

MAR 1 1916

National
Electric Light Association

THIRTY-EIGHTH CONVENTION

Accounting Sessions

NEW YORK
PUBLIC
LIBRARY

Papers Reports and Discussions

SAN FRANCISCO CAL
JUNE 7-11 1915

Published by Order of the Executive Committee

CONTENTS

1—Conventions of the Association	xii
2—Presidents of the Association	xiii
3—Honorary Members	xiv
4—Officers and Executive Committee	xv
5—Committees to Report to the Thirty-Eighth Convention	xvi

ACCOUNTING SESSIONS

FIRST ACCOUNTING SESSION—JUNE 8

	PAGE
1—Address of Chairman. H M EDWARDS	2
2—Report of the Library Committee E J ALLEGAERT	6
3—Report of Sub-Committee on a Uniform System of Accounts JOHN L BAILEY	10
4—Paper: "Some Opportunities of Public Utility Ac- countants" L R REYNOLDS	38

SECOND ACCOUNTING SESSION—JUNE 9

1—Paper: "Workmen's Compensation Insurance" WALTER G COWLES	48
2—Paper: "Electric Vehicle Cost Accounting" W P KENNEDY	75
3—Paper: "Record of Property or Construction Ex- penditures" P R FERGUSON	91

THIRD ACCOUNTING SESSION—JUNE 10

1—Report of Committee on Cost Accounting. J H GULICK	109
2—Paper: "Analytical Accounting for Central Station Purposes" O B COLDWELL	111
3—Paper: "Statistical Machines" W E FREEMAN	128
4—Presentation and Adoption of the New Accounting Session Constitution	198
5—Report of the Nominating Committee	204

INDEX TO ADVERTISERS

American District Steam Co	lxxviii
American Electrical Works	lxv
Babcock & Wilcox Co	lxxvi
Century Electric Co	lxxiv
H L Doherty & Co	lxxix
Edison Lamp Works	lxix
Electric Bond & Share Co	lxxx
Electric Storage Battery Co	lxxvii
<i>Electrical Review & Western Electrician</i>	lxxxii
<i>Electrical World</i>	lxxxii
Electrose Manufacturing Co	lxxii
Fort Wayne Electric Works	lxxiv
General Electric Co	lxvii, lxxviii
Habirshaw Wire Co	lxx
Indiana Rubber & Insulated Wire Co	lxvi
Johns-Manville Co	lxv
Metropolitan Engineering Co	lxx
Otis Elevator Co	lxxi
William A Pope	lxxviii
John A Roebling's Sons Co	lxx
Stone & Webster Co	lxxxii
Westinghouse Electric & Manufacturing Co	lxxiii

INDEX TO AUTHORS

ALLEGAERT, E J *Report of the Library Committee* 6

BAILEY, JOHN L *Report of Committee on Uniform System of Accounts*
Objection has been raised during the last year to the Committee's treatment of account No. 791, relating to sinking-fund accruals and a proposed new treatment is outlined by the Committee. This is the only account changed in the classification as approved last year. The Committee reports on conferences held with the committee of the American Gas Institute with a view to harmonizing existing differences between the gas and electric classifications.

The apportionment of departmental overhead charges in combined gas and electric properties is discussed with relation to forms of organization and methods of allocation based on gross revenue, operating charges, etc., the conclusion being reached that such methods are unreliable and fallacious. The Committee recommends that apportionment be left to individual judgment in each case, and that the company's executives obtain a just distribution regardless of revenue or expense, and thus determine relatively true costs for just rates.

Discussed by Ballard, Blanchard, Driscoll, Edwards, Freeman, Gullick, Jones, Musil. 10

COLDWELL, O B Paper *Analytical Accounting for Central Station Purposes* The test of the value of a system of accounts is obviously the extent to which the management can from it obtain necessary information. There is an increasing tendency on the part of those handling business enterprises to analyze the methods employed, ascertain the sequence of operations when the processes are complicated, study the number of such operations for the purpose of eliminating those which are unnecessary, and, in general, to know more about their business and the cost of the service rendered. Classifications as made at the present time do not adequately provide the information needed for a complete analysis of the business of a utility.

A study of the sequence of operations covering the five steps common to all central station business is made and illustrations given. Finally all classes of service appear under utilization where are added the expenses occasioned by the utility equipment, the commercial and the general expenses, all of which are suitably apportioned to these classes and to the direct users.

Mr. E. N. Strait on "*The Wisconsin Railroad Commission's Method of Rate Making*," and Mr. Arthur S. Ives on "*Factors in Rate Making*" are quoted.

A "post mortem" of the activities of a utility is interesting and of some value, but it is better to establish systems of analytical accounting that will enable us to determine costs as we go along. It is essential that the efforts of all public utility companies be concentrated on the subject in order that substantial progress may be made.

Discussed by Bailey, Hillebrand, Jones. 111

COWLES, W G Paper *Workmen's Compensation Insurance* Although workmen's compensation insurance is new and untried, and therefore involves many uncertainties, it is hoped that it will prove more satisfactory than the old system of employers' liability insurance. The stock insurance system is the only one that furnishes reliable

means for reducing future losses to present fixed values. The mutual plan is not adapted to workmen's compensation insurance, being fundamentally unfitted to an obligation of this nature; and it is still more unwise for a corporation to carry its own insurance. European experience along compensation lines can teach us little or nothing, because the conditions there and here are widely different. In particular, the German system shows a low efficiency that would not be tolerated here. The rates charged by stock companies for compensation insurance are based upon a careful study of the subject, in the light of such experience as is available; and it is fairly certain that they are not more than sufficient to pay the actual obligations, without leaving any margin whatever for underwriting profit. Such money as is made by insurance companies in this line is not made on the premium rate. To illustrate this point an analysis is given of the expenditures of stock insurance companies, as expressed in percentages of the premiums received.

Discussed by Edwards, Peck.

48

EDWARDS, H M *Address of Chairman* The address deals with the new conditions under which the accounting work will hereafter be carried on and describes its status as one of the National special sections of the Association, showing the method of its formation. The work of the Accounting Committee since it was instituted, in the year 1907, is dealt with historically, and the growth from small beginnings to its present large proportions is described. The increased importance of the accounting official in present day public service corporation organizations is referred to, and some ideas are expressed as to the future possibilities which lie within the power of the accountant to accomplish. The work of the Committee is described, and the scope and personnel of the various Sub-Committees announced and explained.

2

FERGUSON, P R Paper *Record of Property or Construction Expenditures* It is highly important that records be made and maintained of all property acquired or constructed. If such a record were always available there would probably be less demand for inventories.

An attempt is made in this paper to outline a complete system for construction expenditures. Many blank forms are shown that cannot fail to be helpful in classifying what in the nature of things must be a more or less shifting body of details. A routine is outlined for requisitions, authorities, purchase and work orders.

Executive and construction departments should be able to get at the cost of the property not only as a whole but by geographical areas.

Discussed by Bailey, Blanchard, Bulger, Calder, Edwards, Jones, Kennedy, Speed.

91

FREEMAN, W E Paper *Statistical Machines* The paper summarizes the information on this subject which has been presented at previous meetings of the Accounting Section and described a new machine combining the Hollerith tabulating device with a recording and totaling device, providing a printing machine which has not until recently been available. Illustrations showing the classes of work done by the New York Edison Company with various machines, and statements of the advantages gained by the use of each are presented.

128

GULICK, J H *Report of Committee on Cost Accounting* The Committee has been making a study of differential classes of rates caused by various classes of service, its purpose being to get at the cost of each. This will take considerable time and little more than reports of

progress can be made. The various papers published on the subject, including those of state commissions, are being collected and the advice and assistance of member companies is asked. 109

KENNEDY, W P Paper *Electric Vehicle Cost Accounting* Without imposing restrictions upon individual preference the paper discusses the general subject of electric vehicle accounting and offers many definite statements concerning the practice of several companies doing a large business. Reference is made to the many reasons for uniformity in order that there may be a common basis for making comparisons.

Two schedules, A and B, are presented which are analyzed and proved to be applicable to the affairs of either large or small companies. The idea is developed that in the interest of accuracy there should be as few as possible charges requiring daily records from garages. 75

REYNOLDS, L R Paper *Some Opportunities of Public Utility Accountants* The great object of a uniform system of accounts is, of course, to make comparable all the transactions of all utilities of a certain class, and to this end, instructions must be such that there can be no deviation. The Interstate Commerce Commission has recently prepared supplements to some of its classifications in the form of indexes to the operating expenses. A state commission is not able to prepare such an index for each of the many classes of utilities under its jurisdiction, but it should be comparatively easy for the accounting members of an Association of this kind through their every day experience in this one particular class of utility, to prepare such an index, and if this were done a very strong plea for its adoption into a National System could be made.

Some paragraphs of the N E L A classification of accounts are analyzed. Depreciation and appreciation are discussed.

One of the most important divisions of an accountant's work consists of setting up upon his books the true cost of his company's construction and thereafter correctly differentiating between new construction and operating expense and other charges to profit and loss.

The books and records of a company are its vital history. Commissions should never hear the remark—"That it is merely a book value and has no relation to the true value of the property." A company in obtaining authority to issue securities should be able to point to its records and say "There is the cost of our property in detail."

The accountant is in a best position of any officer of a corporation to know its obligations, and it is his duty to see that reserves are provided for all contingencies.

Discussed by Baker, Butler, Driscoll, Harrison, Holmes, Jones, Marshall, Morbio, Murphy. 38



GENERAL INDEX

PROCEEDINGS OF THE THIRTY-EIGHTH CONVENTION, 1915

NOTE—In the Index to Authors will be found authors' names and synopses of papers and reports.

A

- Accounting
 - Analytical accounting for central station companies (Coldwell) 111
 - Electric vehicle cost accounting (Kennedy) 75
 - Record of property or construction expenditures (Ferguson) 91
- Accounting for different counties and cities 27, 35
- Accounting Section
 - By-Laws 5, 198, 200
 - historical resumé 2
 - Nominating Committee 5, 44, 198
 - organization of 2, 198
 - status of the accountant 3
 - sub-committees 4
- Accounts
 - divisions and sections for statistical machines 192
 - gas, railways and N E L A compared 11
 - graphic methods important 197
 - N E L A and Amer Gas Inst balance sheets compared 16
- Addresses, H M Edwards 2, 204
- Allegaert, E J, report, library 6
- Analytical accounting for central station companies (Coldwell) 111
- Appropriations, classification 10
- Argument *re* departmental charges for use of joint facilities 18

B

- Bailey, J L, report, uniform system of accounts 10
- Balance sheet accounts 16, 41
- Bibliographies
 - accounting papers and reports 206
 - sinking funds 29, 45
- Bureau, Workmen's Compensation Service 66
 - Manual* 68
- By-Laws, accounting section 5, 198, 200
 - adoption 198

C

- Central stations
 - analytical accounting for (Coldwell) 111
 - Some opportunities of accountants for (Reynolds) 38
- Charges for use of joint facilities 18
- Classification of accounts 8, 10, 111
- Coldwell, O B, paper, analytical accounting for central station companies 111

Commissions

- Arizona, Nevada, Indiana, Montana, Idaho and Washington, on sinking fund reserves 28
- California Commission on sinking funds 27, 29
- I C C act to regulate commerce 29
- I C C prescribed system for street railways 12, 15, 16
- I C C supplements to classifications 38
- Lake Spaulding dam case 124
- Madison rate case 124
- Mass. Commission on Lawrence Gas Co case 23
- Meyers, W J, on sinking funds 31
- New York, New Jersey and New Hampshire, on sinking fund 28
- Oregon Commission on sinking fund 29
- statistical machines for prescribed systems of accounts 191
- Wisconsin Commission on seven cases 23

Committees

- Cost Accounting 109
- joint meeting Gas, Street Railways and N E L A Accounting Committees 11
- Library 6
- Nominating Committee 5, 44, 204
- sub-committees 4
- Uniform System of Accounts 10
- Compensation legislation 70
 - purpose of
 - New York law
 - accident prevention
 - rates
 - reserves
 - safety
- Construction work records 101
- Cost accounting, report (Gulick) 109
- Costs
 - post mortem 120
 - transmission and distribution 122
- Court decisions, N Y State on unappropriated surplus 43
- Cowles, W G, paper, workmen's compensation insurance 48

D

- Departmental charges for use of joint facilities 18
 - chairman, directors, president, vice-president
 - financial and other departments
 - meter reading department
 - bookkeeping department
 - renewals and contingent expense
- Depreciation and amortization 38
- Discussions
 - Bailey report 25
 - Coldwell paper 122
 - Cowles paper 66
 - Ferguson paper 101
 - Kennedy paper 81
- Distribution charges of joint utilities, recommendation 24

E

- Edwards, H M, addresses of chairman 2, 204
- Election of officers 204

Electric vehicles
 cost accounting 75
 cost analysis 76
 daily costs 88
 Los Angeles practice 86
 N Y N H & H RR trucks 82
 Pacific Gas & Electric Co practice 85
 rates 83
 San Francisco situation 85

F

Ferguson, P R, paper, record of property or construction expenditures 91
 Forms for property and construction records 92
 estimates
 old plant displaced
 repairs
 completion reports
 approvals
 time cards
 property records
 Freeman, W E, paper, statistical machines 128

G

Graphic methods for presenting facts 196
 Gross revenue as basis of distribution, fallacy in 23
 Gulick, J H, report, cost accounting 109

I

Indexes
 advertisers iv
 authors v
 bibliographies of accounting papers 29, 45, 206
 conventions of the Association xiv
 honorary members of the Association xvi
 officers, executive committee, standing committees xvii, xviii
 presidents of the Association xv
 Insurance, life
 European experience 55, 57, 61, 63
 mutual insurance unfitted to compensation obligation 50
 pension hysteria 54
 rates, how computed 59
 stock insurance system 48, 62, 70
 trade mutual insurance companies 52, 73
 workmen's compensation insurance 48
 Interstate Commerce Commission
 act to regulate commerce 29
 W J Meyers' opinion on sinking funds 31
 prescribed system of accounts for street railways 12, 15, 16
 supplements to classifications 38

J

Joint committees 11
 Joint utilities, distribution charges of, recommendation 24

xii

K

Kennedy, W P, paper, electric vehicle cost accounting 75

L

Library Committee report (Allegaert) 6

M

Machines, statistical (Freeman) 128
Meyers, W J, letter on sinking funds 31

N

N E L A system of accounts, statistical machines for 191
New York State gas and electric companies mutual insurance 70

O

Officers, nomination and election of 204
Opportunities of public utility accountants (Reynolds) 38

P

Program of Accounting Sessions ii
Property records 91, 101
Public utilities, some opportunities for accountants of (Reynolds) 38

R

Rate making, Wisconsin Railroad Commission 117
Record of property or construction expenditures (Ferguson) 91
Report of committee on
cost accounting (Gulick) 109
library (Allegaert) 6
uniform system of accounts (Bailey) 10
Reserves 10, 24, 29, 45
Revenue, gross, fallacious basis of distribution 23
Reynolds, L R, paper, some opportunities of public utility accountants 38

S

Scrap-books 6
forms for 8
Sinking funds 10, 24, 29, 45
Some opportunities of public utility accountants (Reynolds) 38

- Statistical machines (Freeman) 128
 - advantages 154
 - application to commission accounting systems 191
 - Baggage 128
 - Burroughs 143
 - daily cash sheets 152
 - Hollerith 131
 - Peirce 133
 - Powers 156, 160, 164, 168, 171, 174
 - tabulator-printer 160, 168
- Statistical machines, work done
 - adding and listing 136
 - bank deposit sheets 140
 - cash receipts 144
 - coupon strip typing 135
 - summary ledger sheets 149
- Strait, E N, paper, Wisconsin Railway Commission method of rate making 117
- Sub-committees, Accounting Section 4

T

- Tabulating machines 128
- Transmission and distribution costs 122

U

- Unamortized Premium on Debt, Acc No 377 39
- Underwriters' laboratories of Chicago 69
- Uniform system of accounts (Bailey) 10, 24
- Uniform system of accounts, statistical machines for 191

W

- Welfare work, workmen's compensation insurance 48
- Whitney, A W, on workmen's compensation insurance 66
- Workmen's compensation insurance
 - Cowles 48
 - Whitney 66

CONVENTIONS OF THE ASSOCIATION

		Presidents
1st	Chicago, Feb 25-26, 1885	James F Morrison
2nd	New York, Aug 18-20, 1885	James F Morrison
3rd	Baltimore, Feb 10-12, 1886	James F Morrison
4th	Detroit, Aug 31-Sept 2, 1886	James F Morrison
5th	Philadelphia, Feb 15-17, 1887	James F Morrison
6th	Boston, Aug 9-11, 1887	James F Morrison
7th	Pittsburgh, Feb 21-23, 1888	James F Morrison
8th	New York, Aug 29-31, 1888	Samuel A Duncan
9th	Chicago, Feb 19-21, 1889	Samuel A Duncan
10th	Niagara Falls, Aug 6-8, 1889	Edwin R Weeks
11th	Kansas City, Feb 11-14, 1890	Edwin R Weeks
12th	Cape May, Aug 19-21, 1890	Marsden J Perry
13th	Providence, Feb 17-19, 1891	Marsden J Perry
14th	Montreal, Sept 7-10, 1891	Charles R Huntley
15th	Buffalo, Feb 23-25, 1892	Charles R Huntley
16th	St Louis, Feb 28-Mar 2, 1893	James I Ayer
17th	Washington, Feb 27-March 2, 1894	Edward A Armstrong
18th	Cleveland, Feb 19-21, 1895	M Judson Francisco
19th	New York, May 5-9, 1896	C H Wilmerding
20th	Niagara Falls, June 8-10, 1897	Frederic Nicholls
21st	Chicago, June 7-9, 1898	Samuel Insull
22nd	New York, May 23-25, 1899	Alden M Young
23rd	Chicago, May 22-24, 1900	Samuel T Carnes
24th	Niagara Falls, May 21-23, 1901	James Blake Cahoon
25th	Cincinnati, May 20-22, 1902	Henry L Doherty
26th	Chicago, May 26-28, 1903	Louis A Ferguson
27th	Boston, May 24-26, 1904	Charles L Edgar
28th	Denver-Colorado Springs, June 6-11, 1905	Ernest H Davis
29th	Atlantic City, June 5-8, 1906	William H Blood, Jr
30th	Washington, June 4-8, 1907	Arthur Williams
31st	Chicago, May 19-22, 1908	Dudley Farrand
32nd	Atlantic City, June 1-4, 1909	William C L Eglin
33rd	St Louis, May 23-27, 1910	Frank W Frueauff
34th	New York, May 29-June 2, 1911	W W Freeman
35th	Seattle, June 10-14, 1912	John F Gilchrist
36th	Chicago, June 2-6, 1913	Frank M Tait
37th	Philadelphia, June 1-5, 1914	Joseph B McCall
38th	San Francisco, June 7-11, 1915	Holton H Scott

PRESIDENTS OF THE ASSOCIATION

JAMES F MORRISON of Baltimore

SAMUEL A DUNCAN of Pittsburgh

EDWIN R WEEKS of Kansas City

MARSDEN J PERRY of Providence

CHARLES R HUNTLEY of Buffalo

JAMES I AYER of St Louis

EDWARD A ARMSTRONG of Camden

M JUDSON FRANCISCO of Rutland

C H WILMERDING of Chicago

FREDERIC NICHOLLS of Toronto

SAMUEL INSULL of Chicago

ALDEN M YOUNG of Waterbury

SAMUEL T CARNES of Memphis

JAMES BLAKE CAHOON of New York

HENRY L DOHERTY of Denver

LOUIS A FERGUSON of Chicago

CHARLES L EDGAR of Boston

ERNEST H DAVIS of Williamsport

WILLIAM H BLOOD JR of Boston

ARTHUR WILLIAMS of New York

DUDLEY FARRAND of Newark

WILLIAM C L EGLIN of Philadelphia

FRANK W FRUEAUFF of Denver

W W FREEMAN of Brooklyn

JOHN F GILCHRIST of Chicago

FRANK M TAIT of Dayton

JOSEPH B MCCALL of Philadelphia

HOLTON H SCOTT of New York

HONORARY MEMBERS

E R Crompton	London, England
Marcel Deprez	Paris, France
George D Forbes	London, England
Prof I Fujioka	Tokyo, Japan
*Z T Gramme	Paris, France
*Dr John Hopkinson	London, England
*Edouard Hospitalier	Paris, France
Dr E L Nichols	Cornell University, Ithaca, New York
*Baron Alphonse de Rothschild	Paris, France
John T Sprague	Birmingham, England
Joseph W Swan	Lauriston, Bromley, Kent, England
Prof Silvanus P Thompson	Technical College, Finsbury, London England
*Prof Yashima	Tokyo, Japan
*Lord Kelvin	Glasgow, Scotland
*Prof Henry A Rowland	Johns Hopkins University, Baltimore, Maryland
Charles F Brush	Cleveland, Ohio
Thomas A Edison	Orange, New Jersey
Prof Elihu Thomson	Lynn, Massachusetts
Frank J Sprague	New York City
*George S Bowen	Elgin, Illinois
Dr Edward Weston	Newark, New Jersey
*Sir William Dawson	Montreal, Canada
Frank R Redpath	Montreal, Canada
*Dr Henry T Bovey	London, England
Thomas D Lockwood	Boston, Massachusetts
Nikola Tesla	New York City
James I Ayer	Boston, Massachusetts
Cyrus Osborne Baker	New York City
Frederic Nicholls	Toronto, Canada
T Commerford Martin	New York City
Dr Charles Proteus Steinmetz	Schenectady, New York
*George Westinghouse	Pittsburgh, Pennsylvania
Dr Arthur E Kennelly	Harvard University, Cambridge, Massachusetts
Charles A Coffin	New York City
A C Dunham	Hartford, Connecticut

* Deceased

OFFICERS AND EXECUTIVE COMMITTEE

OFFICERS

HOLTON H SCOTT	President	New York
E W LLOYD	Vice-President	Chicago, Ill
H A WAGNER	Vice-President	Baltimore, Md
L D GIBBS	Vice-President	Boston, Mass
J S BLEECKER	Vice-President	Columbus, Ga.
T COMMERFORD MARTIN	Secretary	
W F WELLS	Treasurer	
H BILLINGS	Assistant Secretary	
EVERETT W BURDETT	General Counsel	
STEPHEN A SEWALL	Assistant to Secretary	
G W ELLIOTT	Master of Transportation	

EXECUTIVE COMMITTEE

H C ABELL	J B McCALL
J S BLEECKER	WALTER NEUMULLER
HENRY G BRADLEE	R S ORR
W C L EGLIN	W N RYERSON
A C EINSTEIN	HOLTON H SCOTT
L D GIBBS	PAUL SPENCER
C E GROESBECK	H A WAGNER
E W LLOYD	W F WELLS

J E BIGHAM, President Southeastern Section
O B COLDWELL, President Northwest Association
H A FEE, President Michigan Section
L D GIBBS, President New England Section
W F GORENFLO, President Mississippi Section
H A HOLDREGE, President Nebraska Section
RUFUS E LEE, President Iowa Electrical Association
W E LONG, President Pennsylvania Section
LEON H SCHERCK, President Eastern New York Section
D R STREET, President Canadian Association
DOUGLASS BURNETT, Chairman Commercial Section

STANDING COMMITTEES

1914 - 1915

GENERAL

Public Policy

W W FREEMAN, Chairman

Union Gas & Electric Co Cincinnati Ohio

N F BRADY	S INSULL	S SCOVIL
E W BURDETT	J W LIEB	C A STONE
H L DOHERTY	J B McCALL	H A WAGNER
C L EDGAR	T E MURRAY	ARTHUR WILLIAMS
GEN G H HARRIES		

Exhibition

J I AYER, Chairman

Simplex Electric Heating Co Cambridge Mass

H G McCONNAUGHY, Secretary and Treasurer

165 Broadway New York City

C BLIZARD	J F GILCHRIST	J W PERRY
S E DOANE	J C McQUISTON	C L PIERCE JR
F H GALE	JOHN MUSTARD	

Finance

J B McCALL, Chairman

1000 Chestnut Street Philadelphia

N F BRADY	CHARLES L EDGAR	W C L EGLIN
-----------	-----------------	-------------

Company Sections

F J ARNOLD, Chairman

Edison Building Adams and Clark Streets Chicago Ill

FRANK A BIRCH	W L BRUCE	J B SEAMAN
D C BRUCE		C H STEVENS

Educational

JOHN F GILCHRIST, Chairman

Honorary Branch

W L ABBOTT	L A FERGUSON	PROF C F SCOTT
J A BRITTON	DR A E KENNELLY	C A STONE
C L EDGAR	J W LIEB	

Regular Committee

Representing the National Electric Light Association

H L DOHERTY	W W FREEMAN	PAUL SPENCER
W C L EGLIN	P M LINCOLN	ARTHUR WILLIAMS

Regular Committee

Representing the Colleges

PROF M C BEEBE	PROF O J FERGUSON	PROF L A HERDT
PROF H E CLIFFORD	PROF A F GANZ	PROF H H NORRIS
PROF C L CORY	PROF C F HARDING	PROF H J RYAN
	PROF G D SHEPARDSON	

Library

ARTHUR WILLIAMS, Chairman
130 East 15th Street New York City

W D WEAVER, Secretary
Charlottesville Va

Progress

T C MARTIN, Chairman
29 West 39th Street New York City

Technical

PETER JUNKERSFELD, General Chairman
120 West Adams Street Chicago Ill

Membership (Organization of the Industry)

GEORGE WILLIAMS, Chairman
60 Wall Street New York City

J F BECKER	T F GROVER	B E LEE
H L BLEECKER	FRANK HAMMOND	R L LINDSEY
HAL BREWS	J E HARSH	W N McDONALD
W H BROWN	M HEBGEN	J A McLAUGHLIN
DOUGLAS BURNETT	V A HENDERSON	B W MENDENHALL
C A CAMPBELL	C C HOLBERTON	T W NEILL
LEVIN J CHASE	H A HOLDREGE	R F PACK
W E CLEMENT	C WILBUR HUBLEY	H ROOT PALMER
O B COLDWELL	P I INGALLS	STEPHEN C POJIE
G H CUSHMAN	H B IRELAND	F W PRINCE
E R DAVENPORT	J A JACOBUCCI	T C ROBERTS
J F DOSTAL	A H JONES	A F VAN DEINSE
H A FEE	T F KELLY	S H WARING
C D FLANIGEN	E H KIFER	T W WILSON
L D GIBBS	E E LARRABEE	G H WYGANT
C J GRIFFITH	JOHN G LEARNED	W S WYMAN

Question Box

STEPHEN A SEWALL, Editor
E H MORRISON Assistant Editor

Question Box Revision

Joint Editors

ALEX J CAMPBELL	PAUL LÜPKE	JOHN C PARKER
E A EDKINS		M S SEELMAN JR

Committee on Constitution and By-Laws

R S ORR, Chairman
 Duquesne Light Company Pittsburgh Pa

H C ABELL	W W FREEMAN	H T SANDS
W C L EGLIN	FRANK W FRUEAUFF	C G M THOMAS

Transportation

GEORGE W ELLIOTT, Chairman
 29 West 39th Street New York City

E C BENNETT	W J GRAMBS	H N SIBBALD
E J BOWERS	C H HODSKINSON	A H SIKES
A A DION	R D LILLIBRIDGE	E B STRONG
G A FREEMAN	J C McQUISTON	A F TRAVER
F H GALE	A H MANWARING	

Accounting

H M EDWARDS, Chairman
 130 East 15th Street New York City

E J ALLEGAERT	C E FOSTER	C E MURRAY
J L BAILEY	J H GULICK	E G SCOBELL
R H BALLARD	H R KERN	R W SYMES
F J BLANCHARD	C S MITCHELL	L M WALLACE
C L CAMPBELL		

Commercial Section

DOUGLASS BURNETT, Chairman
 Lexington Street at Park Avenue Baltimore Md

J F BECKER, Vice-Chairman
 E A EDKINS, Vice-Chairman
 C A LITTLEFIELD, Secretary
 MISS BURKHALTER, Assistant Secretary
 29 West 39th Street New York City

Executive Committee

F D BEARDSLEE	E A EDKINS	H N McCONNELL
J F BECKER	F H GALE	J C McQUISTON
N H BOYNTON	J D ISRAEL	W E ROBERTSON
D BURNETT	T I JONES	L R WALLIS
E L CALLAHAN	J G LEARNED	S V WALTON
W R COLLIER	C A LITTLEFIELD	G WEIDERMAN

Prime Movers

I E MOULTROP, Chairman
 39 Boylston Street Boston Mass

W L ABBOTT	E D DREYFUS	D W MEAD
CHARLES T BARNES	J M GRAVES	W N RYERSON
O B COLDWELL	P T HANSCOM	J F VAUGHAN
P M DOWNING	J B KLUMPP	HARRY P WOOD

Lamps

FRANK W SMITH, Chairman
130 East 15th Street New York City

WALTER CARY	M C GILMAN	G F MORRISON
W W FREEMAN	G C HOLBERTON	F S TERRY
H B GEAR	W H JOHNSON	

Meters

C G DURFEE, Chairman
Rochester Railway & Light Co Rochester N Y

P H BARTLETT	W H FELLOWS	G W MAGALHAES
WM EICHERT	OTTO KNOPP	W L WADSWORTH

Accident Prevention

MARTIN J INSULL, Chairman
112 West Adams Street Chicago Ill

C B SCOTT, Secretary
417 Merchants' Loan & Trust Building Chicago Ill

M W ALEXANDER	J P COGHLAN	J L MURRIE
W J CANADA	T A KENNEY	ALEXANDER TAYLOR
	H W MOSES	

Rate Research

R S HALE, Chairman
39 Boylston Street Boston Mass

M S HART, Secretary
112 West Adams Street Chicago Ill

L H CONKLIN	W H JOHNSON	W J NORTON
ALEX DOW	J W LIEB	N T WILCOX
R G GRISWOLD	E W LLOYD	

Electrical Measurements and Values

DR A E KENNELLY, Chairman
Harvard University Cambridge Mass

DR LOUIS BELL DR CLAYTON H SHARP

Overhead Line Construction

THOMAS SPROULE, Chairman
Philadelphia Electric Co Philadelphia Pa

R D COOMBS	S J LISBERGER	S PIEK
H L GARBUTT	R J MCCLELLAND	C W STONE
J Y HARING	FARLEY OSGOOD	G W WALBRIDGE
	W T OVIATT	

Electrical Apparatus

L L ELDEN, Chairman
39 Boylston Street Boston Mass

E P DILLON	J E KEARNS	R F SCHUCHARDT
HARRY M HOPE	G L KNIGHT	R M WILSON
J P JOLLYMAN	D F SCHICK	

Terminology

DR A S McALLISTER, Chairman

239 West 39th Street New York City

W H GARDINER

R S HALE

DR C P STEINMETZ

C F SCOTT

Underground Construction

PHILIP TORCHIO, Chairman

130 East 15th Street New York City

H B ALVERSON

S B HOOD

R C POWELL

G W CATO

E B MEYER

F E RICKETTS

L L ELDEN

J B NOE

W D ROPER

Street Lighting

JOHN W LIEB, Chairman

130 East 15th Street New York City

DR LOUIS BELL

W MACLACHLAN

F C PIATT

PROF A F GANZ

P S MILLAR

DR C P STEINMETZ

Grounding Secondaries

PAUL SPENCER, Chairman

Broad and Arch Streets Philadelphia Pa

W H BLOOD JR

PROF A F GANZ

J C MARTIN

JOHN FRANK DOSTAL

H B GEAR

FARLEY OSGOOD

Hydro-Electric

M R BUMP, Chairman

60 Wall Street New York City

F G CLARK

P M LINCOLN

R D RUSHMORE

PAUL M DOWNING

R J McCLELLAND

W N RYERSON

Accounting Sessions

ACCOUNTING SESSIONS

FIRST ACCOUNTING SESSION—JUNE 8

- 1—Address of Chairman H M EDWARDS
- 2—Report of the Library Committee E J ALLEGAERT
- 3—Report of Sub-Committee on a Uniform System of Accounts
JOHN L BAILEY
- 4—Paper: "Some Opportunities of Public Utility Accountants"
L R REYNOLDS

SECOND ACCOUNTING SESSION—JUNE 9

- 1—Paper: "Workmen's Compensation Insurance" WALTER G
COWLES
- 2—Paper: "Electric Vehicle Cost Accounting" W P KENNEDY
- 3—Paper: "Record of Property or Construction Expenditures"
P R FERGUSON

THIRD ACCOUNTING SESSION—JUNE 10

- 1—Report of Committee on Cost Accounting J H GULICK
- 2—Paper: "Analytical Accounting for Central Station Pur-
poses" O B COLDWELL
- 3—Paper: "Statistical Machines" W E FREEMAN
- 4—Presentation and Adoption of the New Accounting Session
Constitution
- 5—Report of the Nominating Committee

FIRST ACCOUNTING SESSION

TUESDAY AFTERNOON JUNE 9 1915

CHAIRMAN E. W. LLOYD, Chicago: The meeting will please come to order.

The first number on the program this afternoon is the address of the Chairman, Mr. H. M. Edwards of the New York Edison Company, whom you all know very well.

ADDRESS OF THE CHAIRMAN

It seems entirely fitting that my report of the work of the Section during the past year should deal at the outset with the significant change which we hope to affect at this meeting in the conditions under which the Accounting Section will be conducted. Organized heretofore as one of the standing committees of the N. E. L. A., we shall, if you approve the plans, take our place as one of the definite divisions of Association activity under officials of our own choosing and with the entire body of the section membership available for committee work, ranking in these respects with the Commercial Section already organized and with the Technical Section, if such a section should be organized later.

A glance at the Convention records of the Association will indicate how this increase in our status has gradually, but no less completely, come about, and will also serve to present the matter in its historical aspect. Going back to the Convention records of the year 1902, I find that in that year a paper was presented entitled "What Changes Should Be Made in the Plan of Uniform Accounting;" and in the year 1903, a report was submitted entitled "Report on Office Methods and Accounting." The new President elected at the 1903 Convention appears to have appointed a Committee on Uniform Accounting, for at the 1904 Convention such a committee announced that it had no suggestions to offer and the Committee was by resolution discharged. At the 1905 and 1906 Conventions, no matters of accounting interest were presented. The accounting committee as it is at present organized, was first appointed by President Arthur Williams, and at the 1907 Convention the Chairman of the Committee was invited to preside while its report was being presented.

The first separate meeting of accountants occurred in 1908 and such separate meetings have since been a regular feature of Convention proceedings. At these separate Section meetings, 59 reports and papers, covering a wide range of topics, have been presented and discussed, and, beginning with the Seattle Convention of 1912, have been reported in a separate volume of the Convention proceedings.

It is not difficult to determine the reason for this comparatively recent aroused interest in accounting matters. It is coincident with the advent of governmental regulation of the industry. Following the example of the Interstate Commerce Commission, each state legislating on the subject has realized that to make its control of the business effective, the accounts which epitomize the history of the enterprise must conform to prescribed rules, and that uniformity in account keeping must prevail if comparisons are to be of value. Governmental regulation includes control of the issue of securities and also of the rates at which the product is sold. If a company is to develop its territory properly and effectively, it must attract new capital freely to the enterprise, and to do so it must be able to obtain for its services rates which will enable it to meet its obligations and which will provide adequate compensation for the invested capital. In the determination of the questions which arise when these two fundamentally important matters are being considered, the accounts are necessarily relied upon to furnish the correct answers. The accountant can no longer conduct his business in the closet; instead, he is now brought into the full light of day, and his records are subjected to keen and not always sympathetic scrutiny. It is not sufficient that his accounts be kept correctly; he must in addition be able to explain their significance and to establish their relevance and bearing upon the point at issue. From being a man of sedentary occupation, he has become a functionary with power to affect in no slight degree, the welfare of his Company.

The N. E. L. A. was quick to perceive the increased responsibilities devolving upon the accounting officials of member companies, and at once arranged to place its facilities at their disposal, to the end that by association and exchange of experiences and opinions, they would more surely be able to overcome the difficulties confronting them and would also, as the result of concerted action, be able to assist the various governmental authorities in the preparation of accounting systems adapted to portray clearly and accurately the eventful changes in the business as they occur.

Thus far I think we may, as a Section, confidently claim to have justified our existence, but we should also realize that our work is but just begun. I do not intend now to suggest a program

of future activities; on the contrary, I feel that we should hold ourselves free to meet the necessities of occasions as they arise. We can, however, lay down fundamental principles for our guidance. We declare in our By-Laws that one of our objects is the adoption and dissemination of sound accounting theories and methods, and if we adhere to that declaration and do not allow ourselves to be diverted therefrom by motives of expediency or the exigencies of the moment, we may surely expect to continue to be not only helpful to ourselves but a potential force in the righteous and beneficial settlement of the many questions with which our own and allied industries are confronted today.

Referring now to the work done during the past year, the Accounting Committee has had sub-committees as follows:

Committee of Uniform System of Accounts

Mr. J. L. Bailey, Chairman
 Messrs. R. H. Ballard
 J. H. Gulick
 L. M. Wallace
 C. L. Campbell
 E. J. Allegaert

Question Box Committee

Mr. E. C. Scobell, Chairman
 Messrs. R. W. Symes
 C. E. Foster
 H. R. Kern

Committee on Cost Accounting

Mr. J. H. Gulick, Chairman
 Messrs. C. L. Campbell
 E. J. Allegaert
 R. W. Symes

Library Committee

Mr. E. J. Allegaert, Chairman
 Mr. C. E. Murray

Convention Committee

Mr. F. J. Blanchard, Chairman
 Mr. R. H. Ballard

The work of the first four mentioned committees will be submitted to you in the form of Reports, and the character of their work and their recommendations will be fully set forth.

There has been distributed to you the proposed By-Laws governing the formation of the Accounting Section. These proposed By-Laws have had the approval of the Executive Committee of the Association, and if they now meet with your approval our organization as a Section may be considered to have been duly launched. In order to get the new craft under way, the Chairman will anticipate the formal adoption of these By-Laws—which will not be presented until the Third Accounting Session occurring on Thursday morning—and appoint a Nominating Committee to select officers and an Executive Committee, their report to be submitted on Thursday for your action. If, however, it should be your wish to make other nominations, an opportunity will be afforded you to do so at the close of this session and when the Chairman's appointees are announced.

In closing my address, I wish to congratulate the Section upon the high character of the work that has thus far been accomplished, and to awake in your minds a realization of the great opportunities which we now have for future usefulness. Members of our profession have undoubtedly benefited greatly by the trend of events, and we should see to it not only that we profit by the opportunities which have been given to us, but that we endeavor to exalt our position in the community by efforts of our own.

CHAIRMAN LLOYD: The next number on the program is the report of the Library Committee, Mr. E. J. Allegaert of Newark, N. J., Chairman. Mr. Allegaert is not here, and before I turn the meeting over to Mr. Edwards I will ask the Secretary to read the report.

REPORT OF THE LIBRARY COMMITTEE

The collection of forms in the Library has slightly increased over that of last year, there being now 7740 forms, which have been received from 126 different companies. There are two sets of these forms, one kept by companies in the order of population served and the other arranged according to the subject matter covered by the form.

One set, the latest, shows :

Books	Number of Companies Represented	Number of Forms	Population Served
1	27	398	1,000 to 4,838
2	13	422	5,260 " 7,216
3	10	209	8,179 " 9,876
4	6	270	10,091 " 10,763
5	13	439	10,892 " 20,468
6	4	270	21,892 " 23,253
7	6	195	25,452 " 31,267
8	3	233	31,453 " 34,874
9	3	315	36,000 " 37,176
10	2	266	37,782 " 39,578
11	5	357	41,010 " 50,000
12	6	335	51,678 " 64,186
13	3	355	66,570 " 78,466
14	5	411	92,104 " 96,642
15	3	255	106,294 " 119,838
16	4	238	124,096 " 168,497
17	1	371	187,511 " —
18 } 19 }	1 1	304 275	{ 213,381 " — 213,381 " —
20	2	353	224,326 " 248,381
21	3	317	301,408 " 373,857
22	2	327	416,912 " 465,766
23	3	387	416,912 " 670,585
24	1	438	2,185,283 " —

The other set shows :

Books	Subject Matter
1	Arc and Incandescent Lights—Tests
2	Batteries and specials
3	Collections
4	"
5	Construction
6	"
7	Consumers' Cards
8	Consumers' Ledger Forms
9	"
10	Distribution of Accounts
11	Labor
12	Meters and Motors
13	Meters and Transformers
14	New Business

Books	Subject Matter
15	New Business
16	Pay Rolls
17	Power House Data
18	Power House Reports
19	Power House Specials
20	Purchasing
21	Specials—Books
22	Storeroom
23	"
24	Trial Balances

A number of companies have sent in, during the year, requests for various forms, asking either for a complete set for a company serving a given population, or for a book on some particular subject; such as Consumers' Ledgers. Requests have come from West Virginia, Kansas, Texas, Tennessee, Iowa, New York and other states. No charge is made by the Association for the loan of the books, the only expense to the Company making the request being that of transportation. We would urge our member companies to refer to the collection of forms more often.

During the past year, a member company made this request:

"We mean to work up a complete set of plant cost records. As these records will be kept in connection with N. E. L. A. accounting, we would especially like to receive forms that fit in with the Association classification of accounts. For our purpose we would like to get complete information as to the power station records kept by member companies operating plants in cities of small and medium size."

When this collection was first made, the forms varied in size from one inch to two feet, two inches square. When the second collection was sent in, it was noticed that the sizes had been cut down and, where necessary, two or three forms took the place of one large form. The smaller form is more easily handled and is also less expensive. The forms most in demand are those for companies serving a population of from 30,000 to 60,000.

One curious feature of the collection is a group of miscellaneous forms for which there are no titles. From the printed matter on these forms it is hard to tell just what purpose is served by the use of them. The Committee suggests that member companies have this point in mind when renewal orders are placed in order that the use and purpose of each form may be clearly stated on it.

It is requested that when the member companies amend any of their forms, they send a sample of the new form to the Secretary's office, so that the collection can be kept up to date. When ordering a new supply of bound books it would be well to order a few extra loose sheets for this purpose.

It has been arranged to place in the library two copies of each "Classification of Accounts" prescribed for the use of electric light companies by National or State bodies, or by other authority; also two copies of the form of Annual Report required by each regulating body, State or National. Those copies will be stamped—"Property of N. E. L. A. Accounting Section," and will be kept for reference in the New York headquarters.

As both sets of the books mentioned above have been brought to this convention headquarters, the delegates are urged to examine them.

Respectfully submitted,

E J ALLEGAERT

C E MURRAY

CHAIRMAN EDWARDS: You have heard the report of the Chairman of the Library Committee. If there are any suggestions of the members here as to how this collection of forms can be improved, the Accounting Committee will be very glad to hear them. You may realize that this collection was started in response to a very considerable demand, by some of the smaller companies especially, for forms, et cetera. I recollect that in my Company in New York we were frequently asked by the small companies throughout the country to send a complete set of our blanks. Several years ago we started this collection and it has now grown to be very valuable. There are things in it which it would be difficult to duplicate, and they give a very clear idea of what is happening in our member companies as to the detail of their work and the way their records are kept. The collection is on the fourth floor of this building.

Are there any remarks in relation to this report? The Association has requested that as each report or paper is presented, and after the discussion thereon, a resolution be offered accepting the report and ordering it printed. If some one will make such a recommendation in regard to this report, I will pass it.

(Moved, seconded and carried that the report of the Library Committee be accepted and printed in the minutes of the meeting)

CHAIRMAN EDWARDS: Our next number is the report of the Committee on Uniform System of Accounts, Mr. John L. Bailey of the Consolidated Gas, Electric Light and Power Company of Baltimore, Chairman.

REPORT OF SUB-COMMITTEE ON A UNIFORM SYSTEM OF ACCOUNTS

The work of the Sub-Committee on Uniform System of Accounts in the early part of the year, was confined to a rearrangement of the accounts, and to making clear the text of the Classification adopted at Philadelphia last year; subsequently this Classification was generally distributed to all Class A members of the Association.

Some opposition has developed during the year to the Committee's treatment of Account 791, Sinking Fund Accruals. This account requires that Sinking Funds be created out of earnings, as a deduction from income, whether so required by the terms of a deed of trust, or as a Fund voluntarily created by a company. In order to meet the objections raised, it is recommended that Sinking Fund accruals be carried under Appropriations, applying Account 797, the proposed wording being as follows:

Appropriations

797 *Sinking Fund Accruals*

Where the mortgage is silent in regard to the method of creating Sinking Funds, the fund requirements should be met by a transfer of an appropriate amount of cash from the general cash account to the Sinking Fund.

Charge to this account and credit Sinking Fund Reserves, the amount of all accruals required to be made to Sinking Fund, in accordance with the provisions of mortgages or contracts requiring the establishment of sinking funds.

At the second accounting session, held on June 3, 1914, at the Philadelphia Convention, the following resolution was adopted:

"RESOLVED, That a Committee be authorized to confer with the like Committees of the American Electric Railway Association and the Ameri-

can Gas Institute, with a view to harmonizing, so far as possible and practicable, the uniform system of accounts of the National Electric Light Association with those of the other Associations, before they are finally adopted."

To carry out the idea as contained in this resolution, your Committee invited the Accounting Committees of the American Gas Institute and the American Street Railways and Interurban Association to confer with it regarding this matter. A meeting was held, but unfortunately a representative of the Street Railways Association was not present. The subject of harmonizing accounts was discussed, and the member of the Committee on Uniform Accounting of this Association who was present, thought it advisable to refer this matter to the General Accounting Committee of this Association, recommending the appointment of a Sub-Committee to co-operate with the Gas and Street Railways Accounting Committees and the National Body of Public Service Commissions, to bring about uniformity in property and operating accounts, and to correct such inconsistencies as may now exist in the classification of accounts of the several utilities.

An attempt has been made by your Committee to compare the Income, Non-Operating Revenues, Non-Operating Expenses, Operating Expenses, Deductions from Income and Appropriation Accounts of the three Associations. The American Gas Institute classification of accounts and the National Electric Light Association classification compare favorably. The accounts of the American Street Railways and Interurban Association do not compare as closely as the other two, probably due to the nature of their business. In the American Gas Institute and the National Electric Light Association classifications, the accounts have been arranged in accordance with the various steps followed in conducting the business, which is not the case with the American Street Railways and Interurban Association classification.

No attempt has been made to compare the texts of the accounts under review. It is very important that this should be done, but preferably in conjunction with representatives from the accounting bodies referred to. In making its comparisons, your Committee used the Standard Classification of Accounts adopted by the National Electric Light Association at its thirty-seventh convention, held in Philadelphia in June, 1914, the Uni-

form System of Accounts of the American Gas Institute of September, 1914, and the Uniform System of Accounts for Electric Railways prescribed by the Interstate Commerce Commission, in accordance with Section 20 of the Article to Regulate Commerce, effective July 1, 1914. An effort was made to secure a copy of the classification of the American Street Railways and Interurban Association, and the inquiry brought out the statement that the Railways Association had adopted the Interstate Commerce Commission classification of accounts.

As previously stated, the principal accounts of the American Gas Institute and the National Electric Light Association have been compared, and where any differences exist they are pointed out.

ELECTRIC	GAS
SCHEDULE C	CLASS A
INCOME ACCOUNT	
OPERATING REVENUES	OPERATING REVENUES
	Domestic Sales
Commercial Lighting	Industrial Sales
Commercial Power	Power Sales
	Street Lighting Sales—Private
Municipal Street Lighting— Arc	
Municipal Street Lighting— Incandescent	Street Lighting Sales—Municipal
Municipal Building Lighting	<i>Included in Domestic, Industrial and Power Sales</i>
Municipal Building Power	
Sales to Other Public Service Corporations	<i>Included in Domestic, Industrial and Power Sales</i>
Electric Merchandise and Job- bing Revenues	<i>Classified under Non-operating Revenues</i>
Miscellaneous Electric Rev- enues	<i>No account</i>
<i>No account</i>	Forfeited Discount

In the comparison between the Operating Revenue Accounts of the electric and gas classifications, your Committee finds that the National Electric Light Association sets up accounts for Municipal Building Lighting and Municipal Building Power. In the gas classification, sales derived from the same source

would no doubt be included in Domestic, Industrial and Power Sales.

In the electric classification, an account is set up for Sales to Other Public Service Corporations. In the gas classification, this would probably be included in Domestic, Industrial and Power Sales.

In the electric classification, Electric Merchandise and Jobbing Revenues is classified under Operating Revenues, while in the gas classification it is treated as a Non-Operating Revenue.

In the electric classification, there is an account under Operating Revenues called Miscellaneous Electric Revenues. No similar account has been provided in the gas classification.

In the gas classification under Operating Revenues, there is an account called Forfeited Discount, while in the electric classification no such account has been provided, but this would probably be included in Miscellaneous Electric Revenue.

ELECTRIC NON-OPERATING REVENUES	GAS NON-OPERATING REVENUES
Rent from Lease to Real Estate and Buildings	Rental of Property and Apparatus
Interest and Dividends from Investments	Interest and Dividends from Investments
Miscellaneous Non - operating Revenues
.....	Interest on Bank Deposits
<i>Appears under Operating Revenues</i>	Merchandise and Jobbing Revenues

ELECTRIC

ELECTRIC NON-OPERATING EXPENSES
Rent Expense
Interest Expense
Dividend Expense
Non-operating Taxes
Uncollectible Non-operating Revenues
Miscellaneous Non-operating Expense

GAS

The principal differences between the sub-accounts appearing under Electric Non-Operating Revenues and Gas Non-Operating Revenues are that Merchandise and Jobbing Revenues appear in the gas, under Non-Operating Revenues, while in the electric classification, they appear under Operating Revenues.

In the gas classification, both the Non-Operating Revenues and Non-Operating Expenses are grouped, while in the electric, a division has been made between the Non-Operating Revenues and the Non-Operating Expenses.

OPERATING EXPENSES

Production
Transmission
Storage Battery
Distribution
Utilization

Commercial Expense
New Business
General Expense
Included with Utilization
Taxes

OPERATING EXPENSES

Production
No account
Not applicable to gas
Distribution
Included with Distribution, with the exception of Street Lighting Expense, which appears as a principal account

Commercial Expense
Promotion
General
Street Lighting Expense
Taxes

In the electric classification, under Operating Expense, an account has been provided for Transmission. In the gas, expenses incidental to Transmission would be included in Distribution.

In the electric classification, an account has been provided for Utilization Expenses. In the gas, such items of expense would be included with Distribution, with the exception of Street Lighting Expenses, which has been set up in the gas classification as a separate account.

In the electric classification of accounts, but not in the gas, under General Expense are the following accounts: Relief Department and Pensions, Franchise Requirements, Inventory Adjustment, Duplicate Charges—Credit, Real Estate and Rentals.

In the gas classification, under General Expense there are two accounts, one, Maintenance and Replacements and the other, Contingent Expense. In the electric classification, these two accounts are merged under Renewal and Contingent Expense.

ELECTRIC

GAS

DEDUCTIONS FROM INCOME

INCOME DEDUCTIONS

Interest on Funded Debt
 Interest on Unfunded Debt
 Extinguishment of Discount on
 Securities
 Sinking Fund Accruals
 Miscellaneous Deductions from
 Income
 Extinguishment of Premium on
 Debt—Credit
No account

Interest on Funded Debt
 Interest on Floating Debt
 Bond Discount and Expense
 Amortized
 Sinking Fund Requirements
No account
 Bond Premiums Amortized —
 Credit
 Rentals of Leased Plant

SCHEDULE D

Appropriations
 Dividends Declared
 Miscellaneous Appropriations

.....
 Dividends Declared
No account

A comparison has been made of the balance sheet accounts of the National Electric Light Association and the American Gas Institute, and while the main items of the two balance sheets agree to a large extent, the National Electric Light Association balance sheet is set out in greater detail. However, it should not be difficult to harmonize such differences as now exist in the accounts of the two Associations.

In attempting to compare the American Street Railways classification with the National Electric Light Association classification, the problem was found to be somewhat difficult. For instance, under Power is included the cost of operating substations and the cost of operating transmission system.

With the National Electric Light Association classification, the cost of current produced at the switchboard and the cost of current transmitted and transformed can be determined.

It would seem an advantage to the Railway Companies to have their accounts in such arrangement as would show the cost of producing current in kilowatt-hour units. In the cost of Power, the Railways classification shows depreciation of Power Plant Buildings and Equipment. In the National Electric Light Association and American Gas Institute classifications, depreciation is taken care of in an account appearing under the principal

account, General Expense, but in the Street Railways classification, depreciation has been distributed over several groups: Depreciation of Way and Structures, Depreciation of Equipment, Depreciation of Power Plant Buildings and Equipment.

Taxes in the National Electric Light Association and American Gas Institute classifications are treated as a part of the Operating Expense. In the Street Railways classification they are treated as a deduction from income. The entire classification for Railways is more elaborate than the classification of either the National Electric Light Association or the American Gas Institute.

While looking into this matter, an investigation was made of the Interstate Commerce Commission classification of accounts provided for *steam* railroads and it was found that this classification follows closely the classification provided for the Street Railways, and the balance sheet items are almost identical.

Should this body consider is advisable to pursue the work further, such action being strongly recommended, it must be realized that the task is a tremendous one, involving the expenditure of a considerable amount of labor. If appointed, the Committee should confer with the Accounting Committee of the several Associations and, possibly, the Public Service Commissions of the various States, the Interstate Commerce Commission and the National Association of Public Service Commissioners.

In concluding its report, your Committee urges the importance of uniformity in the accounts of the three principal public utility associations, as it confidently believes that the usefulness and significance of the work will be greatly enhanced by the sanction and approval of the leading thought in three of the most important divisions of public utilities and in regulatory bodies as well.

COMPARISON OF BALANCE SHEET ACCOUNTS

N. E. L. A. BALANCE SHEET OR		AMERICAN GAS INSTITUTE	
INDICANT ACCOUNTS		ASSETS	
ASSETS		ASSETS	
<i>Plant Investment</i>			
101 } Plant Investment		Fixed Assets	
199 }			
200 Unfinished Plant Investment			

COMPARISON OF BALANCE SHEET ACCOUNTS—*Con.*

<i>Current Assets</i>	<i>Current Assets</i>
<i>Quick Assets</i>	
201 Cash	Cash
202 Notes Receivable	Notes Receivable
203 Accounts Receivable	Accounts Receivable "Gas"
204 Other Quick Assets	Accounts Receivable "Merchandise"
	Interest and Dividends "Receivable"
	Accounts Receivable "Miscellaneous"
<i>Business Assets</i>	
205 Material and Supplies	Material and Supplies
206 Prepaid Accounts	
<i>Other Assets</i>	
226 Investments	Investments
227 Reacquired Securities	
228 Sinking Funds—Invested	
229 Sinking Funds—Uninvested	
230 Special Deposits	
	Treasury Securities
231 Treasury Deposits	Treasury Stock
	Treasury Bonds
	Prepayments
<i>Suspense</i>	
251 Debt Disc. and Expense	
252 Abandoned Property	
253 Jobbing Accounts	
254 } Clearance Equalization and	Suspense Accounts
} Apportionment	
255 Other Suspense	

COMPARISON OF BALANCE SHEET ACCOUNTS

N. E. L. A.	AMERICAN GAS INSTITUTE
LIABILITIES	LIABILITIES
<i>Capital Stock</i>	<i>Capital Liabilities</i>
301 Preferred Stock	Capital Stock
305 Common Stock	
DEBT	
<i>Funded Debt</i>	
311 Bonds	Funded Debt
320 Other Funded Debt	

CURRENT LIABILITIES	CURRENT LIABILITIES
321 Notes Payable	Notes Payable
322 Accounts Payable	Accounts Payable
323 Consumers' Deposits	Consumers' Deposits
324 Dividends Payable	Dividends Payable
325 Bond Interest Matured	
326 Other Current Liabilities	
ACCRUED LIABILITIES	ACCRUED LIABILITIES
351 Taxes accrued	
352 Interest Accrued on Funded Debt	
353 Interest Accrued on Unfunded Debt	
354 Other Accrued Liabilities	
RESERVES	RESERVE ACCOUNTS
<i>Permanent and Corporate Reserves</i>	Liability and Damage Reserve
376 Premium on Capital Stock	Uncollectible Bills Reserve
377 Unamortized Premium on Debt	Maintenance and Replacement Fund
378 Sinking Fund Reserve	Contingent Reserve
379 Other Permanent Reserves	Sinking Fund Reserve
OPERATING RESERVES	OTHER RESERVES
390 Renewal and Contingency Reserve	
391 Casualty Insurance Reserve	
392 Other Temporary Operating Reserve	
PROFIT AND LOSS	PROFIT AND LOSS
400 Profit and Loss	Profit and Loss

REPORTING ON THE APPORTIONMENT OF DEPARTMENTAL CHARGES
FOR THE USE OF JOINT FACILITIES, YOUR COMMITTEE
SUBMITS THE FOLLOWING ARGUMENT:

The question involved is the proper segregation of plant and operations in a combined gas and electric business. The investment to a greater or less degree concerns both utilities, and the general expenses carry charges affecting each.

What sound basis is it possible to establish as a standard for any joint Company to use in apportioning charges? In approaching this subject it is first necessary to consider the vari-

ous types of departmental organization, in the several companies, and the various methods available for a discussion on this subject.

All joint companies are confronted with the problem of apportioning the following expense items which are of a general and uniform character:

- Salaries and expense of general offices
- Salaries and expense of general office clerks
- Printing and stationery—general
- General office expense
- Repairs to general office buildings
- Expense—general
- Insurance—on joint facilities
- Inventory adjustments—if joint stores accounts are carried
- Renewal and contingent expense
- Real estate rentals—where jointly used
- Taxes—on joint facilities

The first four items cover the expenses of those departments serving both divisions of the company and include:

- Chairman and Board of Directors
- President's Office
- Vice-President's Office
- Financial Department
- Secretary's Department
- Purchasing Department
- Accounting Department
- Stenographic Bureau
- General Filing and Mailing Department
- Pay Roll Bureau
- Inventory Department.

In those companies where the unity of the organization has been carried further, we must also consider the combined Commercial and New Business Expenses which involve the following joint departments:

- Consumers' Bookkeeping Department
- Collection Bureau
- Meter-reading Department
- General Service Department
- Industrial Fuel and Power Department
- Contract Department
- Credit Department
- Advertising Department.

In some companies it may be found that the supervision of the various operating departments may be handled jointly, and in this group we have:

Meters and Installation (gas and electric) under the same Superintendent

Production Plants (gas and electric) under the same Engineer, and Similar and different combinations.

It may be that the same filtration plant supplies water to both production plants.

The foregoing cover in a general way the possible different forms of organization.

Now, as to the *number* of methods by which the distribution of charges may be made, we have a *great* variety to choose from and they include:

Gross operating revenue
 Direct operating expenses
 Net income
 Customers
 Meters
 Bills rendered to customers
 Delinquent accounts collected
 Employees
 Total pay roll
 Gross receipts, or
By estimate

As different bases may be found best adapted to the various departments, let us first discuss the phases of the "General" Departments.

Chairman, Directors, President and Vice-President

What is the factor regulating the activities of these officers between the two utilities? Does the "Gross Revenue" regulate the amount of attention to be given to each, and is it a fact that the utility with the larger revenue receives the most attention and therefore should bear the major portion of the salaries and expenses of the executives? Or does the "Gross" measure their attention inversely, and thereby put the burden of the utility upon the smaller gross revenue? It is doubtful if either conclusion is correct and while the "gross" is probably the *simplest*

method and may seem the most expedient under some circumstances, the volume of business does not impress one as being the *true* measure of apportioning these expenses.

The "Direct Operating Charges" may be considered the proper basis on the theory that these officials are the court of last resort on all expenditures, but it must be borne in mind that they approve most expenditures on the report or recommendation of their subordinates and they may not in reality pass upon any questions other than matters of policy and finance. Granting that these officials *do* devote much time to solving the many details of operating necessities, would the *money* cost of these expenditures represent the actual time devoted to either utility?

In considering the "Net Income" basis we find, first, that the "net" necessarily includes the use (on some basis) of the very items we wish to distribute. The theory of this basis is that the mainspring of official efforts is to build up the "Net Income" which would again bring in the inverse application of the ratio.

Reviewing each of the several bases in turn, we find that not one is the true measure in time or money of the extent to which these executives devote their energies to the two utilities. We are therefore forced to the conclusion that their devotion to either utility, to the partial exclusion of the other, is dependent upon the exigencies of the case and likewise fluctuates with the necessities of each division at different times. What may seem a sound basis for apportionment in one case will be entirely wrong in another, as the governing conditions are purely local in their nature. It would seem therefore that the only equitable basis is to estimate the proportion applicable to each division solely on the executive's opinion of his past activities, which estimate should be revised as changes in conditions warrant.

Financial Department and Other General Departments

Assuming that the bases discussed in the foregoing group do not apply to the group now under consideration, suppose we take the various other bases in regular order, namely, Number of Employees, Total Pay Roll (due to its relation to the financial department), Number of Customers, or Cash Receipts, and each in turn will be found only partially applicable. Applying these units of measure to each of the General Departments in turn, in no case do they satisfactorily take care of the gas and electric

expenses, and in each case it is considered better practice to distribute these costs according to the intimate knowledge of the Department heads, and the available time and performance records. It may be found in the Purchasing Department that there is an exception to the general rule, and that the expenses there are separable on the basis of purchases made for each division. But, is the amount of time and expense in making a purchase dependent upon the money value? And, if this were the case, the element of joint purchases would again upset our hypothesis.

Following the same line of reasoning in the departments affecting Commercial and New Business Expenses, with few exceptions, an estimate of the costs of the several classes of work, based on a careful study of conditions, can be fully justified. The exceptions to be considered are

Meter Reading Department

It is reasonably clear that the basis for charge should be the number of meters in each division of the company.

Collection Bureau

The basis here is the number of accounts of each class taken up for collection.

Bookkeeping Department

The charges here may be distributed on the basis of Customers, Meters or Bills rendered, but each has some fallacy. An electric account is more difficult to handle than a gas account, which means that a "constant" would have to be determined to apply to the electric, before figuring the ratio. The determination of this "constant" would have to be by estimate, which brings us again back to the estimate basis.

With reference to the items under General Expenses which are not charged against any particular department, your attention is directed to the following conditions:—

Repairs to general office buildings

Insurance—on joint facilities

Real estate rentals and taxes

Where jointly used these charges should be apportioned on a square-foot basis, joint departments carrying their relative expense.

Renewal and Contingent Expense

This can be divided only on the estimate of the management.

With the exceptions noted, there does not appear to be any fixed basis which would be established for apportioning most of the departmental charges, and it is believed that each department head is in a better position to make this distribution, basing his estimate on actual existing conditions and keeping his estimates of costs revised from time to time, as any material changes occur.

As many joint companies use "Gross Revenue" as their basis of distribution, we desire to call attention to one grave fallacy in their method.

We will assume a Company has a gross revenue of \$200,000, divided equally between gas and electric, and distributes departmental charges on a 50-50 basis. The rate for gas is reduced 10 per cent and the basis is changed, reducing the charges to the gas division and adding to the electric, thus seeming to justify the rate reduction. Assume again in the case of the same company that the electric division takes on a large contract to supply the local street railway, which contract will amount to \$25,000 per year. Again the ratio is materially changed and a large additional charge is made to the electric division, whereas this new business will very probably not add \$100 per year to the general expenses of the company.

In this connection and quoting from the decision of the Massachusetts Board of Gas Electric Light Commissioners in re Lawrence Gas Company:—

"In a combined gas and electric business, it is not easy to keep the respective plants and operations accurately separated.

"It is important that the consumers of gas shall not be required to assume in the price charged, any of the costs properly belonging to consumers of electricity. The latter have an equal and opposing right."

In reviewing proceedings before Public Service Commissions, we find that no precedents have been established covering this question, excepting in the state of Wisconsin. There the Railroad Commission passed upon seven cases involving the apportionment of departmental charges, and in each instance the

distribution of general expenses of joint utilities was based on the direct operating charges of each utility.

In view of the almost unsurmountable difficulties attending the establishment of an equitable basis applicable to the various phases of the accounting conditions of the business, it is recommended that the question of apportionment of departmental charges for the use of joint facilities be left to the individual judgment of each Company, with the suggestion that its best interest will be subserved by a careful, just distribution, regardless of the gross or net income of the respective utilities, thereby obtaining the relatively true costs entering into service rates.

Respectfully submitted,

JOHN L BAILEY, *Chairman*,
 E J ALLEGAERT
 R H BALLARD
 C L CAMPBELL
 J H GULICK
 L M WALLACE

CHAIRMAN EDWARDS: In presenting this report for your consideration I would like to ask that the debate proceed along certain lines. Last year this report was first submitted to the section; a number of amendments were suggested from the floor, and these amendments were referred to the Accounting Committee with power to adjust them; and the Committee was further authorized to publish the Uniform System of Accounts, as representing the idea of this Association. The system of accounts as it has been bound and distributed to you during this last year, represents the work of the Accounting Committee, subject to the amendments that were presented at Philadelphia last year; and it is perfectly proper and timely now, if there is anything in this system which you feel could be improved or changed, that you should give the Committee the benefit of your opinion. Under that head would come the consideration of the treatment of Sinking Funds. There is a great deal to be said on this subject. There is considerable matter here in the report for your consideration.

The next thing that I would like you to talk upon is the subject last referred to, the distribution of overhead charges

among departmental operations. Those of you who are operating gas or street railways in combination with the electric lighting business have undoubtedly had to meet that problem, and how you have solved it for yourselves is a matter of great interest to us. We would like to have in the records a statement of the methods you have followed. Whether we all approve of your methods is not important; what we want to get is the record. We would like to know how that is being done.

This is a subject which will probably occupy the attention of the Committee for a number of years. It is a question whether we shall ever, as a body, be able to lay down a definite rule in regard to the distribution of such costs. At the same time we want all the information that is available; and if some of you would prefer to submit the matter in writing after you get home, we shall be very glad to have it in that shape. At the same time, for the benefit of the delegates here, we want to hear from you. The report, gentlemen, is now in your hands.

DISCUSSION

MR. PAUL R. JONES, NEW YORK CITY: I should like to suggest this proviso. The Sinking Fund clause, if I understand it correctly, carries no provision requiring companies to charge against Income any sum of money for the retirement of bonds, unless the mortgage on a particular property requires it. I would also like to suggest that the question of overhead charges, that is, the question of the division of charges, be left entirely out of the record. A Company appearing before a commission might find it embarrassing to follow the method of sub-dividing operating expenses according to the Gross Revenue, or any other method we may adopt at this time.

I believe that on points of policy such as Sinking Funds, Depreciation, and divisions of Overhead Charges, we should not as an Association go on record, setting down any fixed and fast rule. I think it is up to us to leave the broad points of policy out of our Classification, and to make no comments on them, but, through the headquarters of our Association in New York, give such assistance to the member companies as they require.

MR. J. H. GULICK, Chicago: I did not get Mr. Jones' idea quite clearly. Was it to drop from the report all reference to

the reduction features? He suggests that we do not include such things as accruals for bond redemptions in our report?

MR. JONES: My point was that the Sinking Fund should be a transfer of assets, as stated in the report read by Mr. Bailey. I think Mr. Bailey's interpretation of the sinking fund can not be improved upon.

CHAIRMAN EDWARDS: That is, unless the mortgage requires that the fund shall be set up out of earnings. In that case you would follow the recommendation of the Committee and treat it as an appropriation from surplus rather than a deduction from income, if the mortgage require this. If the mortgage is silent, it is a segregation of assets.

MR. JONES: Yes, sir. I thoroughly approve of the wording of Mr. Bailey as to the sinking fund.

CHAIRMAN EDWARDS: The Uniform System of Accounts, as you will gather, was very largely, in fact, I may say was almost entirely constructed as the result of Eastern experience. We came to the West for hydraulic accounts. I recollect that one of the Western members said our "original hydraulic accounts were built up from the interest of eastern people in duck and mill ponds." You do it on an altogether larger basis in the West, and therefore we came to you to get the western idea on that kind of accounting. I would like to know from some of the western members if the present classification meets their requirements.

MR. F. J. BLANCHARD, San Francisco: What Mr. Bailey has said as to the apportionment of the overhead expense has interested me very much. In recent months I have spent a great deal of time studying this subject, particularly in connection with several rate cases which we have had before the Railroad Commission.

In making an apportionment of overhead expenses, I have made an analysis of all vouchers that cover disbursements of a general character, and wherever a disbursement could possibly be segregated against a particular department, electric, gas or water, as the case may be, the disbursement was so segregated. Many of the disbursements, however, were general in character and it was impossible to make a direct segregation. In all such instances I used the average number of customers connected in each department and apportioned the general expenses upon the

basis that this average number of customers in one department bore to the average number in another. This apportionment has been submitted to the Railroad Commission in several rate cases, and while no approval of the method of making the apportionment has ever been officially given by the Commission, it has neither criticised it nor objected to it.

There is a further apportionment of expenses to be made in one of the Companies with which I am connected. For instance, we have two towns or cities supplied with gas from a single plant and have had rate hearings in both of those towns; hence it became necessary to apportion the expense of the gas plant to each of the two towns. The towns are close together, and in making an apportionment of the production and distribution expense, I used the amount of gas sold in each town and made my segregation to each (except in one of the accounts—the account representing the cost of connecting and disconnecting customers) upon the basis that the percentage of gas sold in each town bore to the total gas sold.

During the summer season, one of the towns in question has a large transient population, the result being that a large number of connections and disconnections are made, and the expense for that account is abnormally large. This account I apportioned upon the basis of the connections and disconnections made for the year.

I do not think that any hard and fast rule can be laid down for all companies to follow. Since conditions vary and in some instances it would not be fair to apportion general expenses upon the basis of the average number of customers connected, this is a question which I believe must be worked out by each Company to meet its peculiar conditions.

MR. W. J. DRISCOLL, San Francisco: Regarding the Sinking Fund method that the Committee has recommended I might say that the classification of accounts of the California Railroad Commission provides that the Sinking Fund be treated as an appropriation from Surplus. As to the availability of these appropriations for the payment of dividends, I would like to ask, assuming that the mortgage provides for the retirement of a certain number of bonds each year, if these appropriations must be carried in a separate account as a division of surplus until such time as the entire issue of bonds has been redeemed; or,

would it be permissible to transfer the amount representing a definite number of bonds retired at certain intervals, back to Unappropriated Surplus before the redemption of the entire issue, and declare stock or other dividends therefrom.

MR. W. E. FREEMAN, New York City: Referring to the Standard Classification of Accounts adopted at the Accounting Session of the Association, in June, 1914, and subsequently approved by the Executive Committee, I am of the opinion that all sinking fund accruals necessary to be made in accordance with the provisions of mortgages or other contracts requiring the establishment of sinking funds, should be properly classified under Appropriation Accounts. In other words, such accruals should not be considered as Deductions from Income, but should be included in the group of accounts which shows for any fiscal period the changes in the Corporate Surplus or Deficit. It would be desirable in my opinion to make a separation of the Corporate Surplus or Deficit Account into sections of accounts representing Appropriated and Unappropriated Surplus.

The Public Service Commissions organized throughout the various states are divided as to the prescribed methods and practice for maintaining Sinking Fund Reserves in accordance with the provisions of mortgages or other contracts.

Under the systems of accounts prescribed for public service corporations for the States of Arizona, Nevada, Indiana, Montana, Idaho and Washington, it is stipulated that sinking fund reserves are to be maintained whenever they are required in pursuance of the provisions of mortgage and trust deeds, contracts, etc. Separate sinking fund reserves are required to which reserves appropriations are to be credited and Deductions from Gross Income—sub-account Contractual Sinking Fund Requirements—to be charged, and also accumulations resulting from securities belonging to such particular reserves.

The systems of accounts prescribed by the Commissions for the States of New York, New Jersey and New Hampshire stipulate that gross income applicable to corporate and leased properties is subject to compulsory or contractual deductions classified under Deductions from Income; for instance, sinking fund accruals. All optional appropriations to reserves are chargeable to Appropriation Accounts.

The Railroad Commissions for the States of California and

Oregon, on the contrary, make provision for a separation of the Corporate Surplus or Deficit Accounts, including dividends on outstanding stocks, sinking fund appropriations, miscellaneous deductions from surplus and miscellaneous additions to surplus. All appropriations to sinking funds and accretions to such funds on account of income from previous investments, are chargeable to sinking fund appropriations.

The Commission for the State of Oregon divides the Corporate Surplus or Deficit Account as follows:

- (1) Appropriated Surplus
 - Surplus invested since June 1, 1913, in Fixed Capital
 - Surplus invested in Sinking Funds
 - Other Surplus Reserves.
- (2) Corporate Surplus
 - Corporate Surplus Unappropriated.

Under the Classification of Income, Profit and Loss and General Balance Sheet Accounts for Steam Roads, prescribed by the Interstate Commerce Commission, in accordance with Section 20 of the Act to Regulate Commerce, effective on July 1, 1914, the Corporate Surplus account is likewise divided into two sections, namely:

- (1) Total Appropriated Surplus
 - Additions to Property through Income and Surplus
 - Funded Debt retired through Income and Surplus
 - Sinking Fund Reserves
 - Miscellaneous Fund Reserves
 - Appropriated Surplus not Specifically Invested.
- (2) Total Corporate Surplus
 - Profit and Loss—Balance.

There is a wide divergence of opinion expressed by accountants as to the advisability of corporations creating reserves from income or surplus and investing in sinking and redemption funds, regardless of whether or not they are maintained voluntarily by the corporation, or by compulsion, in pursuance of the provisions of mortgages or other contracts.

As a matter of interest in this connection, from articles appearing during the last seven years in the Journal of Accountancy, the official organ of the American Association of Public Accountants, and from chapters on the subject of principles and

practice in dealing with sinking funds, both American and English publications, the consensus of opinion appears to be that appropriations out of surplus should be held in reserve for sinking and redemption fund payments. A majority of the writers advocate the maintenance of sinking and redemption funds in the interest of present and future investors, both stockholders and bondholders, the resultant advantages of which would be (1) the adoption of a conservative and sound business policy and (2) the equitable conservation of all financial interests involved.

CHAIRMAN EDWARDS: I have read these extracts from the authorities named. They are extremely interesting, and they are various in their nature; in fact, the subject seems to be one in which the accounting profession is not a unit. Some very strong names recommend one treatment, others equally strong, another. What are you going to do with it? You have taken out of your surplus and put into your reserve a certain amount, and with the fund behind the reserve you have bought the bonds and retired them. The bonds and the cash have taken care of themselves, but this reserve still remains on your books. What are you going to do with it? One authority comes to the conclusion that the proper thing to do is to declare a stock dividend for a corresponding amount. You can get any kind of opinion from these authorities. Indeed, these extracts are so interesting and bear on the subject so fully, that I think it will be well to refer to them by title in our proceedings, and keep them on file in Association headquarters where they may be consulted or the copies procured by those wishing to continue the study of the subject.*

The Commission which is responsible for this diversity of opinion is undoubtedly the Interstate Commerce Commission. When this Commission was first organized, it provided in its system of accounts that sinking funds should be set up as a reserve and treated as a deduction from income. Immediately New York, New Jersey, and some other states, followed the lead of the Commission. The statistician of the Interstate Commerce Commission was Mr. Meyers, a very able man; and he was also the author of the New York State classification, which was one of the first promulgated after commission regulation came about. I wrote to Mr. Meyers and asked him whether his opinion had undergone any change, and I will read his reply, signed

*NOTE—See page 45 for list.

"William J. Meyers, Statistician, Interstate Commerce Commission," under date of April 28, 1915. After the usual salutation he writes:

"Referring to yours of the 27th instant regarding the proper place for charges representing assets of a corporation segregated in its sinking funds, I will say that our treatment of the matter in the New York Public Service Commission's scheme of accounts followed the treatment of the Interstate Commerce Commission with respect to sinking funds chargeable to income. The Interstate Commerce Commission's rule, as I recollect, was based upon a suggestion made by Mr. M. M. Kirkman, then Vice-President in charge of accounts of the Chicago & North Western Railway Company. The idea which underlay the rule was that all income which, under the provisions of contracts, was required to be set aside for the establishment of sinking funds was compulsorily set aside, and therefore should be charged to the income account under the head of Income Deductions.

When I came back to Washington, in 1910, it developed, in connection with the rate advance cases, that this segregation of funds was of a character quite distinct from the disbursement of funds representing interest charges and it was therefore thought advisable that in the revision of our accounting schemes the account representing charges to interest for accruals of sinking funds should go in a different group of accounts from that in which it was first placed. We accordingly put it under the head of Appropriations rather than under the head of Income Deductions, recognizing that any segregation of assets in sinking funds was a mere temporary segregation, and also that it did not dissipate the assets of the corporation but resulted in the beneficial application of them, the same, for example, as their devotion to construction of physical property. Such being the case, the account was, as I have said, classified under Appropriations of Income rather than under the head of Income Deductions, and the corresponding credit was required to be made to Sinking Fund Reserves, a subdivision of Appropriated Surplus.

I am sending you under separate cover a copy of the latest revision of our Classification of Income, Profit and Loss, and General Balance Sheet Accounts, and you will find the charge account provided for in No. 552, on page 24, and the credit account in No. 781, on page 56. I think that the rule as we now

have it is correct for all cases where the provisions of the mortgage require the sinking fund to be created out of income. If the mortgage does not require the sinking fund to be thus created, but provides merely for the segregation of assets taken out of the hands of the debtor and put into the hands of the sinking fund trustee, no charge to the Income account seems to be necessary; but this kind of a sinking fund would not, in my opinion, be very valuable for the protection of the creditor. The idea underlying a sinking fund, as I understand it, is that the creditor shall not only have the mortgage lien on all the assets, or at least all of the fixed assets, covered by the mortgage but shall also have an additional safeguard through the segregation of moneys derived through income out of which to pay the debt at its maturity. If no current funds are provided for the satisfaction of the debt at its maturity it might easily happen that the current funds of the debtor would not be sufficient at maturity for that purpose, and the only way by which the creditor could secure the satisfaction of his claim would be through foreclosure proceedings or by a refunding of the debt on the part of the debtor.

The only change which I would suggest in the New York Public Service Commission's rule in this regard would be that it should indicate clearly that the Income account provides only for charging to income those additions to sinking funds which are required, under the conditions of the contract, to be accumulated out of income, and I should also rearrange the order of the accounts so as to show this particular account under the head of Appropriations of Income rather than under the head of Income Deductions.

I have no objection to your quoting me in this connection, if you so desire."

You see that this rule which the Committee on a Uniform System of Accounts has recommended, meets with the approval of the Interstate Commerce Commission, whose statistician, Mr. Meyers, was undoubtedly responsible for the original treatment of the matter which he now suggests be changed in the New York classification. We are entitled to consideration from commissions in the issue of securities if we retire one security out of our earnings. If a firm has \$200,000 worth of property, of which \$100,000 was secured through the issue and sale of stock, and

\$100,000, through the issue and sale of bonds; and if those bonds are paid off through the appropriations made from the surplus by the owners of the property, then the owners should be free, in my opinion, to issue if they wish other securities in place of those that they have liquidated. I do not understand that this point has ever been passed on. In one company with which I am connected we have had bond issues which we are paying off. The mortgage requires that the bonds shall be redeemed by lot, and out of a mortgage of something like \$200,000 we have paid off \$30,000 of the bonds; and in our statement of construction expenditures as a basis for additional securities, we included \$30,000 representing bonds which had been redeemed, because we had the property and there were no securities out against it. That is a point which we want to keep in mind. We are entitled to issue securities to the value of our property; and after we have paid off some of our indebtedness there is no reason why we should not issue other securities, if we desire, provided also that we have the property.

MR. LOUIS F. MUSIL, New York City: In connection with the letter from Mr. Meyers which you have just read, I would like to express the following opinion:

As a body representing the public utility industry, we ought to remember that the Interstate Commerce Commission has various classes of industries under its jurisdiction, all of which are not of the same nature as ours. The nature of the industry is certainly of material importance to the creditor of whom Mr. Meyers speaks in his letter. The public utility company represents a most permanent industry, its permanency having been pretty well established by the past. A creditor with that kind of an industry back of him should therefore look differently in judging what security is back of the indebtedness to him,—whether such indebtedness is in the form of permanent securities or not.

I believe that the Interstate Commerce Commission, and all other commissions as well, will discriminate more and more between this kind of an industry and the industry whose continued existence depends on many shifting factors, such as freight rates, supply of raw materials, and demand for their product. I am therefore emphasizing the same point which you brought out, Mr. Chairman, that the company which has established its permanency should certainly be expected to always have outstanding

against it any securities which it has issued in the past, whether in that form or in some other form, as required by re-financing. It would furthermore seem to be expected that the earning power of such a property would not be reduced because a particular mortgage on that property has a sinking fund provision in it or probably a date of maturity, these factors being made necessary by the conditions under which the securities under that mortgage were sold.

MR. R. H. BALLARD, Los Angeles: Dealing with the question of sinking funds in bond mortgages, I would like to say at the outset that in my opinion mortgages providing for the retirement of a certain number of bonds each year in going public service corporations, are old-fashioned. A more up-to-date method and a better method for the good of the property and for the good of the rate payer and all concerned, is that a certain sum of money be taken each year and invested in additional property rather than in the retirement of bonds. We have a provision of that kind in the mortgage of the Southern California Edison Company and it has worked out quite satisfactorily.

With regard to the place or account to which the sinking fund should be charged I think that we are bound very largely by what we consider when approaching the regulating bodies in the matter of the fixing of rates. In a company such as ours we have about this condition, and I think the principle is the same for all others out here: We have an earning of approximately one million seven hundred thousand dollars a year net over operating expenses; from that net we make a deduction for depreciation amounting to approximately \$700,000, and we have a balance left of approximately a million dollars, which represents an earning of nearly 8 per cent upon the physical value. This 8 per cent is the amount which the California Commission has decided is a proper return to stockholders. Now, in arriving at this million dollars no provision nor deduction has been made for the sinking fund. If we are going to deduct a further amount for sinking fund from the earnings of a million dollars, or from the surplus account, which is an accumulation of some of these balances, then one of two conditions must arise: either we must reduce the amount of dividend to stockholders below that to which they are justly entitled, or we must ask the Commission to allow us a rate fixing both depreciation and sinking fund. Now,

as a matter of practice what sinking funds we have (and we do retire bonds on some of the old underlying mortgages) we handle exactly as is outlined in the Committee report. A sum of money is taken from the cash account and used for the retirement of bonds. No reserve of any kind, no account, is set up other than a temporary one providing a place to put the money during the transitory period while the bonds are being secured. I do not see any other way of handling the proposition unless, as I say, we are going to claim, and can get the regulatory commissions to allow us, both Depreciation and Sinking Funds, or unless we are allowed a certain amount for depreciation, determined in advance and from that adjust the part to be set aside for a sinking fund. It is obvious, as Mr. Edwards has said, that the issuance of securities to take the place of other securities which have been retired, will become absolutely necessary, because if, as under the present system, money is taken each year to retire bonds from cash on hand, and the surplus account is nearly all paid out in dividends, there is only one place from which that money has actually come to the sinking fund, and that is from the amount set aside from earnings for the depreciation fund. At the time, then, when the life of the property has run, there will not be sufficient money to provide new property to take its place, and at that time or at some intermediate time along the line it will be necessary and justifiable, to ask the Commission to allow the issuance of substitute securities to take the place of those which have been retired through sinking funds.

I do not think this is a new question, because I understand that the California Commission has recently authorized one of our large corporations to make such an issue of securities.

With regard to that part of the classification of accounts having to do with the operating expenses of hydraulic power plants and transmission systems, I find that this checks rather closely with the system of the commission out here, and has the advantage of being very much shorter. In my opinion a considerable objection to the accounting system of the California Railroad Commission is its length.

The one point however that troubles us in the Coast Companies having to do with these hydraulic plants operating in different cities and different counties, as for example, our own Company, the Southern California Edison, operating in

seven counties and fifty or sixty different cities, is the further division of these accounts as between the districts or cities. That is a matter that, I think, is not covered in this system of accounting. I do not see how it can well be definitely covered, but it seems to follow along the line of division of the general expense accounts, which I thoroughly agree should be a matter of individual judgment, based upon local conditions. The practice of division of the general expense account and of these production accounts, as between towns, is not general.

A number of accounts are divided according to certain conditions, having to do with the number of meters; other are divided in accordance with gross earnings, and still others, in proportion to the amount of other expenses. I do not see that there can be any system of accounting prepared which will meet the conditions of segregating the general accounts so that the segregation will be applicable to all companies. It is absolutely a matter of judgment and a matter depending upon the operation.

CHAIRMAN EDWARDS: You see, the Association in matters of this kind wants to be of use to the member companies if it can; and it will frequently happen that we may investigate and invite debate on a great many subjects on which we issue no formal conclusions. At the same time we want all the information we can get.

I am of the opinion Mr. Ballard has expressed, that it would not be advisable nor possible for this Association to lay down definite rules for the distribution of overhead charges and departmental operations. At the same time it is a subject for us to take up if only to come to the conclusion that we can do nothing with it. One of the reasons for asking you today to review this uniform system of accounts was to be sure that it meets requirements so far as a general system can meet the individual requirements of your business. The purpose of the system, after it has met your approval, is to use it as the basis, if possible, for a uniform system of accounting by the various Commissions. The street railway men occupy a very advantageous position in that respect. They deal with the Interstate Commerce Commission, and therefore have a unified system which is applicable all over the country, but the electric lighting business is subject to the authority of every commission in every state; and some of the requirements of these commissions, to put the matter very

mildly, do not fit our business. One of the great steps that this Association can take is to move for a uniform classification of accounts to be agreed upon by all authorities throughout the country. It is a nice big job, and I can imagine that it is going to take some years to bring it about. If there is anybody on earth that has fixed opinions it is an accountant, and it is sometimes a little difficult to move him.

I would like to say one word with regard to the point Mr. Jones has brought up, that the Association should be silent on certain subjects. It is my opinion that this Association should proceed very cautiously and not commit itself on any matter until it is sure of its ground. On the other hand, I do not think that we should be afraid to take a position on any subject which we have studied and to use all our influence to carry that idea wherever our influence counts.

If there are no other remarks to be made upon the report a resolution that it be accepted and printed will be in order.

MR. JONES: I would like to move the adoption of the report as submitted, and if you will pardon me for digressing on that subject, to repeat Mr. Edwards' words—he has the power to make himself understood better than I have. What I want to tell you is exactly what Mr. Edwards has told you in his last remarks. We should not be afraid to go on record, but we should be right.

(Motion seconded and carried)

CHAIRMAN EDWARDS: We are to be favored with a paper by Mr. L. R. Reynolds of San Francisco, Auditor of the California Railroad Commission, on "Some Opportunities of Public Utility Accountants." I take great pleasure in presenting Mr. Reynolds.

SOME OPPORTUNITIES OF PUBLIC UTILITY ACCOUNTANTS

The accounting section of the National Electric Light Association has taken a most desirable step in formulating its Standard Classification of Accounts, and I know I can speak for many of the state commissions when I say that we sincerely want a uniform system adopted in all the states, and I think it is quite possible for this to be consummated through your efforts. The greatest difficulty, as I see it, is not in the general scheme of accounts but in laying down, in detail and with great completeness, definitions of the accounts.

The great object of a uniform system of accounts is, of course, to make comparable all the transactions of all utilities of a certain class, and to this end, instructions must be such that there can be no deviation. The Interstate Commerce Commission has recently prepared supplements to some of its classifications in the form of indexes to the operating expenses. A railroad accountant can turn at once to any item of expense that may come up with which he is not familiar and find the number of the account to which it is chargeable. A state commission is not able to prepare such an index for each of the many classes of utilities under its jurisdiction, but I think it would be comparatively easy for the accounting members of an association of this kind, through their every day experience in this one particular class of utility, to prepare such an index, and I am sure if this were done that it would be a very strong plea for its adoption into a National System.

I would like to make a few remarks upon one or two details of your Classification that have particularly attracted my attention. Paragraph 4, on page 12 of the introduction reads as follows:—

“The words Depreciation and Amortization should not be used in connection with the Accounting Systems of Public Utilities. Depreciation means, I. To lessen the price of; lower the rate of. II. To sink in estimation; fall in price or value; become of less worth.

Amortization means, to wipe out; to extinguish. No company desires to wipe out or extinguish its property. On the contrary, its sole aim is to maintain the productive and operating efficiency of its property at its maximum by renewing parts displaced for any cause.”

I find, however, the title of your liability account No. 377 to be Unamortized Premium on Debt. It would seem that if there were an unamortized premium on debt, there must also be at times an unamortized discount. In fact, your classification provides for a debt discount and expense and provides for its amortization, but uses the term "Extinguishment."

Your classification further provides in account No. 376 for a premium on capital stock. It is my experience that there is fully as often a discount on capital stock as there is a premium, and I think it should be provided for.

Under your classification, if it be found that after a physical valuation, the book value of a property does not equal the physical or inventory value, you have provided no alternative but to charge the difference to profit and loss, although the history of the corporation may clearly show that the par value of the stock as carried in the liabilities, is not represented by an equal value in the plant accounts.

Now, in regard to depreciation. I am fully aware of the fact that the interpretation of this account is an exceedingly difficult one, and one fraught with a great deal of danger. From my point of view, I think many times I would like to see it eliminated altogether, but, on the other hand, if it is eliminated, by what means can the cost of maintenance be equalized through the years? Very few corporations are able to show a perfect maintenance at the close of every fiscal year. This may be due to a number of reasons; possibly because of the fact that all possible available funds are required for new extensions in a year when interest rates are very high and the conditions are panicky so that the company does not wish to borrow outside money. It is perfectly legitimate under these circumstances to postpone the maintenance that can be dispensed with until the ensuing year when funds may be obtained at a cheaper rate. The company from its experience can determine in most cases a fair approximation of the amount that should be set aside and charged to operating expenses to equalize this maintenance. If this is not done, it seems to me that the company will not be showing its true operating conditions for a given fiscal year.

If there is no depreciation, should appreciation be considered? I know that utilities before our Commission in rate cases often ask that very large depreciations be allowed in their operating

expenses, but when again before us with an application to issue securities instead of showing a depreciation, they ask a large appreciation.

The question of using a depreciation as a method of accruing the difference between the original cost of the property and its present value, is a point for engineers and not in my province to be commented upon.

One of the most important divisions of an accountant's work consists in setting up upon his books the true cost of his company's construction, and thereafter correctly differentiating between new construction and operating expense and other charges to profit and loss.

I find that the importance of this matter was touched upon last year by Mr. D. C. Jackson in his paper on *Appraisals on Electric Light and Power Properties*. This appeals to the layman as the simplest thing possible, but the accountant knows that it is often one of the most difficult problems with which he has to deal. A charge to capital should mean that the actual physical inventory value of the property has been increased by this specific amount.

It is the practice of the greater number of corporations to require a detailed estimate of any new construction to be approved and passed upon by its engineers and managers and approved by the directors and written into the minutes of the corporation, before money can be expended that is to be charged to capital accounts. It is necessary, however, in an electric light and power company where immediate service extensions must be made, for the directors to appropriate blanket sums of money to be expended for service connections as approved by the officers.

The above outlines what I believe to be the only safe practice and it is probably the course pursued by most of the corporations represented here. I find, however, that an immense number of utilities have a very different practice and that they make multitudinous small charges to capital each year without order or system. The evil resulting from this is not to be minimized by conservatively managed companies. It results generally in the understatement of operating expenses and in over capitalization. Disaster follows both to the company allowing this practice and to the company that meets its competition. A condition like this is very often in the auditor's hands. He is confronted

every week with perhaps hundreds of these small charges passed upon by various division superintendents as items chargeable to construction and commonly does not take the time to trace them. There is no doubt that it is very difficult to study each of these items and ascertain what they stand for, but it must be done.

The lack of eternal vigilance on the part of accountants in setting up a true book cost of a property in complete detail and with complete explanations has resulted in great underestimation of the accountants themselves and their position with a utility. We continually hear the remark by those before our Commission with regard to the book cost of a property that that is "merely the book value and has no relation to the true value of the property."

Do they stop to think what this means? It means nothing else but that the balance sheet which the corporation presents to the public is almost a meaningless statement.

The books and records of a company are its vital history. They are records of the officers in fulfilling their duty to their stockholders. On a sea-going steamer, or a vessel, the captain is required to keep a log book which shall show the record of his voyage and the record of his efficiency. The log book is almost life itself to the captain of that vessel. If he comes to port without a properly kept log book, he may as well say to himself that his days as a sea captain are at an end, and that he can look forward to a life feeding chickens and regretting the past. The books of the corporation are much more important than a ship's log. The amount of capital invested in the average corporation is greater, and the stockholders generally much more numerous than in any single vessel. When I hear such a remark, as we often do, in explanation of some entry on the company's books which cannot be explained, as "Oh, that is only some bookkeeping entry," I wonder what would happen to a ship captain if he came to port with a meaningless entry on his log book, and made a similar explanation.

I have mentioned the phase of the distinction between operating expenses and capital that relates to the accounting of materials and supplies. There is another and more difficult phase still, and that is the handling of so-called overhead charges to construction; those of executive officers' salaries, interest, etc. It goes without saying that all charges of this character should

be accompanied by a very full explanation covering both the philosophy of the charge and the authority therefor. It would occur to an outsider that the tendency on the part of a utility that operates under the jurisdiction of a public service commission would be to charge items upon which there was some doubt to operation rather than to construction, in order to justify their rates in cases before the Commission, but this is very rarely the case; and it seems to be the tendency on the part of utilities to charge the doubtful items to construction. This mitigates against the utilities in every way from the fact that they lose before the Commission in justifying their rates; and again, when it comes to justifying the book valuation they commonly cannot show that sum in physical value.

The statement is often made to me when commenting upon certain entries that they were passed upon by an independent auditor. In but very few cases can construction charges be verified by an auditor without the help of an engineer, and even then the engineer must be entirely conversant with the property at the time the work was performed. We all know that it requires more than the average skill to record current events and that there is no such thing as scientific history. There is only one time to properly record a fact and that is, at the time and place it happened.

An accountant or auditor who is able and does make the requisite study of all the vouchers entered upon his books assumes his true function, which is that of controller. It is my sincere belief that if a corporation's history is kept properly and in detail by a competent auditor, that company will have nothing to fear in its relation with the public.

The company in obtaining authority to issue securities can point to its records and say—There is the cost of our property and in detail. If any item is questioned, it is only necessary to review that single item without going through the long process of a complete physical inventory.

The company in a rate case has only to lay before the rate making body its records and the cost of its property, to defend a just income. There have been cases where the salaried managers of a corporation have deliberately charged their personal profits to the cost of the company's property. The New Haven and the Frisco Railway systems are recent examples. It the

auditor is cognizant of these transactions, he should refuse to enter them upon his books; and if Interstate Commerce Commission examiners found these things out years afterward, certainly the auditor had some knowledge of the transactions at the time they were made.

The cases are more numerous in which careless accounting has utterly confused the records of a company, than of cases like the above.

An accountant should, I believe, exercise much care in all his entries affecting the profit and loss or surplus accounts.

The courts have laid down definitions of the surplus out of which dividends may be declared, that is, the "Unappropriated surplus."

In *People vs State Board*, 112 N. Y. S. 392, 395, we find that

"The net income of a corporation for dividend purposes cannot be determined until all taxes, depreciation, maintenance and upkeep expenditures have been deducted. Otherwise the dividend is not paid from the earnings, but by a depreciation of the capital account. To earn a dividend and be honest with itself, its stockholders, its creditors and the public it has to serve, a corporation cannot distribute earnings at the expense of its capital. If a corporation, year after year, should distribute its earnings, after deducting expenses, making no allowance for taxes, or the replacement or upkeep requirements of the plant, in time its entire capital would be gone by the payment of unearned dividends. The value of the property of the company, especially its franchise and good will, cannot be ascertained until the franchise tax, and all the other taxes, and a proper replacement or upkeep fund, have been deducted from the current earnings."

The accountant is in the best position of any officer of a corporation to know its obligations, and it is his duty to see that reserves are provided for all contingencies.

It is very commonly contended that increases in land value are properly creditable to unappropriated surplus. I believe that such entries should be made with great conservatism. The fact that a neighbor was able to obtain a certain price for property is but little criterion for the fact that you could obtain the same price. In fact it is the experience of every one who has dealt in real estate that it takes often a very long time to sell property at even an approximation of its appraised valuation.

CHAIRMAN EDWARDS: Mr. Reynolds' paper is before you, gentlemen, for discussion.

Mr. Reynolds' recommendations and statements are so sound that I doubt if there will be very much debate upon the principles which he has enunciated; and I will therefore in your name thank him for his appearance here before us, and state that it has always been a pleasure for this Association to come in close contact with the Public Service Commissioners on occasions like this. There are other occasions when we are not quite so happy, but this is not one of them and we are very glad indeed to see you and have you with us.

I have already announced that at the conclusion of this session I would appoint a nominating committee. You have probably seen the By-Laws and know that we are now in a position where we may nominate our own officials. I will place on this committee Mr. T. F. Wickham, Mr. H. L. Snyder, and Mr. Byron T. Storey, and ask that they be prepared to report a ticket for your action at the Thursday morning session.

(Adjourned)

SINKING FUNDS

LIST OF REFERENCES

Advanced Accounting		Sinking Funds	Dicksee
American Association of Public Accounts	1909	Sinking Fund	Committee Report
American Association of Public Accounts	1909	"	Committee Report
Corporation Accounts and Corporation Law		Applied Theory of Accounts	
		Premium Account	Esquerré
		Sinking Fund Account	Rahill
		Funds vs Accounts	
		Investment Account	
Cyclopedia of Commerce	Vol vi	Sinking Funds	
Accountancy		Reserves and Reserve Funds	
Encyclopedia of Accounting	Vol 5-2		
Interstate Commerce Commission	1914	Additions to Property through Income and Surplus Funded Debt Retired through Income and Surplus	
		Sinking Fund Reserves	
		Miscellaneous Fund Reserves	
		Appropriated Surplus not Specifically Invested	
		Profit and Loss—Balance	
Journal of Accountancy	Vol vii	Sinking Fund and Reserve Accounts	Anyon
	Vol vii		Hamblin
			Hogeweg

Vol vi	Should Sinking Funds be Charged Against Revenue	Walton
Vol vi	Sinking Fund Accounts Again	Grant
Vol x	Reserves and Sinking Funds	Rowe
Vol xi	Sinking Fund and Reserve Accounts	Searle
Vol xi	Sinking Fund Reserves Again	
Vol xi	Sinking Fund Reserves	Hutchins
Vol xii	Reserves That Are and Reserves That Are Not	W J P
Vol xii	Sinking Fund Reserves	Lawton
Vol xii	" "	Pangborn
Vol xii	" "	Walton
Vol xiv	Sinking Fund Principle and Practice	Macpherson
1915	Discussion of Uniform Classification of Accounts	Freeman
	Unamortized Premium on Debt	
	Sinking Fund Reserves	
	Extinguishment of Discount on Securities	
	Sinking Fund Accruals	
	" "	Bailey
	" "	Bechtel
	" "	Clark
	" "	Jones
	" "	Wickham
	" "	Wilkin
	" "	Bentley
Science of Accounts	Sinking Fund	

REFERENCES

Classification of Accounts Prescribed by the Interstate Commerce Commission
 Proceedings American Electric Railway Accountants Association 1913 W H Forse Jr on Sinking Funds
 Standard Classification of Accounts, Public Service Commission, State of Ohio

SECOND ACCOUNTING SESSION

WEDNESDAY MORNING JUNE 9

CHAIRMAN L. D. GIBBS, Boston: Gentlemen, the Second Session of the Accounting Section will please come to order. It gives me great pleasure to turn the meeting over to the management of the Chairman of your section, Mr. Edwards.

CHAIRMAN H. M. EDWARDS, New York City: The first item on our program this morning is a paper entitled, "Workmen's Compensation Insurance," prepared by Mr. Walter G. Cowles, Vice-President of the Travelers Insurance Company. Is there a representative of the Travelers Insurance Company here? There being none, I will ask the Secretary, Mr. Schmitt, to read this paper.

WORKMEN'S COMPENSATION INSURANCE

When I was honored by an invitation to prepare a paper for this Convention, I was told that you did not desire to hear particularly about the splendid work now being done by stock insurance companies to further the interests of the rapidly growing movement for "Safety First." Others will doubtless address you fully on that subject. I must therefore resist a natural temptation to tell you something of this work, and follow the instructions of your Committee by devoting my time to the claims of stock insurance to your consideration from the financial or accounting point of view.

I presume I am expected particularly to say something about the new and untried system of Workmen's Compensation. The old and discredited system of employers' liability for damages was both serious and unsatisfactory. The new system is much more serious, especially in its long continued uncertainties, but it is to be hoped that it will prove more satisfactory when the industries of the country are adjusted to it. We are just entering that period of adjustment where the uncertainties are the greatest. As managers of dividend-paying industries you should be immensely interested in any plan which absolutely and forever reduces the untried and unknown obligations of a distant future to a fixed present cost, which very materially simplifies your financial and accounting burdens.

It is the particular province of stock insurance to reduce these uncertainties as to future losses to a present fixed and known value. In the transaction of your business you are constantly facing the probability of unknown losses. Your buildings and plants may be destroyed or, as a result of your operations, some of your employees and some not employed may be injured. You do not know when these things are to happen, nor how often, nor from what cause. Particularly you do not know what these misfortunes will cost you. The means usually offered for the distribution of such losses are stock or mutual insurance. I do not mention so-called "State funds" because I am writing about insurance, and no State fund furnishes insurance.

The stock insurance system, and that alone, furnishes the

reliable means for reducing future losses to present fixed values. The stock insurance company has its subscribed capital and its earned surplus, by means of which provision is made for unexpected or unusually large losses. All variations in experience and in investment values are provided for in advance by gross surpluses which include the subscribed capital. This element of distributive ability and financial strength is found only in a stock insurance organization. By means of the stock system we are able to name a fixed price at which a risk or line of risks can be carried for a stated period of time. Under compensation practice policies are unlimited in amount; therefore, your premium rate, fixed in advance, goes into your accounting, and renders your obligation certain and fixed. There are no assessments and no dividends. You are not in partnership with your insurance company, sharing its risks, not only on your own plant but on all other enterprises which your mutual company may undertake to carry. Your stock premium is computed on your payroll, and may be more or less as your operations increase or decrease; but the premium rate remains the same, subject to no change so long as your policy remains in force. If a stock company loses money on a risk or a line of risks, the surpluses take care of that. If a far-reaching catastrophe happens (not usual but not unknown in your business), the surpluses and special reserves take care of that. In all respects the subscribed capital and earned surpluses of stock companies are the equalizers of risks, the shock absorbers by which the unusual and the unexpected are disseminated.

Stock insurance provides other means for effective distribution of losses at a fixed cost to its policy holders, beyond its surplus. One important means to this end is the wide distribution of risk. Stock companies do not operate in one community or one State; they spread their risks all over the country, thereby obtaining a true application of the law of average, which is the fundamental necessity of real insurance. Stock companies accomplish distribution by means of their agency forces. No effective substitute for the agency system has yet been devised. Many have been tried but none have succeeded. Distribution is quite as essential in our business as it is in yours. Your power plant and our home office are quite analogous in their relations to our respective enterprises. Having equipped your central station you

must arrange for the distribution and delivery of your product or you will not succeed. You not only solicit business as the only known way to obtain it in sufficient quantities to make your enterprise serviceable and profitable, but you distribute your current to your customers by means of wires. You are employing the best means known to you to make your enterprise one upon which the public may safely rely. You need a distribution of business just as badly as we do, and for much the same reasons. You could not succeed if you limited your distribution to a few buildings in the neighborhood of your power plant. Your success lies in pushing, constantly pushing, for a wider and better distribution,—a volume of business which permits you to render efficient and reliable service. You must have surpluses just as we have, to take care of unusual strains, or the demands upon your service under adverse circumstances. You must always maintain extra machinery and equipment in condition for immediate use when required, just as we do. We do business in money while you do business in electric current. You would not be satisfied with a plant which had only enough equipment for its immediate needs and no surplus for emergencies. Yet it is reported that some of you are considering a mutual insurance plan with that sort of equipment. When one of your companies pays a mutual premium I wonder just how you treat it in your accounting. The payment does not discharge your obligation; on the contrary it binds you to new and perhaps vastly increased obligations. By your payment you have become a partner in a new enterprise quite foreign to your usual business. Such a payment represents a liability rather than an asset. When you state your net earnings to your stockholders, what do you do about your new mutual insurance partnership? If you had put the same amount of money into any other experiment, you would scarcely treat it as an asset until the success and real value of the experiment became known. A premium paid to a financially strong stock insurance company is a real asset in the sense that it operates to fully discharge a real liability. This liability is just as real, whether you actually have an accident or not.

The simple truth is that mutual insurance is fundamentally unfitted to the compensation obligation. Mutual insurance has demonstrated its usefulness in some lines, but a moment's thought

will convince any one that it is in those lines where liquidation immediately follows loss. It is often claimed that mutual fire insurance has been successful. Even that claim is not entirely proved. Recent conflagrations have weakened the efficiency of mutual fire insurance as many of you know. In mutual fire insurance the losses are incurred and largely paid within the term of the policy. Sometimes a loss will be in process of adjustment when a policy expires, but it is settled soon thereafter. A mutual fire company collects its premiums and pays its losses immediately or substantially so. At any given time its losses can be computed with reasonable accuracy, and if premium collections are not sufficient to meet them, an assessment can be levied.

With compensation insurance it is all different. The losses are incurred during the term of the policy, but their liquidation is postponed by requirement of law. Such losses must be deferred; their actual cost cannot be known until the deferred payments are all made, and these under the various laws may run for periods varying from a few weeks to many years,—in some instances as many as forty or even fifty years. You may estimate what your own claims will cost, but no estimate can be certain. Experience adequately proves that estimates of deferred obligations are customarily insufficient. However accurately you may be able to estimate the cost of your own claims, what can you do about estimating the claims of your partners in the mutual? The mutual will try to estimate what the final cost in future years for all these claims will be, but that leaves you to guess whether the estimate of the mutual is right or not, with every probability that it is wrong. You must guess hard at this point, for upon mathematical accuracy your safety depends. If your mutual fails to meet these long deferred obligations they will surely come back upon you for payment. All this uncertainty is inherent in the mutual system. Such a system is absolutely unfitted for the distribution of long-deferred claim payments. Mutuels are doing business with one implement only, and that is their premium collections. The stock companies guarantee the accuracy of their mathematics, because when premium collections prove insufficient at some time in the future, they have recourse to their contributed capital which remains liable to the end.

Mutuals attempt to provide a prototype for capital by means

of assessment. The right to assess, however, is customarily limited both in time and amount. This right is usually one extra premium within a year. Some mutuals are even wild enough to boast that they cannot assess. Under these circumstances they are without resources with which to guarantee their mathematics. Of what avail is a limited right of assessment when payment of very long deferred claims is required? Would you consider stock insurance which provided that the support of subscribed capital should be withdrawn at the end of a year? In many mutuals you must agree to exactly that. The only reasonable way to handle the compensation obligation by means of mutual insurance is to provide that assessments in unlimited amounts may be levied at any time so long as claims are outstanding and unpaid. That is what stock companies do when they put up their capital to guarantee their obligations, and that capital is always available so long as any obligation remains. None of you would care to go into a mutual with such extended obligations; yet any other organization will utterly fail in its purpose.

When a mutual company boasts that it saves its members the agency cost of the stock companies, it is quite like a man who boasts of ill health. Mutual companies without agencies do business in a very limited territory; they fail in distribution and volume and therefore their mathematics are much more uncertain, because they cannot safely rely upon the law of average.

The inability of the mutual organization to provide adequately for deferred claims has long been recognized in Germany. No practical attempt is there made to provide for deferred payments. Premiums are levied and collected for current payments only, while deferred payments become charges upon future enterprises, some of which perhaps did not exist when the loss was incurred. Industry could not live and grow in America under conditions such as these.

The so-called trade mutual insurance companies bear about the same relation to the regular stock insurance companies that the private or neighborhood electric light plant bears to your enterprises. Those who advocate or use private or neighborhood plants where the services of a regular public plant are obtainable either yield to the persuasion of others or reason themselves into the belief that there is some advantage to be gained. They

think they can obtain better or cheaper results. You have probably been called upon to puncture some of the bubbles which enter into these arguments; to point out mistakes in the claims of some salesman or in the conclusion of some misinformed individual. You can give endless reasons which are satisfactory to you, and ought to be satisfactory to everybody, why the public plant is better equipped and generally better able to serve the community in which it operates than any private or neighborhood plant could possibly be. I can imagine what some of these arguments are, but you know them much better than I do. I feel I am safe, however, in saying that every one of those arguments which you have found available and which, to you, are convincing, could be made equally applicable to the relation between trade mutual companies and stock companies.

Perhaps you point out to the parties interested in the establishment of private or neighborhood service that there are disadvantages in the maintenance of that service. If circumstances justify, perhaps you say, for example, that there will be but one generator, and if that should burn out those dependent upon it would be obliged to get along in the dark until a new generator could be installed or the old one repaired. Then you speak of your generators held in reserve for such emergencies. So, the stock companies say to the advocates of trade mutual insurance that the equipment does not allow for disaster; that there is no shock absorber; that they have no recourse beyond the one instrument which they employ, which is premium collection. In such a plant there is but one generator, without reserve; in our plant we have a vast number of generators in reserve and ready for immediate use when the occasion arises. This is true of the stock insurance system and of no other.

Perhaps you warn the advocate of the private or neighborhood plant that he will have a lot of wire troubles and general service troubles, and when he has, he is not equipped to take care of them conveniently or economically. The public company is compelled to maintain absolute efficiency to ensure its business welfare, while the private company needs only maintain a degree of efficiency which will barely escape disaster. There is no incentive for efficiency in the private company. So long as these plants give barely usable results there is no one to complain, and the degree of efficiency becomes lower and lower until it ceases,

and renewal must follow under disadvantageous and expensive conditions. As stock insurance companies we say the same thing: One important feature of the stock insurance plans of the day is the service feature. We are equipped, because of long experience, to perform this service not only much better but much cheaper than it can be performed for a community, a neighborhood, or an individual. This is a matter of business with us. We are doing it every day. We have a large force constantly employed for the purpose. The men engaged in this work are challenged by association and by the nature of their work to produce the very best results. We are dependent upon our efficiency for our continued welfare in business.

We have a lot of trouble on our lines. In compensation practice there is one element involved which is most troublesome in every respect, and that is the element of unfair claim making, the unfair extension of periods of disability, a condition commonly called "malingering." It is a dominant and constant element under compensation conditions. It is found everywhere in the civilized world where compensation practice exists.

It cannot be assumed that all the employees with whom you have to deal will be entirely honest and fair with you in connection with claims for compensation. If one of your employees should happen to be disabled to such an extent that his disability might be permanent, you are required to pay him a fixed compensation for a definite term of years. He is under no obligation to remain in the town where he was injured, and if he chooses to move elsewhere you must follow him and see that he receives his compensation at the proper times. Now it may happen that after he has been idle for a time he recovers either wholly or to an extent sufficient to be able to go to work. In that case your liability to him should be greatly reduced or cease altogether. You can hardly expect the man to voluntarily notify you to stop his payments. The large compensation insurance companies have had much experience along lines similar to this, and they have an organization which enables them to keep in touch with the man, wherever he goes. If you desire to protect yourself against difficulties of this kind you will have to maintain a similar organization. It costs money. In Europe where compensation experience has been more extensive than in this country, malingering and fraud are scientifically developed. "Pension hysteria"

is a recognized disease with an ever increasing number of "sufferers." In one instance a man supposed to be totally disabled, and who was drawing compensation on that basis, was found to be performing as an acrobat in a circus under an assumed name. In another case a man who had suffered an injury to his right elbow which he claimed disabled him was found to be actively engaged in the profession of prize fighting, although he was still drawing his full compensation for total disability. I mention these cases merely because I think they will give you food for thought.

Special care should be exercised in drawing inferences from European experience, because no instructive conclusions can be thus reached, as conditions there and here are widely different. Yet some important lessons can be had from Europe, if this fact be borne in mind. A comparison of recently published results in England and Germany tells the story of efficient service. In England the compensation obligation is carried by insurance companies, and very largely by stock insurance companies. There is no state fund. In Germany the compensation obligation is carried by trade associations under government control and with government assistance. The political aspect of the German plan requires low expense ratios and with them goes low efficiency. In Germany an accident case passes into the accident fund after 13 weeks disability. At this point German results show that there are 6.54 claims per 1000 insured, while in England at the 13 weeks' period there are but 3.95 claims per 1000 insured. The expense ratio of the English system is somewhat higher, but it secures efficiency. That saves much more than it costs. Compensation will be harmful rather than beneficial if it is allowed through inefficiency of management to become the breeding place for fraud and malingering. That this has become a scandal under the German system, the best friends of that system admit. Germany shows approximately one and two-thirds claims for every claim in England. Such result, if continued, will destroy any social system. It drains the vitals of social integrity and morality. It destroys character. It rewards dishonesty. Can we in America subject our states or our industries to such a system?

We might proceed with arguments and suggestions almost without end, but I must be mindful of the fact that papers of this

character should be kept within reasonable limits. Perhaps it may be fairly assumed that some—and I hope many—of you gentlemen feel convinced that the compensation obligation, particularly, can be handled most effectively and safely by means of stock insurance, but you are not quite certain that stock insurance is economical. Economy of business management is an important consideration for those of you who have to do with the finances of your several plants. It might with some fairness be said that you ought not to consider the question of price; that you ought to be satisfied with efficiency when the service is offered by a reputable concern of undoubted financial standing. If any one of you were suffering from a serious bodily ailment and you felt that a certain specialist could cure you, you would go right to that specialist without a single inquiry as to the cost.

In a sense the new and largely untried compensation obligation with all its uncertainties is a business ailment. This is not an intended criticism of the compensation system. A well devised and reasonable compensation system, properly applied and so administered that it accomplishes its best purposes, would be of undoubted benefit to any state or to any of the industries in our country. Notwithstanding the analogy employed I think you are justified in inquiring into the price, and inquiring most carefully.

Employers whose previous experience has been confined mainly or wholly to liability insurance as distinguished from compensation, often feel that the rates charged by stock companies for compensation insurance are excessive and unreasonable. I hope to convince you that this impression is altogether erroneous. The stock insurance companies have made a deep study of compensation problems, and they offer you the benefits of this study. This study began many years before compensation plans were introduced in this country. The temptation, to the inexperienced, is to compare the premiums paid in a single year with the payments made in that one year; but it must be remembered that the obligations which are incurred this year run on like Tennyson's brook,—some for a very long time,—and they must be met as they become due, perhaps through a term of many years. If the business is to be soundly conducted, the premiums must be fixed with this fact clearly in mind.

I certainly wish I could tell you what it costs to carry the

compensation obligations of the various states. Those obligations differ materially in their terms and in their resulting cost. Sufficient experience, however, has not yet been accumulated to make it possible for a man to state with any convincing degree of accuracy just what the ultimate cost in any state will prove to be. How, then, you ask, are insurance rates computed? The answer to this very proper question would involve discussion beyond the reasonable limits of this paper. Therefore, I can only undertake a most general answer. The basis for compensating injuries has been materially changed under the new laws, but accident frequency has not been changed. The stock insurance companies which have for many years carried the old employers' liability lines have acquired a vast amount of experience, which is useful in the extreme, and rather conclusive as respects the nature, severity, and frequency of accidents in a given occupation. On these points the companies have a wealth of information. There is some little compensation experience available now, but it is too limited to permit us to adopt it as at all conclusive. We use it, however, to modify our results as far as it goes. In foreign countries much experience has been accumulated and many results obtained. Among those results perhaps the most convincing is the well established fact that the cost of compensation grows amazingly from year to year. Germany has had the longest experience and yet the estimated insurance cost at the outset of compensation—now nearly thirty years ago—was in many classifications not more than one-tenth of its actual cost. The best information in Germany is that the cost of compensation will reach its ultimate level after about fifty years of experience. More than half of that period has expired and rates are constantly on the increase. The German experience with your particular line of business appears to be one of the very few exceptions to the general rule. While the insurance cost in nearly all other industries has increased amazingly, it has apparently been shown that the insurance cost in your particular industry has not increased. Any attempt to account for this exception to the general rule would take us into the realm of conjecture. Your business as an individual injury producer has always been somewhat prominent. The unseen power in which you deal is regarded with the greatest respect by everybody. Its power for good is no greater than its power for harm. We may reason-

ably assume that the German experts, in preparing their first premium rates at the inception of compensation, were led by these recognized conditions to place those rates high. They certainly were out of proportion with the rates in other industries, and time has proved that the first attempt at rates was really a pretty good attempt and that subsequent results have reasonably justified the earlier estimates. It is also quite probable that rapidly increasing efficiency in electrical enterprise, a high respect for a dangerous product, and the marked improvements in appliances and safety conditions, contribute largely to this exceptional result. What has proved to be true in Germany may prove to be true here. As time passes, we may find that the rates reached by the companies will be sufficient to meet the growth in claims which is bound to follow the general adoption of compensation. We hope that may be the fact. It will be vastly better for you if you are able to adjust your business to the final cost of your compensation obligations than if you are compelled to accept temporary estimates for the present, only to find that they will increase amazingly as time passes. I am not able to say that this will be the result under our practice. I can only say that this was the condition developed by German experience, and it may be developed here. The compensation experience in Massachusetts is in the best shape, and from it we learn that the Massachusetts rates upon such experience as we can now obtain, appear to be fairly adequate, but all obtainable experience in Massachusetts involves but a trifle more than three millions of payroll. That is simply no experience at all. A fatal case costing no more than \$2,000 would add 10 cents to the necessary premium, and three such cases would add 30 cents. A small underestimate in each of the outstanding cases would produce great changes in the indicated premium result. Therefore, that experience is not convincing. We also have had a little experience in Illinois which shows that our premium rate in that state is not adequate, but the payroll exposure here is much less. In some of the sub-classifications in Illinois the cost has run very high, while in one sub-classification in Massachusetts the cost is more than four times the premium; but these are small exposures in hundreds of thousands of payroll, and are not in the least conclusive. May we pause here to remark that these varying results demon-

strate the necessity for distribution, to obtain an average result on very wide exposure?

When we are making our rates, we use our accident frequency, and produce upon actual accident tabulations the cost of compensation in each state according to its particular law, when the method of compensation is applied to those accident statistics. We have taken for example a hundred thousand accident cases and have computed the compensation upon those cases upon the data which we possess. This formed the basis for rate making, which in turn was followed by applying foreign experience so far as it was applicable, and local experience so far as we had it. The average of rate making is not and cannot be far wrong. Months have been spent by the best men we could find in our business in the determination of rates. Our rates mean a good deal to us. Our system of insurance has been violently criticized. For this and every other reason we are more than anxious to conduct our business upon the most fair and equitable basis which we can possibly develop. There is every reason in the world why we should make a determined effort to keep our rates down to the lowest efficient point. The rates made by the stock companies are used extensively for all insurance purposes. The stock companies, and those companies alone, have the means at hand for developing the rate. We have used those means conscientiously and intelligently, and our rates are the result. I cannot expect you to accept unsupported assertion, but nevertheless I will tell you that I firmly believe in the comparative and reasonable accuracy of the stock companies' rates. Time will justify this belief, and if I were to express any fears whatever about rates, it would be that they are too low rather than too high.

I certainly wish it were possible to give you more exact information, that you might not feel forced to rely so much upon assertion and glittering generalities. I might employ smooth phrases and by insinuation or direct statement lead you to believe that our rates are in every respect scientifically accurate. I will not do that. The stock insurance companies will not undertake to deceive anybody, but the stock insurance companies can say with absolute truth that the rates themselves are much less experimental than the legal obligations against which they are devised as a protection.

It is generally understood that there is a large amount of

money made in the insurance business. Let me assure you absolutely, gentlemen, that the money is not made on the premium rate. This assertion can be adequately supported by the published reports of the companies, filed in the various states as the law requires. The proper and safe transaction of a stock insurance business requires the employment of a vast amount of capital. The total assets of my own company, applied exclusively to the transaction of an insurance business, are nearly 100 millions of dollars. We are doing a banking business with that vast sum, and it is out of this business and not out of the premium rates that dividends are earned and surpluses increased. If we compute our reserves upon a certain interest basis and can then earn a greater rate of interest with our investments, we make a profit just as a savings bank does. It would be a perfectly safe assertion that an insurance company would do very well if it were able to obtain for its compensation lines the exact cost of doing the business, no more and no less. We can really afford by careful management to write our business without what is called an underwriting profit. Underwriting profits are sometimes included in very small amounts, but more for the purpose of providing a factor of safety than for the purpose of ultimate profit. The employers' liability business of most of the stock companies was carried for years at a small underwriting loss. There is one thing which your financial men should certainly get out of their minds, and that is the carefully cultivated idea that when you pay premiums you are contributing a part of those premiums to the dividend earnings of a stock insurance company. You may be assured that you are not.

At this point perhaps two inquiries suggest themselves to you. If there is practically no profit in insurance premiums, why are the companies so actively striving for the business? When we receive a premium we do not spend it immediately. The premium is not earned until the policy expires, so we must set aside the unearned part until it is earned. When we encounter losses we must set aside reserves for them, and we put all these reserves to work earning interest. When we take your premium we are your bankers, and we do make money on your deposits if we can; but there is one peculiarity about our bank, and that is, your account is never overdrawn. You may make a grossly insufficient deposit to cover certain future obligations; that makes no

difference. The account is balanced. Everyone of you would be glad to make some such arrangement at your banks to take care of all your future obligations, and never have to look up your balance before you draw your check. That is what we do for you within the limits of our contract with you.

The other point is, that it occurs to you that you also have large assets and income, that you have subscribed capital and surpluses; but remember that those means are provided and needed for your own business and should not be exposed to the dangers of quite another business which you are not equipped to transact.

It will be useless to attempt to get any idea of the accuracy of rates by comparing rates in this country with rates in compensation countries abroad. Conditions are in no respect similar. Methods of compensation, maximum amounts, and periods, are of infinite variety and differ essentially from our own, both in quantity and in comparison with the wage basis, which also differs. In Germany, for example, an accident case does not go into the accident fund unless disability lasts more than 13 weeks. Then, as has already been mentioned, the premium collections in Germany are only for current payments of a given year, making no substantial provision for the capitalization of incurred liabilities which will require further payment in future. The insurance bank-account in Germany is always overdrawn. These and many similar conditions make comparison of rate absolutely impossible. There is no determinable basis for comparison.

The substance of the whole proposition is, we have done the best we can, honestly and faithfully, with the material at hand; and we are sufficiently confident of the result to offer to you certain definite prices for your risks, upon which prices the companies stake their corporate integrity and welfare, because if those prices are too low the companies must lose money, and if they are too high they must suffer in competition with other forms of insurance. I certainly wish I could say more to you, but it does not seem possible at this time. The time will come, rather soon now, when accumulated experience will more completely test the accuracy of existing rate conclusions. If any rates are shown to be too high they will promptly be reduced. Whether the companies are willing to reduce them or not, the conditions are sure to bring about a reduction.

As a final point to be considered, perhaps you would like to know what the stock companies do with their premiums. Stock companies have been violently but unfairly criticized because of alleged wasteful methods. As proof of such claims the general expense ratio of doing business is employed. It makes no difference whatever to the critics what goes into that expense. It would not answer their purpose to say that at least a good share of it is employed in a way which serves the very best interests of the policyholder. In the development of compensation rates the general expense of stock insurance is computed at from 33 $\frac{1}{3}$ to 40 per cent of the gross premium. To those who do not stop to analyze this expense ratio it appears to be wasteful. One very large element of it is said to be particularly wasteful, and that is the agency cost or the so-called acquisition expense. The agency cost upon compensation lines averages 17 $\frac{1}{2}$ per cent of the premium. Part of this (averaging about 10 per cent) goes to soliciting cost, and the balance to the maintenance of branch office or general agency service in all parts of the field and readily available to all customers. Our critics say this is waste. Heretofore I have referred to the necessity for an agency organization, to accomplish that distribution of risk which can be accomplished in no other way. We look upon agency cost as a proper price to be paid by our policy holders to obtain the solvency and the efficiency which is obtained only by means of a large volume of business, well distributed. Mutual companies claim that they have no agency cost. Their claims exceed the truth in most instances, because there is no mutual organization nor is there a state fund which gets its business without a cost which is the same as our agency cost in nature, although it may be known under some other name and it may be less in amount.

The expense of conducting a fire insurance business is, in some respects, similar to ours. Fire insurance companies have agencies as we do. There is a system of inspection, but the service is not as frequent, extensive, or expensive as ours. Fire insurance companies pay taxes, but do not perform any service which is similar to our payroll audits. As we can find no convincing statements of mutual expenses in compensation lines, the reports of the expenses on the fire business of 1914 might be instructive. From recent department reports we learn that the average ex-

pense ratio of all stock companies writing in the United States, on all their 1914 business, was 40.4 per cent; and of all mutual companies, 32.4 per cent. The difference is 8 per cent, which some might carelessly say is in favor of mutuals, but which I would confidently assert is in favor of stock companies for the reasons already given. Like wool and shoddy, these are two quite different commodities and the prices necessarily differ.

We make no attempt whatever to say that we can write our business without agency cost. Stock insurance companies could not offer their policy holders what they are now able to offer, but for their agencies; and the claims made by mutuals are a disadvantage—not an advantage. Agency cost should be kept down to the lowest possible point. It is possible to reduce this cost, when competitive conditions are reasonably controlled, as they are in most of the compensation states; but when competition runs rife and is unreasonable, as it always becomes when it exists, then agency cost increases as a natural result. Compensation insurance furnishes opportunities for the most unreasonable competitive conditions of any business in the world. It is a business in which so many men are deceived as to the results obtained and what are to follow. The results are so long postponed that an enterprise apparently successful at one period proves unsuccessful at a later period because of conditions which the management did not properly consider or fully understand. Therefore, it is the easiest business in the world in which to cut rates and compete ignorantly and fiercely. Agency cost, however, at its present ratio to premium, is very reasonable,—more reasonable than the distributing cost of any similar business which is known to us. We offer our acquisition cost without apology, but on the other hand with the claim that this is one of the things which particularly entitles us to your consideration.

In an earlier part of this paper I referred to efficiency in the handling of claims. I showed you that for every claim made in England under the adjusting methods of privately managed companies, there were 1 2/3 claims made in Germany because of the inefficient methods of the political machine, more concerned in the cost of this service than in its efficiency. We spend about 8 per cent of our premiums in the service of our policy holders to guard them against improper claims. This does not mean that we are equipped to contest the worthy and proper claim.

We point with confidence to our long record to prove that proper claims are immediately recognized and promptly settled according to law. I do not know what it costs other companies to do this work efficiently and well,—work that is in the best interest of compensation, the best interest of the honest employee, the best interest of the employer, and the best interest of the community and state; but in my own company this cost averages as stated.

You know a good deal about our inspection service, and it requires no extended comment from me to lead you to agree that it is a service which best protects all interests. It is humane and it is proper in every respect. It is also effective. It costs us about $3\frac{1}{2}$ per cent of our premiums.

We have a system of payroll audits which is a part of our accounting system. It is necessary, because of the nature of the business, that premiums should be adjusted to actual audited payroll. For that we expend about 2 per cent of our premium.

Then there are taxes. I might say a good deal about taxes. It is a growing feature in the insurance business. It seems a little strange that in a state where the law compels an employer to seek insurance or some substitute for it, to provide for his compensation obligations, that same state by another law taxes the premiums which the employer pays. It does not seem quite right, but it is quite the fashion to tax insurance companies in one way or another. It is not merely a matter of state taxation either. There are requirements for licenses, reports, tabulations, experience, and endless things necessitating the employment of a large clerical force and entailing much expense. It would be impossible to say just how much of the expense of a stock insurance company is represented by taxes and governmental impositions, but it certainly exceeds 2 per cent. Over this, at least, we have no control. Of course it must be the policy holder who pays the tax, although ordinarily he does not know it.

Then there is the cost of general management. You all know what that includes. It is not entirely or largely officers' salaries, but it is the general expense of doing a large business. It means a large clerical office force. It means stationery, printing, and binding, in large quantities. It means the writing of policies, involving not only clerical work but the work of the expert underwriter. It involves collection

of premiums, which is far more expensive than it should be. It involves the general financing of the company and all that enters into its general management, with the maintenance of the place or places in which the company does business. All these things taken together cost our policy holders something less than 5 per cent of their premiums.

This shows an average expense division which requires about 38 per cent of the premium. It is not the same in all states. It depends much upon volume of business and geographical conditions, as if the business is scattered and the volume is small, it costs more relatively to handle it. As previously stated, these ratios runs from 33 $\frac{1}{3}$ to 40 per cent. The claims take the rest of the premium. It is designed that they shall. The rates are computed upon that basis.

Having told you how we are spending your money, can you reasonably find any fault with it when you judge it in the light of the results obtained? There is no question that we furnish an efficient service and a reliable and useful protection. Do you honestly think that we can obtain our needed distribution, furnish you efficient service, and discharge our obligations at a lower ratio of expense? If so, I am sure I would personally be pleased to have some one draw my attention to the element which is considered unnecessarily large. I confess that I am totally unable to see it, and if you judge the results fairly, as I believe you will, I do not believe you will see it either.

I have made no particular reference to so-called "self-insurance." What I have said about mutual insurance and its lack of distribution, with resulting inefficiency and grave danger, applies with greatly added force to any plant, however large or financially strong, which undertakes to carry its own risk. It may accomplish it as a matter of fact, it may discharge all its obligations, but nevertheless, the plan is doomed to failure. It cannot succeed any more than a fish can succeed as a parlor guest. It is quite out of its element. You really should hesitate to expose your stockholders to such unnecessary risks. Luck may favor you in some instances, but you are merely gambling; the essentials of loss distribution are entirely missing.

I have spent practically my entire business life in the employ of one large and prominent insurance company. I have the absolute confidence of my convictions, after a very long experience.

I am firmly convinced that stock insurance companies are honestly and intelligently managed, by a very high class of men; that they are engaged in a business which should be commended rather than condemned; that it is stock insurance companies and those alone which have made compensation possible, and which will secure the ultimate success of this great movement of modern times, reducing its uncertainties to a fixed and absolute price which shall be honestly and faithfully computed, and which will provide the kind of service which can be provided in no other way, and a degree of protection which will be absolutely reliable in the time of your greatest need. As such I earnestly commend stock insurance to you as the only desirable method for reducing your future losses to a fixed and absolute present cost.

CHAIRMAN EDWARDS: The paper deals with compensation insurance, more particularly from the insurance trade standpoint. It is a very admirable plea for stock insurance as against mutual or state insurance. I would like to hear a motion that the paper be accepted.

(Moved, seconded and carried)

DISCUSSION

CHAIRMAN EDWARDS: After this paper was received, I communicated with Mr. Albert W. Whitney, who is the general manager of the Workmen's Compensation Service Bureau which is an association of casualty companies, and asked him to give me another slant, a new slant, on this compensation business, from the insurance interests. Mr. Whitney is not associated with any company, and he is authority on the subject from what you might call a sociological standpoint. He says:

"It is only five years now since the first workmen's compensation law was passed in this country. Today there are such laws in 30 states. It has taken an incredibly short time to make this readjustment and while, like any far-reaching change, it encountered a considerable opposition from employers at its inception, it is safe to say now that not one employer in ten would be willing to return to the old conditions.

"Workmen's compensation depends for its strength upon the recognition of the fact that the system of individual fault was entirely unable to cope with the social effects of industrial acci-

dents. The compensation system waived all academic theories as to who was at fault and squarely faced the actual social fact that the loss existed and that society would in the end have to pay for it in the expense and reduced efficiency arising from resultant poverty and crime, and in the expense of litigation. Workmen's compensation recognized the cost of industrial accidents as properly one of the costs of production and therefore made it chargeable to the industry and eventually chargeable to the ultimate consumer, by increased cost of the commodity produced.

"Not the least interesting effect of this changed attitude was that upon insurance. Under the employers' liability system insurance had been necessary, for the employer needed to be protected against improper claims, but the benefits that were derived from such insurance inured almost exclusively to the employer. Insurance under the employers' liability system had little social value in ameliorating the effects of accidents. This was the fault of the system. The companies attempted to supply this deficiency by the system of Workmen's Collective Insurance, as it was called, but the increased cost of this made most employers feel that it was competitively impossible.

"Workmen's compensation insurance is fundamentally different. Whereas in the case of employers' liability insurance it was agreed only that the employer should be reimbursed if he were held liable, and there was no agreement primarily to make payments to the injured workman, the workmen's compensation system, on the other hand, involves in its nature a definite agreement to pay compensation in accordance with the schedule of payments laid down in the law. Workman's compensation insurance has therefore come to be a most important element in bringing about social justice.

"Its direct effects in accomplishing a proper distribution of the cost of industrial accidents upon employers and of the benefits to the injured workmen and their dependents is too obvious to need to be enlarged upon, but the indirect effects of the insurance system upon accident prevention and upon the intelligent handling of the whole problem, while quite as important, are far less evident at first sight. I take this opportunity therefore to call your attention in some detail to these important indirect sociological effects of workmen's compensation insurance;

and as this Bureau with which I am connected is charged with the duty of working out the detail of this system as regards the rates, I may be allowed for the sake of concreteness to refer to the work of the Bureau along these lines.

"The Bureau issues as the basis of its rating system a so-called *Manual*. This contains the basic rates for each compensation state for some 1400 classifications or industries. These are average rates and are based upon the collated experience of the companies. This, however, is by no means sufficient. The *Manual* rate for machine shops, let us say, is 80 cents; this means only that, if this rate is applied to all machine shops, enough money will be received to meet the losses. It does not mean that the rate is individually right for every shop, for in some shops the conditions are good, there is abundant light, the gears are guarded, there is a foreman interested in safety; in other shops the conditions are quite the opposite. The average rate is evidently inapplicable in both these cases. For the sake of justice, therefore, and in the interests of good business, it becomes necessary to devise a system to take account of the hazard of the individual risk in distinction from the hazard of the class.

"This is done by a so-called system of schedule rating which, using the manual rate as a basis, modifies this by credits and debits for conditions that are respectively more favorable and less favorable than the conditions upon which the manual rates are based. This system is applied through a system of inspections. The preventive effect of a system of this kind is readily seen. When it becomes apparent to an employer that he can by making improvements in his plant obtain a reduction in his rate which will pay for his improvements in from two to four years, he usually makes them, when the humanitarian appeal alone was not sufficient. The effect is to capitalize at a high return the economic savings in premium and invest it in the production of safety. We have commercialized safety and made it pay. Last year at least 30,000 risks were rated under this system and the reduction in premiums amounted to several million dollars.

"While this system depends, in the main, upon the physical condition of the risk, in certain classes of risks, for instance, contracting, this is scarcely applicable, and for such cases an individual rate is arrived at by a system which makes use of individual experience. But in either case, whether safety work is

reflected in the physical condition of the risk or in the effect as evidenced by experience, the result is the same—to make safety pay.

“Two interesting by-products of the system of schedule rating have materialized. Schedule rating implies standardization, for it is impossible properly to provide for debits and credits unless the conditions from which departures are supposed to occur are thoroughly standardized. To carry this system out successfully it therefore became necessary for the Bureau to prepare standards for conditions affecting safety. These it is issuing in a series of volumes; the first volume, covering general conditions and conditions in machine shops and foundries, has already been published; the second volume on standards for wood-working machinery is on the press.

“It is not sufficient however to issue such general standards. It is necessary to pass in detail upon given devices. This condition arises for instance: a manufacturer has devised a guard for a stamping press; he brings it to us and asks whether it comes up to our standards; he then asks us to examine it and suggests that if it prove acceptable he should be given some assurance that employers who make use of this guard are entitled to a reduction in their insurance rate. It therefore becomes necessary for the Bureau to enter upon the work of testing and labeling specific articles and devices.

“For this purpose we are fortunate in having been able to make an affiliation with the Underwriters' Laboratories of Chicago, which was already doing this kind of work with remarkable success in the field of safety from fire. Last year the Underwriters' Laboratories issued some 40 million labels on fire hose, electric wire, fire preventive devices and other articles having a relation to the fire hazard. The work of the Underwriters' Laboratories in this new field bids fair to become quite as important as the work in the field of safety from fire.

“The preceding outline has, I hope, suggested what an important part the insurance companies may play in the development of the great social possibilities of workmen's compensation. We bespeak your interest and co-operation in this work. The exhibit of the Workmen's Compensation Service Bureau in the Mining Building will explain in more detail some of the developments that in this article have been only suggested.”

CHAIRMAN EDWARDS (continuing): I consider that this discussion has thrown a very interesting light on the future line of compensation insurance. The great fault that we have had to find with insurance interests generally—stock insurance—is that they insure the whole community, and that we, as individual insurers, have to pay our share of the average cost. Here is an effort, as you will see, to appraise each risk on its merits. If an employer has safe-guarded his machinery; if he has organizations for safety, and makes a study of how to avoid accidents rather than to compensate for them after they have occurred, he gets recognition in his rate; and if that idea prevails—and I should not be surprised if it would—a great many objections to the stock insurance plan might be considerably modified.

I want to make this explanation, so that you will know what the Committee has in mind in presenting a paper of this kind, and also this discussion. The paper is now in your hands, gentlemen.

MR. HENRY W. PECK, Schenectady, N. Y.: When, a year ago, the legislature of the State of New York passed the most stringent compensation law in the world, the officers of the Empire State Gas and Electric Association took the matter under careful consideration. Conferences were held with the state officials, with officers of stock companies, and with other experts in the insurance field. Data applicable to compensation insurance, extending for years back, were obtained from many companies operating in the State. As the result of this study, a mutual insurance company was organized, to include only gas and electric companies of the State of New York. As a result of these studies, and of ten months of experience since this law went into effect, the following notes regarding mutual insurance have been prepared:

PURPOSE OF COMPENSATION LEGISLATION

(1) The obvious purpose of the workmen's compensation legislation recently enacted throughout the country has been the compulsory compensation of workmen, or their dependents, for injuries sustained during the course of employment. The underlying purpose, however, and it is more evident in the legislation of some states than of others, is the elimination of accidents. This underlying purpose is very evident in the New York Law.

NEW YORK LAW

(2) In New York State the workmen's compensation law permits (a) insurance in the State Fund (b) insurance with stock insurance corporations (c) insurance with mutual associations or companies and (d) self insurance.

(3) Self and mutual insurance provide financial incentive to employers to utilize every means to eliminate accidents. Self insurance, however, is applicable to only a comparatively few on account of the necessity for providing security as to the compensation feature.

(4) The legislature apparently recognized the potential possibilities of mutuals, especially trade mutuals, in the elimination of accidents. It provided for the formation of such mutuals by a special law. It also provided in the workmen's compensation law for associations of employers in the same business for accident prevention. A trade mutual will almost automatically become such an association whether it assumes the name or not.

(5) As a further incentive for mutuals and for the benefit of employers joining them, the law provides that the compensation commission may compute the present value of an award requiring periodical payments and may accept a sum equal to such value from the insurance carrier, and thereupon the insurance carrier is relieved from all future liability in the case, such liability being assumed by the State. This provision is of great importance to the mutuals and answers the argument so often made in reference to the continuing liability of the members.

(6) In this State the merit rating system is in operation, which furnishes some financial incentive to employers to make their equipment more safe even under stock company insurance. As, however, this system applies equally to all classes of insurance, the decided advantage remains with the mutuals.

ACCIDENT PREVENTION

(7) The inspectors of a mutual company are chosen for their knowledge of the particular kind of business in which the members of the mutual are engaged. They advise the members in a practical way of improvements in equipment or methods which will tend to reduce the accidents. It is hardly possible for a stock company to employ as inspectors experts in each in-

dustry or to keep in such contact with the employers as appears necessary in order to accomplish the best results.

(8) Each member of a mutual is interested not only in the conditions in his own organization but also in those in the organization of every other member of the company. This is a very decided help in accident prevention, as advice or comment from another in the same business carries much greater weight than such advice or comment coming from a stock insurance company.

RATES

(9) The minimum rates which may be charged are computed and prescribed by the insurance department. They are the same for stock and mutual companies. In the mutuals, however, the balance at the end of the year after setting up all reserves belongs to the members and thus tends to a reduction below this minimum.

(10) Ordinarily, accident experience, which is the basis for all rates, is kept for each industry as a whole. A mutual, however, covering only one or two industries can subdivide these data and such experience for the different classes of work done will form the basis for future modifications in the rates. In the electric light and power business for example, there are a large number of classes and sub-classes into which the work can be divided, and after experience covering a sufficient length of time, the risk in each of these groups can be computed.

RESERVES

(11) When an accident happens the probable cost is figured and a reserve set up. In both stock and mutual companies this reserve if it includes compensation to the injured employee must be approved by the compensation commission.

(12) Quarterly reports are required by the insurance department and the books of the companies are inspected from time to time, special attention being given to this subject of reserves.

(13) At the end of the year the balance over and above all expenses and reserves for future payments may be returned by a mutual company to its members but only with the consent and approval of the insurance department. The more conservative mutuals retain, however, a considerable portion of this balance in one form or another as an additional reserve fund.

(14) Another form of reserve, employed by mutuals especially in their early days, is re-insurance against losses over a certain amount.

SAFETY

(15) The New York law specifies the minimum number of employers and of workmen necessary for the formation of a mutual company and as already stated the organization and operation of the company in all its details is under complete supervision of the insurance department.

(16) The public service business is peculiarly adaptable to a mutual insurance proposition. The companies are all located in different communities, which creates an unusually high diversity factor and adds greatly to the safety of the company. The men are more or less scattered and divided up into small gangs and a catastrophe involving more than one gang or even more than one member is hardly conceivable.

(17) Under public service regulation the accounting method is the same for all companies operating in the same State and accurate accident data are therefore very easily obtainable.

(18) The regulating commissions are striving not only to insure good service to the public but also safety to the employee, and they have power to require changes in equipment or methods. By co-operating with the commissions a mutual composed of public service companies may accomplish much which would otherwise be impossible in reducing the number of accidents, which is the surest way to strengthen the company.

(19) As already mentioned, mutuals, in New York at least, may buy from the State a release from further liability in any particular case. In other words, the State actuaries compute the probable amount the case will cost and the State then agrees to take the gamble. Thus at the end of the year or any other period the company can tell exactly how it stands and the members need have no worry as to any future liability for accidents which have happened.

(20) Ten months' experience of a mutual composed of 72 electric and gas companies in New York State shows losses 12½ per cent, re-insurance 5 per cent and all other expenses 21 per cent of the premiums. This is a total of 38½ per cent. The percentage of losses includes all reserves set up for future payments where a release has not been purchased from the State.

CHAIRMAN EDWARDS: Does any one else desire to discuss this paper? If not, we will proceed to the next number on the program. This is to be a paper on "Electric Vehicle Cost Accounting," prepared by Mr. W. P. Kennedy of New York City. Mr. Kennedy is an expert on electric vehicle operation, and is also one of the Council of the Electric Vehicle Association of America. We have with us this morning Mr. A. Jackson Marshall, who is the Secretary of the Electric Vehicle Association of America, and I have asked Mr. Marshall to present Mr. Kennedy's paper.

ELECTRIC VEHICLE COST ACCOUNTING

The purpose of this paper is to offer recommended practice for reducing to definite and generally accepted form a statement of the costs of automobile equipment service, whereby the investment involved and the annual expense of the entire equipment, as well as the daily charges against units of each size may become manifest, this purpose to be accomplished without imposing any restrictions upon individual preference in the detail of the method employed in cost keeping.

There are many obvious reasons for developing the cost of electric vehicle operation upon a common basis which would serve comparative purposes. The methods of record keeping as now practiced in central stations are so diverse that exchange of information is difficult and the demand therefore exists for something on the order of a balance sheet, to which all detail systems may be reduced, thus providing a common instrument for exchange and comparison, which will not only effect such general purposes, but also serve the auditor and administrative officers with concrete information for their specific requirements.

The form of statement proposed appears in the following SCHEDULES A and B, with figures covering an assumed installation filled in to present a more complete illustration of its application. This form has been developed from a long and varied study of the requirements in this province and has been employed so successfully that it is offered with a confidence in its utility warranted by experience.

In SCHEDULE A a statement of the INVESTMENT is given, which is a necessity to the determination of the fixed charges, as constituting part of the annual expense. Under this heading of INVESTMENT the cost or market value of the machines is given as well as that required for the collateral equipment necessary to their maintenance and operation, such as spare parts, charging apparatus, or other garage fittings, as well as books, record systems or office equipment. "Buildings" appears under this heading to cover such cases where special structures have been provided, but as the expense item of rent will provide for all charges against such investment it may not be necessary or desirable

Cost Analysis—Electric Vehicle Installation

Of The Blank Electric Light & Power Company,
New York City.

Business Energy Supply. June 30th 1915.

INVESTMENT

2	750#	Machines	@	\$ 1500.00	\$ 3000.00
3	2000#	...	@	2800.00	8400.00
10	3000#	...	@	3000.00	30000.00
3	6000#	...	@	3800.00	11400.00
			@		
Spare Parts Equipment					1320.00
Garage Equipment					1800.00
Office Equipment					180.00
Buildings					

TOTAL INVESTMENT 56100.00

ANNUAL OPERATING EXPENSES

FIXED CHARGES

Interest on Investment	\$56100	@ 3	%	\$ 1683.00
Depreciation:				
Machine Equipment	\$ 52800	@ 10	%	5280.00
Spare Parts Equipment	\$ 1320	@ 10	%	132.00
Garage Equipment	\$ 1800	@ 5	%	90.00
Office Equipment	\$ 180	@ 5	%	9.00
Buildings	\$	@	%	
Insurance		@	%	2328.00
Licenses		@	%	126.00

TOTAL FIXED CHARGES \$ 9648.00

MAINTENANCE

Tire Upkeep (Labor and Material)				\$ 4144.00
Battery Upkeep (Labor and Material)				4435.00
Mechanical Upkeep (Labor and Material)				2640.00

TOTAL MAINTENANCE \$11219.00

GARAGING

Electric Power	@ 4	cts. per K W. H.		\$ 4230.00
Supplies, Lubricants, Washing Materials, etc.				831.60
Labor, for cleaning and care				1108.80
Rent, Light, Heat, Water and Telephone				1971.00
Building Upkeep				

TOTAL GARAGING \$ 8141.40

OPERATION

18 Drivers @ \$15. (Average) x 52 weeks				\$14140
Helpers @ " " x 52 "				\$14140.00
Demurrage, Ferry Charges, Claims, Damage, Accidents				
Extra Horse and Wagon Hire, Expressage, etc.				
Platform Labor				
Miscellaneous Expense				

TOTAL OPERATION COST 14140.00

ADMINISTRATION

Salaries and Office Expense				\$ 1800.00
				\$

TOTAL ANNUAL EXPENSES \$ 44948.40

Statement of Proportionate Machine Operating Expense

(ANNUAL)

CAPACITY OF MACHINE	750#	2000#	3000#	6000#	Annual Totals
Annual Charges per Machine					
Interest @ 3%	45.00	84.00	90.00	114.00	
Depreciation @ 10%	150.00	280.00	300.00	380.00	
Insurance	115.00	128.00	180.00	138.00	
License	7.00	7.00	7.00	7.00	
Tire Upkeep	119.00	212.00	225.00	340.00	
Battery Upkeep	170.00	200.00	240.00	365.00	
Mechanical Upkeep	75.00	140.00	180.00	190.00	
Electric Power	120.00	170.00	240.00	360.00	
Total per Machine	801.00	1221.00	1582.00	1894.00	
Number of Machines	2	3	10	3	
Total per Group	1602.00	3663.00	15820.00	5682.00	24767.00
Proportionate General Charges					
				Other Equipment	
Interest on Additional Investment @ 3%	11.00	16.50	55.00	16.50	99.00
Depreciation on Additional Equipment @ 10%	25.66	38.49	128.30	58.49	251.00
Garaging less Power	454.60	651.90	2175.00	651.90	3911.40
Administration	800.00	800.00	1000.00	800.00	1800.00
Annual Expense per Group, less Operator Expense per Machine per Annum	2275.26	4669.89	17176.30	6688.89	30806.40
Expense per Machine per Day	5.69	5.05	5.58	7.24	
Operators per Day Other Operation Exp.	2.00	2.50	2.50	3.00	14140.00
Total per Machine per Day.	5.69	7.55	8.08	10.24	44946.40
Cost per Ton					
Cost per Package					
Cost per Mile					

to record investment in buildings, or any specific expense relating to buildings other than rent.

The ANNUAL OPERATING EXPENSE is subdivided into five sections, as shown. The items under FIXED CHARGES are obvious. MAINTENANCE covers the outlay for material and labor required in the up-keep of the wearing portions of the equipment in practical working condition. GARAGING includes the charges relative to the care, cleaning and housing of the machines, as

well as the electrical energy required for charging batteries. OPERATION charges cover those associated with the operation or service of the machines. ADMINISTRATION indicates the proportionate cost of executive supervision and office expense.

SCHEDULE B

SCHEDULE B provides a means of allocating the annual operating expenses developed in SCHEDULE A against each of the machines in the equipment, according to size, and of determining from the pro-rated annual expense against each machine its daily operating cost, with and without operator.

The final daily operating cost of each machine is the most desirable measure of the service rendered. This can, of course, be resolved into functional cost for such performances as may constitute the day's work. Thus we may derive the cost per package delivered, the cost per ton transported, per meter installed, per arc lamp trimmed, or any other function which may be a regular daily performance. It will be readily conceded that the daily service cost of the machine is the only satisfactory basis of common comparison, as so many peculiar conditions surround the performance of work done in each particular installation as to cause considerable variance in the cost of any other function than the day's service.

Observation of the various groups of charges appearing in the statement of ANNUAL OPERATING EXPENSE in SCHEDULE A will develop the fact that few of these charges require to be recorded from day to day in the garage and those who desire to reduce such record keeping to a minimum may confine it to the items under the heading of MAINTENANCE, with the possible addition of the electrical energy required for charging each machine. In other words, all the other items which are not of daily occurrence will be available in the bookkeeping department of the organization as a matter of routine record; these are, Fixed Charges, Insurance, Licenses, Garage Supplies, Labor Pay-Roll, Rent, Light, Heat, Water, Telephone, Driver's Pay-Roll and Office Expense. It will be evident that a very simple card system will serve the purpose of recording the daily garage operations above suggested. It must also be apparent that the less recording to be done in the garage the better for the accuracy of the accounting.

An inspection of a number of the record sheets employed in relation to the electric vehicle equipment of several central stations disclosed a great variety of sub-headings which, while perhaps necessary to serve the immediate purposes of those in charge, might be readily grouped under the sub-headings recommended in SCHEDULE A; and which for the purposes of illustration are shown herewith together with the reference number indicating the proper location of each in SCHEDULE A. It will be evident therefore, that the layout of SCHEDULE A is comprehensive enough to embrace almost any charge which can be considered as bearing upon the operating cost of electric vehicle equipment.

SCHEDULE A SUB-HEADINGS		SCHEDULE A REFERENCES	
No.		No.	
1	Interest on Investment	1	Interest
2	Depreciation Machine Equipment	2 to 6	Amortization
3	" Spare Parts "	7	Fire Insurance
4	" Garage "	7	Liability Insurance
5	" Office "	8	Registering Vehicle
6	" Buildings "	8	Chauffeur's License
7	Insurance	9	Tires
8	Licenses	9 to 11	Repairs Labor
9	Tire Upkeep	9 to 11	Repairs Material
10	Battery Upkeep	9 to 11	Repairs Expense
11	Mechanical Parts Upkeep	10	Battery
12	Electric Power	11	Mechanical Repairs
13	Supplies, etc.	11	Painting
14	Labor, Cleaning and Care	11	Chassis and Body
15	Rent, Light, Heat, etc.	11	Improvement
16	Building Upkeep	11	Repairs Motive Power
17	Drivers	11	Repairs Running Gear and Body
18	Helpers	12 to 16	Storage
19	Demurrage, Claims, etc.	12	Current
20	Extra Horse Hire	13	Sundries
21	Platform Labor	13	Oil
22	Miscellaneous	14	Garage Supervision and Labor
23	Salaries and Office Expense	15	Rent
		17	Driver
		19	Damages
		22	Miscellaneous
		23	Administration

MR. MARSHALL (continuing): This paper is particularly opportune, in view of the fact that the electric vehicle, which is probably the greatest single development in the entire electric industry to-day, and is rapidly assuming very large proportions, will be upon a number of Central Stations before they realize it, and it is quite necessary that plans be made in advance to take care of the operating records in various cities. Mr. Kennedy, the author of this paper, is a consulting engineer, and he has given a great deal of time to the study of electric vehicle operation, and I am sure that anything he may say on this subject will be entirely practicable.

CHAIRMAN EDWARDS: The paper by Mr. Kennedy is now before you for your consideration, and any suggestions that you have to make. This paper was prepared in response to a considerable demand by member companies for some system by which they can keep track of their electric vehicle costs.

DISCUSSION

MR. DAY BAKER, Long Island City, N. Y.: I would like to say in commenting on Mr. Kennedy's research in regard to the cost of operation of electric vehicles, that undoubtedly he has put more labor and thought into this particular study than any other electric vehicle transportation engineer in the country. I have been privileged to examine reports which Mr. Kennedy has received from nearly 1000 electric vehicle installations, and I feel that it would be of great interest and education to any of the members to see the work and the amount of thought that has gone not only into Mr. Kennedy's inquiries, but also into the replies which have been received by him. One large Brewing Company took occasion to compliment Mr. Kennedy on the closeness of the estimates which he had made of the cost of maintaining electric vehicles. This company went into great detail in the matter and confirmed Mr. Kennedy's estimates of their costs as correct. I looked through about 75 letters from operators of electric vehicles, and they stated that Mr. Kennedy's estimates, as he had prepared them, asking for their correction, were in every case practically correct. I believe that anyone interested in the cost of operating electric vehicles would do well to secure from Mr. Kennedy or from the *Electrical World*, which has published much of his

work on this subject, a copy of his complete report, in order that they may be thoroughly informed on the cost of operation of electric vehicles, and in a position to compare this with operation by other methods of transportation.

As Mr. Marshall has very well said, the electric vehicle is going to be thrust upon the central stations almost before they know it. Its use is increasing very fast not only in this country but abroad. Many foreign shipments have been made during the past year, and the people of South America, Africa and Australia are realizing that electricity as a prime mover of merchandise is far cheaper than horses or gasoline. I had an illustration sent me a few days ago of the reliability and economy of the electric truck from the "cost of repair" standpoint, and amount of work performed. The officials of the New York, New Haven & Hartford Railroad decided that some more economical method should be employed for the purpose of moving what they call "broken lots" of freight, and two years ago purchased two 5-ton trucks. These trucks only move about 16 miles a day, but in moving 16 miles a day they are able to save the railroad corporation in Boston something like \$42 a day over the cost of doing the work by what was known as the "shifter process." Not only that, the complaints on lost freight and delayed freight have been reduced to 7 per cent of the former number.

I might say that their costs of operation would seem somewhat high to the ordinary individual, for this reason: they employ a first-class man to drive the machine. This man is an educated clerk, who takes charge of the shipments of freight and not only drives the machine but keeps a record of all the shipments. He has with him and carries on the truck four handlers, so that when the truck drives up to the freight house it is not necessary for him to call for helpers, as the four men on the truck immediately remove the freight while the driver takes account of it, with the result that the losses are very few.

A letter recently came from the New York, New Haven & Hartford Railroad, which states that in the past 22 months their costs for repairs on these machines have been only \$16.96, which is, of course, a remarkably low amount, considering the fact that these machines are run over very rough pavement and over railroad tracks where the going is very bad. This is only just to illustrate the fact that transportation by electricity is cheaper,

where it is properly applied, than any other form of transportation. Horses have been tried on this work; gasoline machines have been tried; now, finally, the railroad after much experimenting has adopted electricity. The current for operation is bought from the Boston Edison Company, which charges them 10 cents for the first 20 hours of consumption, and thereafter the charge is at the rate of 3 cents per kw-hr up to 2000 kw-hr, when they go on a secondary rate of 2 cents and this amounts to about $2\frac{1}{2}$ cents a kilowatt-hour on the total bill. I know that the officials of the New York, New Haven & Hartford Railroad are much pleased, not only with the operation of the vehicles, but with the economy, both as to operating costs and the cost of the current for charging the machines.

MR. MORBIO, San Francisco: I would like to know something about the rate that should be charged for electricity for vehicles. Has anyone had any experience as to the maximum and minimum rates?

CHAIRMAN EDWARDS: I understand that Mr. W. E. Holmes of Cambridge, has given a great deal of study to this subject. Will you favor us with your views, Mr. Holmes.

MR. WELLES E. HOLMES, Cambridge, Mass.: I have had this paper but a few minutes. I find the statement on page 76, Schedule A, of interest. Probably this is a dummy sheet, but I notice that the company charges itself with electricity for charging at 4 cents per kw-hr. I want to ask for my own information what rate companies charge themselves for their own vehicles, what rate per kw at their own stations. We charge ourselves with switch-board cost, and we put it at 1 cent. For even figuring, we charge our own bills at station, there being no additional cost incurred, with 1 cents per kw-hr. This charge of 4 cents seems to me excessive, unless this is a dummy sheet.

MR. BAKER: If I may be pardoned for speaking again, I will say that Mr. Kennedy, in making up this sheet, adopted the price of 4 cents per kw-hr for the reason that, taken all over the United States, 4 cents is an average price at which electricity is charged. Many foreign and small companies are charging as much as 10 cents or 8 cents per kw, while some charge 6 cents. The Boston Edison Company averages about $2\frac{1}{2}$ cents per kw-hr. But taking the average all over the country, the figure will come to about 4 cents. I might say, for the benefit of those here, that

the Electric Vehicle Association, about two years ago, secured as a "Report of the Electric Vehicle Charging Rates Committee," a large table of rates covering all the charging tables throughout the United States, and undoubtedly the secretary of the Electric Vehicle Association can supply any member with one of these tables.

CHAIRMAN EDWARDS: Have you any figures, Mr. Marshall, on company charges? A question has been asked by a gentleman from the Pacific Gas & Electric Company as to the proper method of charging for services.

MR. MARSHALL: I haven't those figures with me. It is very easy to supply them, as has been indicated by Mr. Baker; but that 4 cent rate may have been put there for another reason. Many central stations have been rather luke warm toward the electric vehicle. It has been stated that if they could get current for "nothing," (would not charge current), they might be able to operate the electric vehicle successfully in competition with the gasoline car. But, even charging themselves with a 4-cent rate, the central stations will find that, as a general proposition, they can operate electric more economically than they can gas cars, paying the regular rate for gasoline.

MR. A. G. JONES, San Francisco: I would like to ask Mr. Marshall how he arrives at 3 per cent interest on the investment, and figures depreciation on machine and equipment from 10 to 20 years. I am wondering how a machine can last that long.

MR. MARSHALL: An electric vehicle, unfortunately, is something that rarely ever wears out. That is one of the greatest obstacles with which we have to deal. You take the passenger type, these old styles of 10 or 15 years ago, are eternally rising up as a nightmare to show us how inartistic we were at that time. The machines are just as good as they ever were, and they will probably be running for 10 years to come, unless someone blows them up. There are in operation in New York City electric vehicles 10, 12 and 15 years old. At the recent electric vehicle show, held under the auspices of the New York Edison Company, I recall one vehicle, belonging I think to Mr. Baker's company, which had been repainted and put in the exhibit, and which looked more like a new model. That machine is about 12 years old.

MR. W. G. DRISCOLL, San Francisco: I might add that a week or so ago I received from the *Electrical World* a request

that we give our data on electric vehicles and submit our costs, along the same lines as indicated in the paper. We consider that interest on the investment at 3 per cent and depreciation at 10 per cent are inadequate, and the statement we sent to the *World* was made on that basis. We charge 7 per cent for interest, and consider the life of the machine four years. That is our custom, to charge off 2 per cent a month as the life of an automobile.

CHAIRMAN EDWARDS: Is that based on your judgment or your experience?

MR. DRISCOLL: It is based both on our judgment and our past experience. We do not differentiate between trucks and automobiles. While the Pacific Gas & Electric Company has probably 200 machines, we have not gone into it on such a fine basis at that.

Perhaps the *Electrical World* is going into a discussion of this matter. It has evidently asked the various companies all over the country to give data on this detail, and probably some future publication of that journal will contain a lot of figures that will be useful to the members.

MR. G. R. MURPHY, San Francisco: I would like to ask Mr. Driscoll if that 2 per cent a month on 200 machines is not made up on a gas car basis? His company has nearly 200 machines, but not many electrics.

MR. DRISCOLL: No, we have not. When we decided to use that figure, we were probably not using as many electrics as we are now. We made that figure three or four years ago.

MR. J. D. BUTLER, San Francisco: I am speaking for San Francisco. Mr. Driscoll's remarks cover the gasoline automobile. We found that electric trucks and automobiles were inadequate for San Francisco, but lately they have been taken up again by our District Manager, and with the General Vehicle Company, and we recognize more and more the usefulness of electric trucks. They will be charged and run for outside draying firms. Mr. Driscoll has asked for the life of an electric truck and compared it with an automobile, saying that the life of a gasoline automobile is four years. He is right. That was the depreciation, plus the automobile; four years. As for electric trucks, I do not think they would run for 10 years in San Francisco, as was suggested by one of the speakers, because, on account of our hills, they would be subjected to a great deal of wear and tear.

MR. H. W. HARRISON, Los Angeles: We have, in the City of Los Angeles, some electric vehicles that were shipped out in 1903, and are still giving excellent service, being used every day. They are used for house moving, and in fact for everything; they are owned by the Los Angeles Street Railway Company.

A gentleman here from the Great Western Power Company has asked regarding the rates for charging vehicles. In Los Angeles, our company operates one of the largest electric vehicle garages west of Chicago. We are using something like 30 000 kilowatts a month. Our rate goes down, starting at 5 cents a kilowatt, until we use 3000 a month, when it gets to 1.2 cent per kilowatt per hour, with a reduction of 20 per cent off that. If current is used off the peak load, our rate gets down to 1.3 cents per kilowatt. Power companies are all competing for that line of business now; they consider it absolutely "found money."

MR. MURPHY: Is there not some rate below which it would be inadvisable for a power company to go in the matter of electric vehicles? I believe there is a certain point below which it is not necessary to drop, even in the effort to encourage the use of electric vehicles. That point has some relation to the kilowatt-hour and the cost in cents per gallon of gasoline. I wonder if any one has had experience with that minimum rate?

MR. MARSHALL: I think we can lay entirely too much stress on the cost per kilowatt-hour. There has been a tendency in the past for some manufacturers to demand excessively low rates, and for the central station, on the other hand, to cry for cheap vehicles. I think the lighting companies can be depended upon to give a rate which is justifiable. The cost of current represents only about 6 or 8 per cent of your total operating costs, and if you have a rate of say 5 cents per kilowatt-hour, and you have reduced that to 2½ cents, you are not reducing your operating cost 50 per cent; you are probably reducing it about 5 per cent, hence your cost of current is not the essential factor that we are sometimes led to believe.

The gentleman from San Francisco has spoken about the hills. It is an easy matter to work up a lot of excuses if you do not want to do anything, and it is astonishing how many excuses we find in the central stations for not using electric vehicles. Fortunately, those excuses are bound in time to run out and

become exhausted. Meanwhile the executive heads, the administrative heads, of the electrical industry are developing a policy which will be favorable to the electric vehicle; that is, "electrics" will be used unless it can be conclusively demonstrated that for the same work a gasoline car will do so much better that the electric cannot be considered. In other words, the burden of proof is going to be placed on the gasoline car.

We say, "Do it electrically," and we co-operate sometimes. It is a rather difficult thing to say to the public, "Use electrics" when we ourselves use gasoline cars. Our position is ambiguous, and the electric vehicle salesman has a pretty hard row to hoe. I can assure you that we have a history back of us. Here in San Francisco electric vehicles have been successfully employed for more than ten years, and the data which you find here in the paper are not based on supposition but on fact. As Mr. Baker has stated, the *Electrical World*, which has gone very carefully into this matter, has prepared a series of papers, one of which I believe appeared in the May 22nd issue, and these contain in tabulated form the result of responses from some two or three hundred cases all over the country.

Mr. William P. Kennedy, a consulting transportation engineer, who has been conducting for the *Electrical World* the investigation of electric vehicle operating costs, states in explanation of his tabulated matter:—

"In the investment account was included not only the value of the vehicles, but also that of the equipment necessary to their employment, such as spare parts, charging apparatus and other garage devices, as well as office equipment, books and record-keeping necessities. The investment in buildings was omitted, as were also the charges for their depreciation and upkeep, as the item of "Rent" in the garaging expenses will adequately take care of the charges against buildings in every case, whether these are owned or leased.

"The annual operating expenses covers all the charges which can be made against the equipment upon an annual basis under the five subdivisions of Fixed Charges, Maintenance, Garaging, Operation, and Administration.

"The fixed charges include the interest and the depreciation at generally accepted rates. While the interest is shown at 3

per cent on the original investment, this is intended as the equivalent of 6 per cent on the average investment spread over the life of the equipment. In explanation of this statement it may be said that the original or total investment is gradually refunded by the charges made for depreciation. Hence the amount of money represented in the investment is constantly being reduced. The average investment per annum throughout the life of the equipment will therefore be equivalent to half the original investment. Instead of stating the interest as 6 per cent on one-half the investment, use has been made of the method generally preferred by auditors, of stating the equivalent in interest at 3 per cent on the total investment.

"In view of the fact that when their equipments were first secured many owners arbitrarily decided upon a five-year life and charged their depreciation accordingly at 20 per cent per annum, while those owners who have actually used their equipments for ten years find them still in as serviceable condition as ever, with prospective life ahead of another ten years, and hence estimate the rate of depreciation at 5 per cent per annum, the charge for depreciation has been set herein at 10 per cent per annum, which may be regarded as a reasonable compromise.

"In 'fixed charges' are included insurance and licenses.

"The mechanical upkeep is intended to include every charge relating to the maintenance in serviceable condition of all of the physical equipment of the machine except the batteries and tires.

"Under 'administration' is prorated against the electric-vehicle equipment a reasonable proportion of the general executive supervision of the organization as well as the accounting and office expense.

SUMMARY OF RESULTS

"Electric vehicles are now being operated for the following daily cost, with a possible reduction of from 5 per cent to 10 per cent in large installations or in service where only a limited amount of the machine's daily normal working capacity can be taken advantage of:

Haulage Weight, Lb	Cost per Day to Operate	Haulage Weight, Lb	Cost per Day to Operate
700.....	\$5.68	4,000.....	\$8.92
1,000.....	6.34	7,000.....	10.38
2,000.....	7.56	10,000.....	11.74

In the above table are shown the costs of operating the regular standard sizes in which electric vehicles are made, in so far as mechanical and motor equipments are concerned. Each size may be modified or augmented by change in the battery and the tire equipment."

MR. BUTLER: In 1905, while in our old building in Post street, our superintendent of electricity and gas used an electric automobile, but he had trouble with the hills. We are now using electric trucks on the hills of San Francisco, and find them far superior to gasoline trucks; in fact we do not use gasoline trucks in San Francisco on the hills. Our experience with electric trucks covers above six years.

MR. JONES: Mr. Marshall has answered my question as to the 3 per cent interest on investment. It strikes me that is low.

CHAIRMAN EDWARDS: I think it is low.

MR. BAKER: I would like to say something in regard to charging 3 per cent interest on investment, because it is a question which is gone into very thoroughly by vehicle manufacturers in computing the cost of maintaining vehicles. It is simply a matter of arithmetic. If anyone will figure it out, he can see that we are ordinarily depreciating the vehicles at 10 per cent per year. Taking a vehicle which is valued at \$2000, the first year you will figure your interest on full value, at 6 per cent. At the end of one year you value your vehicle at \$1800; the following year you figure your interest on only \$1800, 10 per cent of original cost making a value of \$1600. You will therefore figure the next year at \$1600. You have only to go on down the line for the 10 years and figure it out, and you will find that the interest charge will average 3 per cent for the total time.

CHAIRMAN EDWARDS: If no other person desires to speak on this subject, the Chairman will close the discussion by stating that in New York City our company has a fleet of 100 vehicles, two of which are gas, and that has been the situation for the last year. We carry a great deal of material around the streets and in the neighboring territory, and I am very glad to say that we transport our officers around the city with a good deal of ease and comfort and a great deal of elegance, and it is all electrical transportation.

A motion to accept this paper and have it printed will be in order.

(Motion made, seconded and carried)

CHAIRMAN EDWARDS: The next item on the program is a paper by Mr. P. R. Ferguson of Riverside, California, entitled "Record of Property or Construction Expenditures."

RECORD OF PROPERTY OR CONSTRUCTION EXPENDITURES

FOREWORD

The spirit of modern times, tending as it does more and more toward regulation of corporate affairs, with a special penchant for public utilities, makes it highly important that a clear and comprehensive record be made and maintained of all property whether acquired by purchase or constructed in the ordinary routine of the business. It is especially necessary that the corporations maintain such a record so as to enable them to be in a position to substantiate their property values in rate hearings and investigations of a similar nature. As it becomes necessary from time to time to furnish inventories of the physical properties to State, municipal and other governing or regulating authorities it is particularly valuable to have an accurate detailed property record. In fact were such a record always available there would probably be less demand for such inventories.

**Additions
to
Property** No additions to property whether by purchase or construction involving an expenditure of \$100 or over (or such sum as the officials of the Company may determine) should be undertaken except under authority of the Board of Directors or other governing body.

**Preparation
of
Estimate** To present the matter before the Directors it is necessary that a careful estimate of the expenditures be prepared supported with such maps and drawings as are required to fully explain the work under contemplation.

For the ordinary routine work estimates may be prepared either by the local representative or by the Construction Department on information supplied by the local man, or, in the event of there being no Construction Department, the Engineering Department may prepare the estimate from information supplied by the field. It will be found advantageous in case of large installations of power plants and in construction of transmission or distributing lines to have the Engineering Department prepare the estimates, as work of this magnitude is usually initiated by this department.

(b) *Detail sheet*

Showing itemized statement of quantity and cost of material required

- Labor cost
- Indirect expense
- Salaries and wages
- Miscellaneous expense, and
- Measurements of the plant proposed to be built

NOTE—A separate sheet should be prepared for each separate classification

(Name of Company)				
DETAIL SHEET—NEW WORK				
Type of Construction _____		Const. Requisition No. _____		
(Originating Station or District)		R. R. Com. Classification _____		
191				
REPORT NEW WORK UNDER ABOVE REQUISITION NUMBER AND R. R. COM. CLASSIFICATION				
Items of Material	Quantity	Price	Per	Amount
INDIRECT EXPENSE	%	Amount		
Supply Expense				
Supervision Eng and Tool Expense				
General Expense				
Interest				
.....				
.....				
Total Indirect Expense				
Material, Total of above.....				
Salaries and Wages				
Miscellaneous Expense.....				
Total Direct Expense				
INDIRECT EXPENSE				
TOTAL ESTIMATED COST				
MEASUREMENTS:				

(c) *Detail sheet of old plant displaced*

Showing in detail quantity and cost of material to be displaced in connection with the new work under contemplation

Labor cost of original construction

Also salvage and cost of removing

Note—From this statement will be obtained the charge to Depreciation of the plant displaced with a corresponding credit to Property account

(Name of Company)									
DETAIL SHEET—OLD PLANT DISPLACED					Const. Requisition No. _____				
Type of Construction _____					R. R. Com. Classification _____				
(Originating Station or District) _____ 191 _____									
Report Old Plant Displaced, Salvage and Cost of Removing Under Above Constg. Requisition Number and R. R. Com. Classification									
Items of Material	Original Cost of Material				Salvage				
	Quantity	Price	Per	Amount	*Quantity	Price	Per	Amount	
					Total Salvage.....				
Indirect Expense for Old Plant							Cost of Removing Old Plant		
Supply Expense			Material, Total of Above				Material		
Supervision, Engineering and Tool Expense			Salaries and Wages				Salaries and Wages		
General Expense			Miscellaneous Expense				Miscellaneous Expense		
Interest			Total Direct Expense				Total Indirect Expense		
			Indirect Expense per Detail				Indirect Expense		
Total			Total Cost of Old Plant Displaced.				Total Cost of Removing		
MEASUREMENTS:									

Form C (8 1/2 BY 11 IN)

(d) *Detail sheet*

Ordinary repairs. In connection with the new work, showing in detail quantity and cost of material together with salaries and wages and indirect expense, etc.

(Name of Company) _____									
DETAIL SHEET—ORDINARY REPAIRS in connection with Construction Requisition No. _____									
Type of Plant _____					R. R. Com. Classification _____				
(Originating Station or Dist.) _____ 191 _____									
REPORT COST OF ORDINARY REPAIRS AND SALVAGE UNDER ABOVE REQUISITION NUMBER AND R. R. COM. CLASSIFICATION									
Items of Material	Cost				Salvage				
	Quantity	Price	Per	Amount	Quantity	Price	Per	Amount	
Indirect Expense					Total Salvage				
Supply Expense									
Plant Supervision									
Engineering and Tool Expense									
Total									
	Material, Total of Above								
	Salaries and Wages								
	Miscellaneous Expense								
	Total Direct Expense								
	Indirect Expense, per detail								
	Gross Cost								
	Less Salvage								
	Net Cost								

(e) *Preliminary completion report*

To be furnished by the superintendent or foreman in charge of the work.

<small>(Name of Company)</small> PRELIMINARY COMPLETION REPORT		<small>Construction Requisition No.</small> _____
<small>Originating Station or District</small> _____		
To _____		
The work covered by the above Requisition was begun _____		
<small>Date</small> _____		
and completed _____ in accordance with approved plans and specifications with the following exceptions:		
<small>Date</small> _____		
_____ <small>Approved</small>		_____ <small>Local Superintendent</small>
_____		_____
_____		_____
_____		_____

FORM E (8½ BY 11 IN)

(f) *Completion report*

Certificate of accounting officer showing actual cost of work as compared with estimated cost.

Approvals These sheets should be prepared in sufficient number to supply those interested with copies. After approval by the Board of Directors a certified copy should be supplied to the officer in charge of the accounts as his authority to accept charges against the estimate and one copy to the department in charge of the construction as authority to proceed with the work.

(Name of Company)											
COMPLETION REPORT											
										Const. Reqs. No. _____	
Originating Station or District _____										191_____	
The following described work.											
Was begun _____ 191_____ and completed _____ 191_____											
All changes in plant have been entered on the records of the company. Note: Gross Expenditure equals cost of construction of new, plus cost of removing old plant.											
COMPARISON OF ACTUAL EXPENDITURES WITH ESTIMATED COST											
	CHARGE CAPITAL				CHARGE DEPRECIATION OPERATING EXPENSE					M. & S. Value of Salvage	Total Expenditure
	Labor	Material	Miscel. and Indirect	Total	Labor	Material	Miscel. and Indirect	Cost of Removing	Total		
Actual											
Estimated											
Over Expended											
Under Expended											
Per cent Over Expended _____											
Under Expended _____											
Remarks:											
Compiled _____						Audited and Closed in _____ 191_____					
Checked _____						Auditor _____					
Approved _____											

FORM F (8½ BY 11 IN)

Having received authority to proceed with the work it now becomes necessary to see that accurate reports are obtained not only of the labor but also of the material chargeable against the work and that these reports are in sufficient detail to give the necessary information. Upon the man on this job we of necessity have to depend for the proper classification of the labor and for this purpose the following forms are used:

ticular job or authority number and contains briefly the more salient historical and statistical data of the particular pieces of construction.

As often as any one job is completed the totals of the various classifications are transferred to a so-called Property Ledger, care being exercised that reference is made to the original authority number.

If original postings give references to pay rolls, voucher numbers, or journal entry numbers, and these original papers be carefully and systematically filed, the task of verifying the figures on any particular piece of work becomes comparatively simple.

This Property Ledger should be divided into geographical areas according to cities or towns and states, so that the cost of the property in any given area may be immediately available.

By following the plan as outlined the record available will be in form something like this:

BY CLASSES OF PROPERTY							
I Each specific piece of work costing in ex- cess of \$100 itemized in de- tail	Labor	Material	Freight	Hauling	Engr. and Supt.	Miscel.	Total
GEOGRAPHICAL AREAS—STATE, CITIES OR TOWNS							
II By totals	Classes	By of Property					Total
TOTAL PROPERTY							
III (Also(if de- sirable) Grand Total	Classes	By of Property					Totals

While all this would seem to be an unnecessary duplication of the records of the property, it has been found that the Executive and Construction Departments are able to get from it the cost of the property not only as a whole but also according to geographical areas, as well as the cost of each particular piece of work.

DISCUSSION

MR. C. E. CALDER, Dallas, Texas: I would like to inquire of Mr. Ferguson if he keeps three different sets of books from

which to derive the information shown under Classes 1, 2 and 3 on page 13.

MR. FERGUSON: I am not keeping this in its entirety at the present time, but that is what I propose doing.

MR. CALDER: We in Texas, having probably similar conditions, have worked out a construction ledger, wherein we use, as the main class, the requisition number under which the work is done. To get that number, we classify the various expenditures by the property accounts, showing the detail in a column alongside of the various columns giving the classification. The requisition numbers are made so that one number does not cover more than one city or community or town, and by having the information in that shape, we are able, from that one ledger, to prepare the data at any time by classes or by geographical distribution.

MR. D. M. SPEED, Fresno, California: We use a scheme quite similar to that which Mr. Ferguson has outlined, but we have a further safe-guard on all these requisitions by having them passed through an Inspection Department in charge of an engineer, where all costs are analyzed from an engineering point of view before the requisition is returned to the Accounting Department to be closed.

CHAIRMAN EDWARDS: An engineer who is an accountant, or an accountant who has engineering knowledge is, we find, a very valuable addition to our business. Is there to be any further discussion of this paper? It is a very interesting paper and it is a subject, I find, of perennial interest. I presume that at all of our accounting meetings for the last half dozen years we have had a paper of this kind. So far as I am concerned, we cannot have too many of them, nor can we give too much thought to this important matter of segregating and carefully accounting for our property costs. We are all faced with the inevitable inventory, sometime or other, by a public authority, and it will be a great convenience and satisfaction to us to have accounting records by which we can exhibit these data. It may not be of ultimate value but it will be a considerable factor in arriving at that value.

MR. SPEED: Our inspector, in submitting his final analysis to the accounting department, writes a brief history of the work on the face of the sheet before it is finally filed for permanent record, reciting any abnormal conditions, such as state of the weather while work was under construction, transformers burned

out, or anything of that sort, thus giving a history of the work, and explaining whether the cost be high or low.

MR. CALDER: I would like to ask one question of these gentlemen who have spread-out properties, and it is this. When they get their stores inventory (if they do not keep a perpetual inventory) and find shortages or discrepancies in material, do they work those items into the cost sheets which have been previously closed and are considered part of the history of the company?

Another problem which we frequently run into is that our Construction Department, in its zeal to make costs compare favorably with estimates, buys material which is not found to be practicable for the work in hand. This is turned back to the stores or material department as being unused material, which it is, but when we come to the end of the year, this material is found to be of practically no value for any other work. How do our companies account for that material in connection with construction work? This is a question that I am very much interested in.

MR. JOHN L. BAILEY, Baltimore: I should say in answer to that question, that any material necessitated by construction work would naturally be charged to the cost of the work.

I would like to ask Mr. Speed if the inspector checked up on the final construction cost, with the estimates of the costs.

MR. SPEED: No.

MR. BAILEY: I think it would be an excellent scheme. It would be well to hear from others as to the checking of items by the engineer, having in mind, for instance, the fact that engineers might cover up their inability, inefficient work, or lack of attention to supervision, by including an excessive estimate of contingencies. I would like to know how other companies trail engineers in order to determine whether they are looking after their work efficiently. I think it is a most important matter.

MR. SPEED: Since the initiation of our Inspection Department—(it has been in effect about 3 years now)—the inspector, a very zealous man, has followed up all work of this kind so closely that the engineering department has learned to be very careful about making estimates. This inspector has other duties besides those of analysing costs. His happiness depends upon his finding trouble, and he is a very happy man. He causes me a lot of

trouble myself. We know that the moral effect of getting caught has been wholesome in the Engineering Department. We are almost sure to be shown up, if any irregularities appear. Of course, all this presupposes a zealous and honest inspector.

MR. CALDER: Mr. Bailey has my principle all right, and the principle I would like to follow, but what I would like to have is some method of following it, that is, of getting the costs of this material into the cost of the construction work for which it was bought, in proper detail and at the proper time. In other words, the job may be completely finished and all analysis made and so on, and the records put away in the proper archives of the company. Later on a complete analysis of your stores is made, and there has been time to study it over a large geographical area. This material is found, which is of practically no value, and which has been turned into stores by the construction department. Is there a workable method of getting such costs into the proper jobs without tearing the records all to pieces?

MR. BAILEY: That rather emphasizes the point I make with respect to the inefficiency, oftentimes, of construction engineers. It would seem to me to be their duty to report this material not completely used or not used at all, to the storekeeper. In that event, as in the other, I should think the storekeeper would have an inspector out watching the material, although he is relieved to a considerable extent from the responsibility of taking care of the material after it is once issued from his stores.

MR. JONES: In answer to the question about keeping track of materials in construction, we follow, in our companies, a practice of issuing a work order for every job. We also issue stores to the gang, allowing them to take out as much material as the foreman sees fit. He can take anything he wants, but he has to report the actual material used on that particular job semi-weekly or weekly, as he must see to it that his wagons return to the store-room all unused material on the inventory. The inventory turned in by the foreman is then checked, plus the material reported on the back of the form or work order, with the amount of material drawn by that particular wagon, and in this way we have been able to avoid all losses of material. Any material that is taken down from line construction, is credited to that particular job right on the back of the work order. We do not, in our companies, follow the annual inventory, and naturally there is some

shortage, but we charge that direct to our Storage Expense, because the material on the work order shows the actual material used in the construction or expense, and shortage in the store-room through the carelessness of the storekeeper is not chargeable to any particular construction job.

MR. CALDER: We follow the system outlined by Mr. Jones, but his reply does not cover what I have in mind. Perhaps this will be better explained by an example or two. We had a job in which a line was being reconstructed, and three large valves, valued at some \$200, were purchased for it. They were not the proper valves for this job, and were turned back into the stores, unused, at their value when purchased. When an inventory is taken we find these valves on hand, but they are practically valueless to the company, because they were special. They, therefore, to my mind, belong in the cost of that work, as an error in judgment or something else. In the same way, certain insulators were purchased at one time for a particular piece of work, were drawn out for the job and then turned back because they were not just the insulators wanted. They could not be used anywhere else.

These are items of materials purchased that crop up frequently where you do have some mistakes, and I want to find how the accountants handle them on their books.

MR. R. C. BULGER, Visalia, California: Charges of that kind we do not make against construction but to a Merchandise Expense account. This I think is covered quite thoroughly by the Railroad Commission's classification. An error of that kind should not go into the construction, because, in an appraisal such items would not be reflected. The article is not in the job, and because someone has erred, I think that Merchandise Expense should stand it. That is a clearing account. That is taken care of by a certain charge. We figure about 4 per cent on all merchandise issued, and set up and wiped out.

MR. F. J. BLANCHARD, San Francisco: I do not think a system should be so inflexible that it will be impossible to make changes even after accounts have been reported closed. I know that in my experience, from time to time after an engineer reports a piece of construction closed, charges have come along. I have in mind now a transmission line which we built and finished about two years ago at a cost of over \$200,000. It has been in operation over two years, yet from time to time I have had

charges to be made against the line. As an instance, a man was very seriously injured in the course of this construction work, and the case has been in court. Ultimately, it is possible that we shall have quite a large bill of damages to pay in connection with that injury, and this will have to be made against that transmission line. As I have said I do not think any system of accounts good that is so inflexible that disbursements which are legitimate charges against a piece of construction, cannot be made, even after the account has been reported closed.

MR. T. O. KENNEDY, Massillon, O.: Our method of handling construction work under the requisition system, as outlined by Mr. Ferguson's paper in general, is that after the work covered by specific requisitions is finished, we endeavor, in so far as is possible, to close it up. If during the progress of the work we have bought construction apparatus, for instance, a concrete mixer or other tools that were used on this particular job and for which we had no further use; or if we have material as in a recent case we did have, some roof tiling, left after a building was finished, and possibly some other material, purchased in excess of actual requirements; or perhaps some apparatus or machinery bought and not used, as the valves mentioned just now; when that job is finished we endeavor to close it up; that is, we would salvage everything for which we have no further use. It seems to me that those valves should have been disposed of by the Construction Department at what they would bring. If they were of no value to the company and not worth keeping in stock for further use, the amount secured from the sale of them should have been credited to the construction job, the balance being charged to Construction. Contingencies will arise in every construction job, and provision should be made for such in the estimate.

I would like to ask Mr. Ferguson or others who are using the requisition system for keeping construction accounts, what general principle or method they follow in estimating and charging the items of purchasing, department expense, superintendence and engineering, where the expenses of these departments are divided among various construction jobs, and also among various operating departments; that is, the purchasing department may be buying for several construction jobs, and for several operating departments. Is it the practice to charge a certain percentage of

the estimate of the construction job and add that in for purchasing department expense, superintendence and engineering and executive expense, or is the attempt made to actually keep an accurate account of the expense chargeable to each requisition?

CHAIRMAN EDWARDS: Is there to be any further debate on this paper? If not, I will ask that the usual resolution be made that Mr. Ferguson's paper be accepted and printed.

(Moved, seconded and carried)

(Adjourned)

THIRD ACCOUNTING SESSION

THURSDAY MORNING JUNE 10

PRESIDENT SCOTT: The meeting will please come to order. I am just going to present Mr. Gulick, and then turn the meeting over to Mr. Edwards.

CHAIRMAN EDWARDS: The first business on our program this morning is the report of the Committee on Cost Accounting, Mr. J. H. Gulick of Chicago, chairman.

REPORT OF COMMITTEE ON COST ACCOUNTING

Your Committee on Cost Accounting begs to report that it has organized, its purpose being to make a study of costs and of a method of analyzing the costs of electricity supply companies, thus utilizing, for practical purposes, the information brought together by means of the Uniform System of Accounts.

The Committee wishes to state that it has had under consideration the differential classes of rates caused by various classes of service and the relative costs of such classes of service. The Committee realizes that there are difficulties in establishing a method to provide for such a cost system of differential rates and is of the opinion that it will take considerable time to get the subject in shape to make a definite report, consequently at present it is not prepared to make any recommendations along these lines, but to report progress and a continuance of the study of this subject.

Your Committee is engaged in collecting the many papers published on this subject, including those of the various State Commissions, which will be an aid to the Accounting Committees, and if any member companies have made a study of this subject, the Committee will appreciate being informed of the result obtained.

Respectfully submitted,

J H GULICK *Chairman*

E J ALLEGAERT

C L CAMPBELL

R W SYMES

MR. GULICK (continuing): I must say that the brevity of the report was caused mainly by lack of anything definite to be found on the subject, but Mr. W. J. Norton of the firm of Norton and Bird, has been requested to obtain all the data possible, and he has already accumulated some rates and some decisions. This firm has made a specialty of picking up the rulings of the various commissions throughout the country. I might say that it was employed by me on behalf of the Committee.

CHAIRMAN EDWARDS: The report of this Committee, as you will observe, is one of progress. It is a difficult and involved subject, but one which this Section, it would seem, is under obligations to investigate and to carry on. Costs are a very important factor in rate making, and it is my opinion, that as long as current is sold at a differential rate, we shall sooner or later be required to demonstrate a differential cost. The subject, I think, should be continued until the Section has finally come to some definite conclusions, and if you have any suggestions in regard to this work we shall be very glad to have you present your views now in discussing the report which is before you.

If there is to be no debate on this report we will proceed to the next number on our program, which is a paper by Mr. O. B. Coldwell of Portland, Oregon, entitled "Analytical Accounting for Central Station Purposes."

ANALYTICAL ACCOUNTING FOR CENTRAL STATION COMPANIES

INTRODUCTORY

Uniform classifications of accounts as used to-day by central stations generally are familiar to all, and the benefits derived therefrom are universally recognized. The test of value of a system of accounts is obviously the extent to which the management can from it obtain necessary information. For a number of years past there has been an increasing tendency on the part of those handling business enterprises to analyze methods employed, to ascertain the sequence of operations when the processes are complicated, to study the number of such operations for the purpose of eliminating any which are unnecessary, and in general to know more about their business and the cost of the various articles manufactured or of the various classes of service rendered. The uniform classifications for light and power utilities as made up to-day, while they ordinarily show the revenue from the different classes of service rendered, do not in general attempt to determine the cost, either operating or fixed, of these various classes of service, but provide rather for a subdivision of operating charges in accordance with the physical units of the property in their geographical location, rarely, if ever, attempting an equivalent distribution of fixed charges.

On the assumption that the central station management is desirous of looking at its business in an analytical way, and I do not deem it necessary to attempt a demonstration of the same, it would seem that classifications as made up at present, while unquestionably of great value, do not adequately provide the information needed for the complete analysis of the business of the utility. Aside from any desire on the part of the management to know its business in an analytical way, public utility regulation by commission has brought about a condition where knowledge of costs of rendering classes of service is necessary as one of the elements entering into the justification of rates covering such classes of service.

If our accounts are to satisfactorily measure up to requirements such as above mentioned, it will be necessary in determining their make-up to proceed with ideas in mind somewhat different from those underlying uniform classifications as used at present.

Sequence of Operations

In order to apply the principles of analytical accounting, it is necessary to determine the sequence of operations in the business of producing service. This can best be done by bringing about a close understanding between the operating and statistical employees and the accountants. It will be found that the nature of the business is such that there are several more or less distinct and complete steps, each of these resulting in an additional refinement of the product in the process of its preparation for utilization. The officials of the company familiar with the characteristics of the company's operation can advantageously make diagrams of the physical connections which will assist the accountants in tracing the processes involved. The records prepared by the statisticians will supply practically all of the information needed in determining the bases for making such apportionments of expenses as will be found necessary. It is, of course, assumed that the utility is provided with suitable metering instruments located at such points as will secure the desired records.

The classification of operating accounts which should be kept in carrying out the principle of analytical accounting cannot be set down as a uniform classification applicable to all utilities or to certain groups of utilities, because the sequence of operations and the physical connections, as well as the classes of service rendered, vary with different utilities.

The following steps are common in general to the central station utility business:

Generation	Transformation
Transmission	Distribution
Utilization	

In a case where the distribution takes place directly from the switchboard in the generating plant, the transmission and transformation steps would not exist and consequently the accounts provided for these steps would not be utilized.

While in the general case most of the service sold would be from one of the distribution feeders for a particular kind of utilization, there would probably be at the same time sales of service directly from one or more of the various steps; as for instance, the sale of service to a large power user directly from the bus bars in a generating station, or, in other words, from the generation step.

A little consideration will show that in case all of the service were taken from the distribution feeders, and none from the earlier steps, it would not be essential to derive the cost applying to each successive step in the process, although it might be considered wise to do so for the purpose of learning such costs, but in the general case, where sales are also made from the earlier steps, it is quite necessary to apportion the proper part of such cost to the service sold directly from any step and to carry forward the remaining part to the succeeding step.

Illustrative Example

As an example, let us consider a central station utility owning and operating a hydro-electric plant, together with transmission lines, distribution circuits and utility equipment and giving service as follows:

- 1 To a mining company served by a two-mile transmission line connecting directly to the generating plant bus bars.
- 2 To a lumber mill served directly from the low-tension side of the step-down transformers at the end of a fifteen-mile transmission line.

To the following classes of consumers in the town where the lumber mill is located in which the central station owns and operates the distributing system receiving service from the same fifteen-mile transmission line:

- 3 Residence lighting consumers
- 4 Commercial business lighting consumers
- 5 Commercial power consumers
- 6 Special street lighting
- 7 Sign lighting consumers

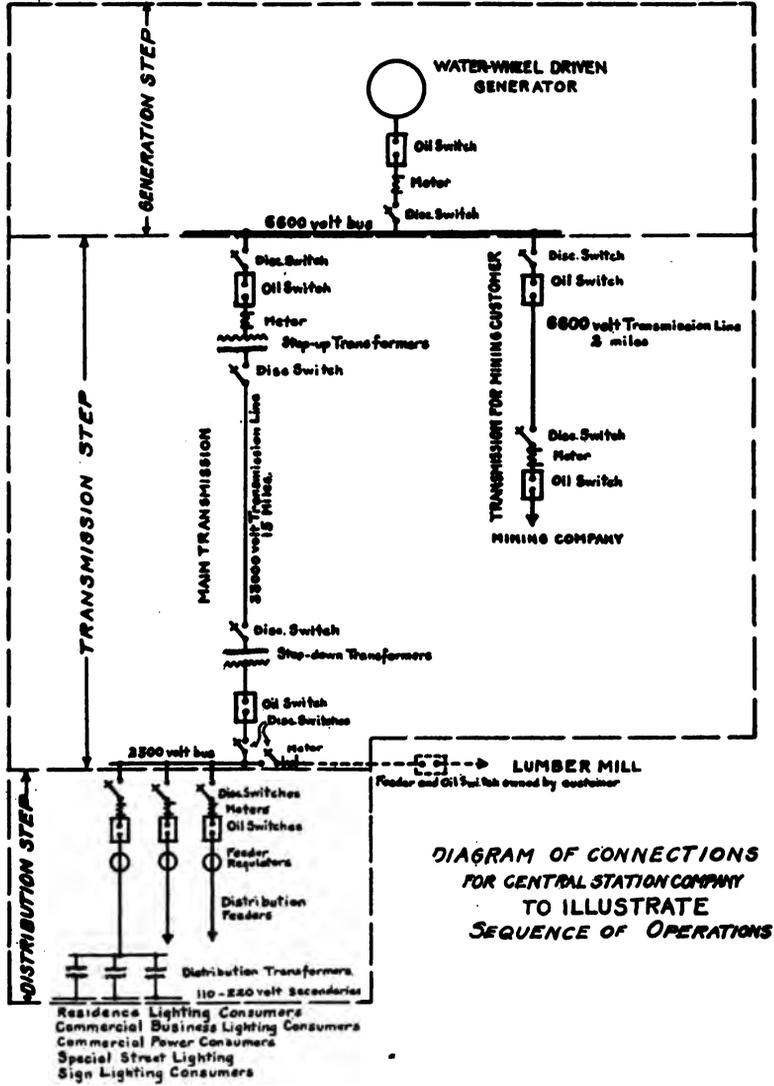


FIG I

	45,000	2.0%	75.85	0.87%	32.55	25.00	138.10	187.10
Commercial Power								
Apportioned from Distribution	135,200	1.98%	220.35	0.87%	96.45	108.60	340.60	449.20
Motor installations	1,000	4.5%	4.50			25.00	40.00	65.00
Commercial	400	4.5%	1.80		0.40		35.00	36.00
General	100	4.5%	0.40				5.00	5.00

THE MEMORANDUM
FOR THE RECORD
OF THE BOARD OF DIRECTORS
OF THE BANK OF AMERICA
AND TRUST COMPANY OF NORTH CAROLINA
INCORPORATED
AT CHARLOTTE, NORTH CAROLINA
THIS 15th DAY OF MARCH 1968

Fig 1 has been prepared to illustrate the situation. By referring to it, the property involved directly in the various steps is readily seen, the steps themselves being boxed in. Thus the transmission step shows the local transmission line to the mining company. This customer is fed directly from the bus bars of the generating station and the investment which the company has in its main transmission line, also shown as part of this step, has no connection with the mining company feeder.

In the distribution step are shown the distribution feeders proper and also a distribution feeder leading from the distribution bus to a large lumber mill customer, the feeder in this instance being owned by the customer.

Now, this diagram of steps and connections should be of assistance in following through the statement for a typical month, which is shown as Fig 2.

Referring to this statement, there will be found bracketed off the various steps and in each of these account titles which are used at one and the same time for the property accounts and for the repair and operating accounts.

It is assumed:

That a determination of value of each parcel of property has been made.

That there has been a grouping of the parcels in accordance with the steps.

That the property investment of a general nature applicable to all steps has been apportioned so that each step shows its proper share of the general property investment.

That operation and repairs applying on property contained under an account title are entered under their respective columns opposite the title in question, it being understood that the subdivisions of these are to be kept elsewhere, detailed to any extent desired.

That taxes which are in practice treated in a number of ways are here known and apportioned to the step and in some cases to the individual parcels.

That a policy of treatment of depreciation has been determined upon and the amounts ascertained and assigned to the various parcels.

Consider the *generation step*. Here it is indicated that the total cost of the step is apportioned and carried forward to the

transmission step, \$44,000 of investment being assigned to the mining consumer and \$176,000 to the main transmission; likewise, \$157.50 of the operating expenses going to the mining consumer and \$472.50 to main transmission. It is assumed that a satisfactory basis of apportionment has been arrived at.

Under the *transmission step*, the accounts for the mining customer and for the main transmission are carried out as parallel sets of accounts and totals secured for each. The total investment for the mining company in the transmission step is \$49,000, of which \$44,000 was carried forward from the generation step; likewise the total operating expenses for the mining customer are \$163, \$157.50 of which came forward from the generation step. The mining company is dropped at this point to be taken up again under utilization, where it appears for the purpose of receiving its share of the commercial expense and to be summed up with the remainder of the customers. The remaining part of the transmission step is apportioned to the distribution step and to the lumber mill, the latter being dropped at this point and appearing again under utilization for the same reason just given in the case of the mining company. It is assumed that a satisfactory basis of apportionment has also been reached in this instance.

We next have the *distribution step*, the total of which is assigned under a suitable basis to the various classes of customers, that is:

Residence lighting
Commercial business lighting
Commercial power
Special street lighting, and
Sign lighting

Finally these classes of service appear under utilization, where are added the expenses occasioned by the utility equipment, the commercial and the general expenses, all of which are suitably apportioned to these classes and to the two direct users split off above.

At the bottom of Fig 2 is given a summary of the various classes of customers showing the investment applicable to these classes, the investment expenses, the operating expenses, the total expenses, the revenue obtained, the net income and the rate of

return the net gives on the investment. This summary indicates that on its business as a whole this company makes 7.3 per cent return, the maximum on any one class being 11.0 per cent and the lowest 5.4 per cent. As to whether or not the rates which may apply in any one of the various classes are equitable among themselves is, of course, not disclosed, and it must not be understood that by the use of analytical accounting it will be possible to go to the company's records and ascertain directly therefrom what the rates should be for all classes of service given by the company.

Apportionment

Technical papers and journals are at the present time dealing with the subject of rate making, costs of rendering classes of service and apportionments to a very considerable extent and a number of very good articles have recently appeared. A paper by Mr. E. N. Strait, entitled *The Wisconsin Railroad Commission's Method of Rate Making*, read before the joint convention of Wisconsin Electrical Association and Wisconsin Gas Association, January 21, 1915, contains the best and most satisfactory exposition of this subject of apportionment which has come to hand. I earnestly recommend that every utility man having to do with operation and accounting read this paper carefully.

On the general subject of apportionment, Mr. Strait says:

"An effort to analyze and distribute costs reveals almost at once that they differ much in their character and causes, and it follows that in order to make a careful and proper apportionment of the expenses we must understand something regarding the conditions from which they rise. Many expenses, it will be found, are directly assignable to one department or another. The cost of lamp renewals, trimming and inspecting municipal lamps, and many of the expenses of gas service are costs of this character. Other expenses are jointly incurred—that is, the same item of expense performs the same function for more than one department at once. If such expenses are found to be proportional, or very nearly so, to such physical circumstances as the number of meters, extent of distribution system and investment, they also may be readily apportioned. But the nature of other expenses, such as fuel and labor for generating power, is more complex as the cost is found to depend on more than one factor of operation. In such cases, the expense items must be divided first between the influences which cause them, such as the demand on or capacity of the plant and the output. These groups of expense may then be divided between departments or classes

of service in the proportion to which each participates in the causing influence. All those expenses, which as a rule are directly assignable to or apportionable between the classes of service on physical bases, are sometimes called 'direct expenses.' There is still another class which includes general and undistributed expenses of the business. These are sometimes called 'indirect' or 'overhead' expenses. They may be considered also as 'directing' expenses since they serve to control and direct the other expenditures of the business.

If the accounting procedure of the utility has been carried out with considerable refinement some of the general and undistributed expenses may be directly charged to the departments or classes of service which occasion them. But often such expenses are not very directly assignable under the accounting practice of many utilities to any particular class of service and should, therefore, be distributed on an overhead basis,—that is, in accord with the ratios established by apportionment of the direct expense. This method is justified on the theory that each increment of direct expense causes a proportionate increment of overhead or general expense.

Apportionments or distribution of expenses must not only show whether each department or class of business is supporting its share of the costs, but must also serve as a means by which the costs may be distributed fairly among the customers. In other words, the apportionments must be so made that, so far as practicable, the schedule of charges shall conform to the variation in the cost of service.

This leads to a consideration of those influences of service upon costs which are susceptible to practical measurement and are therefore suitable for use in establishing schedules of rates. In private commercial enterprises, as well as public utility business, costs have long been classed as fixed if they would continue although operation were stopped, and variable if they would not. Further consideration of these elements of costs shows, however, that fixed costs are fixed insofar as time is concerned—otherwise, they vary with certain other causes. Variable expenses, which, on the other hand, vary as to time, seem to some extent fixed so far as other causes are concerned. This situation seems to require a different distinction in the matter of costs."

On the apportionment of distributing expenses among classes of service, he says:

"Most of the distribution system expenses are found to be more properly apportionable among such classes of service as commercial lighting, power and street lighting on other physical factors than the demand in kilowatts or the output in kilowatt hours. The power business, for example, may exert a relatively large demand on the plant and consume a large amount of current, but if most of such service is received by a few large users, the meter expenses incident to power business may be very small. Labor Removing and Resetting Meters is usually closely related to the number of meters. The size also has some influence on the expense because it often costs more to remove or set the large than the small

meters. In this instance, it appears reasonable to divide 80 per cent of the item between lighting and power on the basis of the number of meters and 20 per cent on their total capacity or size. In this particular case, the proportion which should be charged to lighting on this basis is 94 per cent, and to power, 6 per cent. Now, with respect to inspecting and testing meters, practice varies insofar as the size of meters and their type is concerned, and therefore for a proper apportionment of this expense, the division should take into consideration the annual number of tests that would be required. The size of meter also has a bearing on this expense as it usually costs more to test large than small meters. On these assumptions, 80 per cent of the expense of Labor—Inspecting and Testing Meters—is divided between lighting and power in proportion to the number of tests required, while the remaining 20 per cent is divided in proportion to the aggregate capacity or size of the meters. This results, in this case, in charging lighting service with 85 per cent of the expense and power with 15 per cent.

Maintenance of the overhead distribution system ordinarily varies with the extensiveness of the system. As the relative magnitude of the commercial lighting, power and street lighting systems is represented fairly well by the number of miles of wire, the wire-mileage may be used as a basis for dividing the cost of maintenance among these classes of service."

These extracts indicate that Mr. Strait in making his apportionments analyzes in each case all of the elements and conditions entering into or affecting cost and chooses for his basis of apportionment whatever unit in his judgment is the most suitable.

A very interesting article on *Factors in Rate Making*, by Arthur S. Ives, starts in the March 13th issue of the *Electrical World*.

Mr. Ives analyzes the various elements affecting apportionments, giving separate lists of those concerned with Fixed Charges and those concerned with Operating Charges. I have found some interesting matter in this paper.

In the February 20th issue of the *Electrical World* appears a statement by Chairman H. M. Edwards of the Accounting Section of the Association in which he says:

"At some point every cost accounting system requires individual judgment. If the judgment of any two individuals differs on the necessary allocation of costs, the results will differ. To the extent that they differ uniform cost accounting becomes impossible."

In the light of what has been said in this paper, I should

prefer to state that analytical accounting *is possible* to the extent that satisfactory apportionments can be made.

Up to the present time central station managements have had little or no experience in making apportionments. As experience is obtained there will no doubt be established a more or less uniform practice so that equally competent parties undertaking to make the apportionments necessary in such an example as that given in the foregoing or in an actual case, would obtain results agreeing within a few per cent.

CONCLUSION

For a number of years past I have been called upon frequently in my capacity as an official of a light and power company for costs of one or another type of electric service rendered by our company in its regular business. In order to produce these costs, it has been necessary to deal with the operating statistics, study the details of methods employed, ascertain the amount of direct property involved, determine what part of property used jointly with some other class of service should be added, apportion expenses, etc., etc., in fact, make a sort of post mortem of the activities of the entire concern in order to get what I was after and then when it was all over, I have felt that it was not very satisfactory. Now, I have questioned many central station men about this matter of telling the actual cost of some kind of service and I find invariably that they are well acquainted with operating costs as recorded by our present classifications, but as to class costs they know little or nothing.

A "post mortem," as I have called it above, is interesting and of some value, but would it not be much better for us to establish systems of analytical accounting which would enable us to determine the costs as we go along? Obviously, the change from present systems to one of analytical accounting could not be effected immediately. It would be necessary first to make a study of the operations, determine the limits of the various steps, ascertain the bases for all apportionments, settle on the method of handling depreciation, and divide the property among the various steps so that one title could be employed for property account and operating account.

In the above-mentioned statement of Mr. Edwards it is set forth that this question of ascertaining cost is a live one, as is

shown by letters he has been receiving from all parts of the country expressing some dissatisfaction because the uniform classification adopted last year does not cover this phase of accounting.

It is my belief that analytical accounting applied in some such manner as outlined in this paper will be the solution. Analyses made of individual cases must necessarily result in different bases being arrived at for the distribution of costs, but the underlying principle of analysis will be uniform. At this time it seems to me essential that our efforts should be concentrated in bringing about an acceptance of the principle, for it will only be after this is established and accepted that any substantial progress along these lines can be expected.

In closing I wish to add that the illustrative example employed in this paper does not purport to be a finished and complete piece of work, but merely an exhibit to be used for illustrating the principles set forth.

MR. COLDWELL (continuing): My paper has a rather ambitious title, but as your chairman remarked a few minutes ago, as long as differential rates are in vogue, or, due to the fact that differential rates are in vogue, it will probably be necessary to justify the cost of the various classes of service.

It is of course understood that the step of transmission in a great many of the eastern companies would not appear at all, the generation being carried on directly at the point of distribution, you might say.

On this subject of apportionment it may be said further that we, all of us, the operating people and the accountants in the various companies, know altogether too little about it. Whenever we come into contact with the commissions and their engineers, we immediately run up against this matter of apportionment, and it has been my experience in the company that I am with, that practically none of us at the start knew anything about it. I cannot say that we know very much about it now; in fact, we know as yet very little, and it is my firm conviction that we have got to learn more about it, because the commissions are already applying methods of apportionment for the purpose of determining the costs of these various classes of service which we are rendering, and it behooves us to find out how to do it ourselves, and to know whether they are doing it on the right lines.

I have been told a good many times that it will be impossible for us ever to accomplish this thing. That may prove to be the case, but in my opinion it is worth while to try; in fact, it seems to me essential that something of the sort be done.

CHAIRMAN EDWARDS: Mr. Coldwell's paper is now before you. It touches upon the same matter that was referred to in the report of the Committee on Cost Accounting, and is a very interesting example of the methods followed by one company in trying to determine their costs. We would be very glad indeed now to hear from the members present in regard to this paper.

DISCUSSION

MR. JOHN L. BAILEY, Baltimore: Mr. Coldwell, in his paper, seems to strongly urge the immediate adoption of some scheme of cost accounting, or accounting for the cost of various classes of service. It seems to me that there is a matter of policy involved here; that the Accounting Committee cannot undertake to do this until it has the consent of the Public Policy Committee of the Association.

MR. W. A. HILLEBRAND, San Francisco: It is with some trepidation that I enter a discussion of this kind, because I am not an accountant; but, at the personal request of Mr. Coldwell, I will venture to offer a few remarks.

Mr. Coldwell's suggestion is to me highly interesting in that he recommends, as I understand it, keeping a running classification of cost of service, rather than attempting to make a periodical determination, say, once every year, or once every five years, or for the purpose of rate fixing. It seems to me that the scheme suggested by Mr. Coldwell would be hardly practicable, for certain very practical reasons.

This question of apportionment lies at the bottom of it all. For instance, referring to Fig 2, the monthly statement, you will find that when we get down to the distribution step, probably 60 per cent or more of the total distribution cost is made up of generation and transmission costs carried over to distribution.

Now, taking Mr. Coldwell's example, suppose, for instance, that in one month, or for three or four months, your mine or lumber mill shuts down, due to a seasonal change. It is customary to apportion the charges for generation and transmission

of energy on a demand basis; that, so far as I know, is the only practicable basis that has ever been found, but if you have no demand how are you going to distribute the cost which, in the previous months or in the previous period, was assigned to that particular customer and your other customers? With a fluctuating seasonal demand from month to month and from year to year, as conditions vary, you will have an apparently fluctuating cost on any such basis as this.

For instance, in our irrigating district in the Santa Clara Valley, last year, on the 26th of May we put out 6000 kilowatts, and this year you cannot read it on the ammeters; the late season simply wiped out the irrigating load. What are you going to do with that? Is it right to say that our cost for that service is any less this year than it was last? In an analytical system of accounting like this, which is kept up from month to month, it would show a decided difference.

Furthermore, it seems to me that we are likely, by any such attempt as this, to mislead the public and to mislead ourselves. Personally, I do not believe it is possible to determine the cost of service accurately or scientifically. It is altogether a matter of opinion, and it seems to me not at all desirable that the public, which is not competent to form an opinion on this very technical and very complicated subject, should get the idea that the cost of service can be accurately determined. Street lighting from the direct-current multiple system is much more costly than from the alternating-current system. An additional electric irrigating system would cost very much less run in on a direct-current multiple system than on an alternating-current system, although the charges properly apportioned for that system would show up very much higher.

Some of the apportionments that Mr. Coldwell has seen fit to make himself, for instance, are not at all clear. Under the heading of generation you will find that he apportions (Fig 2) the transmission for the mining customer to the main transmission; he apportions one-fifth, or 20 per cent, of the investment expenses to the transmission for the mining customer, and one-fourth, or 25 per cent, to the operating expenses. It would seem to me that the same proportion should be used in each case.

On the subject of apportionment there are a number of interesting points brought out. For instance, the Wisconsin Rail-

road Commission, I think in its famous Madison rate case, advanced the theory, which may sound very well, that the overhead expense and these general expenses should be apportioned in proportion to the direct expense involved. But now, for example, what proportion of the general managerial, administrative expense, etc., is chargeable to the fuel bill, which may be the largest or one of the largest single bills of the company; or to the bills for wages, for operating, or for clerical hire? In our own cases before the State Commission, my company has consistently held out that these overhead charges should be apportioned on the basis of the number of customers. The State Commission apportions them on a charging basis, as in the Lake Spaulding dam case, for instance.

Coming to the question of meter testing, Mr. Strait offers some interesting suggestions. He says: "With respect to inspecting and testing meters, practice varies in so far as the size of meters and their type are concerned, and therefore, for a proper apportionment of this expense, the division should take into consideration the annual number of tests that would be required. The size of meter also has a bearing on this expense, as it usually costs more to test large than small meters. On these assumptions, 80 per cent of the expense of labor—inspecting and testing meters—is divided between lighting and power in proportion to the number of tests required, while the remaining 20 per cent is divided in proportion to the aggregate capacity or size of the meters."

It is customary to test power meters very much more frequently than lighting meters. The lighting meter is tested once in every three to four years; the power meter may be tested as often as once a month. It takes two men one day, and they can test possibly three meters at a cost of at least \$2 per test.

As to the determination of the class rate, any system of class rates involves the theory of demand, that is, the lighting demand which occurs at a certain time, the power demand and the street lighting and railway demand. You may recognize certain others. The determination of these various demands is, in general, a very expensive thing. It is going to cost the company probably \$3,000 a year to carry these through from month to month.

I will say that it seems to me the value or the importance of an analytical investigation of costs, applying to the costs for differ-

ent classes of service, goes only this far: that it serves to determine whether or not there is undue discrimination in favor of one class of customers as against others. Frankly, I do not believe you can go any further.

MR. PAUL R. JONES, New York City: I would like to back up Mr. Bailey's remarks, that this is a question of policy. In the whole matter of cost accounting I think we should take no action as a Section. Our interests are so varied that it would be very difficult for us to set down any hard and fast rules that will be beneficial to all, and it might prove very embarrassing if, for instance, we should adopt any means of determining costs between various states, particularly when most companies operate under commissions.

MR. BAILEY: I do not intend in anything I may have said to discourage our member companies from keeping cost of service accounts. I think it is a most important thing for them to know, but, as a general proposition, I think we as a Section ought to approach the question with considerable care.

MR. COLDWELL: I have been much interested in listening to Professor Hillebrand's remarks. He has analyzed the difficulties just about as they are. The subject of change in investment is one which can well be brought up. It is one of the difficulties which will attend the application of any such plan as that which I have proposed here. I am rather talking for the acceptance of a principle having to do with the determination of the matter of costs. Whether it will ever be worked out to the extent that I have set forth here remains to be seen.

As regards the keeping of these cost records by member companies, Mr. Bailey has said that he believes it is a proper thing to do. It has been my opinion that for a large number of the smaller companies, in which the amount of help available is more or less limited, a consolidation of the cost keeping and the ordinary accounting can be made, and it will be a step in the right direction.

In the case of the company I am with, we have for a number of years kept cost accounting records entirely separate from the records of the accountants. This paper of mine is a plea to the accounting people to understand the inter-connections of the business to a greater degree than they do to-day, and to use in a practical way the statistics which the operating departments of

most companies are gathering together at considerable expense. I will grant you that in a great many instances the statistics which companies are keeping are not such as would give all the information I have assumed would be available in carrying out their ideas. I believe that we should begin to look at this thing with the idea of being prepared to anticipate what the commissions may do. They are going about this and assuming that it can be done; in fact, they are actually carrying it out, and anything that we may do to the contrary notwithstanding, they are going ahead.

Mr. Hillebrand spoke about the assignment of amounts in the investment column differing from that used in the operating expenses. It must be remembered that these amounts were simply jotted down to illustrate the matter, with no studied effort to make them consistent. The figures do not represent an actual case at all. The apportionment in an actual case would probably come nearer to what Mr. Hillebrand has mentioned.

It is the principle of this thing that seems to me to be of importance. I have been told by some accounting officials that cost accounting has absolutely nothing to do with ordinary book-keeping; that it properly belongs in a different realm, almost in different buildings; at least in different rooms with a different set of men. I do not believe that is necessarily the case. While it may be that in the very largest companies it would not be politic to do away with the separate cost-keeping bureau, in the large majority of cases I believe the consolidation of the two would be a step forward.

It is possible that there are matters of policy involved, but I can not at the moment, think just what those issues might be. Naturally, the National Electric Light Association would not be able to proceed and take definite action now on a subject of this kind, and I am not asking that this be done. I have tried to point out that it would be a slow process at best, but I feel that the subject is well worthy of the most careful thought and study of your cost accounting committees.

CHAIRMAN EDWARDS: We are all very much indebted to Mr. Coldwell, I am sure, for the writing and presentation of this paper. If it does nothing else it should open the eyes of our accounting officials to the desirability and necessity of going a little

outside of the beaten track and becoming familiar with the application to be made of figures which they have so industriously and laboriously compiled.

The next paper on our program describes "Statistical Machines," and has been prepared by Mr. W. E. Freeman of the New York Edison Company.

STATISTICAL MACHINES

EVOLUTION OF BABBAGE'S CALCULATING, DIFFERENCE AND ANALYTICAL ENGINES AND PERFORATED CARDS, WITH PARTICULAR REFERENCE TO IMPROVEMENTS IN THE ART OF MECHANICAL ACCOUNTING

Charles Babbage was probably the first individual to forecast the computation of arithmetical calculations by machinery. An interesting colloquy is contained in his book entitled "Passages from the Life of a Philosopher," published in 1864, as follows:

"The earliest idea that I can trace in my own mind of the calculating of arithmetical tables by machinery arose in this manner:

"One evening I was sitting in the room of the Analytical Society at Cambridge, my head leaning forward on the table in a kind of dreamy mood, with a table of logarithms lying open before me. Another member, coming into the room, and seeing me half asleep, called, 'Well, Babbage, what are you dreaming about?' to which I replied, 'I am thinking that all these tables (pointing to the logarithms) might be calculated by machinery.'"

Of the numerous interesting and instructive passages recounted by the inventor and philosopher, appropriate elections in keeping with the subject of this paper are given herewith.

"The first difference engine with which I am acquainted comprised a few figures, and was made by myself, between 1820 and 1822. It consisted of from six to eight figures. A much larger and more perfect engine was subsequently commenced in 1823 for the Government.

"It was not until 1848, when I had mastered the subject of the analytical engine, that I resolved on making a complete set of drawings of the difference engine No. 2. In this I proposed to take advantage of all the improvements and the simplifications which years of unwearied study had produced for the analytical engine.

"To those who are acquainted with the principles of the Jacquard loom and who are also familiar with analytical formulæ, a general idea of the motion by which the analytical engine executes its operation may be obtained without much difficulty. In the exhibition of 1862 there were many explained examples of such looms.

"It is known as a fact that the Jacquard loom is capable of weaving any design which the imagination of man may conceive.

It is also the constant practice for skilled artists to be employed by manufacturers in designing patterns. These patterns are then sent to a peculiar artist, who, by means of a certain machine, punches holes in a set of pasteboard cards, in such manner that when those cards are placed in a Jacquard loom, it will then weave upon its produce, the exact pattern designed by the artist.

“The analogy of the analytical engine with this well-known process is nearly perfect.

“Every formula which the analytical engine can be required to compute consists of certain algebraical operations to be performed upon given letters, and of certain other modifications depending on the numerical value assigned to those letters.

<i>NUMBER</i>				<i>TABLE</i>						
2	3	0	3	3	6	2	2	9	3	9
●	●	○	●	●	●	●	●	●	●	●
●	●	○	●	●	●	●	●	●	●	●
○	●	○	●	●	●	○	○	●	●	●
○	○	○	○	○	●	○	○	●	○	●
○	○	○	○	○	●	○	○	●	○	●
○	○	○	○	○	●	○	○	●	○	●
○	○	○	○	○	○	○	○	●	○	●
○	○	○	○	○	○	○	○	●	○	●
○	○	○	○	○	○	○	○	●	○	●

FIG 1

Babbage’s card from “Passages from the Life of a Philosopher,” London, 1864. Two-thirds of actual size.

“There are, therefore, two sets of cards, the first to direct the nature of the operations to be performed—these are called operation cards; the other to direct the particular variables on which these cards are required to operate—these latter are called variable cards. Now the symbol of each variable or constant, is placed at the top of a column capable of containing any number of digits.

“Besides the sets of cards which direct the nature of the operation to be performed, and the variable or constants which are to be operated upon, there is another class of cards called number cards. These are much less general in their use than the others, although they are necessarily of much larger size.

"Any number which the analytical engine is capable of using or of producing can, if required, be expressed by a card with certain holes in it; thus

"The above card contains eleven vertical rows for holes, each row having nine or any less number of holes. In this example the tabular number is 3,622,939, while its number in the order of the table is 2,303. In fact, the former number is the logarithmic of the latter."

It was asserted that the British Parliament appropriated £25,000 to Babbage for the exploitation of his machine. This amount, however, was soon expended in experimental work and Babbage got no further than a crude hand-made and incomplete model. The Parliament became skeptical and refused to make any further advances in money, so that Babbage was obliged to discontinue work and the invention was lost to England.

The original model of one of the three Babbage calculating machines referred to was purchased from the inventor in 1858 by an American citizen for \$100,000 and donated to the Dudley Observatory, Albany, New York, where at the present time it may be inspected.

This model of the Babbage calculating machine is of considerable value scientifically, but it is very large, unwieldy and complicated compared with modern computing machines.

Several improved and distinctive types of automatic, mechanical, punching, counting, sorting, tabulating and printing machines have been developed by resourceful inventors since the days of Babbage, as follows:

Hollerith Tabulating Machines and Cards.

The Peirce Systems of Perforated Cards.

The Coupon-Strip Typewriting Machines.

Powers Accounting and Tabulating Machines.

The practical application of the several systems operating with perforated cards outlined herein to the requirements of the electric-light industry is a matter demanding the attention of all accountants. The writer is firmly of the opinion that mechanical accounting must ultimately revolutionize the present methods of keeping accounts and recording statistics. There is positively no question but that substantial economies in operation will be effected by the substitution of such mechanical tools for the manual methods now extensively employed.

HOLLERITH TABULATING MACHINES AND CARDS—A BUSINESS COMPASS—
FACTS MADE IMMEDIATELY AVAILABLE FOR DETERMINING BUSINESS
POLICIES

The Hollerith tabulating machines and cards have been fully described and discussed in several papers previously presented before the Accounting Session of this Association. In order, however, to make as complete a history as possible of the tabulating machines and cards, extracts are included from a pamphlet recently published, entitled "A Business Compass—Facts Made Immediately Available for Determining Business Policies."

"One day the president of a large steel company suddenly called upon his accounting department for a special analysis of the sales for the preceding five years. The next morning he had the complete analysis for the three years immediately preceding. But—as it would have taken a whole month, with a considerable increase in the accounting force, to give him the other two years, he accepted the three years' figures at hand instead of five years a month later. The reason for this was simple. Hollerith tabulating machines and cards had been used for three years, prior to which time the reports were all in loose-leaf form, and the work of compiling the special report would have involved going to original sources, and working over every piece of information from start to finish.

"In a large manufacturing plant the directors formerly met on the second Friday in each month, at which time full reports were available covering the operation of the second preceding month. For instance, the report made at meeting May 12th covered the month of March. After the Tabulating Machine equipment was in smooth operation, the directors' meeting was shifted to the third Friday of each month; and the report made May 16th, 1913, covered the month of April. It is evident that in this plant three weeks were gained by the system, and that this gain was permanent.

"Developed originally for the use of the United States Census Bureau, the Hollerith tabulating system has more recently been arranged for commercial use. It has been adopted by some of the largest firms in the country, and is fast being extended to smaller firms, as a most dependable and speedy means for interpreting facts developed in the every-day operation of a manu-

facturing or mercantile or other business. Some of the more-than-three-hundred firms now using the system have had it in operation for over fifteen years.

“With one exception, the Pennsylvania Steel Company was the first company to realize the value of this equipment for covering the many items entering into the cost of manufacture and sale of its product. At the Steelton works of this company the Hollerith equipment is installed in the Works Accounting Department, Billing Department and Storage Department of the Main Office; also in the Frog, Switch, Bridge and Construction Departments.”

The predecessor of the New York Edison Company—the Edison Electric Illuminating Company of New York—was probably the first electrical corporation to introduce tabulating machines and cards for verifying and analyzing operating revenues.

During the first quarter of the year 1903 the auditor of the New York Edison Company and the writer visited the Steelton Works and inspected the tabulating equipment, with the results that the Hollerith machines were installed in the offices of the former company during the month of July, 1903, and subsequently adopted by other similar corporations in leading cities throughout the country, as, for instance, Chicago, Boston, Philadelphia, Brooklyn and Minneapolis.

FUNDAMENTAL AND DISTINCTIVE PRINCIPLES CLAIMED FOR THE PEIRCE SYSTEMS OF PERFORATED CARDS

Three fundamental and distinctive principles are claimed for the Peirce systems of perforated cards, as follows:

(1) The cards contain the original entry. In the Hollerith system and all other perforated card systems used heretofore, the sole functions, namely, automatic distribution and compilation form only one step in the accounting cycle. The cards are furthermore made from written reports or statistical sheets and are not originated where the entry comes into being. This the Peirce systems strive to obviate, for, if the cards are made from hand-written sheets, it is evident that an additional and unnecessary entry has been made, which only a great saving in subsequent automatic tabulation will warrant. Indeed, in a great many industrial accounting fields it is not justified. An effort has been made to develop a perforating machine suitable for each individual application. It is not too much to say that if the cost of making out the cards does not exceed the cost of making the same entry by hand, the perforated card system will ultimately displace the manual method.

(2) The contents of the cards are printed as well as perforated. This makes it possible for any one handling them to see at a glance the information they contain. Cards which have perforations only are awkward to handle, and, though by practice they may be read with fair facility, they cannot be compared with the simple, direct method of having the characters printed in clear, legible type. Furthermore, the Peirce cards are permanent records and are filed as such, thus making their field as broad as accounting itself.

(3) The characters are represented by combinations of holes. By using this method of representing the digits, it is possible to put a large amount of information on a single card and at the same time keep it in a convenient size. In the case of the Hollerith system, ten digits are provided in each column on the card and the standard cards contain thirty-eight columns. The recorded data is discovered by observing which numbers have been punched out. This makes it necessary to examine the entire body of the card in order to read its contents.

The machines adaptable for the consumers' accounts are:

(1) The perforating machine; (2) the distributing machine, and

(3) the automatic ledger machine. The entire cycle of operations, from taking the meter reading to making out and footing the bill, posting both debits and credits to the ledger, and rendering monthly statements, is performed automatically. All transactions are printed.

The meter under this system is equipped with a small, inexpensive perforating attachment about the size of a cyclometer. The card is placed in the attachment and a key inserted in an aperture in the side and turned. The consumer's number and the reading of the meter, together with the statistical data, is perforated upon the card. The record is not printed in this instance, and hence the card is illegible to meter reader. It is believed this form of card will eliminate "curb readings."

These are briefly the characteristic features of the Peirce system. If the expectations claimed for the Peirce systems are realized, they can be applied with equal advantage to all other account work, including payroll and cost accounting. They should offer likewise increased facility for auditing in all branches of accountancy.

THE COUPON-STRIP TYPEWRITING MACHINE—A COMPLEMENT OF THE
 ADDING AND LISTING MACHINES AS SUCCESSFULLY INSTALLED BY THE
 NEW YORK EDISON COMPANY

THE COUPON-STRIP TYPEWRITING MACHINE

Of the modifications and improvements made in the adding and listing machine within the last three or five years, possibly the most radical and ingenious one is the coupon-strip type-writing machine, recently patented, for assorting and tabulating work in connection with keeping accounts and recording statistics.

The principle of the invention is illustrated in the accompanying photographs and drawings.

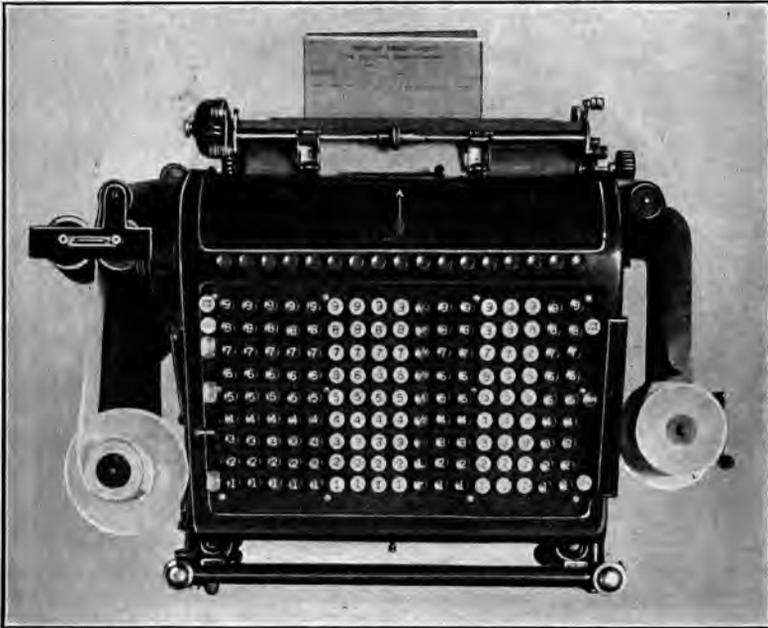


FIG 1

Fig 1 illustrates the keyboard of a Burroughs 17-column machine and a coupon-strip roll of paper placed in position ready for work

A somewhat technical description of the coupon-strip type-writing machine follows:

The invention relates to a type-printing or typewriting apparatus and consists of mechanism whereby, simultaneously with

the production of lines of printing disposed in columns on an impression sheet, a *facsimile* imprint may be made of the lines in sequence, upon another sheet, which second sheet is moved in front and transversely across said first sheet. The said second sheet may be subsequently divided if desired into coupons, each coupon then bearing one of the lines collectively printed in columns on the first sheet.

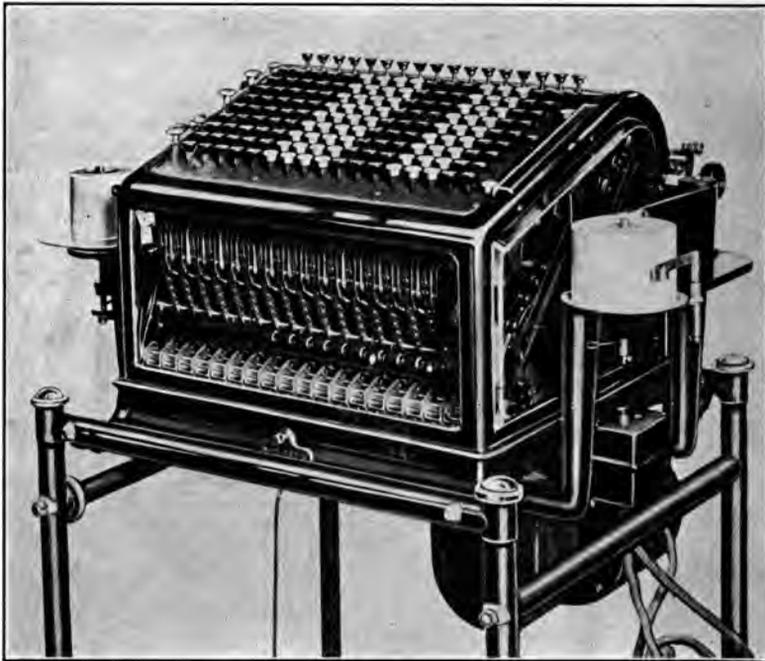


FIG 2

Fig 2 represents a three-quarter view of a Burroughs 17-column machine, showing a coupon-strip typewriting machine attachment on the right side of the machine

A COMPLEMENT OF THE ADDING AND LISTING MACHINE

From a practical standpoint the coupon-strip typewriting machine is a complement of the adding machine, extending its scope by offering not one, but many, short-cuts in various lines of accounting and statistical work, and it is claimed by the inventors

that it will vastly increase the possibilities of the adding machine in all departments of industrial and commercial activities.

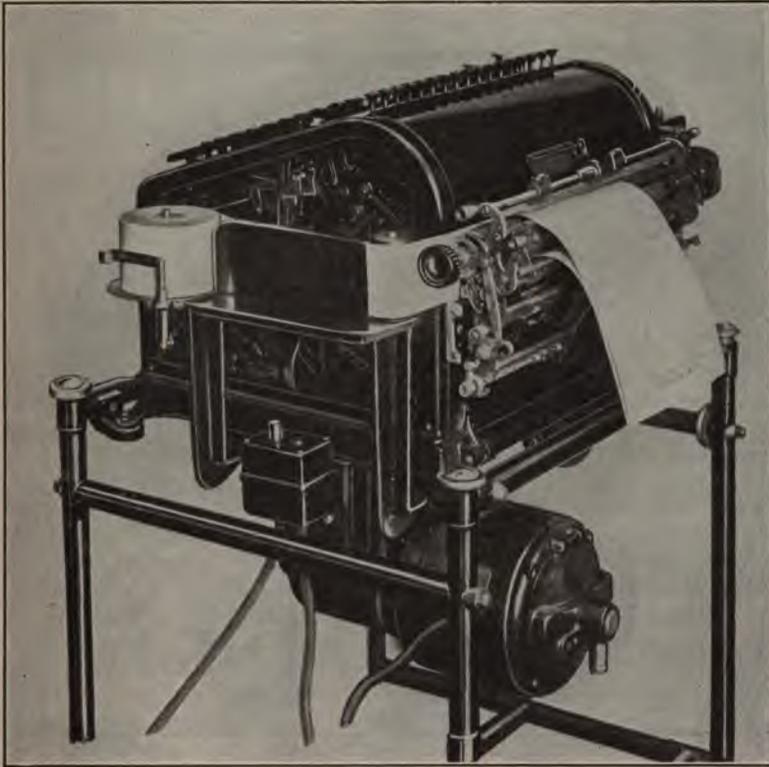


FIG 3

Fig 3 represents a back view of a Burroughs 17-column machine, showing the application of double carbon ribbons for producing listed items simultaneously on sheets of paper and coupon-strip rolls. Bi-colored ribbons of alternating blue and red strips can be used to advantage for separating columns, according to any combination desired, as, for instance — (1) source numbers; (2) account numbers; (3) code letters, and (4) dollars and cents.

The product of this machine will be found accurate and reliable for numerous divisions of the accounting work. The coupons are prepared simultaneously with the adding and listing of items, and there is positively no additional labor involved in their preparation. The accuracy of the printing on the coupon is

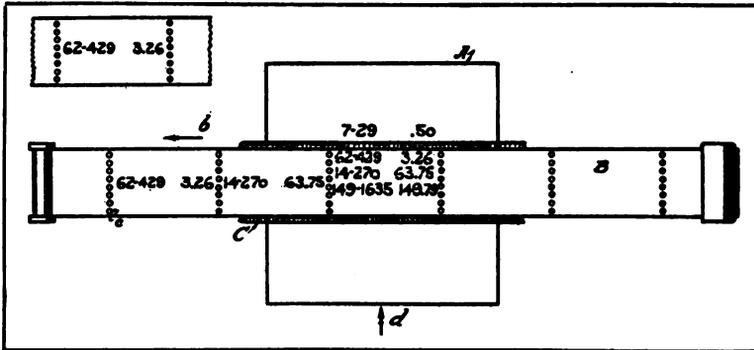


FIG 4

Fig 4 illustrates the principle of the new coupon-strip typewriting machine.

A is a sheet of paper which is moved in the direction of the arrow *a*, so that a series of lines of printing indicated by the characters 7—29—.50; 62—429—3.26; 14—270—63.75; 149—1635—149.79, suitably spaced one above the other in column, may be typewritten thereon.

B is a long strip of paper hereinafter termed the coupon-strip, disposed in front of sheet *A*, extending transversely across the same and longitudinally moved in the direction of the arrow *b*. Between the sheet *A* and strip *B* any copying means, such as a carbon ribbon or sheet indicated at *C*, is provided and an inking ribbon (not shown) is, as usual, disposed in front of strip *B*, so that the imprint made by the type is produced simultaneously in *fac simile* on both strip *B* and sheet *A*. The feed mechanism which actuates coupon-strip *B* and sheet *A*, to feed them respectively in the direction of the arrows *b* and *a*, is to be so timed as that during the interval occupied in moving sheet *A* in a vertical direction over the same between two lines of printing strip *B* is caused to move in a horizontal direction over a much longer distance. The result is that there is imprinted on sheet *A* a series of lines of printing disposed vertically in columns one above the other, as:

7- 29	.50
62- 429	3.26
14- 270	63.75
149-1635	149.79

and on strip *B* a series of lines of printing horizontally disposed in succession and separated by intervals between the end of one line and the beginning of the next line, as: 62—429—3.26; 14—270—63.75; 149—1635—149.79. After the printing is completed the coupon-strip *B* may be cut apart between the printed lines, or divided on the previously prepared perforated lines *c*, and thus converted into separate coupons, each bearing a single line of printing, as indicated.

The product of the machine, as a whole, is a sheet *A* bearing a column of printed lines and also a quantity of coupons *B*, equal in number to said printed lines and each bearing one of said lines in *facsimile*.

determined in advance, and no checking of the coupons is necessary. A proof is secured of listed items from all sources before assorting coupons and posting to accounts. All recording and tabulating work is reduced to mechanical labor, thus eliminating all mental additions—otherwise a constant source of trouble and unnecessary expensive delays.

Several salient features of the coupon-strip typewriting machine may be enumerated as follows: (1) The coupons are valuable in accounting of every description for assorting and distributing work preparatory to tabulating; (2) they are useful for collecting, compiling and recording statistics; (3) valuable for checking purposes, as the coupons furnish both printed and totalized records; (4) and, finally, they are important as they contain the original records, and they may be filed card-index fashion for permanent record.

SPECIFIC EXAMPLE OF THE WORK DONE BY THE MACHINE

The New York Edison Company utilizes the Burroughs adding and listing machine in combination with the coupon-strip typewriting machine, for assorting and compiling the very numerous cash payments received from consumers daily, preparatory to posting such payments to their accounts. The volume of this work is emphasized by the fact that 145 ledgers, with provision for 2500 accounts each, are required for consumers' accounts.

The Company billheads are printed with perforated collectors' coupons attached. The labor and time ordinarily exacted of the bookkeepers in preparing additional or cashier's coupons are eliminated. The additional coupons are prepared simultaneously with the listing operation at the time payment is received, and thus the issuance of the coupon involves no extra attention or expense. On the contrary, the rendering monthly of a vast number of duplicate and unnecessary cashier's or payment coupons is entirely obviated, as, for instance, in the case of delinquent consumers.

As is customary, payments from consumers are derived from three sources, namely, (1) mail receipts, (2) collectors' returns, and (3) office windows.

The mail receipts constitute over 75 per cent. of the total cash payments received. All mail matter is received and opened by a department designated to do that work. All remittances received

from customers are delivered to the cashier's department arranged vertically in metal trays, size 10½ by 14½ inches, and 3½ inches deep, which accommodate approximately 250 individual payments. These trays are assigned to comparing clerks. In comparing and separating mail payments, the clerks use two companion trays—one for holding the checks and the other, the bills. The amount of the checks and bills contained in the respective trays at any time should therefore balance in the aggregate.

SHEET NO. 1					
DATE JUN 17 1913					
100	200	300	400	500	600
342	2220	7438498	300	10186588	
790	2326	83930		3899	
1380	130	130		630	
322	130	1037		110	
622	360	70		4021	
2155	1999	170		260	
1501	269	338		760	
1368	200	1938		3504	
190	1303	90		499	
1105	540	110		968	
10345	360	230		1180	
2140	1128	1244		480	
4647	902	170		720	
310	664	466		769	
347	267	210		746	
1120	140	2430		86	
119	1061	879		2080	
4629	8820	210		3978	
1104	60	260		180	
830	110	101		6997	
130	130	247		1240	
90	1824	130		40	
1744	176	242		10359	
530	250	5121		646	
269	4357	11691			
522	410	11869		73071	
160	240	170		170	
920	600	370		430	
2435	110	400		6698	
4040	1246	930		480	
451	240	3738		780	
190	280	759		170	
170	33858	580		170	
60	558	763		4960	
270	240	410		89	
120	820	240		1779	
100	1400	491		2120	
2676	880	640		136	
100	4395338	200	7438498	300	10186588
			400	14790688	

FIG 5
Bank deposit sheet for mail receipts, prepared in duplicate.
Size 10½ by 19 in.

The companion trays are picked up at intervals of ten to fifteen minutes and delivered to the listing operators. The checks and bills are added and listed on separate machines at one and the same time.

The checks are listed on duplicate bank deposit sheets (Fig 5); a Burroughs 13-column duplex machine is employed for this purpose. The original deposit sheet is delivered to the

DEPOSIT PROOF SHEET					
THE NEW YORK EDISON COMPANY					
DATE JUN 17 1913					
FIRST DEPOSIT			SHEET No.		
DEPOSIT No.	ACCOUNT	AMOUNT	DEPOSIT No.	ACCOUNT	AMOUNT
4398 823	40		4398 873	40	45224
4398 830	40		4398 874	40	340
4398 831	43		4398 875	40	340
4398 833	40		4398 876	40	340
4398 834	40		4398 877	40	340
4398 836	42		4398 878	40	340
4398 837	42		4398 879	40	340
4398 838	42		4398 880	40	340
4398 839	42		4398 881	40	340
4398 840	42		4398 882	40	340
4398 841	42		4398 883	40	340
4398 842	42		4398 884	40	340
4398 843	42		4398 885	40	340
4398 844	42		4398 886	40	340
4398 845	42		4398 887	40	340
4398 846	42		4398 888	40	340
4398 847	42		4398 889	40	340
4398 848	42		4398 890	40	340
4398 849	42		4398 891	40	340
4398 850	42		4398 892	40	340
4398 851	42		4398 893	40	340
4398 852	42		4398 894	40	340
4398 853	42		4398 895	40	340
4398 854	42		4398 896	40	340
4398 855	42		4398 897	40	340
4398 856	42		4398 898	40	340
4398 857	42		4398 899	40	340
4398 858	42		4398 900	40	340
4398 859	42				
4398 860	42				
4398 861	42				
4398 862	42				
4398 863	42				
4398 864	42				
4398 865	42				
4398 866	42				
4398 867	42				
4398 868	42				
4398 869	42				
4398 870	42				
4398 871	42				
4398 872	42				
4398 873	42				
4398 874	42				
4398 875	42				
4398 876	42				
4398 877	42				
4398 878	42				
4398 879	42				
4398 880	42				
4398 881	42				
4398 882	42				
4398 883	42				
4398 884	42				
4398 885	42				
4398 886	42				
4398 887	42				
4398 888	42				
4398 889	42				
4398 890	42				
4398 891	42				
4398 892	42				
4398 893	42				
4398 894	42				
4398 895	42				
4398 896	42				
4398 897	42				
4398 898	42				
4398 899	42				
4398 900	42				
4398 901	42				
4398 902	42				
4398 903	42				
4398 904	42				
4398 905	42				
4398 906	42				
4398 907	42				
4398 908	42				
4398 909	42				
4398 910	42				
4398 911	42				
4398 912	42				
4398 913	42				
4398 914	42				
4398 915	42				
4398 916	42				
4398 917	42				
4398 918	42				
4398 919	42				
4398 920	42				
4398 921	42				
4398 922	42				
4398 923	42				
4398 924	42				
4398 925	42				
4398 926	42				
4398 927	42				
4398 928	42				
4398 929	42				
4398 930	42				
4398 931	42				
4398 932	42				
4398 933	42				
4398 934	42				
4398 935	42				
4398 936	42				
4398 937	42				
4398 938	42				
4398 939	42				
4398 940	42				
4398 941	42				
4398 942	42				
4398 943	42				
4398 944	42				
4398 945	42				
4398 946	42				
4398 947	42				
4398 948	42				
4398 949	42				
4398 950	42				
4398 951	42				
4398 952	42				
4398 953	42				
4398 954	42				
4398 955	42				
4398 956	42				
4398 957	42				
4398 958	42				
4398 959	42				
4398 960	42				
4398 961	42				
4398 962	42				
4398 963	42				
4398 964	42				
4398 965	42				
4398 966	42				
4398 967	42				
4398 968	42				
4398 969	42				
4398 970	42				
4398 971	42				
4398 972	42				
4398 973	42				
4398 974	42				
4398 975	42				
4398 976	42				
4398 977	42				
4398 978	42				
4398 979	42				
4398 980	42				
4398 981	42				
4398 982	42				
4398 983	42				
4398 984	42				
4398 985	42				
4398 986	42				
4398 987	42				
4398 988	42				
4398 989	42				
4398 990	42				
4398 991	42				
4398 992	42				
4398 993	42				
4398 994	42				
4398 995	42				
4398 996	42				
4398 997	42				
4398 998	42				
4398 999	42				
4398 1000	42				
4398 1001	42				
4398 1002	42				
4398 1003	42				
4398 1004	42				
4398 1005	42				
4398 1006	42				
4398 1007	42				
4398 1008	42				
4398 1009	42				
4398 1010	42				
4398 1011	42				
4398 1012	42				
4398 1013	42				
4398 1014	42				
4398 1015	42				
4398 1016	42				
4398 1017	42				
4398 1018	42				
4398 1019	42				
4398 1020	42				
4398 1021	42				
4398 1022	42				
4398 1023	42				
4398 1024	42				
4398 1025	42				
4398 1026	42				
4398 1027	42				
4398 1028	42				
4398 1029	42				
4398 1030	42				
4398 1031	42				
4398 1032	42				
4398 1033	42				
4398 1034	42				
4398 1035	42				
4398 1036	42				
4398 1037	42				
4398 1038	42				
4398 1039	42				
4398 1040	42				
4398 1041	42				
4398 1042	42				
4398 1043	42				
4398 1044	42				
4398 1045	42				
4398 1046	42				
4398 1047	42				
4398 1048	42				
4398 1049	42				
4398 1050	42				
4398 1051	42				
4398 1052	42				
4398 1053	42				
4398 1054	42				
4398 1055	42				
4398 1056	42				
4398 1057	42				
4398 1058	42				
4398 1059	42				
4398 1060	42				
4398 1061	42				
4398 1062	42				
4398 1063	42				
4398 1064	42				
4398 1065	42				
4398 1066	42				
4398 1067	42				
4398 1068	42				
4398 1069	42				
4398 1070	42				
4398 1071	42				
4398 1072	42				
4398 1073	42				
4398 1074	42				
4398 1075	42				
4398 1076	42				
4398 1077	42				
4398 1078	42				
4398 1079	42				
4398 1080	42				
4398 1081	42				
4398 1082	42				
4398 1083	42				
4398 1084	42				
4398 1085	42				
4398 1086	42				
4398 1087	42				
4398 1088	42				
4398 1089	42				
4398 1090	42				
4398 1091	42				
4398 1092	42				
4398 1093	42				
4398 1094	42				
4398 1095	42				
4398 1096	42				
4398 1097	42				
4398 1098	42				
4398 1099	42				
4398 1100	42				
4398 1101	42				
4398 1102	42				
4398 1103	42				
4398 1104	42				
4398 1105	42				
4398 1106	42				
4398 1107	42				
4398 1108	42				
4398 1109	42				
4398 1110	42				
4398 1111	42				
4398 1112	42				
4398 1113</					

SUMMARY PROOF SHEET
THE NEW YORK EDISON COMPANY

DATE **JUL 17 1930**

SECOND DEPOSIT

DEPOSIT NO. _____ SHEET NO. **10**

DEPOSIT SHEETS		
OPERATOR No. 1	AMOUNT	TOTAL
- 1	255	\$1,139.15
- 2	255	4,996.36
- 3	255	84,019.68
- 4	255	84,019.68
- 5	255	84,019.68
- 6	255	84,019.68
- 7	255	84,019.68
- 8	255	84,019.68
- 9	255	84,019.68
- 10	255	84,019.68
- 11	255	84,019.68
- 12	255	84,019.68
- 13	255	84,019.68
- 14	255	84,019.68
- 15	255	84,019.68
- 16	255	84,019.68
- 17	255	84,019.68
- 18	255	84,019.68
- 19	255	84,019.68
- 20	255	84,019.68
- 21	255	84,019.68
- 22	255	84,019.68
- 23	255	84,019.68
- 24	255	84,019.68
- 25	255	84,019.68
- 26	255	84,019.68
- 27	255	84,019.68
- 28	255	84,019.68
- 29	255	84,019.68
- 30	255	84,019.68
- 31	255	84,019.68
- 32	255	84,019.68
- 33	255	84,019.68
- 34	255	84,019.68
- 35	255	84,019.68
- 36	255	84,019.68
- 37	255	84,019.68
- 38	255	84,019.68
- 39	255	84,019.68
- 40	255	84,019.68
- 41	255	84,019.68
- 42	255	84,019.68
- 43	255	84,019.68
- 44	255	84,019.68
- 45	255	84,019.68
- 46	255	84,019.68
- 47	255	84,019.68
- 48	255	84,019.68
- 49	255	84,019.68
- 50	255	84,019.68
- 51	255	84,019.68
- 52	255	84,019.68
- 53	255	84,019.68
- 54	255	84,019.68
- 55	255	84,019.68
- 56	255	84,019.68
- 57	255	84,019.68
- 58	255	84,019.68
- 59	255	84,019.68
- 60	255	84,019.68
- 61	255	84,019.68
- 62	255	84,019.68
- 63	255	84,019.68
- 64	255	84,019.68
- 65	255	84,019.68
- 66	255	84,019.68
- 67	255	84,019.68
- 68	255	84,019.68
- 69	255	84,019.68
- 70	255	84,019.68
- 71	255	84,019.68
- 72	255	84,019.68
- 73	255	84,019.68
- 74	255	84,019.68
- 75	255	84,019.68
- 76	255	84,019.68
- 77	255	84,019.68
- 78	255	84,019.68
- 79	255	84,019.68
- 80	255	84,019.68
- 81	255	84,019.68
- 82	255	84,019.68
- 83	255	84,019.68
- 84	255	84,019.68
- 85	255	84,019.68
- 86	255	84,019.68
- 87	255	84,019.68
- 88	255	84,019.68
- 89	255	84,019.68
- 90	255	84,019.68
- 91	255	84,019.68
- 92	255	84,019.68
- 93	255	84,019.68
- 94	255	84,019.68
- 95	255	84,019.68
- 96	255	84,019.68
- 97	255	84,019.68
- 98	255	84,019.68
- 99	255	84,019.68
- 100	255	84,019.68
- 101	255	84,019.68
- 102	255	84,019.68
- 103	255	84,019.68
- 104	255	84,019.68
- 105	255	84,019.68
- 106	255	84,019.68
- 107	255	84,019.68
- 108	255	84,019.68
- 109	255	84,019.68
- 110	255	84,019.68
- 111	255	84,019.68
- 112	255	84,019.68
- 113	255	84,019.68
- 114	255	84,019.68
- 115	255	84,019.68
- 116	255	84,019.68
- 117	255	84,019.68
- 118	255	84,019.68
- 119	255	84,019.68
- 120	255	84,019.68
- 121	255	84,019.68
- 122	255	84,019.68
- 123	255	84,019.68
- 124	255	84,019.68
- 125	255	84,019.68
- 126	255	84,019.68
- 127	255	84,019.68
- 128	255	84,019.68
- 129	255	84,019.68
- 130	255	84,019.68
- 131	255	84,019.68
- 132	255	84,019.68
- 133	255	84,019.68
- 134	255	84,019.68
- 135	255	84,019.68
- 136	255	84,019.68
- 137	255	84,019.68
- 138	255	84,019.68
- 139	255	84,019.68
- 140	255	84,019.68
- 141	255	84,019.68
- 142	255	84,019.68
- 143	255	84,019.68
- 144	255	84,019.68
- 145	255	84,019.68
- 146	255	84,019.68
- 147	255	84,019.68
- 148	255	84,019.68
- 149	255	84,019.68
- 150	255	84,019.68
- 151	255	84,019.68
- 152	255	84,019.68
- 153	255	84,019.68
- 154	255	84,019.68
- 155	255	84,019.68
- 156	255	84,019.68
- 157	255	84,019.68
- 158	255	84,019.68
- 159	255	84,019.68
- 160	255	84,019.68
- 161	255	84,019.68
- 162	255	84,019.68
- 163	255	84,019.68
- 164	255	84,019.68
- 165	255	84,019.68
- 166	255	84,019.68
- 167	255	84,019.68
- 168	255	84,019.68
- 169	255	84,019.68
- 170	255	84,019.68
- 171	255	84,019.68
- 172	255	84,019.68
- 173	255	84,019.68
- 174	255	84,019.68
- 175	255	84,019.68
- 176	255	84,019.68
- 177	255	84,019.68
- 178	255	84,019.68
- 179	255	84,019.68
- 180	255	84,019.68
- 181	255	84,019.68
- 182	255	84,019.68
- 183	255	84,019.68
- 184	255	84,019.68
- 185	255	84,019.68
- 186	255	84,019.68
- 187	255	84,019.68
- 188	255	84,019.68
- 189	255	84,019.68
- 190	255	84,019.68
- 191	255	84,019.68
- 192	255	84,019.68
- 193	255	84,019.68
- 194	255	84,019.68
- 195	255	84,019.68
- 196	255	84,019.68
- 197	255	84,019.68
- 198	255	84,019.68
- 199	255	84,019.68
- 200	255	84,019.68
- 201	255	84,019.68
- 202	255	84,019.68
- 203	255	84,019.68
- 204	255	84,019.68

bank with the endorsed checks, and the duplicate is retained by the company for reference.

An electrical check endorsing machine is attached to the Burroughs machine, whereby the endorsement of all checks listed is assured, with only one handling of the checks.

The bills are listed on a Burroughs 17-column machine, equipped with a coupon-strip typewriting machine. The verification of this work is obtained by arbitrary divisions of 100 bills, the deposit proof sheets (Fig 6) used in this connection providing exactly for that number of items.

Several coupled letter-characters are used for designating any exceptions to regular payments, such as: A/C, on account; O/P, overpayment; C/R credit memorandum; C/D, consumers' deposits; C/S, consumers' suspense. In addition thereto, two bracket-characters are used for designating payments consisting of two or more items, thus eliminating the necessity for blank spacing otherwise required for checking purposes.

A summary proof sheet (Fig 7) is provided for collating and checking the results of the several operators by individual deposits.

Before the bills are listed they are stamped paid as a necessary safeguard; no bills are listed unless they are properly stamped.

An important advantage of the coupon-strip typewriting machine, which should be emphasized, is that the coupons are prepared simultaneously with the adding and listing of the bills on the deposit proof sheet. An illustration is given herewith of a coupon-strip typewriting machines and a Burroughs adding machine in actual operation.

The regulation adding machine $2\frac{1}{4}$ -inch roll paper is used for this purpose. The super-quality of paper has been found most satisfactory for obtaining legible printing and efficient handling of coupons.

The Burroughs 17-column machine enables a registration of all the essential elements for properly recording payments, as follows: (1) Source number, two columns; (2) ledger number, three columns; (3) ledger folio, four columns; (4) code designation, one column; (5) amount, seven columns. For printing source number and ledger number two special repeat keys are used. A *facsimile* of the detached coupon is shown herewith (Fig 8).

In passing, it should be pointed out that one of the distinctive features of the coupon-strip typewriting machine is the substitution of a carbon ribbon in place of the carbon sheet. This provision admits of the introduction of a two-color, red and purple

Date <u>JUN 17 1913</u>		Ledger No. <u>130</u>			
Deposit No. <u>1</u>		Sheet No. _____			
THE NEW YORK EDISON COMPANY					
CASH RECEIPT SHEET.					
TRANSFERS		Folio	Amount	Source Total	Total
From Ledger	To Ledger				
Amount Brought Forward.					
	0	14	3.45		
		16	4.65		
		16	2.50		
		27	3.62		
		31	33.48		
		32	3.37		
		32	5.23		
		40	4.44		
		45	7.74		
		71	3.33		
		75	2.13		
		77	4.78		
		78	1.27		
	31	263	85.50		
		262	8.10		
		261	8.37		
		257	4.44		
		259	8.54		
		1137	7.50		
		1145	2.50		
		1147	8.30		
		1154	9.75	75.85	
	46	765	6.54		
		767	3.26		
		788	6.73		
		769	4.44		
		730	8.67		
		733	13.62		
		732	4.42		
		735	6.27		
		800	3.38		
		801	4.56		
		805	4.67		
		816	6.83	110.27	423.23
Amount Carried Forward.					252.03
					398.03
Listed	<i>EW</i>	Posted	<i>JR</i>	Examined	<i>HP</i>
				Entered	<i>JD</i>

FIG 9

(1) Cash Receipt Sheet. Two or more sheets are issued daily for the individual ledgers, as required. Attention is directed to the transfer feature and extension of source totals. Size 8½ by 15½ in.

four-division ribbon for printing. This separation of the figures enables the operator to readily distinguish between the source number, ledger number, folio number, and the amount columns.

The coupons are assorted according to ledger numbers and again re-assorted in sequence of ledger folio or account numbers by assorting clerks. For facility in assembling coupons, two com-

Date <u>JUN 17 1913</u>		Ledger No. <u>119</u>			
Deposit No. <u>12</u>		Sheet No. _____			
THE NEW YORK EDISON COMPANY.					
CASH RECEIPT SHEET.					
TRANSFERS		Folio	Amount	Source Total	Total
From Ledger	To Ledger				
	Amount Brought Forward		1.38 ✓		
	8	42	3.88 ✓		
		58	.76 ✓		
		58	5.30 ✓	12.01 ↑	
		76	7.99 ✓		
		2257	15.75 ✓	19.95 ↑	
		82	2.15 ✓	1.52 ↑	86.69 ↑
112		1013	.85 ✓	.85 ↑	87.54 ↑
		58	1.27 ✓		
		1119	3.80 ✓		
		340	3.78 ✓		
		417	10.52 ✓		
		418	4.10 ✓		
		684	4.00 ✓		
		685	.38 ✓		
		687	14.90 ✓		
		1759	1.76 ✓		
		1759	1.42 ✓		
		1759	1.52 ✓		
		1823	6.27 ✓		
		2137	18.24 ✓		
		2137	17.86 ✓		
		2149	.40 ✓		
		2149	1.00 ✓		
	Amount Carried Forward				102.35 ↑
Listed <u>WWS</u>	Posted <u>LP</u>	Examined <u>MP</u>	Entered <u>WWS</u>		

(2) Another example of Cash Receipt Sheet. Attention is directed to transfer feature and extension of source totals.

bination table and pigeonhole racks are used; the first arranged in the order of ledger number, and the second by ledger folios.

Originally the assorted coupons were listed on ledger slips, and postings were made directly from the coupons, the bookkeeper checking the ledger slips at the same time. A cash receipt sheet (Fig 9) has been recently adopted. In addition to printing the amount, the source and folio number are likewise printed thereon, for the greater convenience of the bookkeeper in posting. This sheet provides for extended source totals and for an accurate record of any transfers from or to other ledgers.

THE NEW YORK EDISON COMPANY					
Summary Collectors and Branch Office Receipt Sheet		Amount		Date	
Source	Amount	Source	Amount	Date	Amount
Pension					
A. A. Smith	480.00	120	480.00		
A. B. Johnson	540.00	120	540.00		
A. C. Brown	300.00	120	300.00		
A. D. White	300.00	120	300.00		
A. E. Green	300.00	120	300.00		
A. F. Black	300.00	120	300.00		
A. G. Gray	300.00	120	300.00		
A. H. Blue	300.00	120	300.00		
A. I. Red	300.00	120	300.00		
A. J. Yellow	300.00	120	300.00		
A. K. Purple	300.00	120	300.00		
A. L. Orange	300.00	120	300.00		
A. M. Silver	300.00	120	300.00		
A. N. Gold	300.00	120	300.00		
A. O. Platinum	300.00	120	300.00		
A. P. Nickel	300.00	120	300.00		
A. Q. Copper	300.00	120	300.00		
A. R. Iron	300.00	120	300.00		
A. S. Steel	300.00	120	300.00		
A. T. Lead	300.00	120	300.00		
A. U. Zinc	300.00	120	300.00		
A. V. Tin	300.00	120	300.00		
A. W. Brass	300.00	120	300.00		
A. X. Aluminum	300.00	120	300.00		
A. Y. Magnesium	300.00	120	300.00		
A. Z. Silicon	300.00	120	300.00		
A. AA. Phosphorus	300.00	120	300.00		
A. AB. Sulfur	300.00	120	300.00		
A. AC. Chlorine	300.00	120	300.00		
A. AD. Fluorine	300.00	120	300.00		
A. AE. Iodine	300.00	120	300.00		
A. AF. Bromine	300.00	120	300.00		
A. AG. Mercury	300.00	120	300.00		
A. AH. Silver	300.00	120	300.00		
A. AI. Gold	300.00	120	300.00		
A. AJ. Platinum	300.00	120	300.00		
A. AK. Nickel	300.00	120	300.00		
A. AL. Copper	300.00	120	300.00		
A. AM. Iron	300.00	120	300.00		
A. AN. Steel	300.00	120	300.00		
A. AO. Lead	300.00	120	300.00		
A. AP. Zinc	300.00	120	300.00		
A. AQ. Tin	300.00	120	300.00		
A. AR. Brass	300.00	120	300.00		
A. AS. Aluminum	300.00	120	300.00		
A. AT. Magnesium	300.00	120	300.00		
A. AU. Silicon	300.00	120	300.00		
A. AV. Phosphorus	300.00	120	300.00		
A. AW. Sulfur	300.00	120	300.00		
A. AX. Chlorine	300.00	120	300.00		
A. AY. Fluorine	300.00	120	300.00		
A. AZ. Iodine	300.00	120	300.00		
A. BA. Bromine	300.00	120	300.00		
A. BB. Mercury	300.00	120	300.00		
A. BC. Silver	300.00	120	300.00		
A. BD. Gold	300.00	120	300.00		
A. BE. Platinum	300.00	120	300.00		
A. BF. Nickel	300.00	120	300.00		
A. BG. Copper	300.00	120	300.00		
A. BH. Iron	300.00	120	300.00		
A. BI. Steel	300.00	120	300.00		
A. BJ. Lead	300.00	120	300.00		
A. BK. Zinc	300.00	120	300.00		
A. BL. Tin	300.00	120	300.00		
A. BM. Brass	300.00	120	300.00		
A. BN. Aluminum	300.00	120	300.00		
A. BO. Magnesium	300.00	120	300.00		
A. BP. Silicon	300.00	120	300.00		
A. BQ. Phosphorus	300.00	120	300.00		
A. BR. Sulfur	300.00	120	300.00		
A. BS. Chlorine	300.00	120	300.00		
A. BT. Fluorine	300.00	120	300.00		
A. BU. Iodine	300.00	120	300.00		
A. BV. Bromine	300.00	120	300.00		
A. BW. Mercury	300.00	120	300.00		
A. BX. Silver	300.00	120	300.00		
A. BY. Gold	300.00	120	300.00		
A. BZ. Platinum	300.00	120	300.00		
A. CA. Nickel	300.00	120	300.00		
A. CB. Copper	300.00	120	300.00		
A. CC. Iron	300.00	120	300.00		
A. CD. Steel	300.00	120	300.00		
A. CE. Lead	300.00	120	300.00		
A. CF. Zinc	300.00	120	300.00		
A. CG. Tin	300.00	120	300.00		
A. CH. Brass	300.00	120	300.00		
A. CI. Aluminum	300.00	120	300.00		
A. CJ. Magnesium	300.00	120	300.00		
A. CK. Silicon	300.00	120	300.00		
A. CL. Phosphorus	300.00	120	300.00		
A. CM. Sulfur	300.00	120	300.00		
A. CN. Chlorine	300.00	120	300.00		
A. CO. Fluorine	300.00	120	300.00		
A. CP. Iodine	300.00	120	300.00		
A. CQ. Bromine	300.00	120	300.00		
A. CR. Mercury	300.00	120	300.00		
A. CS. Silver	300.00	120	300.00		
A. CT. Gold	300.00	120	300.00		
A. CU. Platinum	300.00	120	300.00		
A. CV. Nickel	300.00	120	300.00		
A. CW. Copper	300.00	120	300.00		
A. CX. Iron	300.00	120	300.00		
A. CY. Steel	300.00	120	300.00		
A. CZ. Lead	300.00	120	300.00		
A. DA. Zinc	300.00	120	300.00		
A. DB. Tin	300.00	120	300.00		
A. DC. Brass	300.00	120	300.00		
A. DD. Aluminum	300.00	120	300.00		
A. DE. Magnesium	300.00	120	300.00		
A. DF. Silicon	300.00	120	300.00		
A. DG. Phosphorus	300.00	120	300.00		
A. DH. Sulfur	300.00	120	300.00		
A. DI. Chlorine	300.00	120	300.00		
A. DJ. Fluorine	300.00	120	300.00		
A. DK. Iodine	300.00	120	300.00		
A. DL. Bromine	300.00	120	300.00		
A. DM. Mercury	300.00	120	300.00		
A. DN. Silver	300.00	120	300.00		
A. DO. Gold	300.00	120	300.00		
A. DP. Platinum	300.00	120	300.00		
A. DQ. Nickel	300.00	120	300.00		
A. DR. Copper	300.00	120	300.00		
A. DS. Iron	300.00	120	300.00		
A. DT. Steel	300.00	120	300.00		
A. DU. Lead	300.00	120	300.00		
A. DV. Zinc	300.00	120	300.00		
A. DW. Tin	300.00	120	300.00		
A. DX. Brass	300.00	120	300.00		
A. DY. Aluminum	300.00	120	300.00		
A. DZ. Magnesium	300.00	120	300.00		
A. EA. Silicon	300.00	120	300.00		
A. EB. Phosphorus	300.00	120	300.00		
A. EC. Sulfur	300.00	120	300.00		
A. ED. Chlorine	300.00	120	300.00		
A. EE. Fluorine	300.00	120	300.00		
A. EF. Iodine	300.00	120	300.00		
A. EG. Bromine	300.00	120	300.00		
A. EH. Mercury	300.00	120	300.00		
A. EI. Silver	300.00	120	300.00		
A. EJ. Gold	300.00	120	300.00		
A. EK. Platinum	300.00	120	300.00		
A. EL. Nickel	300.00	120	300.00		
A. EM. Copper	300.00	120	300.00		
A. EN. Iron	300.00	120	300.00		
A. EO. Steel	300.00	120	300.00		
A. EP. Lead	300.00	120	300.00		
A. EQ. Zinc	300.00	120	300.00		
A. ER. Tin	300.00	120	300.00		
A. ES. Brass	300.00	120	300.00		
A. ET. Aluminum	300.00	120	300.00		
A. EU. Magnesium	300.00	120	300.00		
A. EV. Silicon	300.00	120	300.00		
A. EW. Phosphorus	300.00	120	300.00		
A. EX. Sulfur	300.00	120	300.00		
A. EY. Chlorine	300.00	120	300.00		
A. EZ. Fluorine	300.00	120	300.00		
A. FA. Iodine	300.00	120	300.00		
A. FB. Bromine	300.00	120	300.00		
A. FC. Mercury	300.00	120	300.00		
A. FD. Silver	300.00	120	300.00		
A. FE. Gold	300.00	120	300.00		
A. FF. Platinum	300.00	120	300.00		
A. FG. Nickel	300.00	120	300.00		
A. FH. Copper	300.00	120	300.00		
A. FI. Iron	300.00	120	300.00		
A. FJ. Steel	300.00	120	300.00		
A. FK. Lead	300.00	120	300.00		
A. FL. Zinc	300.00	120	300.00		
A. FM. Tin	300.00	120	300.00		
A. FN. Brass	300.00	120	300.00		
A. FO. Aluminum	300.00	120	300.00		
A. FP. Magnesium	300.00	120	300.00		
A. FQ. Silicon	300.00	120	300.00		
A. FR. Phosphorus	300.00	120	300.00		
A. FS. Sulfur	300.00	120	300.00		
A. FT. Chlorine	300.00	120	300.00		
A. FU. Fluorine	300.00	120	300.00		
A. FV. Iodine	300.00	120	300.00		
A. FW. Bromine	300.00	120	300.00		
A. FX. Mercury	300.00	120	300.00		
A. FY. Silver	300.00	120	300.00		
A. FZ. Gold	300.00	120	300.00		
A. GA. Platinum	300.00	120	300.00		
A. GB. Nickel	300.00	120	300.00		
A. GC. Copper	300.00	120	300.00		
A. GD. Iron	300.00	120	300.00		
A. GE. Steel	300.00	120	300.00		
A. GF. Lead	300.00	120	300.00		
A. GG. Zinc	300.00	120	300.00		
A. GH. Tin	300.00	120	300.00		
A. GI. Brass	300.00	120	300.00		
A. GJ. Aluminum	300.00	120	300.00		
A. GK. Magnesium	300.00	120	300.00		
A. GL. Silicon	300.00	120	300.00		
A. GM. Phosphorus	300.00	120	300.00		
A. GN. Sulfur	300.00	120	300.00		
A. GO. Chlorine	300.00	120	300.00		
A. GP. Fluorine	300.00	120	300		

repeat keys are introduced. A statement back carriage with an automatic ejector and a keyboard lock is likewise attached for facility in handling the numerous sheets.

Payments are posted to customers' accounts on schedule time twice daily, irrespective of pressure of work, including the taking off of monthly trial balances. The receipted bills are withheld until all postings have been made, including any transfers. When all postings are completed the receipted bills are promptly mailed to consumers. Receipted bills for remittances delivered by the Post Office before 2 p. m. are mailed on the day received. Those delivered after that hour are mailed before noon the next day.

The routine observed with reference to office window and collectors' returns is identical to that outlined for mail receipts. Several features of this part of the work should be especially mentioned.

It has been demonstrated by the company that, regardless of the adoption of collectors' coupons and cashiers' or payment coupons, it is desirable to continue the coupon-strip. In checking the daily receipts from both these sources in the manner indicated no additional work is involved, for the reason that either the statement of coupons presented must be checked and the addition verified, or the coupons must be listed on an adding machine.

As the payments received from the collectors' returns include currency as well as checks, the individual total returns are entered on a summary sheet (Fig 10) under the captions cash, checks and total.

During the time collectors wait at the windows the currency is counted and the checks are listed on the bank deposit sheets (Fig 11), while the coupons are in turn listed on separate deposit proof sheets (Fig 6). The same methods and practice are followed in respect to the office window receipts. Separate sub-totals are extended on the bank deposit sheets, corresponding with the deposit proof sheets. The total currency receipts are entered on the bank deposit sheets in separate amounts for both bills and specie.

In listing collectors' returns and office window receipts code numerals are used to designate the various sources. As an illustration, each collector and each receiving clerk is assigned a definite number, which must appear on all records of returns re-

ported by each individual. The returns of over 50 collectors and 10 local offices, or over 60 sources, are received and verified and the bank deposit sheets prepared for the bank, on an average within a period of 30 minutes.

SHEET NO. 1				
DATE JUN 17 1913				
2		7039 E	252234 E	18 6360
41	570	400	1120	399
	400	680	440	1501
	2497	123	390	2519
	710	116	110	8258
	2111	938	2341	152
	2949	450	1180	280
	24339	2280	320	943
	1048	520	680	57
	380	917	944	4218
	100	540	782	4214
	340	992		880
	624	291	260611 T	1817
	444	280		901
	890	266	11 340	300
	440	550	1340	8000
	510	1156	2002	2000
	880	710	200	1300
	2094	662	806	4500
	790	310	420	1000
	789	109	1020	3000
	1966	90	180	492
	2178	678	170	727
	540	972	950	
	351	223	666	
	610	189	650	
	329	145	345	
	20322 T	338	725	
			288	
		22387 T	300	
	230		340	
488	340	330	300	
	1010	223	1230	
	3330	356	110	
	440	446	46	
	880	129	1847	
	340	289	740	
	490	301	570	
	67208	2444 T	19041 T	

FIG II

Bank Deposit Sheet for Collectors' Returns and Office Receipts, prepared in duplicate. Size 10½ by 19 in.

Two independent proofs are obtained of the several daily deposits, as follows: (1) Proof of deposits by source totals, and (2) proof of deposits by ledger totals. Both the source totals and the ledger totals are listed from the cash receipt sheets on a Burroughs adding machine, equipped with a coupon-strip typewriting machine. The coupon-strips of the former are detached and assorted in the numerical order of the various sources, while those of the latter are assembled according to the ledger numbers.

The source total coupons are listed on source proof sheets (Fig 12), provided with columns for (1) separate coupon items and sub-totals; (2) transfers from and to the various sources;

(3) daily total for the extension of net amounts; (4) amounts brought forward from previous day, and (5) extension of accumulated totals for the month of the various sources.

The ledger total coupons are listed on a ledger proof sheet (Fig 13) with separate columns for (1) amounts of separate deposits; (2) transfers from and to the various ledgers; (3) net daily totals.

Date JUN 17 1913		District No. 1 2 3					
Deposit No. 1		Sheet No. 1					
THE NEW YORK EDISON COMPANY							
SOURCE PROOF SHEET							
SOURCE	ITEMS OR LEDGER	TOTAL OR LEDGER	TRANSFERS		DAILY TOTAL	BROUGHT FORWARD	ACCUMULATED TOTAL
			TO AMOUNT	BY AMOUNT			
1	Brought Forward	3485			3485	1896846	1890031
2		2138			26271	22694	189765
3		24093					
4		8941			19843	128042	147905
5		17922					
6		17063					
7		44623	22	340	68089	128294	190382
8		4648					
9		1732					
10		4035					
11		340					
12		23930					
13		122					
14		6740					
15		1539					
16		30					
17		1201					
18		5086					
19		234					
20		401421			40142	160738	200880
21		8280					
22		220					
23		721					
24		237684			2376	481818	488847
25		18626					
26		1027					
27		325					
28		210781			11578	27496	286074
29		4908			4908	203748	248670
30							
31							
32							
33		12439					
34		6120			10889	200758	208337
Amount Carried Forward		288439	227	237	228439	2206389	2209837

FIG 12

Source Proof Sheet, providing for any transfers from and to the various sources. Extension of net source totals and accumulative source totals for the month. Size 12 by 15 in.

Summary ledger sheets (Fig 14) are maintained, on which is carried forward from the ledger proof sheets the net totals of the several deposits. These sheets likewise are provided with columns, as follows: (1) Daily total after transfers of all de-

receipt sheets are turned over to the tickler operator for distribution of the same on the daily cash tickler sheet (Fig 15). These sheets are divided into 26 separate columns, each of the first 25 columns representing a group of 100 pages of a ledger, while the 26th column contains the daily and section totals.

Date JUN 12 1913		District No. 1						
Deposit No. 4		Sheet No. 1						
THE NEW YORK EDISON COMPANY SUMMARY LEDGER SHEET								
	LEDGER	FIRST DEPOSIT	SECOND DEPOSIT	THIRD DEPOSIT	FOURTH DEPOSIT	DAILY TOTAL	BROUGHT FORWARD	ACCUMULATED TOTAL
<i>Amount Brought Forward</i>								
	01	488.68	419.49	279.86	13.84	1,201.87	3,619.71	4,821.58
	02	6.80	100.82	18.46	7.50	133.08	7,441.10	7,574.18
	03	400.4	127.96	273.28	106.14	547.42	8,064.59	5,612.01
	04	157.43	432.74	239.77		829.94	5,871.49	6,097.63
	05	15.40	122.78	295.18	4.20	437.56	5,358.85	5,696.39
	06	1100.8	166.06	221.08		497.22	5,771.37	4,868.97
	07	192.18	79.29	244.9	1.90	297.87	3,867.84	3,865.71
	25	117.41	82.4	100.28	12.80	317.41	4,492.81	4,810.87
	26	173.63	110.75	37.50		321.88	4,846.13	5,168.01
	27	30.00	436.15	325.90	1.44	806.49	6,087.03	4,833.48
	28	31.34	478.73	438.40	3.70	968.17	6,952.09	7,920.26
	29		20.40	170.34		190.74	6,542.05	6,732.79
	30	81.61	641.98	805.94	26.17	955.70	5,088.75	6,044.43
	31							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
	41							
	42							
		2,380.60	6,045.11	5,323.94	4,285.81	14,178.43	15,988.01	16,816.34
<i>Amount Carried Forward</i>								

FIG 14

Summary Ledger Sheet, providing for listing of separate net deposits, applicable to the separate ledgers, net ledger daily totals and accumulated ledger totals for the month. Size 12 by 15 in.

The accumulated daily sub-transfers must agree with the cash receipt sheet, the sum total of which is recorded under the daily totals. At the expiration of the week the divisional sub-totals are accumulated on the machine and verified with the section totals.

The divisional totals of the daily tickler sheets are carried forward to monthly recapitulation sheets (Fig 16). The amounts of the individual sheets, of course, could be carried forward daily

to the sheets of the succeeding day and thus obviate the necessity of a recapitulation sheet. The same operation in verifying the totals on the former is repeated on this sheet at the expiration of the month.

The tickler sheets have been found to be an indispensable aid to the bookkeeper in checking and verifying monthly trial balances. Where bound or loose-leaf ledgers are used the tickler sheet is recommended for the purpose indicated. Where card ledgers are employed a daily proof of the postings should be taken off on a Burroughs in place of the tickler sheet.

A Burrough 11-column machine is used to advantage in listing the tickler sheets. By the invention of the duplex counter and the split keyboard it is possible to record the date as well as the daily total under each division of 100 pages and to accumulate the daily ledger totals.

A monthly proof is obtained by checking the recapitulation tickler sheet with the summary ledger sheet, the totals of which are finally compared and verified with the general cash book.

All the loose-leaf sheets relating to cash transactions, as illustrated herein, are filed in transfer binders during the current month. On the completion of the work for the month or quarter, depending on the character of the sheets, they are bound in inexpensive canvas bound books for purposes of protection and reference.

ADVANTAGES OBTAINED BY THE NEW YORK EDISON COMPANY

Of the advantages obtained by the New York Edison Company since installing the coupon-strip machine, several pertinent and important ones should be mentioned in this connection, as follows:

As the coupons are prepared simultaneously with the adding and listing of bills, there is positively no additional labor involved in their preparation.

The accuracy of the printing on the coupons is determined in advance, and no checking of the coupons is necessary. A proof is secured on cash payments from all sources before any amounts are listed on cash receipt sheets.

The recording of all cash payments and the tabulating of all statistics are reduced to mechanical labor, thus eliminating all

mental additions, formerly a constant source of trouble on account of numerous errors.

All work is proved daily during regular hours, from 9 A. M. to 5:30 P. M., and 12 noon Saturday, so that the last day of the month is the same as the first day of the month. Before the coupon-strip typewriting machine was introduced it was customary for clerks to work until 10, 11 and 12 o'clock at night in finding differences.

Cash receipt sheets are prepared in the most convenient form for posting purposes, all entries being recorded in the numerical order of consumers' accounts.

A decided improvement is obtained in the appearance and legibility of all cash records, which formerly were noticeably lacking.

Receipted bills are mailed daily without exception. Previously they were retained three, four and more days for checking purposes.

The substitution of the coupon-strip machine has resulted in obtaining a uniform coupon. This has greatly facilitated the work of both assorting and listing.

After all work relating to consumers' payments is completed daily the coupons are destroyed, as it has been discovered that they are useless for further reference in this particular.

A substantial reduction has been obtained in the number of clerks employed in receiving and recording cash payments, notwithstanding the fact that the volume of business has largely increased.

The several forms introduced in connection with the coupon-strip typewriting machine provide all the essential records and are prepared in convenient form for rapid auditing and for future reference.

IMPROVEMENTS AND ADVANTAGES OFFERED BY THE POWERS ACCOUNTING AND
TABULATING MACHINES, CONSISTING OF PUNCHING, SORTING, TABU-
LATING AND PRINTING MACHINES

The Powers accounting systems, in connection with the compilation of the last Federal Census, consisted of three machines, namely, (1) the perforating machine, by which the data and information were punched on the cards; (2) the electrical sorting machine, which separated the cards into different classifications preparatory to tabulating, and (3) the electrical tabulating machine, which compiled the data and information from the cards (Fig 17).

It should be noted that the machines mentioned made only perforated and totalized records; no printed record was obtainable. This was an inherent defect which has been corrected by the development of the Powers tabulator-printer. The tabulator selects and adds mechanically; prints designations and tabulated totals, with or without detail, on paper strips or record sheets; prints legibly five carbon copies; is equipped with one to six designating or adding units which operate simultaneously (Fig 18).

The advantages offered by the Powers improved accounting and tabulating machines are both exceptional and important, as for instance:

PUNCHING MACHINES

(1) The automatic feeding and ejecting of cards; (2) the gang punching feeder; (3) the automatic punching of ciphers; (4) the key selection by the use of the fingers of both hands; (5) the ability to review and correct the key selection; (6) the automatic line indicator and spacer, and (7) the correct registration of punched totals.

In connection with other lines of work where there is comparatively no gang punching, owing to the absence of repeated or consecutive facts, and where each fact must be separately selected on the keyboard, either a 12-key automatic punch or a hand punch is recommended.

SORTING MACHINES

(1) The ease of operation and the removal of cards; (2) the ability of "split" sorting of any holes in a given column; (3) the last card sorted is deposited in its proper box when the machine

Tr	Mo	Day	Invoice No	State	Town	Customer No.	Salesman	Dept	Commodity	Quantity	Unit	Amount of Sale	Cost
12	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9

FIG 17

The above *facsimile* cards used in connection with Power automatic machines. Cards are specially designed to meet local requirements of users.

X. Y. Z. RAILROAD ANALYSIS OF FREIGHT TRAFFIC FOR THE MONTH OF MARCH 1915								
DESIGNATIONS	RAILROAD NUMBER	SECTION NUMBER	PREPARATION SYSTEM	COMMODITY	WEIGHT	FREIGHT	ADVANCE	TOTALS WITH DETAIL
	10000	4390	1765	2481	19 838	1459 12	538 12	871 00
	20001	4390	1765	2482	29 100	1855 25	925 00	950 25
	25789	4390	1765	2483	31 016	1753 89	850 00	883 89
	28091	4390	1765	2484	23 115	1211 23	307 89	890 28
	28093	4390	1765	2485	31 016	1753 89	850 00	883 89
	31927	4390	1765	2486	25 139	1110 21	210 21	850 00
					189 624	9079 59	2599 38	5580 21
	30043	4390	1765	2485	29 339	1310 00	530 00	780 00
	10078	4390	1765	2485	71 900	1234 15	780 00	224 15
	10111	4390	1765	2485	50 000	1357 73	702 21	224 44
	10285	4390	1765	2485	17 000	1122 00	300 80	871 00
	10768	4390	1765	2485	51 901	1428 55	528 00	200 33
	12783	4390	1765	2485	17 000	1245 25	805 00	710 00
	14009	4390	1765	2485	44 298	1471 10	710 00	781 10
	15284	4390	1765	2485	38 431	1351 04	720 50	670 54
	16107	4390	1765	2485	17 165	1310 25	805 00	795 25
					343 020	13190 67	5900 31	6160 34
	10746	4390	1765	2617	17 555	1315 65	410 80	805 16
	10831	4390	1765	2617	26 247	1073 78	870 00	703 78
	10881	4390	1765	2617	12 751	1150 87	425 95	843 10
	10892	4390	1765	2617	21 980	1214 25	404 00	810 25
	11254	4390	1765	2617	83 104	1310 00	800 00	851 00
	11403	4390	1765	2617	43 753	1632 77	750 20	892 57
					245 686	8981 04	3860 20	5100 81
	10745	4390	1765	2618	62 220	1431 47	720 00	724 47
	10749	4390	1765	2618	62 220	1431 47	720 00	724 47
	10748	4390	1765	2618	10 001	1150 87	702 73	801 37
	10874	4390	1765	2618	14 788	1021 82	600 80	801 32
	10877	4390	1765	2618	14 788	1021 82	600 80	801 32
	59574	4390	1765	2618	14 285	1725 46	820 50	851 33
					182 272	8188 91	4244 70	3944 81
	12006	4390	2134	2401	31 016	1733 89	850 00	883 89
	12018	4390	2134	2401	44 125	1622 25	724 28	898 00
	12019	4390	2134	2401	61 248	1321 00	425 00	898 28
	13789	4390	2134	2401	19 538	1489 15	538 15	921 00
	18091	4390	2134	2401	14 108	1422 59	510 25	845 14
	18093	4390	2134	2401	23 115	1211 23	307 89	890 28
	21927	4390	2134	2401	25 139	1110 21	210 21	850 00
	21928	4390	2134	2401	29 100	1855 25	925 00	950 25
	28709	4390	2134	2401				900 25
					332 648	12857 57	5332 23	6029 78

X. Y. Z. RAILROAD ANALYSIS OF FREIGHT TRAFFIC FOR THE MONTH OF MARCH 1915								
DESIGNATIONS	RAILROAD NUMBER	SECTION NUMBER	PREPARATION SYSTEM	COMMODITY	WEIGHT	FREIGHT	ADVANCE	TOTALS ONLY
	4390	2134	2400		596 285	19984 15	9921 21	10041 74
	4390	1765	2305		290 225	8254 47	3685 94	4668 42
	4390	2134	2305		290 273	8234 47	3685 94	4668 42
	4390	1765	2451		189 924	9079 59	3699 58	5580 01
	4390	1765	2452		343 020	12190 67	5900 31	6160 34
	4390	1765	2617		245 686	8981 04	3860 20	5100 81
	4390	1765	2618		182 272	8188 91	4244 70	3944 81
	4390	2134	2401		332 648	12857 57	5332 23	8029 78
	4390	2134	2400		596 285	19984 15	9921 21	10041 74
	4390	1765	2305		290 225	8234 47	3685 94	4668 42
	4390	2134	2305		290 273	8254 47	3685 94	4668 42
	4390	1765	2451		189 924	9079 59	3699 58	5580 01
	4390	1765	2452		343 020	12190 67	5900 31	6160 34
	4390	2134	2401		332 648	12857 57	5332 23	8029 78
	4390	2134	2452		175 098	8481 95	4593 21	3918 94
	4390	1765	2315		250 271	7058 14	3180 08	3677 18
	4390	1765	2452		304 599	10899 82	5179 81	5599 79
	4390	1765	2714		320 032	4737 44	3514 70	3249 74
	4390	1765	2451		189 924	9079 59	3699 58	5580 01

FIG 18—WORK OF TABULATOR-PRINTER

automatically stops; (4) the machine is equipped with a thirteenth or reject box.

The counting sorter attachments are a distinctive feature of these machines.

A new sorting machine will be placed on the market shortly which possesses marked improvements over the present type of machine. This sorting machine will permit of the continuous



FIG 19—CENSUS PUNCHING MACHINE

This model designed for the United States Government. Three hundred used in compilation of the 1910 Census. Automatically feeds and ejects cards. Gang punches repeated facts and makes one sort of cards without additional operation. Is equipped with 240 individual keys and is adapted for cards $3\frac{1}{4}$ by $6\frac{5}{8}$ in.

feeding of cards without stopping the machine, thereby materially increasing the daily output. The box in the new sorter will hold three or four times as many cards as the present sorting machine, thereby greatly facilitating the ease and efficiency with which these machines can be operated.

TABULAR-PRINTER MACHINES

(1) The rapidity with which totals can be taken on the tabulator-printer machine and the machine automatically cleared to proceed with the next tabulation, and (2) the accomplishing of a printed sheet with carbon copies directly upon a finished report whereon are recorded the various designations in conjunction with the totals and the listing of individual items, thus obviating the possibility of errors in clerical transcription of totals.

It is claimed by the Powers Accounting Machine Co. that the tabulator-printer machine is not a competitor of the tabulators manufactured by other firms, inasmuch as the former is a listing machine, whereas the latter are non-listing machines.

For the information of those interested, detailed descriptions of the several machines referred to are given herewith:

POWERS PUNCHING MACHINES

Those who recall the illustrated article contained in the *American Machinist*, issue of July 30, 1914, describing the use of the Powers punching machines in connection with the last Census, will notice many points of difference between the census punching machine and the commercial punching machine now employed (Figs 19 and 20).

When it came to increasing the number of keys to 540, a radical change was desirable to have the keyboard compact enough to be easily manipulated, so that a new design, having but 45 key bars was selected. By giving each bar 12 notches, 540 punch locations are secured in compact form, and a number of advantages over the use of separate keys, as will be seen later.

These keys are in colors—white, black, red and blue, arranged on the keyboard to correspond with the vertical divisions or fields, printed on the cards to be punched. For example, the keys which are to show the value in money are in six columns and are red for the thousands of dollars, white for dollars and black for cents. These keys are, however, readily changed to correspond with any card arrangement which may be desired.



FIG 20—COMMERCIAL PUNCHING MACHINE

Automatically feeds and ejects cards and spaces line indicator. Permits verification by operator before card is punched. Each key can be set as a gang punch. All naughts are punched automatically. No spacing keys required. Punches holes in perfect registration.

This type of keyboard is easily operated, as the palm of the hand rests on the plain plate at the bottom of the keyboard, while four fingers of each hand can readily be used in pulling down as many key bars as may be needed to the desired point. The tips of the fingers are merely placed over the number desired and pulled down to the edge of the plate. One great advantage of this method is that the complete setting of the machine can be read along the edge of the plate before the punch is tripped, enabling the operator to verify the setting and to correct it if necessary before punching the card. Touching the small lever at the bottom releases any key and allows it to be reset at any desired point. This is particularly valuable when punching cards which have other data, and which would have to be made over again in case of erroneous punching.

Another valuable feature of this keyboard is the ability to set any individual key bar, or any number of key bars, so that they will not return to their normal position on the punching of the card. In the setting shown, the entire right-hand half of these keys have their stops pulled down so as to return only to zero. In this way any setting which is to be largely repeated in succeeding cards can be made by the operation of only a few keys, as shown. In the case of dollars, for example, \$1000.50 can be set by simply pulling down the 1 and the 5 in the proper columns, all the keys returning to zero as soon as the card is punched.

The unpunched cards are placed at the back of the machine and automatically fed after each punching by a raised edge about 0.005 in high between the feeding rolls of the machine. With the data to be transferred to the card on the rack above, the operator simply sets the keys to the desired places, touches the release key at the right, which trips the clutch, raises the dies and card-holding mechanism against the punch and punches the entire number of holes desired at one stroke. After the die returns to the lower position the card is automatically fed into the front holder, and at the same time the line spacer or horizontal bar on the schedule holder above feeds down one notch, which facilitates the transfer of data and does away with all uncertainty on the part of the operator as to the line he is transcribing.

Each of the 45 key bars is mechanically connected with an independent lever, which in turn moves a slide into such positions

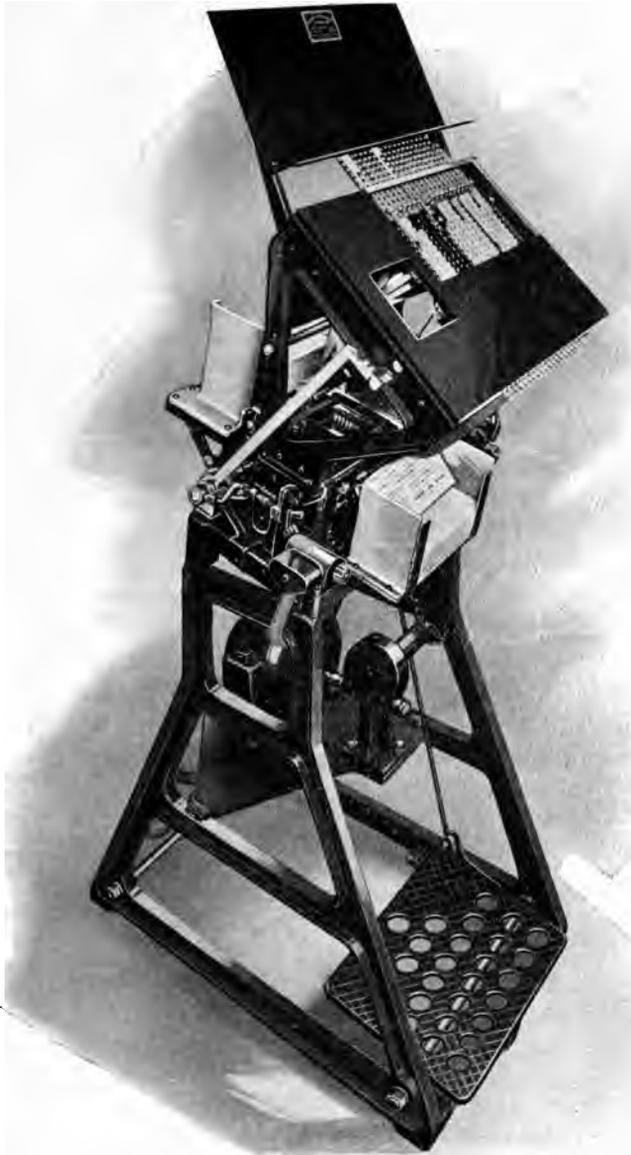


FIG 21—VISIBLE PUNCHING MACHINE

Data to be punched are written upon half of the card. When in the machine the writing is visible to the operator, who punches the data upon the remainder of the card. Similar in all other respects to the commercial punching machine.

as will select the punch which corresponds with the number on the key bar that is next to the upper edge of the plate.

The punching of all holes simultaneously by means of a uniform punch and die insures perfect and uniform registration which is particularly desirable in the sorting and tabulating of the data contained on the cards. Where desirable the punches can be equipped automatically to perforate two separate cards with each key selection, and to deposit these cards automatically in separate magazines if desired.

In one instance, a special punch has been designed for an insurance company which permits one-half of the card to remain visible in the machine. This was to allow the operator to see the data on the written portion of the card and to punch it correspondingly on the other half of the same card. (Fig 21)

Waste punchings are deposited in a receptacle under the machine, which prevents their being scattered over the floor.

Another type of punching machine, introduced by the Powers Accounting Machine Co. since the article referred to was published, should possibly be included in this connection, namely, the verifying machine (Fig 22).

A 12-key automatic punch and, if desirable, a hand punch are provided for work where there is comparatively no gang punching, owing to the absence of repeated or consecutive facts and where each fact must be separately selected on the keyboard.

POWERS SORTING MACHINES

The next step in the tabulating of data by means of punch cards instead of by writing, is the accurate sorting of the cards into their respective groups, so that the data contained on them may be readily examined and tabulated. This is all-important.

The sorting machine for use with the Powers systems was illustrated in the *American Machinist*, issue of February 15, 1915. The mechanism is simple and capable of rapid operating, sorting and counting, when desired, at the rate of from 250 to 270 cards per minute.

It will be remembered that each card contains 12 horizontal rows, each comprising 45 points which may be punched to signify different facts. In sorting these cards the different values are picked out from each horizontal line by means of 12 plungers. Each of these plungers controls the operation of shutters or



FIG 22—VERIFYING MACHINE

Enables operator to verify cards previously punched. Insures accuracy and is more economical than double punching of cards for comparison or other methods of checking.

switches, which divert the cards into their proper compartment according to the holes which have been punched in them.

The cards from the punching machines are placed in the magazine at the right (Fig 23), being fed up by the pressure of the long spring beneath. This is arranged to equalize the pressure regardless of the number of cards in the magazine. At each turn of the machine the upper card is picked from the pile and passed under the guide plate. Over this, carried on the cross-frame are the 12 plungers, each having a small spring which tends to force it down. The plates controlled by the cams and springs at each end allow or prevent movement as desired.

When a card having a hole in any of the 12 horizontal lines in the row under the plungers passes under the guide plate, the corresponding plunger drops through the hole, setting the guide bar beneath, which diverts the card to the correct pocket. As a rule, there is but one hole in line, but in case of two or more there is a device for "split" sorting, as it is called, the pins for the holes not selected being locked so they will not open the shutter leading to the pocket. As soon as the tripping levers underneath have been set, the plungers rise out of the card, which is then moved forward in the position shown and carried under the rubber-covered wheels at the right to its proper compartment. At the same time another card is fed from the magazine and the process repeated; in fact, it is repeated so rapidly that the machine sorts from 250 to 270 cards per minute.

One of the interesting features is the arrangement of pockets one over the other. The upper half of the division between the pockets is double, forming a chute through which the card for the lower pocket easily drops into its proper place without interfering in any way with the upper pocket. At the rear of the machine is another pocket, known as the "discard" box, into which all cards go that are not punched in the line which is being sorted.

THE COUNTING SORTER

Another type of sorting machine, namely, the counting sorter, is shown (Fig 24), this being a duplicate of that shown in Fig 23, except for the counters on the upper part. This attachment consists of 12 individual counters, a sub-total counter and a grand-total counter, the latter being at the extreme right. The



FIG 23—COMMERCIAL SORTING MACHINE

Selects and operates mechanically. Equipped with 12 card boxes and a separate reject box, all compactly and conveniently located. Each card sorted is deposited in its box before the next card leaves the magazine. When machine automatically stops, last card sorted is in its proper box.

first counts the cards going into each pocket, which the total number of cards in all the pockets is shown by the sub-total counter. These 13 counters only count cards which are properly punched and deposited in the various pockets. If any cards go through into the discard box they are shown on the grand total, but not on the sub-total. This forms a constant check, as the number of cards in the discard should equal the difference between the numbers on the two total counters.

All the counters except the grand total can be re-set by a single feed movement controlling the individual box counter, the grand total being set separately. Should anything go wrong in the counting the machine is instantly stopped by means of a throw-out. The tallies on the counters can therefore be absolutely relied upon.

All these machines are driven by $\frac{1}{4}$ -hp motor under the bed, the motor being belted to a main jackshaft and the power transmitted from this by chains to all the other movements.

It will be noted that the operation is entirely mechanical in every detail, no electrical contact being used. This allows either direct or alternating-current motors or any other power to be used for driving.

POWERS TABULATOR-PRINTER

A revolution in the methods generally accepted and followed by accountants and statisticians in the work of compiling statistical data and financial results during the last decade has been brought about by the invention of the Powers automatic mechanical tabulator-printer, whereby what was formerly considered impossible has been achieved, namely, the printing of tabulated totals in conjunction with the designations of code or group numbers directly upon the report or record or, if desirable, the listing in detail of items represented by the holes punched in each individual card (Fig 25).

This machine is also very simple and easily operated, the principle of mechanical selection being practically the same as that of the sorting machine, excepting that it is provided with as many rows of steel pins as there are vertical columns upon the card to be selected. The card is divided into fields, and the rows of selecting pins are accordingly arranged so that they will select and effect the listing and addition of the columns comprising

each separate adding field in the corresponding designating or adding unit of the tabulator-printer.

Perhaps, as the business world of to-day is so thoroughly familiar with the various types of adding machines, it might be well to describe the Powers tabulating machine as an automatic adding machine equipped with 54 "banks" operated by means

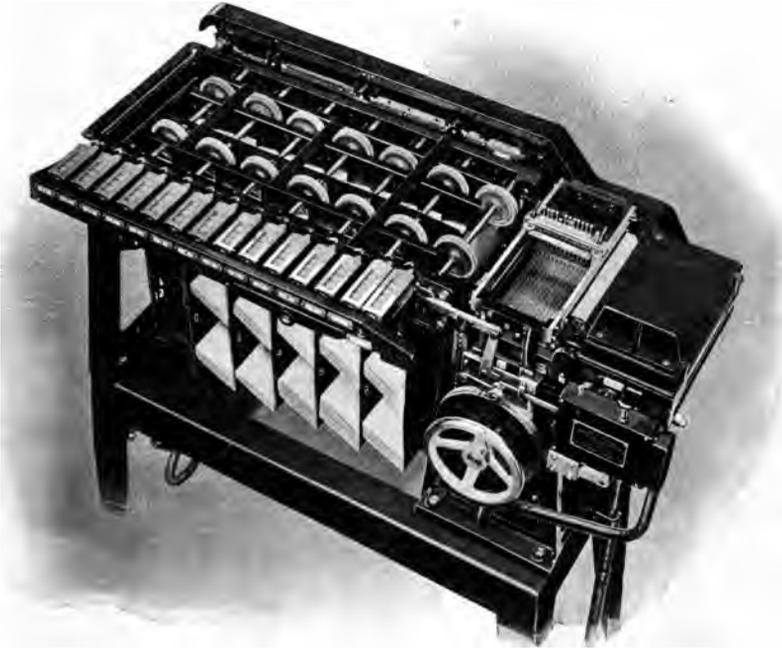


FIG 24—COUNTING SORTING MACHINE

Equipped with sub-total and grand total master counters and twelve individual counters, one for each card box. Sub-total and all individual box counters are simultaneously cleared and set back to zero with one turn of the key. A thirteenth or separate reject box is provided for cards having no holes punched in column being sorted. Sorts and counts the cards, eliminating the tabulating operation, in the compilation of census, vital statistics and other data requiring the addition of units only.

of punched cards. The selecting pins act as the human fingers and, according to the holes perforated in the various fields of each card, make simultaneously the corresponding selection of all the items to be listed or added internally within the adding head of the tabulator-printer. The machine automatically accom-

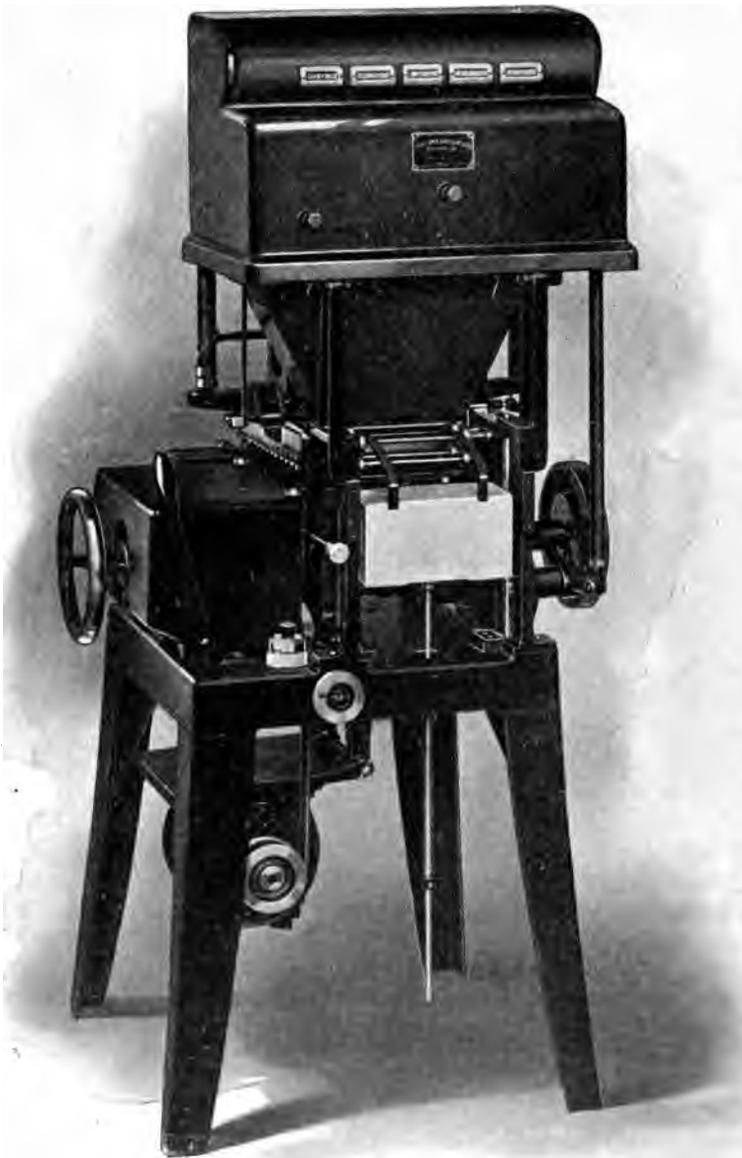


FIG 25—TABULATOR-PRINTER

Selects mechanically; adds mechanically. Prints designations and tabulated totals, with or without detail, on paper strip or record sheet. Prints legibly five carbon copies. Is equipped with one to six designating or adding units which operate simultaneously

plishes the same result as when the handle of an ordinary adding machine is pulled and prints and accumulates the data perforated upon each individual card.

When it is considered that the Powers tabulator-printer can be equipped with from one to six adding or designating units, each of such having a printing or accumulating capacity of nine figures, and that the selection, printing and adding upon all of these is performed simultaneously, it is seen what a decided advantage it offers to the business and statistical world, as compared with a *non-listing* machine having a capacity of five adding sections. The relation is practically the same as that of a 17-bank Burroughs or other standard *listing* adding machine as compared with a small comptometer or *non-listing* machine. At present the largest standard listing adding machine, as above referred to, adds or lists 17 columns of figures, whereas the standard six-unit Powers tabulators have a capacity to list and add 54 columns of figures.

The adding section or head of the tabulator-printer is directly above the selection pins. These pins are under the selective plates, between which the card rests, and when each card is in position to be tabulated a pin comes up through each hole in the columns of the fields being added or listed. The connection between these selective pins and internally with the adding head is absolutely mechanical and flexible as to its possibility of being changed according to the selections desired from different cards. This is accomplished by means of interchangeable selective boxes which can instantly be changed as a unit, which has a distinct advantage, compared with the necessity of changing separately each column to be selected.

The standard six-unit tabulator adding head is of a size about 20 inches square, and the whole machine does not occupy floor space exceeding 2 feet square. It can also be operated by any desired motive power or energy.

In the tabulator the fact that the presence of carbon or metallic substances in the cards has absolutely no effect upon the selections, is very greatly appreciated by those who know of the difficulties encountered where the principle of selection is not mechanical and erroneous results not intended are effected through electrical contacts.

Each tabulator is furnished with a roll-paper holder and

shifting carriage similar to that upon ordinary adding machines or typewriters. These can be of a size to suit the convenience and records of an individual user. The machine also has an automatic ribbon feed and adjustable carriage-roll spacing device.

To operate the machine either to list the details of each card or to print the totals only requires the shifting of a small button from "Print" to "Non-Print."

The usual method of operating the tabulating machine, in order to secure the greatest efficiency from it, is to make use of what are commonly termed "stop" cards. These are blank cards, with a special hole perforated in them in such a location, as to allow a plunger to go through, thereby causing the automatic stop to operate and stop the machine.

As an illustration of the application of these stop cards, assume that the cards have been sorted by departments and a tabulated total of the sales for each department is desired. Between the cards for each department a stop card is placed. The cards are then placed in the rear magazine and the machine started by pressing the starting lever, which causes the cards to be fed one by one over the selecting pins, and when added are ejected into the forward magazine, where they are easily removed. When *all* the cards for each department are selected, naturally the stop card comes next between the selection plates and the machine automatically stops, which action notifies the operator that the end of the first department's cards has been reached and the corresponding total is ready to be printed.

The various department cards are placed consecutively in the tabulator magazine and after the total for each department is printed the machine is automatically started and the operation is repeated.

To print the total requires the operator to press the "Total" button and pull the handle, with which each tabulator-printer is provided, much the same as in the operation of an ordinary adding machine. This is purposely made a human operation, so that the clerk can determine the record or location upon which the total should be printed.

It is possible and often the case that where the group or designating code numbers pertaining to a certain report are known, a stop card is punched for each such code number in the field corresponding to the one on the regular cards being

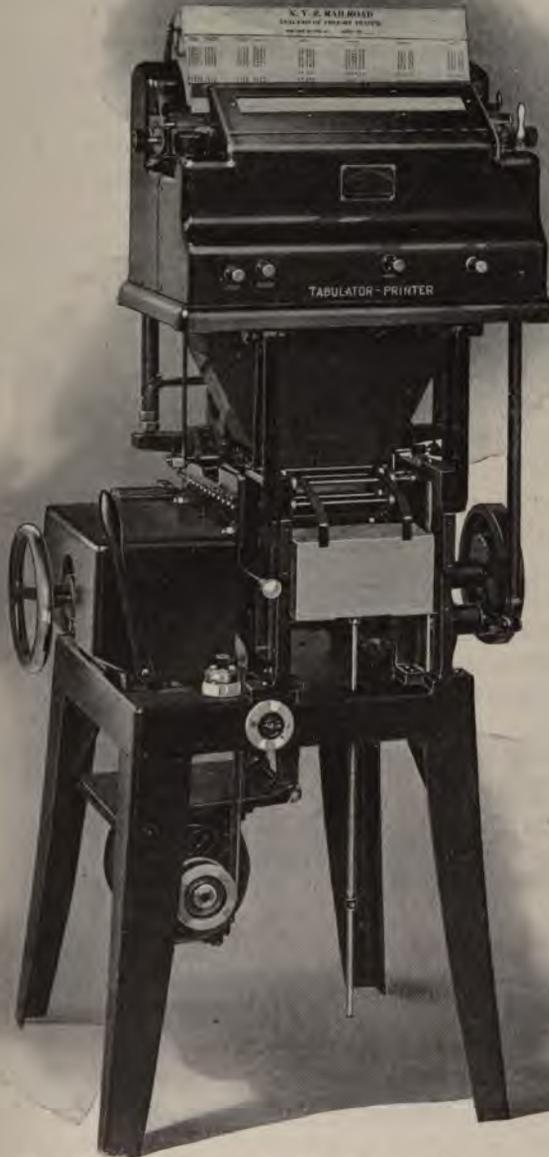


FIG 26—NON-LISTING AND NON-PRINTING TABULATOR

Selects mechanically; adds mechanically. Accumulates totals for manual transcription. Is equipped with one to six designating or adding units which operate simultaneously

sorted. These punched stop cards naturally find their proper location during the sorting operation and automatically prepare the cards for the tabulator.

The tabulating machine is so arranged as to select and print the department or any desired designating code numbers or data directly from the stop cards, provided they have been previously punched. Or the machine can be adjusted to select such designations from the cards tabulated and print the same when the total is recorded.

From this it will be seen that the securing of tabulated results from this machine can be made an entirely automatic operation, and a blank form or, if preferred, a printed sheet of paper can be placed in the tabulator carriage and all that is required of the operator is to press the total button and pull the handle each time the machine is halted by the stop card—the results being a report compiled in accordance with the data indicated upon the cards.

One advantage of the printing feature of the tabulator is found when it becomes necessary to check punched cards back with the original records from which perforated, either to verify the transcription or to locate an error either in punching or in the original record. Heretofore it has been customary to read the punched holes and compare with the original records. If a detail printed list showing the data, as perforated in the card, is made by the tabulator it is readily grasped that it is far easier to check the printed figures appearing on such list with the original data than to read the holes in the cards.

Several carbon copies can be made simultaneously by placing carbon paper between the records upon which the results or lists are recorded. The advantage of this is apparent. For instance, it is possible from the cards to prepare duplicate or triplicate copies of a report and, retaining a copy to send out what is an absolute transcription of their detailed records, if desired. In commercial or accounting work the usefulness of this feature alone is readily appreciated.

A non-listing and non-printing tabulator has recently been introduced by the Powers Accounting Machine Co. (Fig 26).

EXAMPLES SHOWING THE PRACTICAL AND ECONOMICAL PRODUCTS OF THE
POWERS ACCOUNTING AND TABULATING MACHINES OBTAINED BY THE
NEW YORK EDISON COMPANY

On May 1, 1915, the New York Edison Company substituted automatic, mechanical and printing methods for manually written books and records in connection with consumers' deposit accounts. The accounting and tabulating routine observed in the treatment of consumers' deposits is outlined herewith.

Special series of perforating cards are employed in accordance with the logical divisions of the work, reduced facsimiles of which are given below (Figs 27, 28, 29 and 30).

For facility in handling the work, distinctive colored cards were introduced for the respective series, namely, manila, salmon, blue and cherry.

DEPOSITS RECEIVED

Consumers' deposits are accepted at the various branch offices throughout the service. Temporary receipts only are issued at the time deposits are received. Upon receipt of consumers' applications, with returns from branch offices, official certificates are issued by the general office. The amounts of deposits are endorsed on consumers' applications. The applications are forwarded to the Collection Bureau for attention, while the certificates are delivered to the Consumers' Deposits Bureau.

Deposit receipts cards are punched out from the data and information contained on the certificates, as follows: District, deposit number, date, kinds of business, source and amount. Provision is made on half of the cards for typewritten transfers to other premises and certain data and information furnished by the Collection Bureau, as well as for indicating the date of issuance of cards. (Fig 28—Deposits Adjusted, and Fig 29—Deposits Refunded.)

On schedule time daily these cards are tabulated and printed on deposits received sheets.

When proof postings are obtained both certificates of deposits and deposits received cards are delivered to typists for filling in the names and premises as provided for. Upon return of certificates and cards they are checked and the cards indexed. Certificates are then mailed and cards are filed in Deposits Received filing cabinets.

Date	Deposit Number			DATE			DEPOSITS REFUNDED			INTEREST PAYMENT			INTEREST APPLIED		
	Year	Mo.	Day	Year	Mo.	Day	Number	Sheet	Amount	Number	Amount	Card Number	Amount		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	

FIG 29
Deposits Refunded
One-half actual size

Date	Year	Month	Day	Acc. No.	Balance Applied to Part		Balance Applied to Full		Absence Refunded No. Refunded	Total Balance Total
					No. Received	No. in Abs.	No. in Part	No. in Full		
0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9

FIG 30
Accumulated Totals
One-half actual size

DEPOSITS ADJUSTED

Where certificates of deposit are under \$25, and consumers' accounts exceed the amounts of certificates and accrued interest, consumers are requested to endorse and deliver over the certificates and pay any remaining balances either in cash or by checks. In cases where certificates of deposit are over \$25, and consumers' accounts are more than the certificates plus interest, book transfers are made by bookkeepers of the amounts of certificates and interest and applied in part settlement of consumers' accounts.

THE NEW YORK EDISON COMPANY			
DEPOSIT RECEIVED, Date MAY - 1916			
DEPOSIT No.	AMOUNT OF BUSINESS SOURCE	DEPOSITS RECEIVED	REMARKS
A 1189	12 00	12 00	
A 1190	25 00	25 00	
A 1191	24 00	24 00	
A 1192	24 00	24 00	
A 1193	55 00	55 00	
A 1194	33 00	33 00	
A 1195	54 00	54 00	
A 1196	32 00	32 00	
A 1197	55 00	55 00	
A 1198	11 00	11 00	
A 1199	33 00	33 00	
A 1200	77 00	77 00	
A 1201	44 00	44 00	
A 1202	47 00	47 00	
A 1203	32 00	32 00	
A 1204	37 00	37 00	
A 1205	37 00	37 00	
A 1206	37 00	37 00	
A 1207	38 00	38 00	
A 1208	25 00	25 00	
A 1209	25 00	25 00	
A 1210	24 00	24 00	
A 1211	24 00	24 00	
A 1212	24 00	24 00	
A 1213	24 00	24 00	
A 1214	24 00	24 00	
A 1215	24 00	24 00	
A 1216	24 00	24 00	
A 1217	24 00	24 00	
A 1218	24 00	24 00	
A 1219	24 00	24 00	
A 1220	24 00	24 00	
A 1221	24 00	24 00	
A 1222	24 00	24 00	
A 1223	24 00	24 00	
A 1224	24 00	24 00	
A 1225	24 00	24 00	
A 1226	24 00	24 00	
A 1227	24 00	24 00	
A 1228	24 00	24 00	
A 1229	24 00	24 00	
A 1230	24 00	24 00	
A 1231	24 00	24 00	
A 1232	24 00	24 00	
A 1233	24 00	24 00	
A 1234	24 00	24 00	
A 1235	24 00	24 00	
A 1236	24 00	24 00	
A 1237	24 00	24 00	
A 1238	24 00	24 00	
A 1239	24 00	24 00	
A 1240	24 00	24 00	
A 1241	24 00	24 00	
A 1242	24 00	24 00	
A 1243	24 00	24 00	
A 1244	24 00	24 00	
A 1245	24 00	24 00	
A 1246	24 00	24 00	
A 1247	24 00	24 00	
A 1248	24 00	24 00	
A 1249	24 00	24 00	
A 1250	24 00	24 00	
A 1251	24 00	24 00	
A 1252	24 00	24 00	
A 1253	24 00	24 00	
A 1254	24 00	24 00	
A 1255	24 00	24 00	
A 1256	24 00	24 00	
A 1257	24 00	24 00	
A 1258	24 00	24 00	
A 1259	24 00	24 00	
A 1260	24 00	24 00	
A 1261	24 00	24 00	
A 1262	24 00	24 00	
A 1263	24 00	24 00	
A 1264	24 00	24 00	
A 1265	24 00	24 00	
A 1266	24 00	24 00	
A 1267	24 00	24 00	
A 1268	24 00	24 00	
A 1269	24 00	24 00	
A 1270	24 00	24 00	
A 1271	24 00	24 00	
A 1272	24 00	24 00	
A 1273	24 00	24 00	
A 1274	24 00	24 00	
A 1275	24 00	24 00	
A 1276	24 00	24 00	
A 1277	24 00	24 00	
A 1278	24 00	24 00	
A 1279	24 00	24 00	
A 1280	24 00	24 00	
A 1281	24 00	24 00	
A 1282	24 00	24 00	
A 1283	24 00	24 00	
A 1284	24 00	24 00	
A 1285	24 00	24 00	
A 1286	24 00	24 00	
A 1287	24 00	24 00	
A 1288	24 00	24 00	
A 1289	24 00	24 00	
A 1290	24 00	24 00	
A 1291	24 00	24 00	
A 1292	24 00	24 00	
A 1293	24 00	24 00	
A 1294	24 00	24 00	
A 1295	24 00	24 00	
A 1296	24 00	24 00	
A 1297	24 00	24 00	
A 1298	24 00	24 00	
A 1299	24 00	24 00	
A 1300	24 00	24 00	
A 1301	24 00	24 00	
A 1302	24 00	24 00	
A 1303	24 00	24 00	
A 1304	24 00	24 00	
A 1305	24 00	24 00	
A 1306	24 00	24 00	
A 1307	24 00	24 00	
A 1308	24 00	24 00	
A 1309	24 00	24 00	
A 1310	24 00	24 00	
A 1311	24 00	24 00	
A 1312	24 00	24 00	
A 1313	24 00	24 00	
A 1314	24 00	24 00	
A 1315	24 00	24 00	
A 1316	24 00	24 00	
A 1317	24 00	24 00	
A 1318	24 00	24 00	
A 1319	24 00	24 00	
A 1320	24 00	24 00	
A 1321	24 00	24 00	
A 1322	24 00	24 00	
A 1323	24 00	24 00	
A 1324	24 00	24 00	
A 1325	24 00	24 00	
A 1326	24 00	24 00	
A 1327	24 00	24 00	
A 1328	24 00	24 00	
A 1329	24 00	24 00	
A 1330	24 00	24 00	
A 1331	24 00	24 00	
A 1332	24 00	24 00	
A 1333	24 00	24 00	
A 1334	24 00	24 00	
A 1335	24 00	24 00	
A 1336	24 00	24 00	
A 1337	24 00	24 00	
A 1338	24 00	24 00	
A 1339	24 00	24 00	
A 1340	24 00	24 00	
A 1341	24 00	24 00	
A 1342	24 00	24 00	
A 1343	24 00	24 00	
A 1344	24 00	24 00	
A 1345	24 00	24 00	
A 1346	24 00	24 00	
A 1347	24 00	24 00	
A 1348	24 00	24 00	
A 1349	24 00	24 00	
A 1350	24 00	24 00	
A 1351	24 00	24 00	
A 1352	24 00	24 00	
A 1353	24 00	24 00	
A 1354	24 00	24 00	
A 1355	24 00	24 00	
A 1356	24 00	24 00	
A 1357	24 00	24 00	
A 1358	24 00	24 00	
A 1359	24 00	24 00	
A 1360	24 00	24 00	
A 1361	24 00	24 00	
A 1362	24 00	24 00	
A 1363	24 00	24 00	
A 1364	24 00	24 00	
A 1365	24 00	24 00	
A 1366	24 00	24 00	
A 1367	24 00	24 00	
A 1368	24 00	24 00	
A 1369	24 00	24 00	
A 1370	24 00	24 00	
A 1371	24 00	24 00	
A 1372	24 00	24 00	
A 1373	24 00	24 00	
A 1374	24 00	24 00	
A 1375	24 00	24 00	
A 1376	24 00	24 00	
A 1377	24 00	24 00	
A 1378	24 00	24 00	
A 1379	24 00	24 00	
A 1380	24 00	24 00	
A 1381	24 00	24 00	
A 1382	24 00	24 00	
A 1383	24 00	24 00	
A 1384	24 00	24 00	
A 1385	24 00	24 00	
A 1386	24 00	24 00	
A 1387	24 00	24 00	
A 1388	24 00	24 00	
A 1389	24 00	24 00	
A 1390	24 00	24 00	
A 1391	24 00	24 00	
A 1392	24 00	24 00	
A 1393	24 00	24 00	
A 1394	24 00	24 00	
A 1395	24 00	24 00	
A 1396	24 00	24 00	
A 1397	24 00	24 00	
A 1398	24 00	24 00	
A 1399	24 00	24 00	
A 1400	24 00	24 00	
A 1401	24 00	24 00	
A 1402	24 00	24 00	
A 1403	24 00	24 00	
A 1404	24 00	24 00	
A 1405	24 00	24 00	
A 1406	24 00	24 00	
A 1407	24 00	24 00	
A 1408	24 00	24 00	
A 1409	24 00	24 00	
A 1410	24 00	24 00	
A 1411	24 00	24 00	
A 1412	24 00	24 00	
A 1413	24 00	24 00	
A 1414	24 00	24 00	
A 1415	24 00	24 00	
A 1416	24 00	24 00	
A 1417	24 00	24 00	
A 1418	24 00	24 00	
A 1419	24 00	24 00	
A 1420	24 00	24 00	
A 1421	24 00	24 00	
A 1422	24 00	24 00	
A 1423	24 00	24 00	
A 1424	24 00	24 00	
A 1425	24 00	24 00	
A 1426	24 00	24 00	
A 1427	24 00	24 00	
A 1428	24 00	24 00	
A 1429	24 00	24 00	
A 1430	24 00	24 00	
A 1431	24 00	24 00	
A 1432	24 00	24 00	
A 1433	24 00	24 00	
A 1434	24 00	24 00	
A 1435	24 00	24 00	
A 1436	24 00	24 00	
A 1437	24 00	24 00	
A 1438	24 00	24 00	
A 1439	24 00	24 00	
A 1440	24 00	24 00	
A 1441	24 00	24 00	
A 1442	24 00	24 00	
A 1443	24 00	24 00	
A 1444	24 00	24 00	
A 1445	24 00	24 00	
A 1446	24 00	24 00	
A 1447	24 00	24 00	
A 1448	24 00	24 00	
A 1449	24 00	24 00	
A 1450	24 00	24 00	
A 1451	24 00	24 00	
A 1452	24 00	24 00	
A 1453	24 00	24 00	
A 1454	24 00	24 00	
A 1455	24 00	24 00	
A 1456	24 00	24 00	
A 1457	24 00	24 00	
A 1458	24 00	24 00	
A 1459	24 00	24 00	
A 1460	24 00	24 00	
A 1461	24 00	24 00	
A 1462	24 00	24 00	
A 1463	24 00	24 00	
A 1464	24 00	24 00	
A 1465	24 00	24 00	
A 1466	24 00	24 00	
A 1467	24 00	24 00	
A 1468	24 00	24 00	
A 1469	24 00	24 00	
A 1470	24 00	24 00	
A 1471	24 00	24 00	
A 1472	24 00	24 00	
A 1473	24 00	24 00	
A 1474	24 00	24 00	
A 1475	24 00	24 00	
A 1476	24 00	24 00	
A 1477	24 00	24 00	
A 1478	24 00	24 00	
A 1479	24 00	24 00	
A 1480	24 00	24 00	
A 1481	24 00	24 00	
A 1482	24 00	24 00	
A 1483	24 00	24 00	
A 1484	24 00	24 00	
A 1485	24 00	24 00	
A 1486	24 00	24 00	
A 1487	24 00	24 00	
A 1488	24 00	24 00	
A 1489	24 00	24 00	
A 1490	24 00	24 00	
A 1491	24 00	24 00	
A 1492	24 00	24 00	
A 1493	24 00	24 00	
A 1494	24 00	24 00	
A 1495	24 00	24 00	
A 1496	24 00	24 00	

account. Particulars on the deposit adjusted card follows: District, deposit number, date, transfer number, ledger-folio, accounts receivable—applied in part or full, uncollected bills—applied in part or full and balance. (Fig 28—Deposits Adjusted)

Separate sheets are utilized for tabulating and printing deposits adjusted transactions, as follows:

THE NEW YORK EDISON COMPANY						
District <u>1</u>		DEPOSITS ADJUSTED, Date <u>MAY - 1 1916</u>			Accounts Receivable	
DEPOSIT TRANS. No.	LEDGER FOLIO	PART	ACCOUNTS RECEIVABLE APPLIED TO	FULL	BALANCE	
1103 001	123 0 232	5 69			9 31	
1103 002	111 1 110			5 00		
1107 003	123 0 233			15 00		
1114 004	123 0 231	5 71			1 29	
1112 005	122 1 170	7 14			84	
1117 006	122 0 646			5 00		
1118 007	122 0 300	1 44			3 86	
1124 008	104 2 310	4 1			6 35	
1123 009	102 U 220	4 10			6 99	
1134 010	122 D 226	1 80			5 25	
1142 011	122 J 778	1 80			6 85	
1148 012	102 0 042	4 61			5 39	
1154 013	124 0 182	9 11			6 99	
1145 014	122 S 240	5 00			5 00	
1152 015	124 0 331	92			4 81	
1207 043	134 0 008	1 25			4 78	
1188 045	119 1 122			30 00		
1186 046	133 2 010			5 00		
1185 048	118 2 499	5 23			3 76	
1182 048	123 0 358			10 00		
1184 047	114 1 199	1 28			3 71	
1104 049	112 0 988	3 02			1 82	
1107 049	112 1 248	16 47			13 52	
1131 040	147 1 220			16 00		
1117 041	134 1 226					
1134 042	333 0 232	43			0 37	
1137 043	134 1 226	25			4 82	
1127 044	135 1 110	4 00			1 04	
1129 044	130 2 000			23 00		
1128 045	140 1 133	10 30			14 98	
		226 85		180 00	233 15	

FIG 32
Deposits Adjusted—Accounts Receivable
Size—14 by 17 inches

The cards employed for these purposes are filed in steel cabinets according to the divisions of the work as outlined:

- (1) Deposits Received (2) Deposits Adjusted (3) Deposits Refunded

The cards are filed in the sequence of certificates of deposit numbers by geographical or district divisions. Before filing in transfer cabinets cards are checked with the respective daily printed sheets in order to obviate the possibility of errors in filing.

A general card index, arranged alphabetically, irrespective of district divisions is maintained for convenient reference to Consumers' Deposits accounts. All transfers to Deposits Ad-

justed and Deposit Refunded sections of the filing cabinets are recorded on these cards.

The advisability of filing the cards in separate sections of the steel cabinets during the calendar month until the completion of the trial balance has been considered, when they would be placed in the regular compartments.

THE NEW YORK EDISON COMPANY						
District <u>1</u>		DEPOSITS ADJUSTED, Date <u>MAY - 1 1918</u>			Uncollectible Bills	
DEPOSIT TRANS. No.	LEDGER No.	FOLO	PART	UNCOLLECTIBLE BILLS APPLIED TO	FULL	BALANCE
1098 001	133	0 822	3 69			9 31
1075 002	111	1 110			3 00	
1064 003	118	0 900	16 46			88 54
1019 004	122	0 720	41 67		18 00	83 33
1099 005	122	0 823				
1061 006	122	0 821	8 71			11 29
1084 007	122	1 116	9 16		5 00	84
1037 008	122	2 116				
1021 009	146	0 330	1 44			4 88
1046 010	146	2 110	61			6 99
1103 011	102	0 820	9 10			8 99
1114 012	122	0 822	6 80			6 80
1119 013	124	1 779	1 80			6 80
1028 014	102	0 822	4 21			8 33
1021 015	124	2 225	2 11			8 33
1019 020	118	1 297	6 00	15 00		19 00
1088 041	134	0 088	1 27			18 73
1087 042	133	2 100		20 00		
1097 043	132	2 499	26 25		10 00	23 75
1107 044	122	2 226				1 00
1123 045	112	0 820	9 00			3 32
1127 047	114	1 845	14 47			
1137 048	127	1 220			28 00	
1139 049	134	0 120	3			29 37
1030 050	133	0 222	58			4 10
1082 051	125	1 110	10 00			4 10
1045 052	128	2 200	10 00			29 37
			323 88	198 00		455 42

FIG 33
Deposits Adjusted—Uncollectible Bills
Size—14 by 17 inches

As previously explained, proof postings are secured daily from the original sources of Deposit Receipts, Deposits Adjusted and Deposits Refunded. Accumulated totals of the above transactions are carried forward daily by means of the accumulated totals card. (Fig 30—Accumulated Totals) This card answers for three distinctive purposes, by which the following information is obtained:

(1) Accumulated Totals—Deposits Received, including Balance, Deposits Received, Deposits in Abeyance and Totals Received.

THE NEW YORK EDISON COMPANY						
Date: <u>3</u>		ACCUMULATIVE TOTALS, Date: <u>MAY 21 1916</u>		Deposits Received		
MO.	DAY	A. No.	BALANCE	DEPOSITS RECEIVED	DEPOSITS RECEIVED	TOTAL
5	01	11	2225 00	655 00	55 00	2225 00
5	02	11	2052 15	755 00	70 00	2070 15
				1410 00	125 00	
5	03	11	1691 57	710 00	60 00	2441 57
				2120 00	165 00	
5	04	11	1092 57	610 00	62 00	1747 57
				2730 00	210 00	
5	05	11	520 25	910 00	15 00	1445 25
				3840 00	224 00	

FIG 34
Accumulated Totals—Deposits Received
Size—14 by 17 inches

THE NEW YORK EDISON COMPANY						
Date: <u>3</u>		ACCUMULATIVE TOTALS, Date: <u>MAY 21 1916</u>		Deposits Adjusted		
MO.	DAY	A. No.	PART	FULL	DEPOSITS ADJUSTED	BALANCE
5	01	11	225 89	190 00	755 00	2025 15
5	02	11	201 55	175 00	810 00	1691 57
			438 42	355 00	1565 00	
5	03	11	294 70	200 00	854 00	1092 57
			755 12	565 00	2419 00	
5	04	11	251 62	185 00	791 00	520 25
			904 75	750 00	3210 00	
5	05	11	157 14	55 00	524 10	679 05
			1141 57	825 00	2734 10	

FIG 35
Accumulated Totals—Deposits Adjusted
Size—14 by 17 inches

THE NEW YORK EDISON COMPANY						
Date: <u>1</u>		ACCUMULATIVE TOTALS, Date <u>MAY 31 1916</u>			Deposit Statistics	
MR. DAY	AA No.	NO. OF RECEIVED AMOUNT	IN PART	IN FULL	REPLACED	REMARKS
5 01	51	27 00 10	20 00 15		35	
5 02	51	55 00 11	10 00 10		11	
		125 00 21	30 00 25		76	
5 03	51	61 00 08	23 00 14		43	
		186 00 29	61 00 39		119	
5 04	51	57 00 05	11 00 10		39	
		243 00 34	72 00 49		138	
5 04	51	70 00 01	7 00 04		51	
		313 00 35	79 00 53		208	

FIG 36
Accumulated Totals—Deposits Statistics
Size—14 by 17 inches

THE NEW YORK EDISON COMPANY					
Date: <u>1</u>		TRIAL BALANCE, Date <u>MAY 31 1916</u>		Deposits Received	
DEPOSIT No.	AMOUNT OF BUSINESS SOURCE	DEPOSIT RECEIVED	REMARKS		
1 002	41 00	10 00			
1 004	45 00	10 00			
1 009	43 00	10 00			
1 010	44 00	10 00			
1 015	46 00	10 00			
1 016	45 00	10 00			
1 018	49 00	10 00			
1 020	49 00	10 00			
1 022	41 00	10 00			
1 024	41 00	10 00			
1 026	41 00	10 00			
1 027	41 00	10 00			
1 028	41 00	10 00			
1 029	41 00	10 00			
1 030	41 00	10 00			
1 031	41 00	10 00			
1 032	41 00	10 00			
1 033	41 00	10 00			
1 034	41 00	10 00			
1 035	41 00	10 00			
1 036	41 00	10 00			
1 037	41 00	10 00			
1 038	41 00	10 00			
1 039	41 00	10 00			
1 040	41 00	10 00			
1 041	41 00	10 00			
1 042	41 00	10 00			
1 043	41 00	10 00			
1 044	41 00	10 00			
1 045	41 00	10 00			
1 046	41 00	10 00			
1 047	41 00	10 00			
1 048	41 00	10 00			
1 049	41 00	10 00			
1 050	41 00	10 00			
1 051	41 00	10 00			
1 052	41 00	10 00			
1 053	41 00	10 00			
1 054	41 00	10 00			
1 055	41 00	10 00			
1 056	41 00	10 00			
1 057	41 00	10 00			
1 058	41 00	10 00			
1 059	41 00	10 00			
1 060	41 00	10 00			
1 061	41 00	10 00			
1 062	41 00	10 00			
1 063	41 00	10 00			
1 064	41 00	10 00			
1 065	41 00	10 00			
1 066	41 00	10 00			
1 067	41 00	10 00			
1 068	41 00	10 00			
1 069	41 00	10 00			
1 070	41 00	10 00			
1 071	41 00	10 00			
1 072	41 00	10 00			
1 073	41 00	10 00			
1 074	41 00	10 00			
1 075	41 00	10 00			
1 076	41 00	10 00			
1 077	41 00	10 00			
1 078	41 00	10 00			
1 079	41 00	10 00			
1 080	41 00	10 00			
1 081	41 00	10 00			
1 082	41 00	10 00			
1 083	41 00	10 00			
1 084	41 00	10 00			
1 085	41 00	10 00			
1 086	41 00	10 00			
1 087	41 00	10 00			
1 088	41 00	10 00			
1 089	41 00	10 00			
1 090	41 00	10 00			
1 091	41 00	10 00			
1 092	41 00	10 00			
1 093	41 00	10 00			
1 094	41 00	10 00			
1 095	41 00	10 00			
1 096	41 00	10 00			
1 097	41 00	10 00			
1 098	41 00	10 00			
1 099	41 00	10 00			
1 100	41 00	10 00			
1 101	41 00	10 00			
1 102	41 00	10 00			
1 103	41 00	10 00			
1 104	41 00	10 00			
1 105	41 00	10 00			
1 106	41 00	10 00			
1 107	41 00	10 00			
1 108	41 00	10 00			
1 109	41 00	10 00			
1 110	41 00	10 00			
1 111	41 00	10 00			
1 112	41 00	10 00			
1 113	41 00	10 00			
1 114	41 00	10 00			
1 115	41 00	10 00			
1 116	41 00	10 00			
1 117	41 00	10 00			
1 118	41 00	10 00			
1 119	41 00	10 00			
1 120	41 00	10 00			
1 121	41 00	10 00			
1 122	41 00	10 00			
1 123	41 00	10 00			
1 124	41 00	10 00			
1 125	41 00	10 00			
1 126	41 00	10 00			
1 127	41 00	10 00			
1 128	41 00	10 00			
1 129	41 00	10 00			
1 130	41 00	10 00			
1 131	41 00	10 00			
1 132	41 00	10 00			
1 133	41 00	10 00			
1 134	41 00	10 00			
1 135	41 00	10 00			
1 136	41 00	10 00			
1 137	41 00	10 00			
1 138	41 00	10 00			
1 139	41 00	10 00			
1 140	41 00	10 00			
1 141	41 00	10 00			
1 142	41 00	10 00			
1 143	41 00	10 00			
1 144	41 00	10 00			
1 145	41 00	10 00			
1 146	41 00	10 00			
1 147	41 00	10 00			
1 148	41 00	10 00			
1 149	41 00	10 00			
1 150	41 00	10 00			
1 151	41 00	10 00			
1 152	41 00	10 00			
1 153	41 00	10 00			
1 154	41 00	10 00			
1 155	41 00	10 00			
1 156	41 00	10 00			
1 157	41 00	10 00			
1 158	41 00	10 00			
1 159	41 00	10 00			
1 160	41 00	10 00			
1 161	41 00	10 00			
1 162	41 00	10 00			
1 163	41 00	10 00			
1 164	41 00	10 00			
1 165	41 00	10 00			
1 166	41 00	10 00			
1 167	41 00	10 00			
1 168	41 00	10 00			
1 169	41 00	10 00			
1 170	41 00	10 00			
1 171	41 00	10 00			
1 172	41 00	10 00			
1 173	41 00	10 00			
1 174	41 00	10 00			
1 175	41 00	10 00			
1 176	41 00	10 00			
1 177	41 00	10 00			
1 178	41 00	10 00			
1 179	41 00	10 00			
1 180	41 00	10 00			
1 181	41 00	10 00			
1 182	41 00	10 00			
1 183	41 00	10 00			
1 184	41 00	10 00			
1 185	41 00	10 00			
1 186	41 00	10 00			
1 187	41 00	10 00			
1 188	41 00	10 00			
1 189	41 00	10 00			
1 190	41 00	10 00			
1 191	41 00	10 00			
1 192	41 00	10 00			
1 193	41 00	10 00			
1 194	41 00	10 00			
1 195	41 00	10 00			
1 196	41 00	10 00			
1 197	41 00	10 00			
1 198	41 00	10 00			
1 199	41 00	10 00			
1 200	41 00	10 00			
1 201	41 00	10 00			
1 202	41 00	10 00			
1 203	41 00	10 00			
1 204	41 00	10 00			
1 205	41 00	10 00			
1 206	41 00	10 00			
1 207	41 00	10 00			
1 208	41 00	10 00			
1 209	41 00	10 00			
1 210	41 00	10 00			
1 211	41 00	10 00			
1 212	41 00	10 00			
1 213	41 00	10 00			
1 214	41 00	10 00			
1 215	41 00	10 00			
1 216	41 00	10 00			
1 217	41 00	10 00			
1 218	41 00	10 00			
1 219	41 00	10 00			
1 220	41 00	10 00			
1 221	41 00	10 00			
1 222	41 00	10 00			
1 223	41 00	10 00			
1 224	41 00	10 00			
1 225	41 00	10 00			
1 226	41 00	10 00			
1 227	41 00	10 00			
1 228	41 00	10 00			
1 229	41 00	10 00			
1 230	41 00	10 00			
1 231	41 00	10 00			
1 232	41 00	10 00			
1 233	41 00	10 00			
1 234	41 00	10 00			
1 235	41 00	10 00			
1 236	41 00	10 00			
1 237	41 00	10 00			
1 238	41 00	10 00			
1 239	41 00	10 00			
1 240	41 00	10 00			
1 241	41 00	10 00			
1 242	41 00	10 00			
1 243	41 00	10 00			
1 244	41 00	10 00			
1 245	41 00	10 00			
1 246	41 00	10 00			
1 247	41 00	10 00			
1 248	41 00	10 00			
1 249	41 00	10 00			
1 250	41 00	10 00			
1 251	41 00	10 00			
1 252	41 00	10 00			
1 253	41 00	10 00			
1 254	41 00	10 00			
1 255	41 00	10 00			
1 256	41 00				

(2) Accumulated Totals—Deposits Adjusted, including Deposits Applied in part and full, Deposits Refunded and Balance.

(3) Accumulated Totals—Deposit Statistics, including Number Received, Number in Abeyance, Number Applied in part and full, Number Refunded and Remarks.

Accumulated sheets corresponding to the above are tabulated and printed daily, as illustrated:

THE NEW YORK EDISON COMPANY						
Date		TRIAL BALANCE, Date MAY 9 1911			Deposits Adjusted	
REPORT No.	TRANS. No.	LAGER	FOLD	PART	FULL	BALANCE
1103	001	123	0	022		9 31
1103	017	124	0	209		1 20
1107	049	112	1	143		13 20
1108	048	112	0	148		1 20
1110	028	122	0	110		1 20
1110	034	122	0	221		1 20
1111	027	122	0	220		1 20
1111	031	124	0	220		1 20
1112	009	102	0	120		1 20
1115	028	122	0	222		1 20
1122	028	140	0	222		14 70
1122	029	122	0	222		1 20
1127	023	122	1	118		1 20
1129	019	122	0	222		1 20
1134	011	124	1	170		1 20
1134	017	124	1	192		1 20
1134	022	122	0	222		1 20
1134	024	122	0	224		1 20
1134	025	122	0	224		1 20
1134	028	124	0	211		1 20
1134	029	122	0	222		1 20
1134	030	122	0	222		1 20
1134	031	122	0	222		1 20
1134	032	122	0	222		1 20
1134	033	122	0	222		1 20
1134	034	122	0	222		1 20
1134	035	122	0	222		1 20
1134	036	122	0	222		1 20
1134	037	122	0	222		1 20
1134	038	122	0	222		1 20
1134	039	122	0	222		1 20
1134	040	122	0	222		1 20
1134	041	122	0	222		1 20
1134	042	122	0	222		1 20
1134	043	122	0	222		1 20
1134	044	122	0	222		1 20
1134	045	122	0	222		1 20
1134	046	122	0	222		1 20
1134	047	122	0	222		1 20
1134	048	122	0	222		1 20
1134	049	122	0	222		1 20
1134	050	122	0	222		1 20
1134	051	122	0	222		1 20
1134	052	122	0	222		1 20
1134	053	122	0	222		1 20
1134	054	122	0	222		1 20
1134	055	122	0	222		1 20
1134	056	122	0	222		1 20
1134	057	122	0	222		1 20
1134	058	122	0	222		1 20
1134	059	122	0	222		1 20
1134	060	122	0	222		1 20
1134	061	122	0	222		1 20
1134	062	122	0	222		1 20
1134	063	122	0	222		1 20
1134	064	122	0	222		1 20
1134	065	122	0	222		1 20
1134	066	122	0	222		1 20
1134	067	122	0	222		1 20
1134	068	122	0	222		1 20
1134	069	122	0	222		1 20
1134	070	122	0	222		1 20
1134	071	122	0	222		1 20
1134	072	122	0	222		1 20
1134	073	122	0	222		1 20
1134	074	122	0	222		1 20
1134	075	122	0	222		1 20
1134	076	122	0	222		1 20
1134	077	122	0	222		1 20
1134	078	122	0	222		1 20
1134	079	122	0	222		1 20
1134	080	122	0	222		1 20
1134	081	122	0	222		1 20
1134	082	122	0	222		1 20
1134	083	122	0	222		1 20
1134	084	122	0	222		1 20
1134	085	122	0	222		1 20
1134	086	122	0	222		1 20
1134	087	122	0	222		1 20
1134	088	122	0	222		1 20
1134	089	122	0	222		1 20
1134	090	122	0	222		1 20
1134	091	122	0	222		1 20
1134	092	122	0	222		1 20
1134	093	122	0	222		1 20
1134	094	122	0	222		1 20
1134	095	122	0	222		1 20
1134	096	122	0	222		1 20
1134	097	122	0	222		1 20
1134	098	122	0	222		1 20
1134	099	122	0	222		1 20
1134	100	122	0	222		1 20

FIG 38
 Trial Balance—Deposits Adjusted
 Size—14 by 17 inches

Trial balances in verification of the daily proof postings are prepared for the calendar months of both deposits received and deposits adjusted.

The loose-leaf sheets are placed in transfer binders during current periods, and at the expiration of the month or quarter they are bound in inexpensive canvas books for protection, filing and reference.

This fund is likewise reimbursed daily for the total amount of certificates refunded.

The deposits refunded card, for convenience in operation, was devised to take care of both kinds of transactions and, therefore, provides for district, deposit number, date, deposits refunded—source and amount, interest payment—voucher number and amount, and interest applied—card number and amount. (Fig 29—Deposits Refunded) Separate sheets are introduced for recording, namely, (1) Deposits Refunded—Interest Payments and (2) Deposits Refunded—Interest Applied.

THE NEW YORK EDISON COMPANY			
District <u>1</u>	DEPOSITS REFUNDED, Date <u>MAY - 1 1916</u>		Interest Applied
DEPOSIT No.	CARD No.	INTEREST APPLIED	REMARKS
1 103	1	1 00	
1 101	2	0 00	
1 107	3	1 00	
1 114	4	1 00	
1 110	5	0 00	
1 119	6	4 00	
1 116	7	4 00	
1 124	8	4 00	
1 120	9	0 00	
1 130	10	0 00	
1 144	11	0 00	
1 144	12	0 00	
1 144	13	0 00	
1 144	14	0 00	
1 144	15	0 00	
1 144	16	0 00	
1 144	17	0 00	
1 144	18	0 00	
1 144	19	0 00	
1 144	20	0 00	
1 144	21	0 00	
1 144	22	0 00	
1 144	23	0 00	
1 144	24	0 00	
1 144	25	0 00	
1 144	26	0 00	
1 144	27	0 00	
1 144	28	0 00	
1 144	29	0 00	
1 144	30	0 00	
1 144	31	0 00	
1 144	32	0 00	
1 144	33	0 00	
1 144	34	0 00	
1 144	35	0 00	
1 144	36	0 00	
1 144	37	0 00	
1 144	38	0 00	
1 144	39	0 00	
1 144	40	0 00	
1 144	41	0 00	
1 144	42	0 00	
1 144	43	0 00	
1 144	44	0 00	
1 144	45	0 00	
1 144	46	0 00	
1 144	47	0 00	
1 144	48	0 00	
1 144	49	0 00	
1 144	50	0 00	
1 144	51	0 00	
1 144	52	0 00	
1 144	53	0 00	
1 144	54	0 00	
1 144	55	0 00	
1 144	56	0 00	
1 144	57	0 00	
1 144	58	0 00	
1 144	59	0 00	
1 144	60	0 00	
1 144	61	0 00	
1 144	62	0 00	
1 144	63	0 00	
1 144	64	0 00	
1 144	65	0 00	
1 144	66	0 00	
1 144	67	0 00	
1 144	68	0 00	
1 144	69	0 00	
1 144	70	0 00	
1 144	71	0 00	
1 144	72	0 00	
1 144	73	0 00	
1 144	74	0 00	
1 144	75	0 00	
1 144	76	0 00	
1 144	77	0 00	
1 144	78	0 00	
1 144	79	0 00	
1 144	80	0 00	
1 144	81	0 00	
1 144	82	0 00	
1 144	83	0 00	
1 144	84	0 00	
1 144	85	0 00	
1 144	86	0 00	
1 144	87	0 00	
1 144	88	0 00	
1 144	89	0 00	
1 144	90	0 00	
1 144	91	0 00	
1 144	92	0 00	
1 144	93	0 00	
1 144	94	0 00	
1 144	95	0 00	
1 144	96	0 00	
1 144	97	0 00	
1 144	98	0 00	
1 144	99	0 00	
1 144	100	0 00	

FIG 40
Deposits Refunded—Interest Applied
Size—14 by 17 inches

Where it is claimed by consumers that they have mislaid or lost Certificates of Deposit, release and discharge forms are furnished. No refunds in such cases are permissible at the branch offices. Signatures to such forms are compared with those on the applications for service before accounts are adjusted.

Consumers' deposits are transferred to new premises only upon delivery of Certificates of Deposit through the General Office. Consumers returning Certificates of Deposit for transfer

are given receipts stating that they are turned in for the purpose of recording transfers. Book transfers as distinguished from voucher-check transfers are confined to district boundaries. No book transfers are made between districts.

Consumers are given the option of having the transfers endorsed on Certificates of Deposit or receiving new certificates in exchange and checks for accrued interest to date. Unless upon special request by consumers, certificates for former premises are cancelled and new ones delivered with checks for amount of accrued interest to dates of transfers.

In making settlements with consumers, statements of accounts are obtained from the respective bookkeepers only for the last premises endorsed on the Certificates of Deposit or recorded on the Consumers Deposit Records; in other words, the Collection Bureau is held responsible for the collection of accounts at former premises.

INTEREST APPLIED

Interest on consumers' deposits ceases 30 days after the termination of the electric service or 30 days after the issuance of written notices to consumers that the Company is prepared to refund deposits. If certificates are surrendered within the period of 30 days, interest is computed to date of settlement.

Upon applying deposits in liquidation of consumers' accounts interest is computed to date of settlement.

In cases where deposits plus interest exceed consumers' accounts interest is applied in part settlement thereof (Fig 29—Deposits Refunded—Interest Applied) and the balances of the accounts are satisfied out of the consumers' deposits. (Fig 28—Deposits Adjusted—Accounts Receivable.)

Interest on any remaining portions of deposits is computed from the date of adjustment to the dates specified in written notices.

GENERAL REMARKS

A radical departure in mechanical accounting has been achieved in this connection, whereby the recording of all transactions is reduced to mechanical processes. Daily transactions are recorded by the tabulating-printing machines on loose-leaf sheets with printed captions. Accumulated totals are carried forward on recapitulation sheets (if preferred, accumulated)

totals could be carried forward on daily sheets). Proof postings are taken daily of the ledger cards on which entries have been recorded. Trial balances in verification of the work are taken monthly of the ledger cards; the loose-leaf sheets are filed in transfer binders during current periods. On completion of the monthly or quarterly periods they are bound in canvas books for protection, filing and reference.

Previous to the installation of the Powers accounting and tabulating machines there was a congestion of work throughout the month. Trial balances for the current month usually were not obtained until the 15th of the succeeding month or thereafter. Five ledgers with provisions for 25,000 accounts each, were maintained, and three or four days, including over-time work, were required for bookkeepers to take off the trial balances.

Under the new conditions the work is constantly up-to-date. Proof postings are taken daily, and trial balances, it is reasonably assured, will be tabulated and printed on the first day of the calendar month. The last day of the month, therefore, for all practical purposes, is the same as any other day of the month and all over-time is eliminated. In addition to the improved method and practices a substantial reduction has been obtained of approximately 50 per cent in clerical labor and expense.

SCIENTIFIC AND CLASSIFIED SYSTEMS OF ACCOUNTS FOR PUBLIC SERVICE CORPORATIONS—IMPORTANT FACTORS IN THE MATTER OF MECHANICAL ACCOUNTING

Suggested schedules of classified accounts for public service corporations are given below:

If logically arranged, the indicant or general ledger accounts should be grouped under several principal schedules, as follows: (1) Actual Resources, (2) Actual Liabilities, (3) Income Accounts—Debits, (4) Income Accounts—Credits, (5) Appropriation Accounts—Debits, (6) Appropriation Accounts—Credits, (7) Intangible Capital, and (8) Capital Liabilities.

These schedules should be divided into divisional accounts, as follows:

- | | |
|--|--|
| <p>(1) Actual Resources</p> <ul style="list-style-type: none"> Tangible Capital Materials and Supplies Current Assets Treasury Securities Investment Accounts Special Deposits Prepaid Accounts Suspense Accounts—Debits Reacquired Securities Associated Companies—Debits | <p>(2) Actual Liabilities</p> <ul style="list-style-type: none"> Funded Debt Current Liabilities Accrued Liabilities Suspense Accounts—Credits Associated Companies—Credits |
| <p>(3) Income Accounts—Debits</p> <ul style="list-style-type: none"> Operating Expenses Non-Operating Revenue Deductions Income Deductions | <p>(4) Income Accounts—Credits</p> <ul style="list-style-type: none"> Operating Revenues Non-Operating Revenues |
| <p>(5) Appropriation Accounts—Debits</p> <ul style="list-style-type: none"> Dividends and Outstanding Stocks Amortization Elsewhere Unprovided for Appropriations to Reserves Other Deductions from Surplus | <p>(6) Appropriation Accounts—Credits</p> <ul style="list-style-type: none"> Bad Debts Collected Other Additions to Surplus |
| <p>(7) Intangible Capital</p> <ul style="list-style-type: none"> Organization Expenses Franchise or Rights Patent Rights | <p>(8) Capital Liabilities</p> <ul style="list-style-type: none"> Stock Accounts Reserve Accounts Corporate Surplus |

The aggressive and successful executive official or general manager requires periodical detailed analyses of the important

controlling accounts in order to ascertain the sources of income and profits and of the expenses and losses incidental to the business, as well as to determine the characteristic elements of all classes of income and expenditures necessary to a comprehensive and intelligible statement of revenue.

Where several operating or manufacturing departments are maintained in the accounts, the automatic, mechanical, punching, sorting and tabulating machines referred to in this paper will be found invaluable for the purpose of collating items of proceeds and expenditures of each department.

Examples of the several classes of income and expenditures and the important controlling accounts applicable to public service corporations are given below :

OPERATING REVENUES

Commercial revenues; municipal revenues; other electrical corporations; rent of electrical appliances; electric merchandise and jobbing revenue; sales of by-products; miscellaneous electric revenue.

OPERATING EXPENSES

General and miscellaneous expenses; commercial expenses; production expenses; transmission expenses; electric storage expenses; distribution expenses; utilization expenses.

WORK IN PROCESS

Capital additions; capital betterments; capital replacements; capital withdrawals; operating orders; contract orders (to be billed); standing orders (to be pro-rated).

MATERIALS AND SUPPLIES

Tube and cable material; wiring supplies and appliances; arc and incandescent supplies; hardware, piping, structural iron, etc.; general station supplies; automobile supplies; second-hand material.

Accounting and tabulating machines are especially serviceable in the preparation of accounting and statistical figures, including all production factors, the various trading accounts, the profit and loss accounts and the revenue accounts. To illustrate, either daily, weekly or monthly comparative statements can be compiled containing both dollars and cents and quantities, and showing variations between current, preceding and corresponding periods, such as: (1) Current month and preceding months, with corresponding months of former years; (2) Current months and elapsed months, with corresponding periods of former years, and (3) Extended differences in dollars and cents and quantities, with the percentage of increase or decrease.

Mechanical accounting is susceptible to innumerable applications along the lines of accounting and statistics. The punching, sorting, tabulating, and particularly the printing machines, present opportunity for obtaining valuable data and information hitherto considered prohibitive on account of the excessive labor costs and expenses, as, for instance, maintaining perpetual inventories of materials and supplies; recording appraisals of buildings and equipment; preparing perpetual inventories of underground and overhead transmission and distribution systems; summarizing changes in consumers' connected installations; distribution of accounts payable charges, including operating and other expenses; tabulating monthly consumption and bills rendered; analyzing operating earnings by geographical divisions, kinds of business and classified rates; ascertaining in advance effect of various new rates suggested from time to time upon present operating revenues.

SUBSTITUTION OF NUMERICAL AND ALPHABETICAL DESIGNATIONS FOR
WRITTEN DESCRIPTIONS OF ACCOUNTS AND FOR INDICATING THE VARIOUS
CLASSES OF DIRECT AND INDIRECT LABOR, MATERIALS AND
SUPPLIES, APPARATUS, APPLIANCES AND MISCELLANEOUS

There is a growing tendency at the present time to substitute numerical and alphabetic designations for written descriptions of accounts in accounting work. This modern method has been demonstrated to be efficient and reliable.

The systems of accounts prescribed for electrical corporations by the various Public Service Commissions and those adopted by the Accounting Session of this Association at its Thirty-Seventh Convention, and subsequently approved by the executive committee, might, for illustration, be divided to advantage into ten main classes, numbered from 00—09 to 90—99. Each of these ten classes should be sub-divided into ten divisions, and each of these ten divisions should be again divided into ten sections. Each account should be numbered according to the section in which it appears, and all the accounts should be arranged in simple numerical order. While the classes, divisions and sections of accounts should be indicated by numerals, the various stations, departments and bureaus should be designated by letters. Sub-account numbers could also be used for a more complete analysis of materials and supplies, work in progress accounts and standing and specific orders.

As an illustration, the main classes might be designated as follows:

- 00 to 09 General and Miscellaneous Expenses
- 10 to 19 Commercial expenses
- 20 to 29 Production Expenses
- 30 to 39 Production Expenses—Repairs
- 40 to 49 Transmission Expenses
 - Electric Storage Expenses
 - Distribution Expenses
- 50 to 59 Utilization Expenses
- 60 to 69 Fixed Capital—Land, Buildings and Equipment
- 70 to 79 Fixed Capital—Transmission, Distribution Systems
 - Work in Progress
- 80 to 89 Other Indicant or Ledger Accounts—Debits
- 90 to 99 Other Indicant or Ledger Accounts—Credits

Provision should be made for all the accounts prescribed by the Public Service Commissions and those required by the

company, but only such accounts as are actually needed should be opened on the books and records of the company.

In this connection it might be suggested that possibly the ten classes and the ten divisions only would answer all demands of the small corporations, while the large corporations would undoubtedly require to sub-divide the ten divisions into ten sections, and in some instances it might be necessary for them to again sub-divide the ten sections in order to take care of any extended analysis needed. Assuming that the ten classes and ten divisions would furnish all information exacted by the public authorities for annual reports, all corporations, regardless of size, would be in a position to conform to standard schedules and distribution of accounts.

Several examples of the divisions and sections of accounts, which are self-explanatory, follow :

- 00 to 09—*General and Miscellaneous Expenses*
- 01—Salaries and Expenses of General Office Clerks
 - 011 Fiscal Department
 - 0111 Cashiers
 - 0112 Paymasters
 - 0113 Bookkeepers and Clerks
 - 0114 Payroll Clerks
 - 012 Accounting Department
 - 0121 Abstract Clerks
 - 0122 Work Order Clerks
 - 0123 Auditing Clerks
- 03—General Stationery and Printing
 - 032 General office stationery
 - 0321 Fiscal Department
 - 0322 Accounting Department
 - 0323 Purchasing Department
 - 0324 General Service
 - 0325 General Offices
 - 034 Commercial Department
 - 0341 Indexing
 - 0342 Collecting
 - 0343 Contracts
 - 0344 Accounting
- 10 to 19—*Commercial Expenses*
- 16—Commercial Administrative
 - 161 Commercial Department Indexing
 - 1611 Meter Clerks
 - 1612 Meter Reading
 - 162 Commercial Department Collecting

- 163 Commercial Department Contracts
- 164 Commercial Department Accounting
 - 1641 Bill Clerks
 - 1642 Ledger Clerks
 - 1643 Statistical Clerks
- 165 Commercial Department Miscellaneous
 - 30 to 39—*Production Expenses—Repairs*
- 34—Repairs of Boiler Apparatus
 - 341 Feed Pump Repairs
 - 342 Boilers and Boiler Engine
 - 343 Heaters for Feed Water
 - 344 Coal Conveying System
 - 345 Ash Conveying System
 - 346 Filters
 - 347 Miscellaneous

Specific and standing work orders could be divided into four classes: (1) Sales orders, or those covering accepted proposals by customers; (2) Stock orders, or those representing standard contracts to be manufactured for stock during slack periods; (3) Plant orders, or those issued for the construction of machinery for the plant and extensive repairs to apparatus of plant buildings, and (4) Standing orders, or those giving authority for supervision and general service work, and in addition thereto minor repair work at all times as needed.

Examples of work in process serial numbers

- 70 to 79—*Fixed Capital—Work in Process*
- 75—Work in Process
 - Construction Department
 - SO 1000— 1999 Standing Orders (to be pro-rated)
 - CA 5000— 9999 Additions
 - CB 20000— 24999 Betterments
 - CR 30000— 34999 Replacements
 - CW 40000— 49999 Withdrawals
 - OE 50000— 99999 Operating
 - AR 110000—114999 Contracts (to be billed)

Examples of the various classes into which materials and supplies could be separated, arranged and designated

- 80 to 89—*Other Indicant or Ledger Accounts—Debits*
- 80—Materials and Supplies
 - 00 Tube and Cable Material
 - 01 Tube Feeders
 - 02 Tube Mains

- 03 Junction Boxes
- 04 Junction Box Parts and Supplies
- 05 Tube System Material
- 06 Cable Material and Jointing Supplies
- 07 Reels and Carboys
- 30 Hardware, Piping and Structural Iron, etc.
 - 31 Light Hardware and Sundries
 - 32 Iron
 - 33 Steel and Heavy Hardware
 - 34 Pipe and Fittings
 - 35 Copper, Brass, etc.
 - 36 Structural Iron
 - 37 Lumber
 - 38 Building Material
- 60—Second-hand Material
 - 61 Scrap Brass and Copper
 - 62 Brass and Iron Filings
 - 63 Iron Pipe Ends
- 64 Meters, Transformers and Arc Lamps
 - 65 Electric Signs
 - 66 Electrical Apparatus
 - 67 General Machinery
 - 68 Spare Parts
 - 69 Building Material

As an indication of the efficiency of the numerical system for designating accounts, suppose it is required to make a charge for labor or expense against the following:

- Main Class Account 00 to 09—
 - General and Miscellaneous Expenses
- Divisional Account 01—
 - Salaries and Expenses of General Office Clerks
- Sectional Account 011—
 - Fiscal Department
- Sub-Sectional Account 0114—
 - Payroll Clerk

instead of writing the full description, as indicated, all that is necessary is to designate the figures

“0114”

Again, should it be desirable to make a charge for pipe and fittings against a supply-room located, for instance, at 41st Street and First Avenue, in place of writing

Account Letter L—
 Storeroom, 41st Street and First Avenue
Main Account 80 to 89—
 Other Indirect or Ledger Accounts—Debits
Divisional Account 80—
 Materials and Supplies
Sectional Account 30—
 Hardware, Piping, Structural Iron, etc.
Sub-Sectional Account 34—
 Pipe and Fittings

all that is essential is to indicate

“L80—34”

IMPORTANCE TO EXECUTIVE OFFICIALS AND GENERAL MANAGERS OF GRAPHIC METHODS FOR (1) ILLUSTRATING ENGINEERING AND FINANCIAL PROBLEMS AND CONDITIONS; AND (2) AFFORDING CONTINUOUS COMPARISONS FROM MONTH TO MONTH FOR PERIODS OF SEVERAL YEARS

Graphic methods have been utilized for many years by engineers in all classes of engineering work for illustrating various problems and conditions. It is only recently, however, that such methods have been turned to practical service for illustrating statistics and numerous kinds of accounting problems.

An important advantage secured by adopting the graphic methods is the opportunity afforded for continuous comparisons from month to month for periods of several years.

The consolidation and condensation of a series of statements, covering monthly and annual periods, presented in graphic form, enables executive officials and general managers to pass judgment on important problems without devoting valuable and unnecessary time and labor to comparing and dissecting numerous individual statements.

Before any statistical and graphical charts can be prepared it is essential that all the necessary data and information should be collated and compiled in advance. In preparing the various kinds of accounting and statistical work essential for public service corporations the mechanical machines outlined herein will be found invaluable.

In discussing the necessity of graphic methods for presenting facts Willard C. Brenton, an authority on this subject, has suggested that the method of presentation is as important as the data. In his treatise entitled "Graphic Methods for Presenting Facts," he considers among other important matters the possibility of standard methods of presenting tabulated figures versus graphic methods; various methods, including simple comparisons involving time; examples of good practice in curve plotting; component parts shown by curves; curves for income and expense on accumulative basis; vertical bars to represent frequency; methods for combining curves, with figures recording the data; corporation financial reports; records of previous years not usually given; recent examples showing bad practice, etc.

THE ADAPTATION OF GRAPHIC CHARTS FOR PRESENTING ACCOUNTS IN CLASSIFIED ORDER PREPARED ON THE NUMERICAL SYSTEM FOR THE PURPOSE OF FACILITATING THE MEMORIZING BY EMPLOYEES OF VARIOUS CLASSES, SECTIONS AND SUB-SECTIONS

The latest use of the graphic charts is for the purpose of presenting accounts in classified order based on the numerical system. It has been demonstrated by actual practice that a chart ruled into one hundred square sections showing the accounts grouped according to classes, sections and sub-sections, and desig-

PROPERTY ACCOUNT LETTERS									
00-99 OPERATING EXPENSE ACCOUNTS					50-79 FIXED CAPITAL ACCOUNTS			80-99 GENERAL LEDGER ACCOUNTS	
01-01	01-02	01-03	01-04	01-05	51-52	51-53	51-54	81-82	81-83
01-06	01-07	01-08	01-09	01-10	52-55	52-56	52-57	82-84	82-85
01-11	01-12	01-13	01-14	01-15	53-58	53-59	53-60	83-86	83-87
01-16	01-17	01-18	01-19	01-20	54-61	54-62	54-63	84-88	84-89
01-21	01-22	01-23	01-24	01-25	55-64	55-65	55-66	85-90	85-91
01-26	01-27	01-28	01-29	01-30	56-67	56-68	56-69	86-92	86-93
01-31	01-32	01-33	01-34	01-35	57-70	57-71	57-72	87-94	87-95
01-36	01-37	01-38	01-39	01-40	58-73	58-74	58-75	88-96	88-97
01-41	01-42	01-43	01-44	01-45	59-76	59-77	59-78	89-98	89-99
01-46	01-47	01-48	01-49	01-50	60-79	60-80	60-81	90-99	90-99
SPECIAL SUBACCOUNT NUMBERS									
SPECIAL SUBACCOUNT NUMBERS		SPECIAL SUBACCOUNT NUMBERS			SPECIAL SUBACCOUNT NUMBERS			SPECIAL SUBACCOUNT NUMBERS	
100-101	100-102	100-103	100-104	100-105	100-106	100-107	100-108	100-109	100-110
100-111	100-112	100-113	100-114	100-115	100-116	100-117	100-118	100-119	100-120
100-121	100-122	100-123	100-124	100-125	100-126	100-127	100-128	100-129	100-130
100-131	100-132	100-133	100-134	100-135	100-136	100-137	100-138	100-139	100-140
100-141	100-142	100-143	100-144	100-145	100-146	100-147	100-148	100-149	100-150
100-151	100-152	100-153	100-154	100-155	100-156	100-157	100-158	100-159	100-160
100-161	100-162	100-163	100-164	100-165	100-166	100-167	100-168	100-169	100-170
100-171	100-172	100-173	100-174	100-175	100-176	100-177	100-178	100-179	100-180
100-181	100-182	100-183	100-184	100-185	100-186	100-187	100-188	100-189	100-190
100-191	100-192	100-193	100-194	100-195	100-196	100-197	100-198	100-199	100-200

FIG 41
Suggested Classification of Accounts for Public Service Corporations

nated by numbers, is the most effective guide device known for obtaining reliable records of business transactions. The sections should be numbered from 00 to 99 and the accounts logically arranged in numerical sequence, as previously suggested. Where several operating or manufacturing departments are maintained in the accounts, as, for instance, gas, electrical and street railroad, provision should be made therefor. An illustration of a proposed classified and numerical system of accounts for electric corporations is given herewith.

CHAIRMAN EDWARDS: This paper of Mr. Freeman's covers a great deal of matter which has been submitted to this Association at other meetings, and rather rounds up in one place about all that has heretofore been said. I understand that there is described here a new machine that has never been referred to before. It is a combination of the Hollerith tabulating machine with a recording and totalling device, a printing device which that machine has not had heretofore. The Accounting Department, as you can see, is rapidly becoming a machine shop. I suppose the time will come when we shall have all automatic figures there, and not require any individuals.

If there is to be no further debate on the subject I will ask that the regular resolution be offered that the paper be accepted and printed. If any members desire to debate the paper, or require any additional information, the paper is before you for discussion.

MR. BAILEY: Before the resolution is presented I would like to call attention to the fact that Mr. Coldwell's paper has not been ordered spread on the minutes of the meeting.

CHAIRMAN EDWARDS: I had that in mind. I do not believe that the resolution in regard to the report of the Committee on Cost Accounting has been put. If you will offer a resolution that the report of Chairman Gulick and these papers of Mr. Coldwell and Mr. Freeman be accepted and printed in the minutes, I shall be glad to put the motion.

MR. BAILEY: I make the motion.
(Motion seconded and carried)

CHAIRMAN EDWARDS: The next matter on our program is the discussion and adoption of the proposed By-Laws constituting

this Section, and, as is customary in adopting constitutions, I will have the Secretary read the different articles.

(The Secretary read the proposed By-Laws)

CHAIRMAN EDWARDS: A motion to approve the By-Laws as they are now constituted will be entertained by the Chair.

MR. BAILEY: I make the motion.

(The motion was seconded)

CHAIRMAN EDWARDS: It is moved and seconded that the By-Laws proposed for the Accounting Section of the National Electric Light Association, be approved and adopted. Those in favor will please say "Aye."

(Carried unanimously)

AMENDED BY-LAWS OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION ACCOUNTING SECTION

ARTICLE I

NAME

The name shall be: National Electric Light Association Accounting Section.

ARTICLE II

STATUS

The Section is an internal organization of the National Electric Light Association, organized in accordance with Article XV, Sections, 1, 2, 3, and 4 of said Association.

The By-Laws of the Section are an adaptation of the Constitution and By-Laws of the N. E. L. A. to the immediate needs of the Section and to enable it more effectively to achieve its "objects."

ARTICLE III

OBJECTS

The objects of the Section shall be to bring together those engaged in the fiscal, accounting, statistical, purchasing, and stores departments of member companies, for the interchange of ideas, to promote the adoption and dissemination of sound financial and accounting theories and methods, and to work for the establishment of a single uniform system of accounts by concerted action of the Interstate Commerce Commission, the various regulating bodies, and this Section.

ARTICLE IV

MEMBERSHIP

SECTION 1 Members shall be divided into two classes, Active and Associate.

SECTION 2 Active members shall be Class A or Class B members of the N. E. L. A. who shall become affiliated with the

Section. Each active member shall be entitled to one vote and to hold office. The vote of Class A members shall be cast by a properly accredited active member of this Section.

SECTION 3 Associate members shall be other than Class A or Class B members of the N. E. L. A. who shall become affiliated with the Section. They shall have all the privileges of active members except the right to vote and to hold office.

SECTION 4 All members shall receive, in consideration of their membership, such publications of the Section and of the National Electric Light Association as shall be designated for free distribution.

SECTION 5 Members are affiliated with the Section by reason of their membership in good standing in the N. E. L. A. and no Section dues are payable. Loss of membership in the N. E. L. A. cancels membership in the Section likewise.

ARTICLE V

OFFICERS

SECTION 1 The officers of this Section shall be a Chairman, a Vice-Chairman, a Secretary and Treasurer who may be one person, and seven others, all active members, who shall constitute an Executive Committee. They shall be elected at each annual meeting and shall hold office until their successors are elected. Vacancies in any office may be filled for the remainder of the term by the Executive Committee.

SECTION 2 The Executive Committee shall be the governing body of the Section and shall have entire charge of its affairs. It shall hold meetings upon the call of the Chairman, and five members shall constitute a quorum. If desirable, a vote of the Executive Committee may be taken by mail.

SECTION 3 The Chairman shall be the chief executive officer of the Section. He shall preside at all meetings of the Section or of the Executive Committee and he shall represent the Section at meetings of the Executive Committee of the N. E. L. A. The Chairman shall with the approval of the Executive Committee of this Section, name such committees as may seem desirable and he shall appoint the members thereof. The terms of all committee members shall terminate at the same time as the terms of the officers, unless sooner terminated by the Executive

Committee. In the absence or disability of the Chairman his duties shall be performed by the Vice-Chairman.

SECTION 4 The Treasurer shall receive and keep safely all moneys of the Section, keep correct account of the same, and pay all bills approved by the Executive Committee. He shall make a quarterly report to the Executive Committee and an annual report to be submitted at the annual meeting of the Section and if the Executive Committee so decides, he shall give a bond in such sum and with such sureties as the Executive Committee shall prescribe.

SECTION 5 The Secretary shall take minutes of all the proceedings of the Section or of the Executive Committee, shall give notice of all meetings, keep a record of the membership, and perform such other duties as may be assigned to him by the Executive Committee, and shall file a report in writing of the activities of the Section to the Secretary of the National Electric Light Association, as required in Section 2, Article 16, of the Constitution of the National Electric Light Association.

ARTICLE VI

MEETINGS

SECTION 1 Regular annual meetings of the Section shall be held at the time of the annual convention of the N. E. L. A. Special meetings may be held upon the order of the Executive Committee.

SECTION 2 Fifteen active members shall constitute a quorum for the transaction of business.

ARTICLE VII

ELECTIONS

SECTION 1 The Executive Committee shall select a Nominating Committee consisting of five active members and the Chairman shall announce the names of the members so selected at the first session of the annual meeting. This Nominating Committee shall, at a subsequent executive session, bring in the names of those recommended by it for the offices to be filled.

SECTION 2 Any active member may make nominations for any or all the offices to be filled, which nominations, if seconded,

shall be submitted for election at the same time and in the same manner as those of the Nominating Committee. Whenever there are more nominees than vacancies to be filled, then, in such cases, the election shall be decided by ballot. When there is no contest for office, the Secretary may be instructed by *viva voce* vote to cast the ballot for those recommended by the Nominating Committee.

SECTION 3 Voting by proxy shall not be allowed.

ARTICLE VIII

OFFICIAL ORGAN

The official organ of the Section shall be the monthly BULLETIN issued by the N. E. L. A.

ARTICLE IX

PARLIAMENTARY RULES

Roberts' Rules of Order shall be the governing parliamentary law of the Section in all cases not definitely provided for by its By-Laws.

ARTICLE X

AMENDMENTS

Amendments to these By-Laws shall be offered in writing, and shall be referred, before being acted upon, to a committee to be elected by the Section. A two-thirds vote of all active members present shall be necessary for their adoption.

CHAIRMAN EDWARDS: We will now hear the report of the Nominating Committee, Mr. J. F. Wickham of Cincinnati, Chairman.

REPORT OF NOMINATING COMMITTEE

We beg to submit the following names in nomination for the offices provided for under the By-Laws of the Accounting Section:

For Chairman, H M Edwards (New York City)
Vice-Chairman, J L Bailey (Baltimore)
Secretary, E J Allegaert (Newark, N J)
Treasurer, C E Calder (Dallas, Texas)

Executive Committee

R H Ballard, Los Angeles, Cal.
F P Dexter, Seattle
J S Gould, Smith's Falls, Ontario
J H Gulick, Chicago
Paul R Jones, New York City
R W Symes, Detroit
L M Wallace, Boston

J F Wickham, *Chairman*
H L Snyder
B F Story

CHAIRMAN EDWARDS: Will you put the motion, Mr. Coe, on the acceptance of the report of the Nominating Committee? Will you preside for the time being?

MR. A. V. R. COE, Chester, Pa. (presiding): You have heard the report of the Nominating Committee. Are there to be any other nominations? If not, a motion will be in order to accept the report of the Committee.

(Motion made, seconded and adopted unanimously)

CHAIRMAN EDWARDS (again presiding): Is there any other business to come before this meeting?

In closing this last session I want to thank you for your attention, and to congratulate you upon the character of the papers presented, and also upon the debate which we have had in relation to these papers. I want also to thank you for my election as your Chairman for the coming year. My only reason for accepting this election is that as this is the first year of the

section as a Section, and as there will be considerable legislative work to be done, and considerable work in relation to organizing, and getting the routine arrangements and our relations to the main body well established on a definite basis, I have felt that possibly I could be of service to you this coming year. I am a thorough believer in rotation in office, and I hope that each year this Section will see to it that new men go on the official list, both of executive officials and the executive committee.

I am going to ask all the members of the Section to respond cheerfully to my requests as Chairman of the Executive Committee for committee work. It is in committee work that the main value of these associations lies. We expect to have some very active committees this year, and I am sure that in our large body of membership we ought to be able to get enthusiastic and strong work. I ask all of you to give such time as is necessary to the carrying on of the work of the Section during the coming year.

MR. PAUL R. JONES, New York City: I would like to offer a resolution, that it be the sense of this meeting that the thanks of the meeting be tendered to Chairman Edwards and to Mr. Bailey and to the other active members of the Accounting Committee, for the vast amount of work they have accomplished in this last year in preparing for this meeting.

MR. J. D. BUTLER, San Francisco: I second that motion, and say for California and the Pacific Coast, that the conducting of this meeting by its Chairman and the committee of the Section, has been educational for us.

(Motion seconded and carried unanimously)

CHAIRMAN EDWARDS (again presiding): I thank you on my own behalf and on behalf of the Committee. If there be no further business this session will stand adjourned.

(Adjourned)

INDEX TO ACCOUNTING PAPERS

READ AT CONVENTIONS

NATIONAL ELECTRIC LIGHT ASSOCIATION

YEARS 1907 TO 1914 INCLUSIVE

GENERAL ACCOUNTING MATTERS

- 1907 Report of Committee on a Uniform System of Accounting
for Electric Light Companies . . . H M Edwards
Ref.: 1907 Proceedings Vol I, 144 to 188
- 1908 Report of Committee on a Uniform System of Accounting for
Electric Lighting Companies . . . H M Edwards
Ref.: 1908 Proceedings Vol I, 180 to 201
- 1909 Report of Committee on a Uniform System of Accounting for
Electric Light Companies . . . H M Edwards
Ref.: 1909 Proceedings Vol I, 13 to 27; Vol III, 1 to 17
- 1910 Report of Committee on a Uniform System of Accounting
John L Bailey
Ref.: 1910 Proceedings Vol I, 107; Vol II, 216 to 234
- 1911 Report of Committee on a Uniform System of Accounting
John L Bailey
Ref.: 1911 Proceedings Vol I, 35; Vol II, 1 to 4
- 1912 Report of Committee on a Uniform System of Accounting
E J Bowers
Ref.: 1912 Proceedings Vol IV, 2 to 11
- 1913 Report of Committee on Uniform Accounting . . . E J Bowers
Ref.: Accounting Vol, 2 to 43
- 1910 Report of Sub-Committee on Public Service Commission Re-
lations . . . H M Edwards
Ref.: 1910 Proceedings Vol II, 311 to 312
- 1913 Report of Sub-Committee on a Tentative Classification of
Accounts, including Balance Sheet and Indicant Accounts
John L Bailey
Ref.: 1913 Accounting Vol, 110 to 200
- Branch Office Accounting . . . E J Allegaert
Ref.: 1909 Proceedings, Vol III, 18 to 29 and 49 to 73
- Accounting Methods as Applied to Detroit Electric Properties
E J Bowers
Ref.: 1910 Proceedings Vol II, 235 to 256
- Accounting Symbols . . . A L Holme
Ref.: 1910 Proceedings Vol II, 405 to 407
- General Office Accounting . . . Franklyn Heydecke
Ref.: 1911 Proceedings Vol I, 141 to 178
- Regulated Electric Light Accounting . . . H M Edwards
Ref.: 1912 Proceedings Vol IV, 106 to 148
- Scientific Management of an Accounting Department . Franklyn Heydecke
Ref.: 1912 Proceedings Vol IV, 71 to 84
- Method of Keeping Prepaid and Accrued Accounts . Franklyn Heydecke
Ref.: 1913 Proceedings Accounting Vol, 70 to 77
- Handling of Freight Bills . . . Albert S Scott
Ref.: 1913 Proceedings Accounting Vol, 202 to 215
- Handling of Bond Coupons . . . W J Kehl
Ref.: 1913 Proceedings Accounting Vol, 255 to 261
- Report of Sub-Committee on a Uniform System of Accounts
John L Bailey
Ref.: 1914 Proceedings Accounting Vol, 46 to 162

- Accounting for Merchandise Sales H B Lohmeyer
 Ref.: 1914 Proceedings Accounting Vol, 201 to 222
 Suspense Accounts Frederick Schmitt
 Ref.: 1914 Proceedings Accounting Vol, 223 to 242
 An Accounts Payable Methods Including the Mechanical Tabulation
 and Distribution of Operating and Other Expenses . Frank A Birch
 Ref.: 1914 Proceedings Accounting Vol, 243 to 261

APPRAISALS AND DEPRECIATION

- Depreciation Accounting for Small Companies G E Clafin
 Ref.: 1909 Proceedings Vol III, 165 to 175
 Accounting for Depreciation H M Edwards
 Ref.: 1911 Proceedings Vol II, 179 to 199
 Accounting for Replacement of Plant Retired from Service
 Frank A Birch
 Ref.: 1913 Proceedings Accounting Vol, 216 to 239
 Appraisals Dr D C Jackson
 Ref.: 1914 Proceedings Accounting Vol, 163 to 187
 Report of Sub-Committee on Depreciation J W Lieb
 Ref.: 1914 Proceedings Accounting Vol, 196 to 200

PURCHASING AND STORES

- Care and Handling of Supplies John L Bailey
 Ref.: 1909 Proceedings Vol III, 118 to 140
 Storeroom Accounting R F Pack
 Ref.: 1910 Proceedings Vol II, 275 to 291
 Tracing Storeroom Material John T Brady
 Ref.: 1911 Proceedings Vol II, 65 to 89
 Purchasing Department Accounting T W Buxton
 Ref.: 1911 Proceedings Vol II, 90 to 122
 Incandescent Lamp Accounting of The New York Edison Company
 W H Bogart
 Ref.: 1912 Proceedings Vol IV, 12 to 43
 Handling and Accounting for Scrap Material C E Bowden
 Ref.: 1912 Proceedings Vol IV, 44 to 47

WORK ORDER SYSTEMS

- Job or Work Order System R D Rubright
 Ref.: 1910 Proceedings Vol II, 323 to 348
 Advantages of a Job Cost System A L Holme
 Ref.: 1911 Proceedings Vol II, 123 to 139

METERS AND METER RECORDS

- Meter Records Dougless Burnett
 Ref.: 1910 Proceedings Vol II, 349 to 358

CUSTOMERS' ACCOUNTS

- Customers' Accounts L M Wallace
 Ref.: 1909 Proceedings Vol III, 29 to 73
 Care and Handling of Customers' Accounts J M Mulvihill
 Ref.: 1910 Proceedings Vol II, 257 to 274
 Keeping of Customers' Records R F Bonsall
 Ref.: 1910 Proceedings Vol II, 363 to 372
 Handling of Customers' Orders R F Bonsall
 Ref.: 1911 Proceedings Vol II, 5 to 6
 Accounting for Sale of Electric Devices L M Wallace
 Ref.: 1912 Proceedings Vol IV, 64 to 70

COLLECTIONS

- Workings of a Collection Bureau J S Van Duyne
 Ref.: 1910 Proceedings Vol II, 372 to 405
 Collection of Bills E J Bowers
 Ref.: 1911 Proceedings Vol I, 27 to 51

COST ACCOUNTING AND STATISTICS

- 1910 Significance of Statistics B F McGuire and G A McKana
 Ref.: 1910 Proceedings Vol II, 291 to 311
 1913 Report of Sub-Committee on Statistics and Forms
 C L Campbell and Hermann Spoehrer
 Ref.: 1913 Accounting Vol, 240 to 246
 1909 Cost Accounting H R Kern
 Ref.: 1909 Proceedings Vol III, 141 to 165
 1914 Cost and Statistics Thomas J Walsh
 Ref.: Accounting Vol, 17 to 44

MISCELLANEOUS TOPICS

- Classification of Income and Sales W W Dow
 Ref.: 1910 Proceedings Vol II, 312 to 323
 Pay Roll Problems of the Electric Light Industry W E Freeman
 Ref.: 1909 Proceedings Vol III, 74 to 118
 Extent to which the Tabulating Machine can be used in Accountancy
 Work Wm Schmidt Jr
 Ref.: 1911 Proceedings Vol II, 200 to 220
 General Filing System R H Williams
 Ref.: 1912 Proceedings Vol IV, 48 to 62
 Central-Station Motor Vehicle Costs and their Distribution to Ac-
 counts Benefited E C Scobell
 Ref.: 1912 Proceedings Vol IV, 85 to 104
 Electric Vehicle Accounts as Applied to a Department of a Central
 Station Hermann Spoehrer
 Ref.: 1911 Proceedings Vol II, 52 to 63
 Progress made in the Uses of the Tabulating Machine Wm Schmidt Jr
 Ref.: 1912 Proceedings Vol IV, 149 to 200
 Accounting School and Education of Employees A L Holme
 Ref.: 1913 Proceedings Accounting Vol, 44 to 69
 Office and Mechanical Appliances; Their Uses, Economies Affected,
 etc. H L Lohmeyer
 Ref.: 1913 Proceedings Accounting Vol, 78 to 108
 Variations in Public Service Systems of Accounting E C Scobell
 Ref.: 1914 Proceedings Accounting Vol, 188 to 193
 Application of Sorting and Tabulating Machines to the Inventory
 of Transmission and Distribution Systems G L Knight and
 C V Woolsey
 Ref.: 1914 Proceedings Accounting Vol, 262 to 282
 Purchasing, Storing and Accounting of Coal of The New York
 Edison Company C L Lehmann
 Ref.: 1914 Proceedings Accounting Vol, 283 to 305



JOHNS-MANVILLE SERVICE is an evolution—the growth of half a century's endeavor to insure permanent satisfaction to users of J-M Products, of whatsoever kind. The sale of an article is not the end, it is really the beginning of J-M responsibility.

J-M Lighting Service
Cove, Semi-Indirect and
Diffusing Lighting
Systems
Chandeliers

"Noark" Universal Meter
Protective Devices
"Noark" Fuses, Service and
Subway Boxes
J-M Fibre Conduit

Booklets on the above gladly sent on request.

H. W. Johns-Manville Co.

New York and Every Large City.

Sole Selling Agents for Frink and J-M Linolite Systems of Illumination; Mitchell Vance Lighting Fixtures and Bronzes; Gill Bros. Co., Parian Ware.

See our advertisement in any issue of Electrical World.



Lead Encased Underground Cables

SINGLE, DUPLEX and THREE-PHASE

Weatherproof Wires and Cables

MAGNET WIRES

GALVANIZED STRANDS

AMERICAN ELECTRICAL WORKS

PHILLIPSDALE, R. I.

NEW YORK

CHICAGO

CINCINNATI

BOSTON

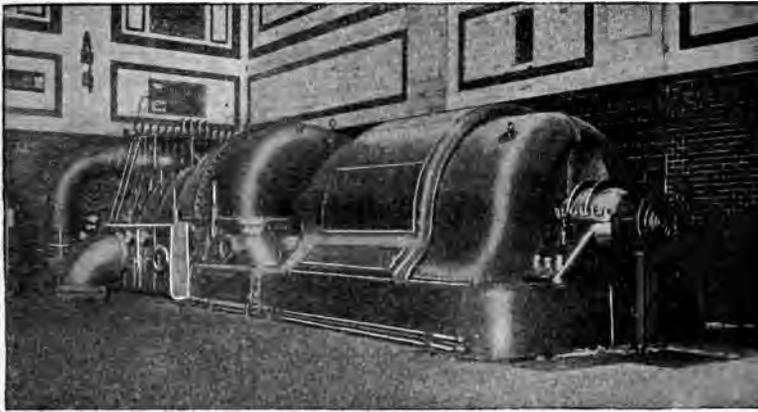


Paranite Rubber Covered Wires and Cables are made to meet all requirements of New Code Specifications. For Inside, Aerial, Underground and Submarine use. Telephone, Telegraph, Electric Light, Power and Signal Wires and Cables.

IF IT'S PARANITE IT'S RIGHT

Manufactured by

Indiana Rubber & Insulated Wire Co.
JONESBORO, INDIANA



30,000 K. W. Curtis Steam Turbo-Generator, New York Edison Co.

World's Largest Turbine Placed in Commercial Service

The largest single turbine generating unit ever installed has been placed in regular commercial service by the New York Edison Company.

This machine is of 30,000 Kw. capacity. Its general design is similar to the 35,000 Kw. turbine at the Schenectady Works of the General Electric Company. In both machines a single generator is direct connected to, and mounted on the same bed plate with the turbine which drives it.

The completion of this contract marked a new epoch in the history of steam turbines. The installation is notable not only because the unit is so much larger than anything heretofore attempted, but because its design and manufacture were carried out without hitch or delay of any kind and the installation completed in less than a year from the date of awarding the contract. The machine was immediately placed in service and for the past four months has been carrying daily commercial load.

GENERAL ELECTRIC COMPANY

General Office:



Schenectady, N. Y.

DISTRICT OFFICES IN:

BOSTON, MASS.
NEW YORK, N. Y.
PHILADELPHIA, PA.

ATLANTA, GA.
CINCINNATI, OHIO
CHICAGO, ILL.

ST. LOUIS, MO.
DENVER, COLO.
SAN FRANCISCO, CAL.

SALES OFFICES IN ALL LARGE CITIES.



The Adjustment Elements of the Type I-14 Meter

The regulating or adjustment elements of a watt-hour meter control the speed of meter so that it will register the load correctly under widely varying load conditions.

The continued accuracy of a meter depends more upon the permanence of the damping magnet, than upon any other one thing. The two C-shaped magnets used in the Type I-14 Meter are manufactured from the highest grade of steel, specially hardened, magnetized and aged. The perfection of the processes by which these magnets are produced has been developed in the commercial production of ten million magnets. In ordinary service these magnets are absolutely permanent.

The full load speed of the meter is regulated by moving these magnets nearer to or further from, the edge of the moving disk, thus increasing or decreasing the magnetic drag. This adjustment is made by a micrometer screw, which gives a fine regulation with a wide range of adjustment.

The friction compensation or light load adjustment is regulated by the "light load plate" which carries a small copper punching under the potential pole. The plate is moved laterally by a micrometer screw to secure the desired compensation.

The permanence of magnets and the simplicity and convenience of adjustments are two of the many good points of Type I-14 Meters.

This is the sixth of a series of seven advertisements explaining the advantages of various points of construction of Type I-14 Meters. The last advertisement of this series will appear in October 9th issue of the Electrical World and in October 2nd issue of Electrical Review.

General Electric Company
 General Office: Schenectady, N. Y.



District Offices in:

Boston, Mass. New York, N. Y. Philadelphia, Pa. Atlanta, Ga. Cincinnati, Ohio
 Chicago, Ill. Denver, Colo. San Francisco, Cal. St. Louis, Mo.

Sales Offices in all Large Cities

5687

Sales-building Co-operation for every Edison Agent

NO manufacturer in any line offers agents a more complete line of sales helps than those shown in the pages of the Edison Sales Builder.

THE CHAPTER ON LAMP DEVELOPMENT

Keeps you fully posted regarding all new improvements in the product.

UNDER LIGHTING PRACTICE

Are included the latest methods in residential, home, industrial, commercial and street lighting.

THE MAGAZINE ADVERTISING SECTION

Gives ample advance notice of forthcoming campaigns so that our agents can take full advantage of the same by laying their plans accordingly.

IN THE CHAPTER ON CO-OPERATIVE PUBLICITY

Are described the many varieties of sales helps furnished to Edison agents. Here are found timely window display suggestions and material together with a complete list of all the new booklets, bulletins, blotters, folders, posters, carcards, novelties, post cards, lantern slides, posterette stamps, display racks, cut-outs, pennants, billboard posters, wall charts, lamp shades, decalcomania and muslin signs, lectures, newspaper cuts, electrotyped advertisements and other publicity material. A typical list of "live" material includes 77 different pieces. This list does not include newspaper electros of which about 70 different cuts are offered in the course of a year.

THIS DEALER SERVICE,

In all its completeness, is available to central stations and lamp agents holding Edison contracts.



EDISON LAMP WORKS

OF GENERAL ELECTRIC COMPANY

General Sales Office

Harrison, New Jersey



5537

Habirshaw Wire Company

NEW CODE

For all
Services



High and Low
Pressure

Offices and Works
YONKERS, N. Y.



INSULATED WIRES

OF EVERY DESCRIPTION

ARE OF THE HIGHEST QUALITY

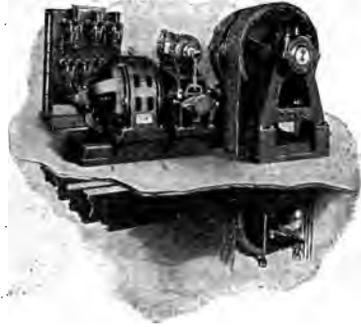
WIRE ROPE-BARE WIRE

JOHN A. ROEBLING'S SONS CO.

TRENTON, N. J.

BRANCHES AND AGENCIES

New York	Cleveland	Seattle
Philadelphia	Pittsburg	San Francisco
Atlanta	Chicago	Los Angeles
	Portland, Ore.	



The Otis Variable Speed Alternating Current Traction Elevator Machine. A development that makes possible the use of a relatively high speed elevator in Alternating Current districts.

Your "Vertical Transportation" Load

Is it fully developed in your city? Are you getting the most out of the enormous current revenues that come with the use of electrical devices for transporting people vertically? Do you know what these devices are, how they operate, where they can be used?

The answers to these questions are contained in a series of booklets which will be sent you at request. Booklets that picture and explain the newer developments in elevators; why and where Escalators are employed; how Inclined Elevators save for the user and earn for you; in what way Incline-Railways and Hoists can be useful to your community and to the manufacturer.

You should have these booklets for your salesmen and for your customers. To know the "Efficiency" results that such electrical transportation devices invariably produce is to realize the valuable market for Central Station power that is latent in the office, residential, mercantile and industrial buildings of your city.

We offer facts, figures and a thorough sales co-operation to help extend motor drive as applied to elevating apparatus in your community. The first step is to ask us for these facts—today.

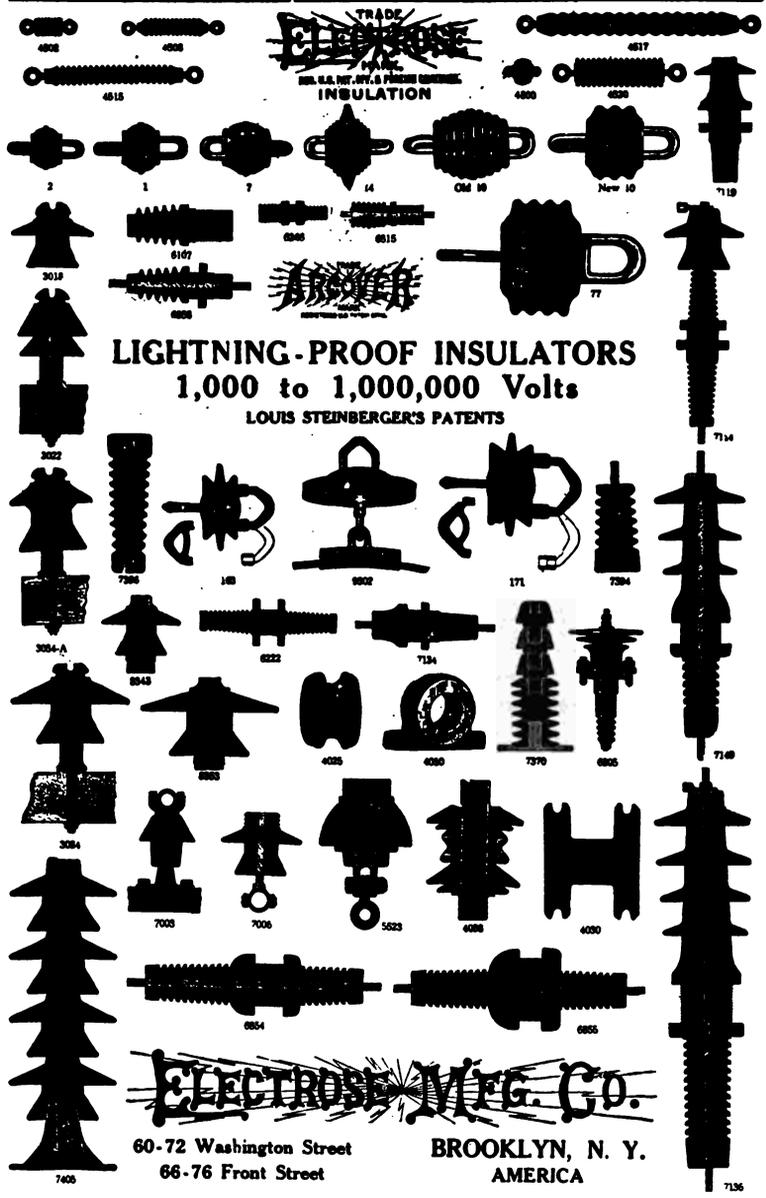
OTIS ELEVATOR COMPANY

Eleventh Avenue and Twenty-Sixth Street, New York

Offices in All Principal Cities of the World

INSULATORS 1,000 to 1,000,000 VOLTS



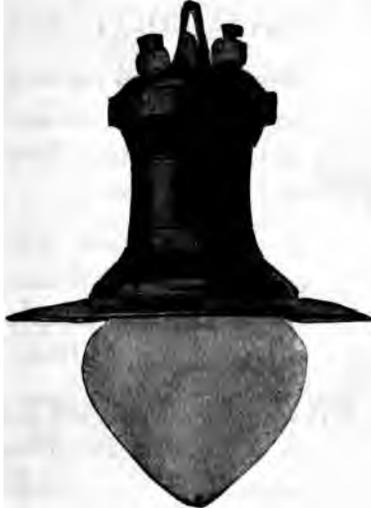


LIGHTNING-PROOF INSULATORS
1,000 to 1,000,000 Volts
LOUIS STEINBERGER'S PATENTS



60-72 Washington Street
66-76 Front Street
BROOKLYN, N. Y.
AMERICA

Westinghouse Series Mazda Street Lighting System



LUXSOLITE FIXTURE

With Regulating Transformers

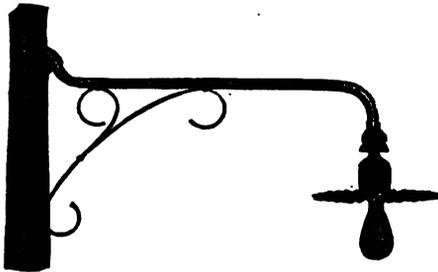
For Lighting Residential
Districts, Parks and other
locations of similar char-
acter.

Standard Street Hoods are
furnished for either external or
concealed wiring.

Luxsolite Fixtures for High-
Candle Power Mazda C Lamps are
particularly popular for the replace-
ment of enclosed carbon arc lamps.



WESTINGHOUSE MAZDA 17 KVA.
REGULATING TRANSFORMER



SCROLL-STYLE BRACKET FOR CONCEALED WIRING

When a lamp burns out in a
street hood, a film cut-out in the
hood short-circuits the lamp,
and thus maintains the conti-
nuity of the circuit.

When a lamp burns out in a
Luxsolite Fixture, the auto-
transformer provided therein
for the high current lamp, maintains the continuity of the circuit without auxiliaries.

The series of Mazda C Lamps are supplied from a constant-current regulating
transformer which automatically controls the current and the voltage of the circuit,
and maintains a constant current regardless of the number of lamps burning.

The Regulating Transformers are especially designed with ventilated coils, no
section of which is over $\frac{1}{4}$ inch thick, insuring the most perfect cooling. Sixty
cycle regulators are built in rating of 4 to 68 kva.

Full particulars in Catalogue Sections 704, 782 and 783

WESTINGHOUSE ELECTRIC & MFG. CO.

Sales Offices in all
Large American Cities



East Pittsburgh,
Pennsylvania

SMALL

Century

SINGLE PHASE MOTORS



are permitted on any lighting circuit because of their low starting current.

A fuse which will protect under full load is usually of ample capacity for starting.

CENTURY ELECTRIC COMPANY,
19th, Pine to Olive Sts.,
St. Louis, Mo.

154

DEMAND INDICATORS

FOR

**VARIOUS CLASSES OF
ELECTRICAL SERVICE**

Write for Bulletins

**FORT WAYNE ELECTRIC WORKS
OF GENERAL ELECTRIC COMPANY**

FORT WAYNE, INDIANA

FREE

Trial of 30 Days to Any

CENTRAL STATION

Wishing to Improve its Service

METROPOLITAN PRIMARY CUTOUTS



List No. 10350 Primary Cutout, 2,600 volts, 0 to 100 amperes

Offer positive protection to your branch circuits, transformers and arc lamp circuits. They are designed, in case of trouble, to instantaneously open the circuit, especially where the disruptive effect is severe, due to high capacity. A generous factor of safety is employed in the use of contact surfaces and insulation to insure satisfactory operation under the most severe conditions of service. Constructed of heavy porcelain, in brown finish, they are so designed as to be weatherproof when installed on crossarms. Each conductor is held in position in the terminals by two screws to prevent loose connections. All live parts are amply recessed and protected to prevent injury from contact.

CENTRAL STATION REVENUE

depends very largely upon the service wiring and the watt-hour meter.



List No. 118—Protective Service Switch and Cutout. For meter protection metallic adapter may be added to switch to enclose all conductors.

How much unmetered electrical energy are you losing due to unprotected service and watt-hour meter wiring?

Metropolitan Protective Devices

where installed have increased the revenue and efficiency of CENTRAL ELECTRIC STATIONS.

Why not let them do the same for you?

Let Us Send You Full Particulars.



Metropolitan Engineering Co.

42d Street Building

New York



Canadian Representative—Metropolitan Engineering Co., Ltd., 90 Sherbourne St., Toronto, Can.

The Babcock & Wilcox Company

85 LIBERTY STREET

NEW YORK

BRANCH OFFICES

CHICAGO,
Marquette Building

ATLANTA,
Candler Building

CLEVELAND,
New England Building

SEATTLE,
Mutual Life Building

HAVANA, CUBA,
Calle de Aguiar 104

LOS ANGELES,
I. N. Van Nuys Building

CINCINNATI,
Traction Building

HOUSTON, TEXAS,
Southern Pacific Building

SAN JUAN, PORTO RICO,
Royal Bank Building

BOSTON,
35 Federal Street

PHILADELPHIA,
North American Building

SAN FRANCISCO,
Sheldon Building

PITTSBURGH,
Farmers' Deposit Bank Building

NEW ORLEANS,
535 Baronne Street

DENVER,
435 Seventeenth Street

SALT LAKE CITY,
705-6 Kearns Building

TUCSON, ARIZONA,
Santa Rita Hotel Building

MANUFACTURERS OF

Water Tube Steam Boilers

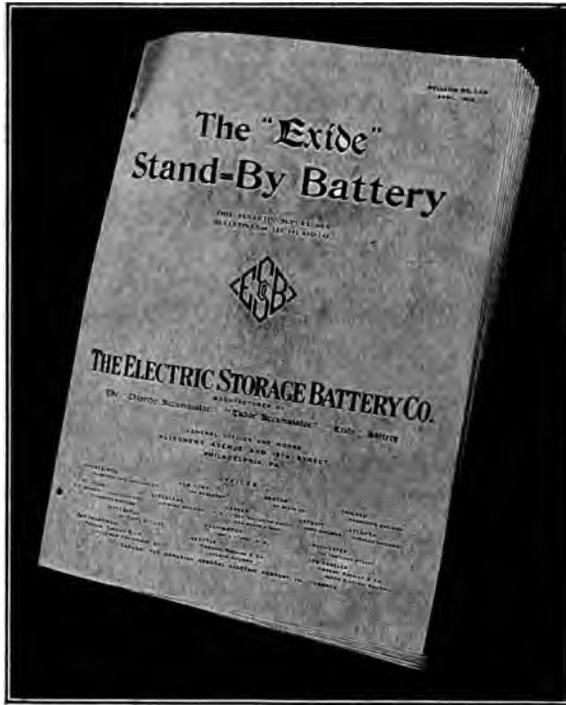
Steam

Mechanical

Superheaters

Stokers

WORKS: BARBERTON, OHIO; BAYONNE, N. J.



Did You Get a Copy

of this new bulletin on the "Exide" Stand-By Battery?

It gives up-to-date engineering data concerning modern practice in the installation and operation of Stand-By Batteries for Central Station Service.

The extensive use of Stand-By, or Emergency, Batteries indicates the increasing importance attached to the reliability of service such batteries insure.

Any of our offices will be very glad to mail you a copy of this bulletin.

THE ELECTRIC STORAGE BATTERY CO.

New York Boston PHILADELPHIA, PA. Chicago Denver
 St. Louis Cleveland Atlanta 1888-1915 Rochester Detroit Toronto
 Washington Pittsburgh San Francisco Los Angeles Seattle

ENGINEERS 1877=1915

AND CONTRACTORS

“CENTRAL STATION HEATING SYSTEMS”

For Cities, Towns, Colleges, Asylums, or any Group of Buildings

DETAIL INFORMATION AND ESTIMATES GLADLY FURNISHED

“WRITE FOR BULLETINS”

AMERICAN DISTRICT STEAM COMPANY

General Offices and Works

NORTH TONAWANDA, N. Y.

NEW YORK
West St. Building

CHICAGO
First National Bank Bldg.

SEATTLE
Hoge Building

WILLIAM A. POPE
CONTRACTOR

POWER PLANT PIPING
COMPLETE HEATING PLANTS

26 NO. JEFFERSON STREET
CHICAGO

HENRY L. DOHERTY & COMPANY

Sixty Wall Street

New York

Alliance Gas & Power Co.	Lebanon Gas & Fuel Co.
Amarillo Street Railway Co.	Lincoln Gas & Elec. Lt. Co.
Arkansas Valley Gas Co.	Manufacturers Natural Gas Company, Ltd.
Athens Railway & Elec. Co.	Massillon Electric & Gas Co.
Bartlesville Gas & Oil Co.	Meridian Light & Railway Co.
Bartlesville Interurban Ry. Co.	Montgomery Light & Water Power Company
Bristol Gas & Electric Co.	Neosho Electric Light Co.
Brush Electric Company	Niagara Lt., Heat & Pwr. Co.
Central Ohio Gas & Elec. Co.	Ozark Power & Water Co.
Citizens Gas, Elec. & Htg. Co.	Producers Nat'l Gas Co., Ltd.
Cities Service Company	Pueblo Gas & Fuel Company
City Light & Traction Co.	Quapaw Gas Company
City Light & Water Co.	Rio Grande Public Serv. Corp.
Cumberland & Westernport Electric Railway Co.	St. Joseph Railway, Light, Heat & Power Co.
Danbury & Bethel Gas & Elec- tric Light Co.	Salina Light, Pwr. & Gas Co.
Denver Gas & Elec. Light Co.	South'n Ontario Gas Co., Ltd.
Doherty Operating Company	Southwestern Oklahoma Gas & Fuel Company
Doherty Securities Company	Spokane Gas & Fuel Company
Dominion Gas Company	Summit County Power Co.
Durham Traction Company	Toledo Trac., Lt. & Pwr. Co.
Electric Bond Deposit Co.	Trumbull Public Service Co.
Elyria & Lorain Electric Properties	United Wtr., Gas & Elec. Co.
Empire District Electric Co.	Urban Water Supply Co.
Empire Gas & Fuel Company	Waines & Root Gas Co., Ltd.
Fremont Gas, Electric Light & Power Company	Washita Gas & Fuel Co.
Gas & Electric Securities Co.	Watauga Power Company
Gas Securities Company	Western Distributing Company
Glenwood Nat'l Gas Co., Ltd.	Western Oklahoma Gas & Fuel Company
Improved Appliance Company	Wichita Natural Gas Co.
Improved Equipment Company	Wichita Pipe Line Company
Knoxville Gas Company	

We Finance
Extensions and
Improvements

to Electric Light, Power and Street Railway properties which have established earnings. If prevented from improving or extending your plant because no more bonds can be issued or sold, or for any other reason, correspond with us.

Electric Bond and Share Co.

(Paid-up Capital and Surplus, \$14,500,000)

71 Broadway

New York

Dealers in Proven

Electric Light, Power and Street Railway

Bonds and Stocks



STONE & WEBSTER

Established 1889

OUR ORGANIZATIONS ARE PREPARED TO

FINANCE public utility developments.

BUY AND SELL securities of public utility corporations.

DESIGN steam power stations, hydro-electric developments, transmission lines, city and interurban railways, gas plants, industrial plants and buildings.

CONSTRUCT either from our own designs or from designs of other engineers or architects.

REPORT on public utility properties, proposed extensions or new projects.

MANAGE railway, light, power and gas companies.

Stone & Webster Securities Department

Stone & Webster Engineering Corporation

Stone & Webster Construction Company

Stone & Webster Expert Department

Stone & Webster Management Association

NEW YORK

BOSTON

CHICAGO

The
**ELECTRICAL REVIEW and
WESTERN ELECTRICIAN**

is read by every up-to-date electric-light man

It is the wide-awake and comprehensive exponent of all departments and all developments in the electrical industry

Issued weekly ; price \$3 per year

ELECTRICAL REVIEW AND WESTERN ELECTRICIAN
608 South Dearborn St., Chicago, Ill. 13 Park Row, New York City

**EVERY MAN IN
EVERY DEPARTMENT OF
EVERY CENTRAL STATION**

can find something of interest
and value in every issue of the

Electrical World

Central Station finance, design, construction, operation and maintenance—power plants, substations, transmission lines, distribution systems, lighting and power installations; engineering, legal, commercial and sales department considerations—all receive their full share of attention in the columns of the great newspaper of the industry—*Electrical World*. For over forty years it has been the authority on all matters electrical wherever wires run.

Subscription \$3.00 a year in the U. S. Sample copy free.

McGraw Publishing Co., Inc., 239 W. 39th St., New York
Electric Railway Journal Electrical World Engineering Record
Metallurgical and Chemical Engineering