PROCEEDINGS

OF THE

LOUISIANA ENGINEERING SOCIETY

VOL. XIX, 1933

PUBLISHED BI-MONTHLY
BY THE
LOUISIANA ENGINEERING SOCIETY
NEW ORLEANS

CONTENTS

The Proceedings of the Louisiana Engineering Society

Published bi-monthly, February, April, June, August, October, December, under the auspices of the Committee on Publication.

JAMES M. ROBERT, Editor.

Subscription, $2.00 per annum Single copy, 35 cents

Address all communications to
JAMES M. ROBERT, Editor, Tulane University,
New Orleans, La.

Entered as second-class matter July 27, 1916, at the Post Office at New Orleans, Louisiana, under the Act of August 24, 1912.

Acceptance for mailing at special rate of postage provided for in section 1105 Act of October 3, 1917, authorized August 1, 1918.

LOUISIANA ENGINEERING SOCIETY

OFFICERS FOR 1933

President, J. H. O'NEILL, 637 Lowerline Street.
Vice-President, A. L. DUNLAP, 1318 Nashville Avenue.
Secretary, FRANK A. MUTH, 7705 Willow Street.
Treasurer, WALTER B. MOSES, 425 S. Peters Street.

DIRECTORS

E. S. BRES, 311 Maritime Building.
CHARLES WIGGIN, JR., 1105 Maritime Bldg.
PAUL F. HOOTS, 317 Baronne Street.
FRED N. BILLINGSLEY, 702 Interstate Bank Building.

STANDING COMMITTEES

On Technical Papers
Charles Wiggin, Jr., Chairman
James M. Robert
Charles M. Kerr
Carl Schneider

Motivating Committee
James M. Robert, Chairman
W. B. Gregory
George R. Hammett
George P. Rice
James M. Todd

On Library
Ralph Earl, Chairman
C. W. Ricker
A. J. Harris
G. W. Lawes

On Publications—Division "A"
James M. Robert, Chairman
Frank A. Muth

On Publications—Division "B"
D. W. Stewart, Chairman
Harry B. Henderlite
J. A. McNiven
W. H. Scales

On Entertainments and Outings
H. L. McLean, Chairman
S. E. Hottinger
Ole K. Olsen
D. W. Stewart

On Legislation
James M. Todd, Chairman
E. S. Bres, Vice-Chairman
F. N. Billingsley
Donald Derickson
George R. Hammett
Harry Jacobs
George P. Rice
Ira W. Sylvester

On Finance
A. L. Dunlap, Chairman
Walter B. Moses
F. N. Billingsley

On Membership—Division "A"
E. S. Bres, Chairman
Frank G. Frost, Vice-Chairman
A. L. Dunlap
H. B. Henderlite
Harry Jacobs
J. T. Bullen
Ira W. Sylvester
Bryson Vallas
B. W. Pegues

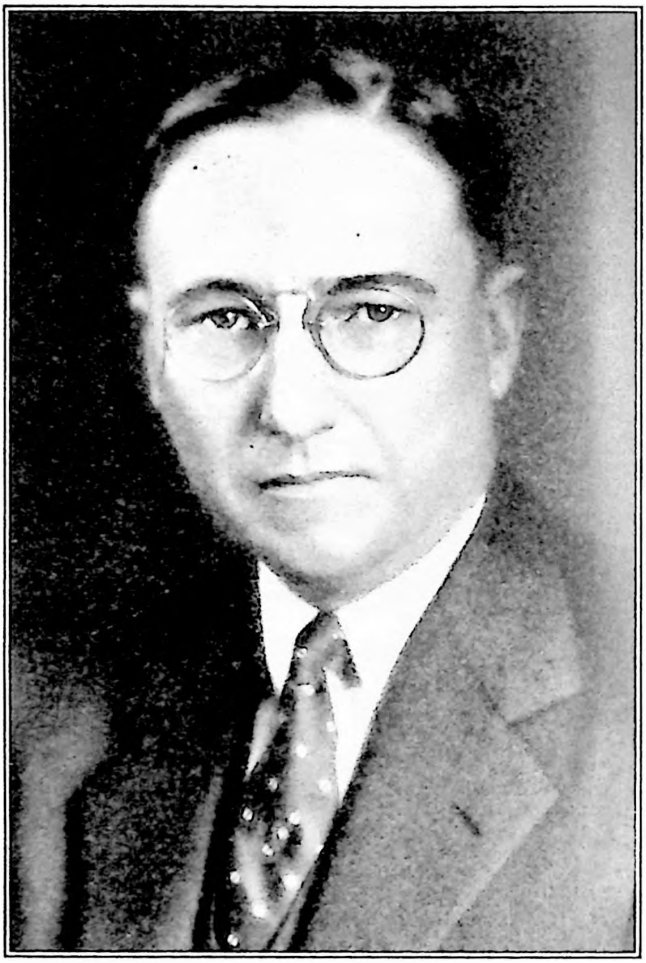
On Membership—Division "B"
W. B. Gregory, Chairman
James M. Todd
B. H Grehan

On Employment
R. H. Baumbach, Chairman
R. Bassich
H. B. Henderlite

On Civic and Industrial Affairs
A. M. Lockett, Chairman
A. B. Paterson, Vice-Chairman
J. F. Coleman
Donald Derickson
A. T. Dusenbury
John Klorer
F. N. Billingsley
James M. Todd

The headquarters of the Society are in the State Museum Building, Jackson Square.

All business communications should be addressed to F. A. Muth, Secretary, 7705 Willow Street, New Orleans, La.



PRESIDENT, JOHN H. O'NEILL

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XIX. FEBRUARY, 1933 NO. 1

CONTENTS

EDITORIAL NOTES AND COMMENT

Our New President. John H. O'Neill, Sanitary Engineer, Louisiana State Board of Health, was born in Lowell, Massachusetts, November 18, 1877.

He received the degree of Bachelor of Science from Massachusetts Institute of Technology in 1910. From 1910 to 1913 he was assistant in the Department of Public Health, American Museum of Natural History, New York City.

From 1913 he has served in his present capacity as Sanitary Engineer to the Louisiana State Board of Health.

In 1931, upon the completion of the new Medical Center, Louisiana State University, he was appointed Assistant Professor of Preventive Medicine and Public Health, which position he still holds.

During the World War Mr. O'Neill heeded the country's call and from November, 1917, to February, 1919, he served as Captain, Sanitary Corps, U. S. Army.

Other Officers for 1933. Professor A. L. Dunlap was elected Vice-President for 1933 and Mr. Paul F. Hoots was elected to the Board of Direction to serve three years. Mr. Frank A. Muth and Mr. Walter B. Moses were re-elected as Secretary and Treasurer respectively.

Colonel E. S. Bres and Mr. Charles Wiggin, Jr., are the other elective members of the Board who hold over for one and two years respectively. Mr. F. N. Billingsley, as retiring President, automatically becomes a member of the Board, taking thereon the place of the preceding retiring President, Mr. Frank G. Frost.

A complete list of the standing committees is given on the title page of the *Proceedings*.

The Annual Meeting and Dinner Dance. It was indeed a glorious affair. It was also a radical innovation. As an experiment the entertainment committee decided to change the type of social affair which always accompanies the annual meeting. Heretofore it has been a stag smoker. This year a dinner dance. It was successful from every angle.

Our own Douglas Anderson, former editor of the *Proceedings*, presided as toastmaster. A good one he was and always will be.

The total attendance was 115. The guests of the Society were Admiral H. H. Christy, Commandant U. S. Naval Station; Lieut. Commander and Mrs. Edwin Hacker, U. S. Naval Station, and Mrs. N. W. Nolte.

There were several excellent but short—should we say short and *therefore* excellent?—speeches during the course of the evening. The principal speaker was Mr. Clayton Rand, who addressed the audience on "Oeracies, Technical and Otherwise."

By far the most enjoyable part of the evening was the surprise program of entertainment. This program was "engineered" by the Ladies' Auxiliary under the able guidance of

its President, Mrs. W. B. Gregory. Some funny stories by our well-known Miss Louise Remanjon were followed by the real surprise hit of the evening. The ladies had laboriously secured infant pictures of many members who were present at the dinner. Lantern slides were made of these pictures and flashed on the screen. No end of merriment was caused by this part of the program. The whole scheme had been worked up in secret by the ladies, and even those members whose pictures were shown knew nothing of it in advance.

But human nature will be human nature, and as the editor watched infant picture after infant picture flashed upon the screen (his own was among them), he could not help recalling to mind the passage in that old, old song we used to sing. The lines went something like this: "What's the use; what's the use, of all those pretty little babies growing up into such ugly men?"

The Annual Reports. This is *your* Society; never forget that. Elsewhere in this issue are published the annual reports of the officers and Board of Direction. These reports summarize for the year the activities of *your* officers for the benefit of *your* Society with *your* money. These reports, and in particular the report of the Board of Direction, should be carefully read by every member. It will be a source of pride to you to see how well the affairs of our Society have been managed in these trying times and in the face of many discouragements.

Commander Schoppe Leaves Us. We regret to record the fact that Commander Ray L. Schoppe has been ordered to sea duty.

Commander Schoppe for the past few years has been in charge of the local office of the U. S. Coast and Geodetic Survey.

When he first came here he immediately identified himself with the activities of the Society and has been an active member in them ever since. He has been an enthusiastic and con-

stant attendant at meetings, and made a host of friends by his genial good nature.

We are very sorry indeed that he leaves us, and we wish him "bon voyage."

Industrial Rehabilitation. We print in another part of this issue a paper by Mr. A. M. Lockett on Industrial Rehabilitation.

Mr. Lockett, and through him the Society, has been honored by his appointment as Chairman of the New Orleans Section, Committee on Industrial Rehabilitation.

This committee was organized in Washington at the conference of banking and industrial committees of the twelve Federal Reserve Districts called by President Hoover and attended by the ranking officials of the United States Government.

The local committee as formed by Mr. Lockett includes a large number of members of our Society who have agreed to serve with him.

Additions to the Library. The following books have been edded to our library:

"The Story of the Rockefeller Center." Presented by one of our members, Mr. Frank L. Reynolds, General Superintendent, Irons & Hoover, Inc., 420 Lexington Ave., New York City.

"Planning and Building the City of Washington," edited by Frederick H. Newell.

PAPERS AND DISCUSSIONS

INDUSTRIAL REHABILITATION

By A. M. Lockett.*

Read before the Society, December 8, 1932.

I am very much gratified at the opportunity to explain to you some work which I have undertaken because that work has to do with things in which you engineers are vitally interested, and if you choose so to do you can not only be of great assistance in this work but incidentally will benefit yourselves.

The undertaking to which I refer is that of chairman of the New Orleans District of the Committee on Industrial Rehabilitation.

The Committee on Industrial Rehabilitation was organized in Washington at the recent conference of banking and industrial committees of the twelve Federal Reserve Districts, called by President Hoover and attended by ranking officials of the United States Government.

The fact was made plain in conference discussions that one solution of the problem of unemployment and of business recovery lies in the direction of industrial modernization.

Accordingly, this committee was authorized to devise and put into action a national program to accelerate replacement of obsolete equipment and facilities throughout industry.

The general chairman is Mr. A. W. Robertson, Chairman of the Board of the Westinghouse Electric & Manufacturing Company. Mr. Robertson has appointed as sub-chairman an outstanding business men in each of the Federal Reserve Districts. Mr. Theodore Swann of the Swann Chemical Company, Birmingham, is the chairman for the Sixth District, of which New Orleans is a part. Mr. Swann has asked me to be the chairman of the New Orleans District, and I have accepted service.

I am gratified to state that, on my request, about sixty men have agreed to work with me. This list includes representatives of five of the leading banks, a majority of the manufac-

*Member. President, A. M. Lockett & Co.

turers' representatives located in New Orleans, and a number of engineers, contractors and chemists, including members of the staff of Tulane University and of Louisiana State University. Also on my committee is the local representative of the United States Department of Commerce, and the manager of a leading broadcasting station.

I have explained to these men that I conceive this job to be largely one of spreading propaganda, and as no funds are provided for the expenses, I have further had them understand that while I will not call upon them for any contributions I will expect them to pay the expenses to which they themselves are subjected in carrying out this work, and I will, on my part, shoulder the expenses for the work devolving upon the chairman.

While engineers frequently do philanthropic things, and any work having for its purpose finding jobs for the unemployed is certainly philanthropic, I believe we will make no headway if the propaganda material which we distribute amongst the industries of this section is not absolutely sound from an engineering standpoint.

If we are going to undertake to persuade an executive to replace obsolete machinery or to make other needed improvements, it is necessary for us to give him arguments which will justify the cost, and the only argument which an engineer should advance in this connection is financial benefit to the institution involved.

That the industrial plants of this country have fallen far behind in maintaining proper efficiency of their plants is clearly proven by the fact that within the past three years the normal sales of machinery and equipment has fallen off more than five billion dollars. This has thrown out of work about 1,600,000 men and has stopped payrolls of more than three billion dollars.

There are three very sound reasons why a company should modernize its facilities for production, distribution, and merchandising: (1) to reduce costs and make more profit; (2) to improve its competitive position on present business; and (3)

to provide for efficient production when the normal volume of business returns. These reasons are all sound.

While it is true that many plants are shut down and others operating on reduced output because of the falling off in consumption of manufactured goods, I believe it is a fact that some of these plants which are shut down could operate at a profit if brought up to date in equipment, and those which are in operation on a reduced rate of output could increase their profits or at least reduce their losses by the judicious expenditure at this time of money for equipment.

Prices of equipment are low, terms of payment are liberal, and I am assured by bankers with whom the subject has been discussed that the attitude of the banks is in full sympathy with the objects of this rehabilitation movement, and that any proposition put up to them which comes within the scope of legitimate banking methods will be given proper banking accommodation. In any event, any plant owner who realizes the value of these improvements should put his case before his banker, who will, no doubt, point out to him ways and means which will enable him to make the necessary purchases.

I will take the responsibility of assuring you men here present that there are sufficient reasons in evidence to justify the belief that the bottom of the depression has been passed and we are on the upward turn. The panic of bank failures is past, gold has stopped leaving the country and is flowing back, money is steadily coming out of hoarding, stocks and bond prices have risen, industrial production has increased, and reemployment has begun.

I will appreciate greatly if the members of this Society will actively join with my committee and me in preaching the gospel of industrial rehabilitation, and if, through all the agencies engaged in this work, we can create a more hopeful state of mind amongst the plant executives and people in general, the return to normal business conditions will be greatly accelerated.

It has occurred to me to bring to your attention a subject which is not included in the scope of the work assigned to me by our general chairman. It does, however, come under the

general head of industrial rehabilitation. I refer to the financial condition of the railways of the United States.

As some of you know, I am a member of the executive committee for the State of Louisiana of the Intracoastal Canal Association. This Association was organized more than twenty-five years ago for the purpose of developing an inland waterway from New Orleans to Corpus Christi, and thence to Brownsville. This waterway has been considered by its advocates as very necessary to the future of this section of the country and thanks to the work which has been diligently carried on the completion as far as Corpus Christi is to be accomplished within the near future.

The advocacy of this particular waterway and of inland waterways in general, while not actively opposed by the railways up to a recent time, is now looked upon by railway people as constituting an unfriendly attitude toward those railroads who have, heretofore, handled the traffic which will move over these waterways.

It has been stated by the leaders in this movement consistently, and this policy has been enunciated in resolutions passed at the various meetings, that the members of the Intracoastal Canal Association, while working for the development of the inland waterways as highly beneficial to the nation in general, are not opposed in any sense to the railways. They want to see all forms of transportation, railway, waterway, and highway, developed to the fullest extent and each form given reasonable protection and encouragement.

The railroads have apparently just awakened to the fact that a substantial part of the tonnage which they have been accustomed to carry has been diverted to the waterways and the highways, and they are now making very active efforts to be permitted to reduce their rates to such a level as will successfully compete with these two other forms of transportation.

As you know, up to the present time railways are not permitted, at least in interstate traffic, to make use either of the

highways or the waterways, and they are therefore unquestionably suffering from this competition.

I want to leave with you the thought (on my own account and not speaking for any organization) that laws governing the railroads should be so modified that they may be permitted to engage in any form of transportation that exists now or may be hereafter created. In other words, the railroads should be permitted to meet barge competition with barges and truck competition with trucks.

The objection now existing to permitting railways to enter into the waterway traffic is the fear on the part of the public that the purpose in mind (should the railroads go into this business) is to put the independent barge lines out of business and then, themselves, abandon the use of the waterways. This can easily be prevented by putting all forms of transportation under governmental supervision on waterways and highways as now exist and on the railroads and prevent the promulgation of any freight rates which are not in truth and in fact compensatory.

The public should remember that the insurance companies, savings banks, and vast numbers of private individuals have their money invested in railroad securities and if these people are to be saved from serious losses something should be done to put the railroads on a better earning basis, and it seems to me that the suggestion offered here is, while not a new one, meritorious and deserving of the serious consideration of all fair-minded citizens.

I believe the state of mind of the public at this time is such that the railways can obtain the legal right to do the things suggested. This seems to me the psychological moment for action on their part.

While, as I said, the subject of railroad rehabilitation was hardly contemplated when this work was undertaken, it is not difficult to imagine the activity in certain mechanical lines that would promptly result from such legislation as is here suggested, since the railways, if given these privileges, would undoubtedly immediately place their orders for river and highway equipment.

Before concluding this interesting subject, I want to leave this further thought with you. In international competition it is going to be necessary for the people of this nation to make use of those forms of transportation which involve the least cost. When I say "cost" I do not mean the lowest rates which the transportation companies may name, but the forms of transportation selected must, in all cases, everything taken into consideration, be the ones which involve the lowest actual costs of transporting the goods.

MEMBERSHIP LIST

HONORARY MEMBERS

J. F. COLEMAN, (C. M. and H. M.), of J. F. Coleman Engineering Co., 1418 Hibernia Bldg., New Orleans.

WALTER H. HOFFMAN, (C. M. and H. M.), Civil Engineer, 1518 State St., New Orleans.

SIDNEY F. LEWIS, (C. M. and H. M.), Consulting Engineer, 1704 Pine St., New Orleans.

GERVAIS LOMBARD, (C. M. and H. M.), Board of State Engineers, 207 N. O. Court Bldg., New Orleans.

ALFRED F. THEARD, (C. M. and H. M.), Drainage Engineer, Sewerage and Water Board Bldg., New Orleans.

LIFE MEMBERS

GEORGE E. EARL, (1900), Consulting Engineer, American Bank Bldg., New Orleans.

JOHN T. EASTWOOD, (1901), Consulting Engineer, 1926 Milan St., New Orleans.

WILL J. GIBBENS, SR., (1900), 532-4 Canal St., New Orleans.

JULES GODCHAUX, (1900), Vice-President and Engineer of Operations, Godchaux Sugars, Inc., 1007 Masonic Temple, New Orleans.

ERNEST LEE JAHNCKE, (1900), Assistant Secretary of the Navy., Washington, D. C.

JOHN KLORER, (1898), Chief Engineer, Orleans Levee Board, 600 Common St., New Orleans.

G. W. LAWES, (1898), Civil Engineer, 310 Balter Bldg., 918 Broadway, New Orleans.

A. M. LOCKETT, (1900), President, A. M. Lockett & Co., Queen & Crescent Bldg., New Orleans.

HENRY J. MALOCHEE, (1898), President and Engineer, Buckmaster, Buck and Malochee, Inc., 713 Union St., New Orleans.

IRA W. SYLVESTER, (1901), Consulting Engineer, Rapides Bank Bldg., Alexandria, La.

THOMAS H. TUTWILER, (1898), Retired, 1488 Vinton Ave., Memphis, Tenn.

FRANK H. WADDILL, (1898), Consulting Civil Engineer, 407 Tulane-Newcomb Bldg., New Orleans.

BEN WILLARD, (1900), Local Manager, General Electric Co., 1004 Union Indemnity Bldg., New Orleans.

VICTOR L. WILLOZ, (1900), Distribution Engineer, New Orleans Public Service, Inc., 317 Baronne St., New Orleans.

HENRY L. ZANDER, (1898), Civil Engineer, 821 N. Rampart St., New Orleans.

RESIDENT MEMBERS

FELIX L. ALCUS, (1922), Vice-President, Carbine-Harange Machinery and Supply Co., 1001 Annunciation St., 1224 Lowerline St., New Orleans.

ALEXANDER ALLISON, JR., (1926), Office Engineer, Sewerage and Water, Sewerage and Water Board, S. & W. Board Bldg., 1013 Milan St., New Orleans.

LESTER F. ALEXANDER, (1915), Engineer and Contractor, 834 Audubon Bldg., New Orleans.

DOUGLAS S. ANDERSON, (1909), Professor of Electrical Engineering and Dean of the College of Engineering, Tulane University, New Orleans.

PAUL ANDRY, JR., (1930), Engineering Department, Shell Petroleum Corporation, 1527 Fourth St., New Orleans.

SAM VERNON APPLEWHITE, (1927), with J. W. Billingsley, Interstate Bank Bldg., New Orleans.

A. F. BARCLAY, (1908), Chief Engineer Public Belt Railroad, 5670 Rosemary Place, New Orleans.

JOHN S. BARELLI, (1908), Boilers and Power Plant Equipment, 612 Godchaux Bldg., New Orleans.

WADE BARNETT, (1910), Engineer, Sewerage and Water Board, 6117 Loyola Ave., New Orleans.

CECIL N. BEAN, (1922), Supervising Inspector Steam Vessels, 10th District, 8012 Burthe St., New Orleans.

JAMES D. BECK, (1916), Consulting Engineer, 2331 Constance St., New Orleans.

BEN H. BELL, (1920), Operating and Electrical Engineer, New Orleans Public Service Inc., 4604 So. Derbigny St., New Orleans.

F. N. BILLINGSLEY, (1915), Consulting Engineer, 702 Interstate Bank Bldg., New Orleans.

A. MERRICK BLAMPHIN, (1908), Consulting Engineer, Box 897, 517 Audubon Bldg., New Orleans.

CLARENCE NICHOLAS BOTT, (1927), General Contractor, 608 Audubon Bldg., New Orleans.

SHIRLEY C. BRASELMAN, (1919), Vice-President, American Creosote Works, Station F, New Orleans.

EDWARD S. BRES, (1925), Scott & Bres, Contracting Engineers, 1007 Maritime Bldg., New Orleans.

LOUIS M. BUJA, (1922), Engineer Globe Construction Co., Inc., 312 La. Bldg., New Orleans.

R. T. BURWELL, (1908), Manager New Orleans Department, Hartford Steam Boiler Inspection and Insurance Co., 1128 Hibernia Bank Bldg., New Orleans.

M. F. CANNING, (1931), Lighting Service Department, New Orleans Public Service Inc., 317 Baronne St., New Orleans.

C. GLENN CAPPEL, (1915), Vice-President, W. Horace Williams Co., Inc., Engineers and General Contractors, 833 Howard Ave., New Orleans.

CHESTER W. CARR, (1926), Vice-President, E. W. Carr, Inc., 807 Howard Ave., New Orleans.

D. B. H. CHAFFE, JR., (1920), Vice President, Southern States Equipment Co., Inc., President, Rogers, Higgins Co., Inc., 1518 Tchoupitoulas St., New Orleans.

JAMES HENRY CHERRY, (1929), 1120 Hibernia Bank Bldg., New Orleans.

E. H. COLEMAN, (1922), J. F. Coleman Engineering Co., 501 Hibernia Bldg., New Orleans.

JAMES HOWARD COLLINS, (1929), General Outdoor Advertising Co., 2120 Canal St., 1310 Short St., New Orleans.

CHARLES C. CRAWFORD, (1921), 1315 First St., New Orleans.

HORACE E. CRUMP, (1912), Office Engineer, Dock Board, No. 2 Canal St., New Orleans.

DAVID L. CULLOM, (1916), Assistant Engineer, Board of Commissioners of the Port of New Orleans, 4032 Prytania St., New Orleans.

B. N. DAVIS, (1913), Engineer and Contractor, 1006 Tchoupitoulas St., New Orleans.

JOHN PAUL DEAN, (1932), Captain Corps of Engineers, U. S. Army, 2339 Octavia St., New Orleans.

DONALD DERICKSON, (1912), Professor of Civil Engineering, Tulane University, New Orleans.

JACQUES de TARNOWSKY, (1915), Structural Engineer, Room 25, City Hall, New Orleans.

ARCHIBALD LEE DUNLAP, (1925), Assistant Professor of Mechanical Engineering, Tulane University, 1318 Nashville Ave., New Orleans.

B. H. DUPUY, (1932), Designer Mechanical Appliances, 1421 Harmony St., New Orleans.

ALLAN T. DUSENBURY, (1909), Drainage and Reclamation Engineer, 1407 American Bank Bldg., New Orleans.

ANDRE C. DUVAL, (1926), with State Board of Engineers, 2206 Jefferson Ave., New Orleans.

RALPH EARL, (1913), Consulting Engineer, Earl Engineering Co., American Bank Bldg., New Orleans.

DANIEL STANLEY ELLIOTT, (1921), Professor of Physics, Tulane University, New Orleans.

JAMES P. EWIN, (1915), Vice-President and General Manager, Doullut & Ewin, Inc., 901 Queen and Crescent MBldg., New Orleans.

CHARLES A. FAVROT, (1919), 18 Richmond Place, New Orleans.

EDWIN J. FISHER, (1913), Proprietor of the Electrical Contracting and Engineering Co., The Electrical Fixture and Material Co., 518-520 Gravier St., New Orleans.

LIONEL E. FLOTTE, (1930), Distribution Engineering Dept., N. O. Public Service Inc., House J, St. John Court, New Orleans.

FREDERICK H. FOX, (1922), Associate Professor, Civil Engineering, Tulane University, New Orleans.

JOSEPH J. FRIEDLER, JR., (1930), Southern District Sales Manager, Ilg Electric Ventilating Co., 5820 Hurst St., New Orleans.

ALVIN M. FROMHERZ, (1915), Building Constructor, 344 Camp St., New Orleans.

FRANK G. FROST, (1919), General Superintendent, Electrical Dept., New Orleans Public Service Inc., New Orleans.

JOHN V. GAUDET, (1927), Superintendent, Chalmette Petroleum Corp., Chalmette, La., 2133 Calhoun St., New Orleans.

DAVID W. GODAT, (1924), Assistant Engineer in charge of Bridges, City Engineer's Office, 7826 Zimple St., New Orleans.

MAYER GOICHAUX, (1920), 2234 State St., New Orleans.

JOSEPH McCORMICK GONDRAN, (1924), Structural Engineer with Jones & Laughlin Steel Corp., New Orleans.

ROBERT E. GOSA, (1929), Vice-President, Merritt Chapman-Williams, Inc., 833 Howard Ave., New Orleans.

ARTHUR A. GRANT, (1923), Marine Surveyor, 1543 Canal Bank Bldg., New Orleans.

WALTER K. GRANT, (1922), 1527 Audubon St., New Orleans.

W. B. GREGORY, (1907), Professor of Experimental Engineering and Hydraulics, Tulane University, New Orleans.

B. H. GREHAN, (1914), member of firm of Geo. J. Glover Co., Inc., 1670 Soniat St., New Orleans.

A. H. GUILLOT, (1917), Assistant Engineer, New Orleans Public Service Inc., 317 Baronne St., New Orleans.

ALLEN H. HACKETT, (1921), Consulting Engineer, 511 Whitney Bldg., New Orleans.

CALLENDER FAYSSOUX HADDEN, (1928), Supervising Engineer, Standard Supply & Hardware Co., P. O. Drawer 620, New Orleans.

DAN HALLORAN, JR., (1924), Assistant Engineer, Distribution Department, New Orleans Public Service Inc., 1111 Elysian Fields Ave., Netw Orleans.

GEORGE R. HAMMETT, (1920), Sales Engineer, A. M. Lockett & Co., 505 Queen and Crescent Bldg., New Orleans.

ALLAN J. HARRIS, (1924), President, Walter Castenado, Inc., 1105 Maritime Bldg., 7615 Jeannette St., New Orleans.

M. V. HAULARD, (1906), Superintendent, Municipal Repair Plant, 4154 Iberville St., New Orleans.

WILLIAM WALLACE HAY, (1928), Engineer, Inland Waterways Corp., 1717 Broadway, New Orleans.

W. S. HENNING, (1919), Civil Engineer, 329 E. Boulevard, Baton Rouge, La.

LOYLESS HAMPTON HIERS, (1929), Gas Distribution Dept., New Orleans Public Service, Inc., 317 Baronne St., New Orleans.

W. T. HOGG, (1913), Principal Assistant Engineer, Board of Commissioners, Port of New Orleans, 8000 Nelson St., New Orleans.

PAUL FROST HOOTS, (1927), Resident Engineer, New Orleans Public Service Inc., 1635 S. Carrollton Ave., New Orleans.

SAMUEL E. HOTTINGER, JR., (1932), Engineer, Meter Inspection Division, Department of Public Utilities, City of New Orleans, 1903 Marengo St., New Orleans.

EDWARD C. HYATT, (1925), Civil Engineer, 2328 St. Charles Ave., New Orleans.

LYALL GIBSON IRELAND, (1929), Vice-President, New Orleans Public Service Inc., 1634 Robert St., New Orleans.

ALFRED F. JACOBI, (1922), Designer, Dock Board, 2211 State St., New Orleans.

HARRY JACOBS, (1919), Civil Engineer, 264 Audubon Blvd., New Orleans.

PAUL F. JAHNCKE, SR., (1908), President Jahncke Service, Inc.; Vice-President, Shipside Storage Co.; President, Brookhaven Gravel Co., 814 Howard Ave., New Orleans.

WARREN JOHNSON, (1903), President and General Manager, Johnson Iron Works, Dry Dock and Shipbuilding Company, Inc., P. O. Box 840, New Orleans.

C. LEONARD JONES, (1923), Structural Designer, with Dock Board, 2747 Audubon St., New Orleans.

KARL P. KAMMER, (1931), with New Orleans Public Service Inc., 1503 Dufossat St., New Orleans.

JAMES P. KEMPER, (1909), Civil Engineer in Private Practice, Fordoche, La.

CHARLES MACDONALD KERR, (1914), Sales Engineer, 5831 So. Robertson St., New Orleans.

LEONARD R. KIRST, (1928), Civil Engineer, Roadway Dept., New Orleans Public Service Inc., 8122 Birch St., New Orleans.

R. B. KOHNKE, (1911), Engineer, 932 Picheloup Place, New Orleans.

JOSEPH J. KREBS, (1926), Assistant Engineer in charge of Street Planning, City Engineer's Office, 4021 S. Derbigny St., New Orleans.

HERRICK J. LANE, (1922), Secretary and Treasurer, Merritt-Chapman, Williams, 833 Howard Ave., New Orleans.

EDWARD S. LANPHIER, (1918), Senior Lighthouse Engineer (Superintendent of Lighthouses), Room 224, Custom House Bldg., New Orleans.

RANDALL FRANK LEGEAI, (1923), Industrial Gas Engineer, New Orleans Public Service Inc., 317 Baronne St., New Orleans.

ALBERT J. LEGETT, JR., (1919), Assistant Superintendent, Johnson Iron Works, Dry Dock and Shipbuilding Co., 5859 Catina St., New Orleans.

NEVILLE LEVY, (1929), President, Equitable Equipment Co.; President, Welded Products Co.; Vice-President, Equitable Dredging Co., 410 Camp St., New Orleans.

J. H. LEWIS, (1908), President, Lewis-Chambers Construction Co., 1743 Canal Bank Bldg., New Orleans.

RALPH E. LIND, (1930), Consulting Engineer, 221 Balter Bldg., New Orleans.

ROWLAND LINFIELD, (1923), Marine Surveyor, 2404 Joseph St., New Orleans.

JULES A. LORIO, (1921), 126 N. Genois St., New Orleans.

THOMAS MICHAEL McCARROLL, (1926), State Board of Engineers, 1827 S. Dupre St., New Orleans.

W. T. McCAY, (1931), Sales Engineering, 109 Tchoupitoulas St., New Orleans.

H. L. McLEAN, (1930), Consulting Mechanical Engineer, 822 Maritime Bldg., New Orleans.

J. A. McNIVEN, (1922), Chief Engineer, Dock Board, No. 2 Canal St., New Orleans.

IVOR ORIN MALL, (1922), with New Orleans Public Service Inc., 526 Florida Ave., New Orleans.

ODON O. MELANCON, (1930), Member, State Board of Engineers, 2227 Jefferson Ave., New Orleans.

JOHN W. MONTGOMERY, (1924), Engineer with Jones and Laughlin Steel Corp., 417 Balter Bldg., New Orleans.

A. S. MONTZ, (1919), Architect and Engineer, 740 Poydras St., New Orleans.

HOWARD N. MOODY, (1926), Mechanical Engineering Contractor, 815 Perdido St., New Orleans.

EARLE B. MORDEN, (1928), Chief Engineer, Standard Fruit and Steamship Co., 1603 Pine St., New Orleans.

WALTER B. MOSES, (1912), Mechanical Electrical Engineer; Vice-President, Engineering Sales Co., Inc., 425 S. Peters St., New Orleans.

CARL G. MEUNCH, (1927), Vice-President, Charge of Engineering, Construction and Operation The Celotex Co., 193 Audubon Blvd., New Orleans.

FRANK A. MUTH, (1915), Lighthouse Engineer, (Assistant Superintendent), Lighthouse Service, 7705 Willow St., New Orleans.

ROBERT A. NADLE, (1929), Engineering Dept., Celotex Co., 4503 Prytania St., New Orleans.

ARTHUR J. NAQUIN, (1924), Transportation Engineer, New Orleans Public Service Inc., 624 Audubon St., New Orleans.

BERNARD STANLEY NELSON, (1911), Chief Engineer, A. M. Lockett & Co., Ltd., 501 Queen and Crescent Bldg., New Orleans.

LEROY J. NEWMAN, (1923), Superintendent of Distribution, New Orleans Public Service Inc., 317 Baronne St., New Orleans.

WILLIAM T. NEWTON, (1915), U. S. Senior Superintendent, 5352 Perrier St., New Orleans.

WILLIAM F. OAKES, (1918), 344 Camp St., New Orleans.

ROBERT M. O'BRIEN, (1916), Superintendent, Rolling Stock and Shops, New Orleans Public Service Inc., 5315 Camp St., New Orleans.

HOWARD NORMAN OLD, (1930), Sanitary Engineer, U. S. Public Health Service, 714 Masonic Temple, New Orleans.

BENJAMIN J. OLIVEIRA, (1926), Assistant Engineer, Office of City Engineer, 2300 Joseph St., New Orleans.

OLE K. OLSEN, (1905), Contracting Engineer, 833 Howard Ave., New Orleans.

JOHN H. O'NEILL, (1916), Sanitary Engineering, Louisiana State Board of Health, 637 Lowerline St., New Orleans.

ALBERT B. PATERSON, (1923), President, New Orleans Public Service Inc., 2021 Jefferson Ave., New Orleans.

JOHN L. PORTER, (1924), Consulting Chemical Engineer, 8407 Panola St., New Orleans.

PATRICK HENRY QUINLAN, (1926), City Engineer, 1141 Philip St., New Orleans.

GROVER CLEVELAND RACKERBY, (1926), Field Engineer, Board of Commissioners, 2217 Short St., New Orleans.

CHARLES FREDERICK RANTZ, (1924), Proprietor, Rantz Ice Factory, 436 Elmira Ave., New Orleans.

W. LAIDLAW RAYMOND, (1931), Assistant City Engineer, 4619 Iberville St., New Orleans.

LYMAN C. REED, (1907), Electrical Equipment, 1230 Hibernia Bldg., New Orleans.

W. H. RHODES, (1927), Asphalt Department, Shell Petroleum Corp., New Orleans.

JOHN RIESS, (1906), Civil Engineer and Contractor, 807 New Orleans Bank Bldg., New Orleans.

OSCAR RIESS, (1916), Engineer, with John Riess, Civil Engineer and Contractor, 1423 Milan St., New Orleans.

GEORGE P. RICE, (1924), Rice and Staples, Consulting Engineers, 1006 Baronne Bldg., New Orleans.

CLAIRE W. RICKER, (1928), Professor of Electrical Engineering, Tulane University, New Orleans.

JAMES M. ROBERT, (1908), Professor of Machine Design, Tulane University, New Orleans.

THOMAS H. ROBERTS, (1923), Mechanical Engineering, 1530 N. Broad St., New Orleans.

WALTER HOWARD SCALES, (1930), Southern Manager, National Lumber Mfgrs. Assn., 308 Interstate Bank Bldg., 2023 Broadway, New Orleans.

CARL SCHNEIDER, (1926), Mechanical Engineer, Dept. of Public Property, Division of Public Works, 7711 Plum St., New Orleans.

FLORANCE J. SCHWAB, (1931), with New Orleans Public Service Inc., 1938 Octavia St., New Orleans.

ARTHUR M. SCOTT, (1915), with Ole K. Olsen, Concrete Engineer, 833 Howard Ave., New Orleans.

HARRY D. SCOTT, (1920), Assistant to Vice-President, Standard Fruit and S. S. Co., Union Indemnity Bldg., 5424 Pitt St., New Orleans.

GEORGE ARTHUR SEAVER, (1920), Chief Engineer, George J. Glover Co., Inc., 1219 Eleonore St., New Orleans.

SOLIS SEIFERTH, (1927), Architect, Secretary-Treasurer, Weiss, Dreyfous and Seiferth, Inc., Maison Blanche Bldg., 608 Iona St., New Orleans.

HERBERT M. SHILSTONE, (1932), Consulting Chemist, 1662 Valmont St., New Orleans.

LESTER C. SMITH, (1920), Secretary-Treasurer, Doullut & Ewin, Inc., 901 Queen and Crescent Bldg., New Orleans.

LEROY AUGUSTUS STAPLES, (1931), Rice and Staples, Consulting Engineers, 1006 Baronne Bldg., New Orleans.

REINHARD A. STEINMAYER, (1925), Assistant Professor of Geology, Tulane University, 7933 Oak St., New Orleans.

DAVID WHYTE STEWART, (1920), Chief Engineer, New Orleans Public Service Inc., Market and S. Peters Sts., New Orleans.

ERNEST K. STRAHAN, (1929), President, E. K. Strahan, Inc., 816 Howard Ave., New Orleans.

B. G. SYMON, (1932), Lubrication Engineer and Lubrication Sales Manager, Shell Petroleum Corp., 33 Neron Place, New Orleans.

JAMES M. TODD, (1923), Consulting Engineer, 818 Maritime Bldg., 1561 Exposition Blvd., New Orleans.

W. O. TURNER, (1931), Chief Engineer, Louisiana Power & Light Co., 142 Delaronde St., New Orleans.

JAMES F. TOMPKINS, (1932), Engineer, Carnegie Steel Co., 1030 Maison Blanche Bldg., New Orleans.

EUGENE UNSWORTH, (1919), Assistant Chief Inspector, New Orleans Department Hartford Steam Boiler Inspection and Insurance Co., 1128 Hibernia Bank Bldg., 5827 Perrier St., New Orleans.

BRYSON VALLAS, (1925), City Engineer, Room 21, City Hall, 607 Clare St., New Orleans.

GEORGE E. VINNEDGE, (1927), Superintendent, City Park, 6303 West End Blvd., Lakeview, New Orleans.

GEORGE D. WADDILL, (1911), Assistant Engineer, U. S. Engineer Office, 7616 Hampson St., New Orleans.

J. D. WALKER, (1908), Engineer for Craven & Lang, Carondelet Bldg. ,New Orleans.

STEPHEN J. WALLBILLICH, (1926), Engineer, 1415 Adams St., New Orleans.

LEO S. WEIL, (1918), Mechanical and Electrical Engineer; President, Engineering Sales Co., Inc., 425 S. Peters St., New Orleans.

LEON C. WEISS, (1918), 600 Maison Blanche Bldg., New Orleans.

CHARLES WIGGIN, JR., (1927), Secretary-Treasurer, Walter Castenedo, Inc., 1105 Maritime Bldg., New Orleans.

ELMER WILLIAMS, (1927), Contractor, 118 Fairway Drive, New Orleans.

W. HORACE WILLIAMS, (1908), President and General Manager, W. Horace Williams Co., Inc., Engineer and General Contractor, Southern Bldg., 833 Howard Ave., New Orleans.

C. S. WILLIAMSON, JR., (1916), Head of School of Chemical Engineering, Tulane University, New Orleans.

ARMAND L. WILLOZ, (1922), Engineer, Orleans Levee Board, 4439 S. Miro St., New Orleans.

J. NORMAN WILSON, (1911), Assistant Technical Engineer, Mechanical Engineering Department, Sewerage and Water Board, 2425 Audubon St., New Orleans.

ROGER O. WINE, (1928), 690 S. Mason St., Hornsbourg, Va.

WALTER E. WINSHIP, (1921), President, Chalmette Petroleum Corporation, Union Indemnity Bldg., New Orleans.

A. R. WINGATE, JR., (1924), Engineering Department, Lukens Steel Co., 1731 Robert St., New Orleans.

CHARLES J. WYLER, (1919), Principal Assistant Engineer, A. M. Lockett & Co., Ltd., 530 Jackson Ave., New Orleans.

NON-RESIDENT MEMBERS

JAMES R. ADAMS, (1911), Lake Providence, La.

LEWIS SCHERCK ALCUS, (1922), 536 St. Anthong St., Baton Rouge, La.

KENNETH McGRATH BAILEY, (1924), Engineer, Livonia, La.

CHARLES V. BAKER, (1931), Assistant State Highway Engineer, Louisiana Highway Department, Baton Rouge, La.

CHARLES DREWRY BATSON, (1928), Manager, Republic Creosoting Company, Mobile, Ala.

DANIEL M. BEARD, (1926), 320 Magazine St., New Orleans.

JOSEPH P. BERANGER, (1915), Vice-President, Chief Engineer and General Manager, Cuban Dominican Sugar Corp., Room 2136, 25 Broadway, New York City.

MERRILL BERNARD, (1917), Consulting Engineer, Crowley, La.

JACOB THOMPSON BULLEN, (1925), Caddo Parish Engineer, Box 772, Shreveport, La.

THEO. T. CHENET, (1922), Resident Engineer, Louisiana Highway Commission, Winnsboro, La.

J. B. CONVERSE, (1921), President, J. B. Converse & Co., Engineers, Mobile, Ala.

HARVEY McL. COTTON, (1931), Vice-President of Sales Engineering L. S. Valley & Co., Second National Bank Bldg., Houston, Tex.

ALBERT BAKER DAVIS, JR., (1928), 1101 23rd St., Galveston, Tex.

GEORGE H. DAVIS, (1909), Member Ford Bacon & Davis, Inc., 39 Broadway, New York City.

WILLIAM F. EBLEN, (1916), Secretary-Treasurer, Engineering Service Corp., 823 Post Dispatch Bldg., Houston, Tex.

L. P. ELBERSON, (1911), Chief Engineer, Louisiana Irrigation & Mill Co., Crowley, La.

S. W. ELBERSON, (1911), General Superintendent, Louisiana Public Utilities Co., Lafayette, La.

CHARLES H. FENSTERMAKER, (1914), Chief Engineer, Industrial Lumber Co., Engineer, Road District No. 5, Allen Parish, Elizabeth, La.

EDWARD GEORGE FREILER, (1926), Drainage Engineer, Hammond, La.

HERBERT M. GALLAGHER, (1921), Field Engineer, American Wood Preservers Assn., 111 West Washington St., Chicago, Ill.

MARCEL GARSAUD, (1905), 940 Picheloup St., New Orleans.

CHARLES ROBERT GATES, (1929), Roadmaster, Southern Railway, (N. O. & N. E. R. R. and N. O. Terminal Co.), Hattiesburg, Miss.

FLOYD HAMILTON, (1919), Lake Charles, La.

HARRY B. HENDERLITE, (1929), Chief Engineer, Louisiana State Highway Commission, 403 Evergreen Drive, Baton Rouge, La.

RUDOLPH HERPICH, (1926), Southern Banana Corp., 3904 Delgado Ave., New Orleans, La.

C. A. IVES, JR., (1922), Construction Engineer, Louisiana Highway Commission, 940 Park Blvd., Baton Rouge, La.

CHARLES E. JOUBERT, (1909), Asst. Maint. Engineer, Louisiana Highway Commission, Box 563, Monroe, La.

L. A. LOUSTALOT, (1913), Civil Engineer, Hammond, La.

SAMUEL P. LANDRY, (1929), Field Engineer, Box 244, Plaquemine, La.

ROBERT P. LINFIELD, (1930), with Cuyamel Fruit Co., 7411 Maple St., New Orleans.

HERBERT H. McGEHEE, (1920), 1917 Lamar Ave., Apt. 3, Memphis, Tenn.

RALPH G. MALONE, (1924), Oficios 12 Y 14, Deptos. 301-308, Apartado No. 607, Habana, Cuba.

RUFUS S. MANLEY, (1912), President, Texas Creosoting Co., Orange, Tex.

RALPH H. MANN, (1921), Field Engineer, Am. Wood Preservers Ass'n., 111 West Washington St., Chicago, Ill.; Field Hdqrs., 1215 Graybar Bldg., New York City.

HENRY A. MENTZ, (1915), Consulting Engineer, Lock Drawer 929, Hammond, La.

ALLEN J. NEGROTTO, (1920), Engineer, 1331 Arabella St., New Orleans.

CHARLES W. OKEY, (1911), Engineer, Lesser-Goldman Cotton Co., Walnut Ridge, Ark.

GUY OSBORNE, (1913), Logging Superintendent, Donner, La.

BOYKIN W. PEGUES, (1907), Professor of Civil Engineering, Louisiana State University, Baton Rouge, La.

FREDERICK F. PILLET, (1922), Associate Professor, Civil Engineering, Louisiana State University, 730 N. 10th St., Baton Rouge, La.

FRANK LOUIS REYNOLDS, (1916), General Superintendent, Irons and Hoover, Inc., 420 Lexington Ave., New York City.

EDWIN J. H. RODRIGUEZ, (1918), care Johns-Manville Corp., 41st and Madison Ave., New York City.

RODNEY B. ROUGELOT, (1928), Engineering Department, Cuban-American Sugars Co., Delicias, Oriente, Cuba.

REGINALD McC. SCHMIDT, (1915), Assistant Engineer, 4th District, Mississippi River Commission, 1923 Leontine St., New Orleans.

ARTHUR F. SHUEY, (1928), Roseland Box Co., Roseland, La.

JOHN A. SILSBEE, (1915), Petroleum Engineer, 1923 So. Wheeling St., Tulsa, Okla.

T. BAKER SMITH, (1919), Houma, La.

JOHN Y. SNIDER, (1918), Engineer, 1211 City Bank Bldg., Shreveport, La.

ROGER I. TANNER, (1921), Abbeville, La.

STEWART TICKNOR, (1922), Civil Engineer, Box 598, Baton Rouge, La.

WM. VON PHUL, (1908), President, Ford, Bacon and Davis, Inc., 39 Broadway, New York, N. Y.

W. S. WHITE (C. M.), Box 44, Sulphur, La.

A. A. WOODS, (1911), Chief Engineer, Maintenance of Way and Structures, Southern Railway System, Lines West, 506 Southern Railway Bldg., Cincinnati, Ohio.

D. F. WOODS, (1922), Lutcher, La.

AFFILIATE MEMBERS

RAYMOND P. BASSICH, (1923), Manager, New Orleans Blue Print & Supply Co., Inc., 826 Union St., New Orleans.

R. H. BAUMBACH, (1911), Manager, Eugene Dietzgen Co., 318 Camp St., New Orleans.

JAMES P. BRODTMAN, (1932), Gulf States Creosoting Co., 901 United Fruit Bldg., New Orleans.

FRANK C. CODIFER, (1929), Contractor, Real Estate Development, 510 American Bank Bldg., New Orleans.

L. VILLERE CRESSY, (1930), Sales Engineer and Representative for C. A. Dunham Co., and Modine Mfg. Co., 1666 Abundance St., New Orleans.

D. F. DULION, (1932), with Fairbanks, Morse & Co., 1900 St. Charles Ave., New Orleans.

JOHN P. EGAN, (1931), Assistant Chief Engineer in Charge, Maintenance and Operation for New Orleans Public Service Inc., at Market Street Steam Electric General Station. 1127 Euterpe St., New Orleans.

JOHN F. GEIS, (1929), Sales Supervisor, Johns-Manville Corporation, 4518 Pitt St., New Orleans.

GEORGE B. GIBSON, (1921), 2103 Painter St., New Orleans.

GUS C. KRAUSS, (1929), Assistant to Superintendent, Rolling Stock and Shops Dept., New Orleans Public Service Inc., 3223 Magazine St., New Orleans.

CHARLES LOB, (1927), Investments, 3309 St. Charles Ave., New Orleans.

ROBERT P. LOCKETT, (1931), Sales Manager, A. M. Lockett & Co., Ltd., 2130 Palmer Ave., New Orleans.

JOHN McINERNEY, (1920), Manager Construction, 200 Madison Ave., New York City.

SEBASTIAN V. MASSIMINI, (1931), Erecting Machinery, 8428 Pritchard Place, New Orleans.

JOHN REINHARD, (1931), Industrial Engineer, Johns-Manville Corp., 3719 Camp St., New Orleans.

PHILIP T. SAMUEL, (1929), Affiliate Member, American Society of Civil Engineers, 2511 S. Carrollton Ave., New Orleans.

ALPHONSE J. SARRE, (1931), Superintendent of Industrial Relations, New Orleans Public Service Inc., 1503 Valmont St., New Orleans.

F. W. STEVENS, (1909), Manager, New Orleans District Sales Office, Allis-Chalmers Mfg. Co., 1124 Canal Bank Bldg., New Orleans.

WILLIAM WALLACE, (1931), Contractor, 1403 Pere Marquette Bldg., New Orleans.

NON-RESIDENT AFFILIATE MEMBERS

OTTO S. JESSEN, (1929), Draftsman and Inspector, Mississippi-Warrior Service, 4956 Music St., New Orleans.

JOHN J. STEADHAM, (1912), Supervisor, Bridges and Buildings, N. O. & N. E. R. R. and N. O. T. Co., 308 Newman St., Hattiesburg, Miss.

RESIDENT JUNIOR MEMBERS

WILMOT A. ACKERMANN, (1928), with Mississippi-Warrior Service, Board of Trade Annex, 223 S. Clark St., New Orleans.

JEROME C. BAEHR, (1930), Junior Engineer, U. S. Engineer Office, 522 Lowerline St., New Orleans.

LEINHARD BLUMER, JR., (1931), Engineer, 258 Audubon St., New Orleans.

J. J. BULLUING, (1915), Market Street Power House, New Orleans.

PHILIP HOPE CAMPBELL, (1925), Engineer, with Federal Barge Lines, 6041 Perrier St., New Orleans.

LIONEL J. CUCULLU, (1928), with New Orleans Public Service Inc., 317 Baronne St., New Orleans.

SALVADOR DI BENEDETTO, (1925), Assistant Engineer, Drainage Department, Sewerage and Water Board, 1810 Gallier St., New Orleans.

ROBERT JOSEPH DRUEDING, (1925), Assistant Engineer, Orleans Levee Board, 1220 Second St., New Orleans.

HERMAN G. ENGELHARDT, (1932), Assistant Engineer, Distribution Dept., New Orleans Public Service Inc., 317 Baronne St., New Orleans.

JOSEPH W. HAVLICEK, (1929), Radio Electrician, 8th U. S. Lighthouse District, 3223 Belfort St., New Orleans.

STEPHEN C. HORVATH, (1929), Graduate of Delgado Trade School, 942 Race St., New Orleans.

WALTER HOLLOWAY, (1923), District Engineer, Mississippi Power Co., Gulfport, Miss., 34 Washington Ave., Ocean Springs, Miss.

JAMES S. JANSSEN, (1932), Engineering, with New Orleans Public Service Inc., 1903 Short St., New Orleans.

WILHELM EMIL KOCH, (1913), Civil Engineer, 2627 Coliseum St., New Orleans.

ROBERT JAMES KUHN, (1925), Electrolysis Engineer, New Orleans Public Service Inc., 529 Washington Ave., New Orleans.

ALBERT E. MARKS, (1925), 3320 Palmyra St., New Orleans.

GORDON J. McLEAN, (1924), Power Plant Equipment(1544 Henry Clay Ave., New Orleans.

F. ROBERT MENDOW, (1930), Engineer, 2900 Calhoun St., New Orleans.

HU B. MYERS, JR., (1927), Civil Engineer, 2438 Palmer Ave., New Orleans.

EDWARD M. NABERSCHNIG, JR., (1923), Assistant to Works Superintendent, Southern Cotton Oil Co., Box 360, New Orleans.

CLAYTON L. NAIRNE, (1929), with New Orleans Public Service Inc., 1219 Valence St., New Orleans.

WILLIAM P. OSTER, (1928), Sales Engineer, 4651 Bassich St., New Orleans.

CHARLES L. RITTENBERG, (1923), Chief Draftsman, Dock Board, 4437 S. Rocheblave St., New Orleans.

MARCUS J. ROUX, (1931), with Federal Barge Line, 1610 Ursuline St., New Orleans.

H. S. SALZER, (1927), Assistant Lighthouse Engineer, U. S. Lighthouse Service, 6028 Catina St., New Orleans.

HENRY F. SIRGO, (1932), with Todd Dry Dock, Engineering & Repair Co., Inc., Engineering Division, 1215 St. Anthony St., New Orleans.

FRANK GURLEY STEWART, (1928), City Engineer's Office, Assistant Engineer, Bridge Department, 3816 D'Hemecourt St., New Orleans.

S. A. THEARD, (1920), Oyster Shell Products Corp., Berwick, La.

SID E. TROUARD, JR., (1928), 1526 Conery St., New Orleans.

ALVIN A. VOSS, (1928), Engineer, 1701 Valmont St., New Orleans.

NON-RESIDENT JUNIOR MEMBERS

G. O. ALLAIN, JR., (1916), Southern Bell Telephone Co., New Orleans.

A. L. BLACK, JR., (1931), Jacksonville, N. C.

CHARLES MILTON BROUGH, (1927), 2125 Cherry St., Vicksburg, Miss.

DONALD A. duPLANTIER, (1922), Assistant Professor of Structural Engineering, University of Alabama, Tuscaloosa, Ala.

FRED H. FENN, (1930), Graduate Student, Louisiana State University, 204 Church St., Baton Rouge, La.

JOSEPH E. LEININGER, (1931), Graduate Student, M. I. T., Boston, Mass., 920 Music St., New Orleans.

JACOB F. MULLER, JR., (1912), Vice-President, Muller Furniture Manufacturing Co., Ltd., 7024 Hickory St., New Orleans.

PAUL W. STOKELY, (1933), Graduate, La. State University in Electrical Engineering, Box 485, L. S. U., Baton Rouge, La.

BRISTER BLAKE PIERCE, (1929), 841 St. Hypolite St., Baton Rouge, La.

STUDENT MEMBERS

ROBERT LANG ARGUS, 7725 Plum St., New Orleans.

WILLIAM PFAFF BARROW, 5357 Magazine St., New Orleans.

CHARLES ALBERT BENDER, JR., 1729 Marengo St., New Orleans.

JOHN W. BIERHORST, JR., 3116 St. Claude Ave., New Orleans.

WILLIAM T. BOARDMAN, JR., 2017 Peniston St., New Orleans.

LAWRENCE CLAUDE BRUNE, 2546 Conti St., New Orleans.
LOUIS CARON, JR., 1715 Napoleon Ave., New Orleans.
CHARLES E. CASSAGNE, JR., 164 Delaronde St., New Orleans.
RICHARD HARRISON CHURCH, 7901 Willow St., New Orleans.
AUBREY GEORGE CODE, 7814 Green St., New Orleans.
RICHARD HUTSON COLCOCK, 828 Burdette St., New Orleans.
ERNEST A. COULOHERAS, 2627 Peniston St., New Orleans.
WILLIAM H. CREIGHTON, 1446 Henry Clay Ave., New Orleans.
DANIEL VAN S. CRESAP, 5420 Canal Blvd., New Orleans.
MARCEL EMILE CRETTET, JR., 5580 Woodlawn Place, New Orleans.
CHARLES D. DAVID, Mandeville, La.
ARTHUR A. DEFRAITES, 620 State St., New Orleans.
LUCIEN DEVALL, 2124 Milan St., New Orleans.
CLAUDE E. DOLHONDE, 7008 Zimple St., New Orleans.
WILLIAM JOSEPH DRAWE, JR., 7918 S. Claiborne Ave., New Orleans.
THEODORE LAWRENCE ESTORGE, 614 State St., New Orleans.
DANIEL D. EWING, JR., 5539 Richardson Court, New Orleans.
JOHN B. GEIGER, 902 Eighth St., Gretna, La.
JOHN S. GENTILICH, 6436 Catina St., New Orleans.
EDWARD H. GESSNER, 119 Audubon Blvd., New Orleans.
JOSEPH E. GUIDRY, JR., 5121 Danneel St., New Orleans.
JOHN M. GUILLORY, 8717 Marks St., New Orleans.
JOHN A. HAASE, III, 115 So. Hennessy St., New Orleans.
ERIC J. HANNEMAN, 1126 Dumaine St., New Orleans.
W. T. HESS, 202 Rosewood Drive, Metairie, New Orleans.
ALVIN E. HOTARD, Box 117, Abbeville, La.
EDMOND F. HUGHES, 4502 S. Miro St., New Orleans.
LOUIS I. KORN, 6030 Garfield St., New Orleans.
STANLEY M. LECOURT, 213 N. Solomon St., New Orleans.
WM. P. LEVERICH, 2100 Pine St., New Orleans.
CLARAMON B. McEACHERN, 7103 Freret St., New Orleans.
FRANK M. McDONALD, 2820 General Pershing St., New Orleans.
LEAL C. McLEAN, 1544 Henry Clay Ave., New Orleans.
JOHN K. MAYER, 1738 Carrollton Ave., New Orleans.
PAUL G. MERRITT, JR., 1931 General Pershing St., New Orleans.
ALBERT J. MEYERS, 5517 Prytania St., New Orleans.
MICHAEL P. H. MICHEL, 327 Alix St., New Orleans.
CHARLES R. MONTIERO, 1817 General Pershing St., New Orleans.
JENS C. NIELSEN, JR., 7468 Garfield St., New Orleans.
MYRTIS M. NORTON, 823 Pine St., New Orleans.
PASCAL PERETI, JR., 619 Bourbon St., New Orleans.
PHILIP FRANK PHILLIPS, 4424 So. Claiborne Ave., New Orleans.
CARROLL J. PIERCE, JR., 8217 Nelson St., New Orleans.
WALTER H. PRICE, 3001 Ursuline Ave., New Orleans.
RAYMOND C. PROUET, 5110 Freret St., New Orleans.
JAMES M. ROBERT, JR., 2141 State St., New Orleans.

EDWARD A. RODRIGUE, 1543 Calhoun St., New Orleans.

JOSEPH H. SAUCIER, 2616 Ursuline Ave., New Orleans.

HERBERT M. SHILSTONE, JR., 7730 Jeannette St., New Orleans.

WALTER SUMNER SIMPSON, 19 Audubon Place, New Orleans.

DAVID STAYER, with R. C. A. Victor Co., 219 White Horse Pike, Audubon, N. J.

HOMER H. STOCKMAN, 5665 Ada Place, New Orleans.

BRUNO STOLLEY, 630 Napoleon Ave., New Orleans.

HERBERT C. SWAN, 6316 Magazine St., New Orleans.

JOSEPH F. THOMPSON, 139 S. Genois St., New Orleans.

LOUIS M. TOGNONI, 4609 Arts St., New Orleans.

BERNARD J. TORTOMASI, with Orleans Parish School Board, 2461 Burgundy St., New Orleans.

NELSON W. TREMBLAY, 2025 Jena St., New Orleans.

WILDAY TUDURY, 2522 Palmer Ave., New Orleans.

ERNESTO VENEGAS, 1006 Broadway, New Orleans.

RICHARD E. WAGNER, 1818 S. Gayoso St., New Orleans.

PHILIP ANTOINE WEBER, 3118 Magazine St., New Orleans.

CLARANCE MOHR WILLIAMS, 7103 Freret St., New Orleans.

JOHN W. WILSON, 7916 Oak St., New Orleans.

CARROLL LEE WOOD, JR., 819 Calhoun St., New Orleans.

SUMMARY

Resident Honorary Members	5
Life Members	15
Resident Members	164
Non-Resident Members	54
Associate Members	0
Non-Resident Associate Members	0
Affiliate Members	19
Non-Resident Affiliate Members	2
Junior Members	30
Non-Resident Junior Members	9
Student Members	70
Total	367

PAST PRESIDENTS

Sidney F. Lewis	1898	Samuel M. Young	1916
Thos. L. Raymond	1899	A. T. Dusenbury	1917
Henry J. Malochee	1900	John Klorer	1918
Frank M. Kerr	1901	Olo K. Olsen	1919
Alf. F. Theard	1902	John Riess	1920
Alf. Raymond	1903	R. S. Manley	1921
J. F. Coleman	1904	Donald Derickson	1922
W. B. Wright	1905	J. S. Barelli	1923
W. H. Hoffman	1906	James M. Robert	1924
G. W. Lawes	1907	Marcel Garsaud	1925
C. W. Wood	1908	Farrar P. Hamilton	1926
J. T. Eastwood	1909	Edward S. Lanphier	1927
W. B. Gregory	1910	John L. Porter	1928
J. C. Haugh	1911	Frederick H. Fox	1929
D. S. Anderson	1912	James M. Todd	1930
A. M. Shaw	1913	Frank G. Frost	1931
W. H. Williams	1914	Frederic N. Billingsley	1932
L. C. Datz	1915		

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Special Meeting of Board of Direction, December 5, 1932.

A special meeting of the Board of Direction was held after a call by the President at his residence, 7:30 P. M., December 5, and the following members were present: Messrs. Billingsley, Frost, Dunlap, Bres and Muth. Mr. Moses was excused due to his absence from the city, and Mr. O'Neill because of illness.

It was pointed out that during the summer a special committee was appointed by the President to make a study of the situation in regard to those members who were in arrears. The committee was as follows: Mr. John H. O'Neill, chairman, J. L. Porter and J. M. Todd. The committee recommended that all members in arrears who were interested in being carried would be kept on the roll, but the Board would remove the names of members who did not manifect sufficient interest to reply to communications or who no longer desired to be members. A letter was written in September to those in arrears with the date, November 1, being set for all replies to be at hand. However, the date was held open until December 5, the date of this Board Meeting. At this time the matter of delinquent dues was discussed very sympathetically. The reply of all those who answered the letter from the Secretary following the meeting of the Board in September were carefully considered. On motion, duly seconded, it was voted that in view of the lenieney of the Society in the past few years, and after considering the financial condition it would be best for all eoncerned to remove from the rolls those members who were not interested to the extent of reply to the letters, or who do not desire to be carried any further. To this end a number of names were removed in accordance with the attached list. It was understood that those members who desire to be reinstated could pay up back dues and the Society would be glad to reinstate them in accordance with the Constitution.

It was with regret that the following resignations were accepted:

Messrs. L. F. Kershaw, F. P. Hamilton, H. J. Burt, J. A. O'Brien, L. K. Nelson, R. P. Rordam, E. G. Roessle, V. W. Webb, W. P. H. Creighton, R. W. French, J. M. Jenks, H. Schlenk, E. W. Burgis, C. E. Snypp, A. L. Webre, L. M. Reinach, C. H. Green, P. L. Bernstein, F. J. Trelease, W. F. Jahncke, L. T. Stevens, C. A. Williams, M. Carbonnel, N. L. Marks, J. F. Case, E. P. Madden, and I. S. Seligmann.

There being no further business the meeting adjourned.

F. A. MUTH, Secretary.

Minutes of the Board of Direction, December 12, 1932.

The meeting was called to order by Mr. Billingsley, and the following members were present: Messrs. Frost, Dunlap, Wiggin, O'Neill and Muth. Messrs. Bres and Moses were excused. Mr. McLean, Mr.

Todd and Professor Anderson were present upon invitation.

The minutes of the previous meeting were read and approved, and bills on hand were ordered paid.

Mr. McLean, chairman of the Entertainment Committee, presented his views of a tentative plan for the annual meeting to be a Ladies' Night to be held at 8 P. M., January 21, at the Roosevelt Hotel. This is planned to be a dinner and a dance at the estimated cost of $2.00 each. On a motion, duly seconded, it was voted that this plan be approved, and Mr. McLean was authorized to proceed, based on the affair being self-supporting.

Communication from the Community Chest was read, and the Secretary was instructed to advise the Chairman that the membership of the Society has contributed from other sources, and that each member was urged to increase his contribution where possible, being pointed out that the Society was unable to make a contribution as such.

The report of the Committee on Prize Award was received, and in this connection it was voted that the Society would remit dues to members who presented acceptable papers before the Society during the year 1933.

Mr. Todd presented a plea for contribution for A. S. M. E. students to attend the student conference in Birmingham in April. On motion, duly seconded, Mr. Todd was thanked for bringing the matter before the Board, and it was voted to lay it on the table.

The Secretary presented an informal report relative to the State Board of Engineering Examiners withdrawing support of the bill presented to the legislature during the summer. On motion, duly seconded, the matter was referred to the Committee which drafted the originally proposed bill, and the committee will be called into action when the local chapter of the American Society of Civil Engineers is heard from.

There being no further business the meeting adjourned.

F. A. MUTH, Secretary.

Minutes of the Society, December 12, 1932.

The meeting was called to order about 8:10 P. M. Mr. F. N. Billingsley, President, F. A. Muth, Secretary, and fifty-five members and guests were present.

The minutes of the previous meeting were read and approved. Announcement was made by the Chairman of the Entertainment Committee of the Ladies' Night to be held January 21.

The Chairman of the Technical Papers Committee announced that during the coming year members of the Society who presented acceptable papers would have their dues remitted for the year.

Professor James M. Robert presented a stirring appeal in behalf of the Community Chest, and all members were urged to increase their contribution.

The proposed amendments of the Constitution and By-Laws were read by the Secretary. This was the second reading. On motion, duly seconded, it was voted to approve the proposed amendments, and they were adopted.

The Nominating Committee submitted its report for officers for the ensuing year as follows:

For President.....John H. O'Neill
For Vice-President.....A. L. Dunlap
For Secretary.....F. A. Muth
For Treasurer.....Walter B. Moses
For Board Member (to serve three years).....Paul F. Hoots

On motion, duly seconded, the report of the committee was received. The President called for additional nominations, and their being none, it was voted to close nominations, and to pass the slate to ballot.

Mr. A. M. Lockett presented a most interesting paper, "Industrial Rehabilitation". The paper was followed by an interesting discussion, and a rising vote of thanks was tendered the speaker.

The meeting was adjourned to the usual collation.

F. A. MUTH, Secretary.

Minutes of Board of Direction, January 21, 1933.

The meeting was called to order by President Billingsley, and the following members were present: Messrs. Moses, Dunlap, Frost, O'Neill, Wiggin and Muth. Mr. Hoots was present upon invitation.

The minutes of the previous meeting were read and approved and bills on hand, including those for the Annual Meeting, were ordered paid.

The reports of the Treasurer and Secretary were read and ordered printed in the Proceedings.

On motion, duly seconded, it was voted to transfer from the Library Fund to the General Fund $1,000.00, which the Secretary was instructed to do.

On motion, duly seconded, it was voted to have a Budget Committee appointed by the President.

There being no further business, the meeting adjourned to the Annual Meeting.

F. A. MUTH, Secretary.

Minutes of the Annual Meeting of the Society, January 21, 1933.

The Annual Meeting was called to order about 8:10 P. M. in the Tip Top Inn, Roosevelt Hotel, Mr. F. N. Billingsley, President, in the chair, F. A. Muth, Secretary, and 115 members and guests present.

On motion, duly seconded, the reading of the minutes of the previous meeting was dispensed with. The reading of the Annual Report of the Board of Direction was also dispensed with and ordered printed in the Proceedings.

The President announced the tellers had counted the ballots for the election of officers for the following year and there were 69 formal and no informal ballots cast. The following officers were therefore declared elected:

President.....Mr. John H. O'Neill
Vice-President.....Mr. A. L. Dunlap
Treasurer.....Mr. Walter B. Moses
Secretary.....Mr. Frank A. Muth
Member of Board (to serve 3 years).....Mr. Paul F. Hoots

The incoming President, Mr. John H. O'Neill, was then inducted into the chair and was presented with the gavel by the retiring President after he had thanked all members, officers and committees for their co-operation during the past year. Mr. O'Neill made some appropriate remarks and the meeting then adjourned to the Ladies' Night, with Professor Douglas Anderson as Toastmaster. The Ladies' Night was an affair enjoyed by all. Mr. Clayton Rand was the guest-speaker, and an interesting program was presented by the ladies of the Woman's Auxiliary after a short address by Mrs. W. B. Gregory, who is President of the Auxiliary. Dinner was followed by dancing, and the meeting adjourned.

F. A. MUTH, Secretary.

ANNUAL REPORTS

ANNUAL REPORT OF THE BOARD OF DIRECTION

Year 1932.

To the Members of the Louisiana Engineering Society:

Gentlemen—Your Board of Direction begs to report that during the year 1932 there were held 10 regular meetings and 1 special meeting, or a total of 11 meetings of the Board for the transaction of the business of the Society.

The Technical Papers Committee has given us a most excellent program of high grade papers covering a variety of interesting topics. These papers have all been printed in the Proceedings for permanent record.

The Library Committee has done good work and some valuable accessions have been made to the Library during the year. Expenditures have been kept well within the amount allotted to the committee for its activities.

The Committee on Employment has kept up its fine performance record in securing positions for unemployed engineers.

The Membership Committee has found it most difficult to secure new members as this year was not a propitious one for a campaign of membership expansion. As is shown in the Secretary's Annual Report, there has been a material decrease in the membership of the Society. This has been brought about by resignations and by the newly established policy of your Board in dropping from the rolls those who have become unduly in arrears in their dues. It is hoped that when times become better we will regain a number of those who for one reason or another have been obliged to discontinue their membership in the Society.

The Publications Committee has gotten out six excellent issues of the Proceedings, and the Editor deserves the highest praise for the tone and quality of this publication. The committee has worked diligently in keeping down the cost of the Proceedings without impairing its appearance or scope of coverage, as a result of which the cost of the publication for 1932 was $825.00 less than for a similar number of issues during the preceding year.

The Committee on Entertainments and Outings has handled this phase of the activity of the Society in admirable manner. The Second Annual Golf Tournament was held at the Metairie Golf Club in May and was very well attended. Numerous trophies, generously donated for the occasion, were distributed at the dinner which followed the tournament.

An innovation of the year was the holding of a Stag-Smoker in October, fashioned along the lines of the Annual Meeting Smokers of

the past. A more formal type of entertainment has been planned for the Annual Meeting this year—a dinner, to which ladies may be invited and at which we hope to have the membership of the newly-formed Woman's Auxiliary of the Society fully represented. The committee has arranged for dance music and for an interesting program of entertainment. This is a radical departure from the old order of affairs and meets a request that has grown quite insistent of late years. The committee has worked hard preparing for this Ladies' Night, and its success or failure will reflect the attitude of the Society membership toward future entertainments of similar character.

The Nominating Committee, which was authorized by constitutional amendment during the year, was duly appointed and submitted its report at the December meeting. This initiated the practice of selecting and nominating officers after a careful committee consideration.

Special committees were appointed during the year and submitted reports on certain matters of particular interest to the Society as follows:

Financial Budget,
Registration of Professional Engineers,
Changes in Constitution and By-Laws,
Prize Award for Outstanding Service to the Public,
Members in Arrears.

In response to the need for a careful use of operating funds, the Board authorized the appointment of a committee which rendered a report setting forth recommendations for a budgetary control of the Society's expenditures. As a result, the expenses of the Society during the year were kept within the income which decreased both in membership fees and advertising in the Proceedings. The matter of making the entertainments of the year self-supporting was recommended by the Budget Committee and was adopted. The Golf Tournament and the Stag-Smoker in October were self-sustaining, and it is planned that the Ladies' Night for January shall similarly pay its own way.

A Steering Committee, working in conjunction with the Legislative Committee, looked after the interests of the Bill for Registration on Professional Engineers which was introduced in the State Legislature of 1932 in approximately the same form as in 1930. The bill was passed by both Houses, but failed to become a law because of a last-minute veto by the Governor. Following the veto, a delegation from the Society waited upon the Governor and obtained from him the promise that this bill would be given favorable consideration at the next regular or special session of the Legislature. A special committee was appointed at the last meeting of the Board to take under advisement certain changes which the Louisiana State Board of Engineering Examiners recommended be made in the Bill before it is again submitted to the Legislature.

Because of changed conditions and out-of-date provisions, a careful and detailed study of the Constitution and By-Laws of the Society was made by a special committee. This committee rendered a report recommending a number of amendments which were subsequently adopted by the Society in December. The amendments related principally to qualifications of members, reduction of dues, and the creation of additional grades of membership to conform to present-day requirements. All Associate Members were re-classified as Affiliate Members.

Because of decreasing business and increasing unemployment among engineers during the last several years, the Society has been very lenient with its members who were in arrears. The unpaid dues account, however, increased to such an extent that a committee was appointed to make a survey of the situation and report to the Board its recommendations as to what action should be taken in connection therewith. Following the submission of its report, letters were written in September to all members in arrears urging them to make payment by November 1st, later extended to December 5th, of all or a part of their past-due accounts if they desired to be continued on the roster of the Society. A second letter was sent to those members who did not respond to the first letter, stating that the final date for payment on account of delinquent dues had been further extended to December 20th, assuring them of the intention of the Board to co-operate with them fully in the matter if they would indicate their desire to be kept on the roster, and stating that the Board would be reluctantly compelled to drop from the membership rolls those who did not reply by this date. As a consequence of the failure of members to respond to the plea of the Board, it became necessary to remove 156 names from the roster. These former members, however, may be reinstated at any time by the discharge of their obligations to the Society.

It has been suggested from time to time that the Society provide for some sort of award annually to the member of the Society who, without compensation, had rendered the greatest public service during the year. This matter was referred to a special committee which reported unfavorably upon the suggestion. In this report a recommenda tion was made that during the year 1933 the dues of those members who present technical addresses before the Society be remitted. This recommendation was adopted by the Board, and the members of the Society duly notified thereof.

The Society continued its practice of awarding Junior Memberships to two outstanding students. This year the awards were made to Joseph E. Leininger of Tulane University and Paul W. Stokeley of Louisiana State University.

The award of two scholarships was again made. The recipients this year were Daniel V. Cresap of Tulane University and George De La Matyr of Louisiana State University.

Your attention is called to the financial condition of the Society. Despite its reduced income the Society, operating under budget control, has been able to carry on all of its customary activities without touching any of its reserve funds. The Annual Report of the Treasurer shows a cash balance on January 1, 1933, of $2,082.72, as compared to a corresponding figure of $1,561.70 on January 1, 1932. Cash on hand includes an item of $280.00 representing a first liquidating payment on account of a Series D-6% Collateral Trust Gold Note of the New Orleans Securities Company which is held by the Society. Other than this the investment securities remain unchanged.

In conclusion, the Board wishes to express its appreciation to the various committees and members of the Society for their support and co-operation in assisting to carry on the activities of the Society so successfully during this tryinug period.

Respectfully submitted,

F. H. BILLINGSLEY, President,
JOHN H. O'NEILL, Vice-President,
F. A. MUTH, Secretary,
WALTER B. MOSES, Treasurer,
A. L. DUNLAP,
F. G. FROST,
Board of Direction.

ANNUAL REPORT OF THE SECRETARY

Year 1932.

New Orleans, La., January 2, 1933.

To the Board of Direction,
Louisiana Engineering Society,
New Orleans, La.

Gentlemen—As Secretary of the Society, I herewith submit the following report for the year 1932:

During the past year, the Board of Direction has held ten regular and one special meetings, a total of eleven meetings; the Society has held nine regular meetings, one special meeting, one golf tournament, and one stag smoker. The average attendance at regular meetings was 71, maximum 86, minimum 55. This was all in addition to the Annual Smoker held in January.

During the year a check-up of all those in arrears who desired to be continued as members was made. The result was that a number of names were removed from the roll. A number of resignations have also been submitted as a result of the depression year, further reducing the number of members. The result was a net decrease in membership of 156 members for the year, as shown on attached tabulation.

GRADE	On Roll Jan. 1, 1932	Elected	Reinstated	Transferred to	Transferred from	Dropped	Resigned	Failed to Qualify	Died	On Roll Jan. 1, 1933
Honorary Members	5	....	....	....	....	....	....	....	....	5
Life Members	15	....	....	....	....	....	....	....	....	15
Resident Members	225	....	....	....	....	45	15	....	1	164
Non-Res. Members	95	....	....	....	....	34	6	....	1	54
Associate Members	31	....	....	....	19	8	3	....	1	....
Non-Res. As. Mem.	5	....	....	....	2	2	1	....	....	....
Affiliate Members	....	....	....	19	....	....	....	....	....	19
Non-Res. Affil. Mem.	....	....	....	2	....	....	....	....	....	2
Junior Members	39	....	....	....	1	6	2	....	....	30
Non-Res. Jun. Mem.	12	1	....	2	....	4	2	....	....	9
Student Members	96	....	....	....	1	22	3	....	....	70
	523	1	....	23	23	121	32	....	3	367

It is with regret that the deaths of Messrs. A. E. Washburn, L. C. Datz and Geo. J. Glover are recorded.

The Treasurer's report is submitted separately, and shows a cash balance of $2,082.72.

During the year the Investment Account, as submitted in the Treasurer's Report, stands as follows:

Total Receipts	$5,817.12	
Total Disbursements	3,734.40	
		$ 2,082.72
Checking Account in Interstate Bank & Trust Co.		$ 2,082.72
1—Union Title Guarantee Gold Note	$1,000.00	
1—New Orleans Securities Gold Note	720.00	
1—Farmer and Ochs Gold Bond	1,000.00	
2—$100.00 First Liberty Lona	200.00	
1— 50.00 First Liberty Loan	50.00	
5— 50.00 (1917) Liberty Loan	250.00	
Greater New Orleans Homestead	1,184.90	
Union Homestead	500.00	
Standard Homestead	500.00	
Italian Homestead	500.00	
Security Homestead	500.00	
Columbia Homestead	500.00	
Interstate Trust & Savings Bank (Savings Account)	1,716.41	
Canal Trust & Savings Bank (Savings Account)	605.85	
		9,227.16
		$11,309.88

The following technical exercises were held:

February 15—"The Lee Ferry Bridge," by Mr. Herbert M. Shilstone, Jr.

March 14th—"Slag Road Construction," by W. H. Caruthers.

April 11th—"The Economic Status of the Mechanical Engineer," by James M. Todd.

May 9—"Barge Lines in the Mississippi Valley," by Mr. J. S. Brodie.

June 13—"Air Conditioning," by O. E. Cammill.

September 12—"Natural Gas Compressor Stations," by Mr. B. S. Nelson.

November 14—"The Technique of Hydraulic Model Experimentation," by Lieut. Paul W. Thompson, also "The Work of the U. S. Waterway Experiment Station," by Lieut. Herbert D. Vogel, read by Lieut. Paul W. Thompson.

December 12—"Industrial Rehabilitation," by Mr. A. M. Lockett.

Attached hereto are statements showing the financial condition of the Society.

The Secretary desires to thank you for your co-operation during the year. It has been an honor and a privilege to serve you.

Respectfully submitted,

F. A. MUTH, Secretary.

FINANCIAL CONDITION OF THE SOCIETY

January 1, 1933.

Assets:

Cash on Hand in Bank	$ 2,082.72	
Accounts Receivable (Members)	747.50	
Accounts Receivable (Advertisers)	10.65	
Entrance Fees	77.00	
Smoker Memberships	143.00	
Investments	9,227.16	
		$12,288.03

Liabilities:

Proceedings Reserve Fund	$ 1,425.13	
Library Fund	1,300.47	
Accounts Payable	252.90	
1933 Dues in Advance	7.00	
Balance in General Fund	9,302.53	
		$12,288.03

General Reserve Fund

Balance from 1928	$ 9,209.96	
Transferred from Proceedings Reserve Fund in 1929	700.00	
Transferred from Library Reserve Fund in 1929	200.00	
Balance from 1929	1,151.22	
Balance from 1930	1,140.29	
Balance from 1931	679.18	
	$13,080.65	
Deficit from General Fund 1932	112.63	
	$12,968.02	
Transferred from Building Fund	151.65	
	$13,119.67	

Deductions for Members Removed from Roll by Order of Board—		
1927 Dues	$ 242.25	
1928 Dues	409.25	
1929 Dues	661.00	
1930 Dues	760.50	
1931 Dues	1,130.25	
Entrance Fees	135.50	
Smoker Membership	459.33	
Cancelled Ads.	19.06	
		3,817.14
Balance in General Fund December 31, 1932		$ 9,302.53

Proceedings Reserve Fund

Balance from 1928 and Prior Years	$ 1,278.13	
Less Amount Transferred to General Fund—1929	700.00	
	$ 578.13	
Balance from 1929	169.48	
	$ 747.61	
Balance from 1930	149.04	
	$ 896.65	
Deficit from 1931	71.66	
	$ 824.99	
Balance from 1932	600.14	
		$ 1,425.13

Cash Account—Year 1932

Receipts:		
1927 Dues Collected	$ 10.00	
1929 Dues Collected	5.00	
1930 Dues Collected	67.50	
1931 Dues Collected	408.50	
1932 Dues Collected	1,912.00	
1933 Dues Collected	2.50	
Smoker Memberships Collected	481.00	
Entrance Fees	81.00	
Advertisers	731.69	
Investment—Liquidating Gold Note	280.00	
Interest on Investments—Cash	286.56	
Proceedings Sales	4.05	
Contributions from A. S. M. E.	25.00	
Total Receipts		$ 4,294.80
Deduct Exchange and Tax		4.04
		$ 4,290.76
Add Balance from January 1, 1932		1,561.70
		$ 5,852.46
Total Vouchers Paid During Year		3,734.40
		$ 2,118.06
Less N. S. F. Checks		35.34
Balance on Hand, Checking Accounts, Jan. 1, 1933		$ 2,082.72

Library Fund

Revenues:

Balance, January 1, 1932	$ 1,072.50	
Allotted from General Fund	480.00	
		$ 1,552.50

Expenditures:

W. W. Eckert	$ 30.00	
American Society for Testing Materials	11.60	
Farish Art Store	3.90	
Concrete Pub. Co.	8.00	
Carrie Freret	180.00	
Hill Pub. Co.	10.00	
Simmons-Boardman Co.	2.00	
Railway Eng. & Maintenance—	4.00	
John Wiley & Sons	2.53	
		252.03
		$ 1,300.47

Proceedings Funds

Revenues:

Sales	$ 4.05	
Advertising Revenues	758.53	
Members' Subscriptions	1,042.00	
		$ 1,804.58

Expenses:

Salary of Editor and Secretary	$ 360.00	
Printing and Mailing	664.44	
Proceedings Miscellaneous Expense	180.00	
		$ 1,204.44
Balance for year 1932		$ 600.14

General Fund—1932

Revenues:

Membership Dues for 1932	$ 2,974.50	
Smoker Account	237.50	
Entrance Fees	77.00	
Income on Investments	386.23	
A. S. M. E. Contribution	25.00	
		$ 3,700.23

Expenses:

Subscriptions to Proceedings	$ 1,042.00	
Allotment to Library Fund	480.00	
Secretary Dues	12.00	
Printing and Postage	384.51	
Secretary's Salary	540.00	
Refreshments	118.00	
General Expense	322.12	
Exchange and Tax	4.04	
Auditor	50.00	
Expense of Smokers	659.85	
Scholarships	165.00	
Loss on N. S. F. Checks, etc	35.34	
		$ 3,812.86
Deficit on Books		$ 112.63

Summary of Cash Disbursements 1932

Smoker Expense	$ 629.85
Library Expenses	221.06
1931 Accounts Paid in 1932	291.35
Proceedings Miscellaneous Expense	165.00
Secretary's Salary	495.00
General Expense	315.84
Salary of Editor and Secretary	355.00
Printing and Postage	363.86
Refreshments	118.00
Printing and Mailing	564.44
Scholarships	165.00
Auditor	50.00
Exchange and Tax	4.04
N. S. F. Checks	35.34
Total Vouchers Paid, including N. S. F. Checks and Tax	$ 3,773.78

ANNUAL REPORT OF TREASURER

New Orleans, La., January 1, 1933.

To the President,
Louisiana Engineering Society,
New Orleans, La.
Dear Sir:—

As per requirements of Article No. 4 of the Constitution, I have the honor to submit the following report covering receipts and disbursements for the period of Jan. 1st, 1932, to Jan. 1st, 1933:

Received from Secretary—	Deposited in Interstate Bk. & T. Co.	Exchange Charged
Feb. 15th, 1932—Memo 1 to 8 incl.	$1,312.92	$ 1.55
Mar. 14th, 1932—Memo 9 to 11 incl.	463.80	.35
April 11th, 1932—Memo 12 to 14 incl.	368.88	.15
May 9th, 1932—Memo 15 to 17 incl.	326.87	.10
June 13th, 1932—Memo 18 to 20 incl.	296.77	.30
July 19th, 1932—Memo 21 to 22 incl.	284.53	.....
Aug. 11th, 1932—Memo 23 to 24 incl.	123.01	.10
Sept. 13th, 1932—Memo 25 to 26 incl.	130.77	.10
Oct. 17th, 1932—Memo 27 to 29 incl.	324.65	.20
Nov. 21st, 1932—Memo 30 to 32 incl.	377.31	.15
Dec. 12th, 1932—Memo 33 to 34 incl.	139.42	.30
Dec. 23rd, 1932—Memo 35	67.49	.....
	$4,215.42	$ 3.30
Coupons Deposited (Liberty Bonds).....	19.38	.....
Coupons Deposited (Farmer & Ochs).....	60.00	
		4,294.80
Less Exchange		3.30
		$4,291.50
Less Tax		.74
		$4,290.76
Less Checks Returned from the Bank:		
2/23/32 S. P. Landry (a/c closed).....	6.00	
5/31/32 H. C. Cooley (a/c closed).....	12.00	
6/27/32 Pac. Flush Tank (Bank closed).....	4.67	
7/27/32 Pac. Flush Tank (Bank closed).....	4.67	
12/20/32 J. K. Mayer (Bank closed).....	8.00	
		35.34
		$4,255.42
Balance on Hand as per Treasurer's Report 1/1/32.....		1,561.70
		$5,817.12

Disbursements from January 1st, 1932, to January 1st, 1933.

No.	Name—	Amount
January 18th—		
1	Tulane Press	$ 193.85
2	Carrie Freret	15.00
3	Edna Doll	15.00
4	McGraw Hill Pub. Co.	13.00
5	F. A. Muth	54.50
6	American Society for Testing Metals	9.60
7	Interstate Trust & Banking Co.	6.00
8	Walter Tabrum	2.25
9	Ahten Jewelry Co.	2.00
10	Farish Art Store	3.90
11	Concrete Pub. Co.	4.00
12	Leo Loubere	50.00
13	Jos. Levy and Bros. Co.	2.25
14	Walter B. Moses	338.85
15	Jung Hotel	171.00
16	Y. Drouet	35.00
February 15th—		
17	Simmons-Boardman Pub. Co.	2.00
18	Coleman E. Adler	25.00
19	Carrie Freret	15.00
20	F. A. Muth	55.22
21	Edna Doll	15.00
22	Tulane Press	110.03
23	Boylan's Detective Agency	3.00
24	A. Serremon	15.00
25	Harcol Film Co.	12.50
26	Railway Engr. & Maintenance	2.00
27	Addressograph Co.	2.10
March 14th—		
28	Tulane Press	53.03
29	Standard Accident Ins. Co.	25.00
30	W. W. Eckert	10.00
31	Carrie Freret	15.00
31½	F. A. Muth	54.50
32	Edna Doll	15.00
33	Boylan's Detective Agency	3.00
34	A. Serremon	14.50
April 14th—		
34½	Tulane Press	73.00

No.	Name—	Amount
April 12th—		
35	Edna Doll	15.00
36	F. A. Muth	57.91
37	Carrie Freret	15.00
38	Boylan's Detective Agency	3.00
39	A. Serremon	15.00
40	Postmaster—New Orleans	22.16
41	Tulane Press	248.91
42	Edna Doll	15.00
43	F. A. Muth	54.50
May 9th—		
44	Carrie Freret	15.00
45	Boylan's Detective Agency	3.00
46	J. Kelly	9.75
47	A. Serremon	14.50
48	J. M. Todd	5.00
June 13th—		
49	W. W. Eckert	10.00
50	J. M. Todd	16.65
51	Tulane Press	74.98
52	Carrie Freret	15.00
53	F. A. Muth	64.70
54	Edna Doll	15.00
55	J. M. Robert	150.00
56	Boylan's Detective Agency	3.00
57	American Society for Testing Materials	2.00
58	A. Serremon	14.50
July 18th—		
59	Tulane Press	95.99
60	Edna Doll	30.00
61	F. A. Muth	104.00
62	Carrie Freret	30.00
63	J. M. Todd	79.40
September 13th—		
64	Tulane Press	28.00
65	Carrie Freret	15.00
66	Edna Doll	15.00
67	F. A. Muth	54.50
68	A. Serremon	14.50
69	Tulane University	125.00
70	Louisiana State University	40.00
71	P. Kaul	7.50

No.	Name—	Amount
October 17th—		
72	H. L. McLean	60.00
73	Tulane Press	97.49
74	Carrie Freret	15.00
75	F. A. Muth	54.48
76	J. Kelly	14.30
77	Edna Doll	15.00
78	E. J. Christenberry	2.70
November 21st—		
79	Tulane Press	77.96
80	W. W. Eckert	10.00
81	M. Potter-Davis	8.50
82	Carrie Freret	15.00
83	Edna Doll	15.00
84	F. A. Muth	62.50
85	Boylan's Detective Agency	3.00
86	A. Serremon	15.00
December 12th—		
87	Tulane Press	8.25
88	Edna Doll	15.00
89	F. A. Muth	58.16
90	Carrie Freret	15.00
91	E. M. S. LeBlanc	40.00
92	J. M. Robert	150.00
93	Postmaster of New Orleans	30.00
94	A. Serremon	15.00
95	Jno. Wiley and Sons	2.53
	Total	$3,734.40

RECAPITULATION

January 1st, 1933.

Total Receipts	$5,817.12	
Total Disbursements	3,734.40	
		$ 2,082.72
Checking Account in Interstate Bank & Trust Co.		$ 2,082.72
1—Union Title Guarantee Gold Note	$1,000.00	
1—New Orleans Securities Gold Note	720.00	
1—Farmer and Ochs Gold Bond	1,000.00	
2—$100.00 First Liberty Lona	200.00	
1— 50.00 First Liberty Loan	50.00	
5— 50.00 (1917) Liberty Loan	250.00	
Greater New Orleans Homestead	1,184.90	
Union Homestead	500.00	
Standard Homestead	500.00	
Italian Homestead	500.00	
Security Homestead	500.00	
Columbia Homestead	500.00	
Interstate Trust & Savings Bank (Savings Account)	1,716.41	
Canal Trust & Savings Bank (Savings Account)	605.85	
		9,227.16
		$11,309.88

Respectfully submitted,

LOUISIANA ENGINEERING SOCIETY,
Walter B. Moses, Treasurer.

REPORT OF THE EMPLOYMENT COMMITTEE

To the President and Members of the Louisiana Engineering Society:

Gentlemen—As Chairman of the Employment Committee of the Louisiana Engineering Society, I take great pleasure in handing you herewith my report covering last year's activity of your committee, which is composed of Mr. Bassich and the writer.

Mr. Bassich has sent me his figures which I am combining with my own records. Below is tabulated results of your committee's work:

Number of applications received	143
Number of vacancies reported	7
Number of vacancies filled by applications filed with us	5

Due to the poor business conditions existing now and during the past year, the number of applicants seeking positions has far exceeded the demand for men, and your committee sincerely hopes that conditions will improve during 1933 so that we can place a larger percentage of the applications filed with us.

It is likely that applicants have registered both with Mr. Bassich and myself so that the actual number of applications may be less than the number mentioned above.

Mr. Bassich and the writer hope that any engineers, draftsmen, etc., who are out of work will continue to file their applications with either of us, and we also ask that any members of the Society who learn of any openings will notify either Mr. Bassich or the writer.

We trust this report is satisfactory to the Society and hope that we can do better next year.

Respectfully submitted,

R. H. BAUMBACH, Chairman.

The Proceedings of the Louisiana Engineering Society

Published bi-monthly, February, April, June, August, October, December, under the auspices of the Committee on Publication.

JAMES M. **ROBERT**, Editor.

Subscription, $2.00 per annum Single copy, 35 cents

Address all communications to
JAMES M. ROBERT, Editor, Tulane University,
New Orleans, La.

Entered as second-class matter July 27, 1916, at the Post Office at New Orleans, Louisiana, under the Act of August 24, 1912.

Acceptance for mailing at special rate of postage provided for in section 1105 Act of October 3, 1917, authorized August 1, 1918.

LOUISIANA ENGINEERING SOCIETY

OFFICERS FOR 1933

President, J. H. O'NEILL, 637 Lowerline Street.
Vice-President, A. L. DUNLAP, 1318 Nashville Avenue.
Secretary, FRANK A. MUTH, 7705 Willow Street.
Treasurer, WALTER B. MOSES, 425 S. Peters Street.

DIRECTORS

E. S. BRES, 311 Maritime Building.
CHARLES WIGGIN, JR., 1105 Maritime Bldg.
PAUL F. HOOTS, 317 Baronne Street.
FRED N. BILLINGSLEY, 702 Interstate Bank Building.

STANDING COMMITTEES

On Technical Papers
Charles Wiggin, Jr., Chairman
James M. Robert
Charles M. Kerr
Carl Schneider

Motivating Committee
James M. Robert, Chairman
W. B. Gregory
George R. Hammett
George P. Rice
James M. Todd

On Library
Ralph Earl, Chairman
C. W. Ricker
A. J. Harris
G. W. Lawes

On Publications—Division "A"
James M. Robert, Chairman
Frank A. Muth

On Publications—Division "B"
D. W. Stewart, Chairman
Harry B. Henderlite
J. A. McNiven
W. H. Scales

On Entertainments and Outings
H. L. McLean, Chairman
S. F. Hottinger
Ole K. Olsen
D. W. Stewart

On Legislation
James M. Todd, Chairman
E. S. Bres, Vice-Chairman
F. N. Billingsley
Donald Derickson
George R. Hammett
Harry Jacobs
George P. Rice
Ira W. Sylvester

On Finance
A. L. Dunlap, Chairman
Walter B. Moses
F. N. Billingsley

On Membership—Division "A"
E. S. Bres, Chairman
Frank G. Frost, Vice-Chairman
A. L. Dunlap
H. B. Henderlite
Harry Jacobs
J. T. Bullen
Ira W. Sylvester
Bryson Vallas
B. W. Pegues

On Membership—Division "B"
W. B. Gregory, Chairman
James M. Todd
B. H Grehan

On Employment
R. H. Baumbach, Chairman
R. Bassich
H. B. Henderlite

On Civic and Industrial Affairs
A. M. Lockett, Chairman
A. B. Paterson, Vice-Chairman
J. F. Coleman
Donald Derickson
A. T. Dusenbury
John Klorer
F. N. Billingsley
James M. Todd

The headquarters of the Society are in the State Museum Building, Jackson Square.

All business communications should be addressed to F. A. Muth, Secretary, 7705 Willow Street, New Orleans, La.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XIX. APRIL, 1933 NO. 2

CONTENTS

EDITORIAL NOTES AND COMMENT

The New Crop. Very shortly the colleges of the country will hold their commencement exercises. Within the space of a few days thousands of technical graduates, now extremely *busy* just before graduation, will be thrown upon the community to join the "army of the unemployed."

The day before graduation he is the biggest man in the school. The day after graduation he is just another technically trained man looking for something to do. Is the outlook discouraging?

It should not be. Times like these may be hard, but it gives us a chance to "take stock." The world's work must go on—it hasn't stopped, though it may have slowed down. New processes must be developed, new inventions crystallized, new types of structures designed, new construction started. It is unthinkable that all these activities have come to an end. Say what you will, progress is the watchword of civilization—civilization *is* progress. It will not be stayed because of the inadequacy of our monetary and banking system to keep pace with it.

But one thing must be realized by all graduates who are looking for jobs; in fact, by all others who are looking for work. Obtaining a job is a piece of salesmanship. The technical man can be ever so brilliant, ever so experienced, but if he is not a salesman, he gets no job. The only thing he has to sell are his services, and he must know how to exhibit his wares to the best advantage.

He must also keep clearly in mind the employer's point of view. Under our present economic set-up an employee must earn for his employer his salary, his overhead, and a profit besides. Otherwise his employment is not justified. Any employer, all employers, are looking for men who can earn them profits. It therefore behooves a technical man who is looking for work to study a prospective employer's problems carefully and then show him definitely that he is losing money by not employing the applicant. That is salesmanship. Simply going around blindly asking for a job will not bring results. Unfortunately, too many technical men, highly capable in many ways, are extremely deficient when it comes to selling their services.

More instruction in personal salesmanship is a needed adjunct to the engineering profession. Industry always needs the services of the technically trained man. He should be taught how to sell these services for what they are worth.

Production of Sulphur. Luring wealth from the earth has ever been an intriguing occupation.

And Louisiana has an almost boundless store of natural resources.

The interesting article on sulphur production by Mr. O'Donnell is printed elsewhere in this issue. Sulphur is one of the State's great sources of wealth. Because of the fact that the sulphur of Louisiana is so far underground, the profitable commercial development of our sulphur deposits had to await the invention of the Frasch system.

Mr. O'Donnell's paper is unique, however, in that it describes the first successful attempts to drill sulphur wells and carry on mining operations in the middle of a lake and over water. The continued development of this project will be of great interest to the engineering profession.

Economic Factors in Our Present Crisis. A very clear and succinct statement of the causes which led to the present depression is given in Dr. Bonnett's article published in this issue. Dr. Bonnett has gained national recognition in the field of economics. His statements, therefore, carry a great deal of weight. We have all felt, perhaps unconsciously, that *mass stupidity* played a large part in the present crisis, but Dr. Bonnett comes out and plainly says so. His indictment is drawn clearly and fearlessly.

Professor Derickson Honored. We write with pride that one of our members, Professor Donald Derickson, has been appointed a technical Director of The American Institute of Steel Construction. This is an honor for both Professor Derickson and our Society. We offer our congratulations to Professor Derickson.

Our Library Now Available to Non-Resident Members. Provision has recently been made by the Board of Direction whereby our Library will be made more useful to our out-of-town members. Arrangements will be made to permit books to be withdrawn by non-resident members upon application to the Secretary. The books are to be sent by insured parcel post each way, the Society sending to the member requesting same at the expense of the Society, and the member paying return postage and insurance. A list of books will soon be prepared and will be issued by the Secretary upon request to him.

OBITUARY

WILLIAM HENRY CREIGHTON

William Henry Creighton, U. S. N., Professor of Mechanical Engineering, *Emeritus,* Tulane University, died at his home in New Orleans, January 24, 1933, after a brief illness.

Professor Creighton was born in Cincinnati, Ohio, June 29, 1859. He received his early education in the public schools of his native city and was graduated from the United States Naval Academy in 1882. After several years of active duty in the Navy, he became one of a group of young naval officers who were assigned by the United States Government to Land Grant colleges as instructors in engineering. In this service Professor Creighton was assigned to Purdue University, where he taught from 1887 to 1891. He then became Chief Engineer of the U. S. Coast Survey *S. S. Blake,* but owing to an affection of the throat which prevented his continuance of sea duty, he was retired from active service in 1892.

He was appointed to the position of Professor of Mechanical Engineering in Tulane University in October, 1894, and served continuously in that capacity until his retirement in September, 1932.

Professor Creighton was married December 29, 1904, to Miss Matilda Mathis of New Orleans and is survived by her and their only son, William H., Jr., an engineer.

With the organization of the College of Technology as a separate college in 1911, he was appointed Dean of the same and served until 1919, when he relinquished the position in order to devote his whole time to his teaching duties.

While he won recognition as a consulting engineer, as a contributor to engineering journals and periodicals, and as the author of a standard text-book on the "Steam Engine," Professor Creighton's distinct contribution to the College of Engineering of Tulane University has been his outstanding ability as a teacher. Always a strict disciplinarian and exacting the highest standard of accomplishment from his students, he was

possessed of a sympathetic understanding of their difficulties and had developed methods of instruction which, from practically unanimous testimony of his students, have been of the greatest value to them, not alone in college, but in the subsequent practice of their profession.

Professor Creighton was retired on a Carnegie Pension at the close of the session of 1931-32, but in accordance with a recent ruling of the Carnegie Foundation, he was retained in active service for a few hours of class work each week in his favorite subject of "Strength of Materials."

He was a member of the Society of Naval Engineers, the Society for the Promotion of Engineering Education and the Louisiana Engineering Society.

As an expression of the high regard and esteem of his fellow-members in the Louisiana Engineering Society, it was resolved that this obituary notice be spread upon the minutes of the Society and be published in the *Proceedings*.

W. B. Gregory,
James M. Robert,
Douglas Anderson, *Chairman*.

SIDNEY FRANCIS LEWIS

Died February 8, 1933.

In the course of human events Sidney Francis Lewis, highly esteemed and well-beloved member of the Louisiana Engineering Society, Past President and Honorary Member, has been called to the Great Beyond, where he takes his place amongst that silent throng of the countless who have gone before.

In order that the memory of his being one of the beloved and honored amongst us during his sojourn on earth may be an enduring record in our archives, we engrave on our tablets this swift summary of his life and achievements as a man and a shining example of the profession he so signally dignified; viz.:

Sidney Francis Lewis was born in the city of New Orleans, Louisiana, on the 28th day of January, 1854. His father, Dr. John Hampden Lewis of New Orleans, was an eminent physician whose father was Judge Joshua Lewis, scion of illustrious lineage. His mother was Annie E. G. DeBritton, also of distinguished lineage.

Sidney Lewis, as he was universally known, was educated in the public grammar and high schools of New Orleans, finishing which he matriculated at the University of Virginia, where he acquired the degree of Civil Engineer in the Class of 1874.

Returning to his native city in 1875, during the closing days of the reconstruction after the Civil War of 1861-1865, his start in professional life was during the difficulties of this period. In 1887, during the incumbency of the illustrious Governor Francis T. Nichols, Mr. Lewis received the appointment as draughtsman with the Board of State Engineers of Louisiana, where, after serving through various offices, he was appointed to the Board of State Engineers, as Assistant State Engineer, by Governor Louis P. Wiltz, September, 1890. He served in this office until 1908. In September, 1908, at the request of Governor Jared Y. Sanders, he was elected Chief Engineer of the Orleans Levee Board, which Board had for its chief offices the protection of the city of New Orleans from inundation

from the Mississippi River and Lake Pontchartrain. After serving four years with the Orleans Levee Board, he opened an office in New Orleans as Consulting Engineer. In 1920 he was reappointed to the Board of State Engineers as Assistant State Engineer, where he served until 1928, retiring to private practice.

Mr. Lewis joined the State Militia during the late 70's or early 80's, serving as private, lieutenant and captain; and was Colonel of Engineers on the staff of Governor S. D. McEnery to 1888.

Mr. Lewis was one of the organizers of the Louisiana Engineering Society, being its first President. Such was the prestige and esteem he was held in by the members, that, on March 12th, 1917, he was made an honorary member of the Society.

Mr. Lewis was a man of high attainments, fine character and a signal honor to his profession. He attained the allotted three score years and ten of life, to which was added nine additional years for good measure.

Mr. Lewis was married twice: first to Miss Clara Davis in 1880, who died in 1889, and later to Miss Evelina Nicaud, who survives him. By the first union there were four children, and by the second there are five children living.

The Louisiana Engineering Society deeply regrets the loss of Sidney Francis Lewis as a member of the Society, an Engineer and friend. To his wife, children and family, we extend our heartfelt sympathy.

That a copy of this memorial be duly inscribed as a part of our minutes and that a copy, suitably inscribed, be sent to the family.

WALTER H. HOFFMAN,
CHAS. M. KERR,
BRYSON VALLAS,
G. W. LAWES, *Chairman*.

BOOK REVIEW

VOCATIONAL GUIDANCE IN ENGINEERING LINES. Elicited and Edited by the American Association of Engineers; printed and sold by the Mack Printing Company, Easton, Pa. $2.00.

Reviewed by
DONALD DERICKSON
Professor of Civil Engineering,
Tulane University.

This book, the work of some fifty engineers and technical specialists of the highest standing, is the crystalization of a long-continued effort on the part of American Association of Engineers. In the words of the President, Mr. Houshoulder, the principal objects of the undertaking are as follows:

> "*First.* To encourage the brightest, most active, most ambitious and most suitable of the youth of our country to come into the engineering profession, and to discourage from attempting to enter it the indolent, unambitious, unintellectual, and otherwise incompetent or undesirable young man.
>
> "*Second.* To provide for the students in our technical schools a treatise that will describe in full detail the profession of which they are striving to become members, and at the same time put before them numerous examples of unusually fine engineering English, in order to serve them as models for their future techno-literary work.
>
> "*Third.* To furnish the faculties of the American engineering schools with a fund of information about the profession they are teaching, only a portion of which is now known to any of them individually—which information they should be able to use to the greatest advantage in their pedagogic work.
>
> "*Fourth.* To provide some 500 pages of truly interesting, instructive and useful reading matter for every engineer in our land who is willing to take the time to peruse the volume; because there is absolutely no person, except the editors, who now possess all of the information it contains.
>
> "*Fifth.* To give the general public an opportunity to correct the impression it has concerning the engineering profession, and to teach it that a professional

engineer is not a man who drives a locomotive or operates a stationary engine.

"*Sixth.* To keep the square peg out of the round hole, and *vice versa*, and thus prevent a great number of young men from making failures of their lives, and from developing in their minds an inferiority complex because of having flunked out of a technical school.

"*Seventh.* To save a vast sum of money each year by preventing a large number of young men who are unsuited for technical careers from attempting to study engineering. The magnitude of this saving will be understood when one considers that about one-half of the engineering freshmen are dropped out in the first year, that it costs in the neighborhood of one thousand dollars per annum for a young man to attend college, and that the institution has to spend at least that amount in its unsuccessful attempt to teach for a scholastic year a predestined flunk-out.

"*Eighth.* By keeping weaklings out of the freshman class, the men of higher mentality will make greater progress; because it is a well-recognized fact that the slow-thinking, lazy, indifferent, and otherwise undesirable members of the class always hold back the better men, thus getting them also into lazy habits and preventing them from attaining to the maximum of their working capacity. The immediate result of such exclusion would be the including of more courses in the curriculum and the attainment of greater thoroughness and efficiency in the method of teaching.

"*Ninth.* To arouse in the minds of both engineering teachers and engineering students a far greater enthusiasm for the engineering profession than they have under present conditions. This result is likely to occur for two reasons—first, the writer of the various chapters of the book are themselves enthusiasts, and what they say is often of an exceedingly stirring and inspiring character; and second, a thorough knowledge of what engineering in all its lines and ramifications really means must arouse the interests of all live men who adopt it, or are contemplating adopting it for their life work."

The preceding remarks apply to practicing engineers as a whole as well as to technical teachers and students—and nobody

can deny that the enhancing of the respect and liking of engineers in general for the profession of their choice would be a most important desideratum. One direct result of this would be to induce engineers to take an interest in civic and national affairs, and to assume their proper stations in society.

> "*Tenth.* The ultimate benefits of the work inaugurated by this movement of our Association will be to improve materially in a few years' time the quality and efficiency of the men in the graduating classes in engineering, and also later on these same characteristics among practicing engineers."

This is not just another book on the same subject. It is an altruistic enterprise without remuneration to anyone but the printer. It is unique in that it is written by men who stand high in the engineering profession, their number being such that they cover its entire range. Here perhaps for the first time a young man contemplating engineering as a career can inform himself from authoritative sources as to just what engineering is, its requirements and rewards. The engineering colleges of this country would do well to include "Vocational Guidance in Engineering Lines" as required reading in their courses in English, as it is written by men, engineers, economists and others, who know how to write. It is the product of many minds, skillfully edited by a committee headed by scholarly Doctor J. A. L. Waddell, and should hold the interest of the engineering student from its first to its very last page.

In the production of this book the American Association of Engineers has accomplished something of value and a contribution to the engineering profession which should result in the improvement of the status of its practitioners and a better understanding among laymen as to engineering. No book can be of much benefit if it is not read. If this book is brought to the attention of those to whom it should come, and it is understood that it is the purpose of the Association to see that this is done, then as time goes on, may we hope for the accomplishment of the objectives stated at the beginning of this review.

Note:—A copy of the above book is to be placed in our Library.—Editor.

PAPERS AND DISCUSSIONS

SULPHUR PRODUCTION AT BARBA, LOUISIANA

By L. O'Donnell,*

Read before the Society, February 13, 1933.

Location of Jefferson Island. Jefferson Island is one of the five islands of Southwest Louisiana which run in a straight line from Lake Peigneur, ten miles south of New Iberia, to the Atchafalaya River on the Coast. Time has shown that there are great masses of salt under each of these islands. Only one island has yielded oil commercially, namely, Belle Island, and only one island has yielded sulphur commercially, namely, Jefferson Island. In a strict sense of the word, Jefferson Island should not be called an island, as it is an elevation on a dry plane, but because of its apparent relation to the other islands of the group it has been called by that name. The island proper rises seventy-five feet above the surrounding plane; however, fully seven-eighths of the salt dome is under Lake Peigneur, which lake is about two miles long and a mile wide, with an average depth of four feet.

History. The island has been known by a number of different names. Its present name is after that of Joseph Jefferson, the famous actor, who for years had a winter home on the island.

In 1894, while a water well was being drilled for Mr. Jefferson a short distance from his home, salt was hit at a depth of 384 feet. Shortly after this the contours of the salt dome were outlined by a drilling campaign, and the Jefferson Island Salt Mining Co. organized. Actual production was begun in April, 1923, and has continued since.

In November, 1924, the United Oil and Gas Syndicate prospected the dome for oil without success.

Due to financial difficulties, the company was reorganized a number of times by the original officers, and finally the Jef-

* General Superintendent, Jefferson Lake Oil Co., New Iberia, La.

ferson Lake Oil Co., following the advice of a German company, who stated that they could discover petroleum by an electrical conductivity method, drilled a hole in the lake. Sulphur was discovered at a depth of 660 feet and continued deeper with increasing quantities through a thickness of 208 feet. Other exploration holes were drilled, after which the company decided to produce sulphur commercially. The first was successfully produced on October 20th, 1932, and production has since continued.

Geology. The bed of the lake is composed of muck and soft clay approximately 30 feet in thickness, then follows hard clay imbedded with small amounts of sand and gravel. We then have approximately 150 to 200 feet of sand and gravel overlying an irregular amount of gumbo which is immediately above the cap rock. The cap rock is at approximately 600 feet and goes to a depth of approximately 870 feet, where salt is hit. The cap rock is composed of three parts. The top is a thin layer of coarse limestone. It is then followed by a thick layer of porous limestone, calcite and sulphur. Beneath the sulphur bearing zone is a layer of anhydrite which is directly over the salt zone. It is interesting to note in the sulphur zone that the amount of sulphur is in direct proportion to the lime and calcite and in inverse proportion to the anhydrite and gypsum. The sulphur itself is very irregularly distributed throughout the zone. It is found in thin layers; again in very small crystals, microscopic in size. Again it is found in large masses and bunches of crystals forming columns extending upward through the formation.

Cypress logs have been found at an approximate depth of 500 feet in gumbo overlying the cap rock.

Paleontology. Fossils found on the dome indicate that the mound was probably formed by a very late Pleistocene or Post-Pleistocene uplift.

Formation of Dome. Most geologists agree on the theory of salt dome intrusions for the formation of this dome. On this theory the salt has come from salt beds in lower regions. The pressure of the overlying beds being sufficient to

cause the salt to flow in plastic state through faults or cracks upward to the surface of the earth until a condition of equilibrium had occurred.

Origin of Sulphur. It is logical to conclude that the sulphur has formed from Calcium Sulphate, being a result of the reaction of this compound with Methane Gas. Calcite, lime, hydrogen sulphide, water and sulphur are formed as a result of this reaction. It is interesting to note on the dome that the calcium carbonate increases as the calcium sulphate decreases, all with an increase in the amount of sulphur present.

Mining Operations. It was necessary to do a great deal of pioneer work in the production end, as this was the first time in the history of sulphur mining that the operations were carried on out in the middle of the lake and over water.

The power plant is situated on the shore of the lake, approximately one mile from the center of mining operations. It was, therefore, necessary to build a trestle from the power plant to the point of mining. Creosoted piling and timbers were used for the construction of this trestle. The trestle carries five pipe lines and a three-foot-wide board walk. The pipe lines are as follows:

8″ Hot Water Line
4″ Steam Line
4″ Cold Water Line
2½″ Double Extra Heavy Air Line, and,
6″ Sulphur Line.

The hot water line, the steam line, and the sulphur line are insulated with 3″ of mineral wool covered by galvanized iron. Many carloads of mineral wool were used in the installation of these lines. The lines terminate at the sulphur station or sulphur collecting station for the wells. At this station booster pumps are located for boosting water down into the wells. Here also is the steam jacketed collecting bin to collect sulphur, and also sulphur pumps to pump sulphur from the bin to the storage vats which are on the shore of the lake near the railroad terminal. The sulphur cools in these vats. It is then

blasted down and loaded into cars by means of a locomotive crane. The vats are approximately 100x200 feet by 40 feet high.

The process of sulphur mining as used at Barba is the Frasch Process as invented by Herman Frasch in 1891. With this method the sulphur is melted in the ground by means of superheated water and is then raised to the surface in a molten state by means of compressed air. It is easily understood why great volumes of water are needed, as the underground strata of the dome must be kept at a sufficient temperature to melt sulphur. The strata must also be pressure-proof, as sufficient pressures must be maintained to keep water at the melting temperature of sulphur. Since the wells used for mining of sulphur are very similar to oil wells, an oil well rotary rig is used for drilling these wells. In the first operations on Lake Peigneur this rig was installed on top of piling, but this was found to be a very expensive process, so a drilling rig was developed which could be placed on top of a barge and floated from well to well. This barge is 40x60x5½ feet and is permanently equipped with a complete set of drilling machinery. All machinery on the barge is operated by electricity, which electricity is supplied to the barge by submarine cable at 2300 volts. The barge is held in position by means of four 8″ pipes placed on its corners, and which pipe pass through the barge and into the lake bottom. The barge is kept level by a very accurate distribution of the different pieces of drilling machinery. Since the level of the lake raises as much as a foot in a ten-hour period, a telescopic joint was devised to take care of this change in elevation in connecting the casing of the well.

Whereas it takes three or four days to move the average drilling rig, this rig has been moved from one well to another in as short a time as 12 minutes. While the barge cost approximately $8,500.00, it is estimated that as much as $5,000.00 is saved per well by its use. Forty wells have successfully been drilled. A number of the large oil companies have copied the barge and it has been used in other marine operations for the drilling of oil. In using this barge, first a surface casing is set

to shut off the lake water. This is a 12″ pipe approximately 40′ long. A 10″ hole is then sunk rapidly to cap rock, a distance of 600′. An 8″ casing is set in the hole and cemented, and the hole is then drilled and cored to the bottom of the sulphur bearing formation. The well is then equipped for sulphur mining, which equipment constitutes a 6″, a 3″ and a 1″ line, set concentrically. An 8x6″ stuffing box is provided at the surface so that the 6″ line can expand in the 8. Similarly a 6x3″ and a 3x1″ are provided. Two sets of holes are drilled in the 6″ pipe, and at the bottom of the well just about at the bottom of the sulphur bearing formation. The lower group is used as a sulphur strainer. The sulphur enters the 3″ pipe through this group of holes. The sulphur drops to the bottom of the well, as its gravity is twice that of the water. The upper group of holes are used as an outlet for water pumped into the wells, which water floats on top of the sulphur. Between the two groups of holes is a seat or seal which supports the string of 3″ pipe, and 1″ pipe is supported from the top by means of a coupling on the stuffing box. The procedure of steaming a well is as follows:

The water from the plant, heated to approximately 320°, is forced down into the well between the 3″ and the 6″ pipes at a pressure of about 100 to 200 pounds. The sulphur melts. This water being 9/10 specific gravity, rises to top of the dome as it melts the sulphur. The melted sulphur with the specific gravity of about 2 drops to the bottom of the well, where it is forced up the 3″ pipe a short distance by water pressure of the dome. The compressed air of varying pressure under 500 pounds raises the sulphur to the surface. Under certain conditions sufficient sulphur is melted by the water furnished the well so that the well operates for weeks and months at a time. Under other conditions sufficient sulphur is not melted and the sulphur elevation lowers so that hot water enters the 3″ pipe. This hot water coming to the surface, and at atmospresic pressure, flashes into steam. The well is then said to blow. Air is then cut off from the well and water is pumped down both the 3″ and the 6″ pipes until sufficient sulphur is melted, which is usually about a 3-hour period.

The sulphur as produced at Barba, La., averages 99.91% pure.

Power Plant. To provide sufficient heat for large scale mining by the Frasch Process, enormous quantities of water, heated under pressure to a temperature of approximately 320° F., must be pumped into the sulphur bearing formation, therefore, a suitable water supply must be provided together with an efficient power plant for the heating of this water. This power plant is located on a piece of high bank on the shore of the lake, approximately one mile from the site of operations.

A highway was graded to the plant, and 3 miles of railroad spur were laid, primary to bringing in the materials for construction and machinery. Careful consideration had to be given to the lay-out as the plant must operate continuously. Any temporary shut-down would involve an immense loss to the company.

The water supply is provided by two 10″ deep wells; one with an electric pump and the other with an air lift. Water from these wells is discharged into a reservoir with an approximate 50-million gallon capacity. Water from this reservoir is treated before going into the power plant by means of a Cochrane Hot Process Lime-Soda Ash Softener. Exhaust steam from the pumps and compressors is used to heat the water in the softener. In the plant, after the softener, two water circuits are maintained; the first system passes into the boilers, the second passes into a high-pressure mine water heater and then to the mines. The plant is provided with three Babcock-Wilcox 600-horsepower boilers, capable of operating at 200% rating. These boilers were of the first fusion welded drum construction in the southern territory. Two additional boilers are now being installed.

The heaters in the plant are of the Cochrane jet type and capable of handling over two million gallons of water per twenty-four hours. These heaters operate at boiler pressure, bringing the water to approximately 330° F. temperature.

The pump units are driven by General Electric, single stage, turbines operating at 100-pound steam pressure and 5-pound

back pressure. High pressure air at 500 pounds for sulphur air lift is furnished by two Ingersoll-Rand three-stage compressors. All pumps, heaters and compressors are furnished in duplicate so as to prevent costly shut-downs. The present plant is capable of turning out over a million gallons of hot water per day. The new addition will increase this approximately two-thirds.

Sulphur Production in the United States. From 1910 to 1929 production in the United States has increased from 247,060 long tons to 2,362,389 long tons. This is a total increase of 856%, or an annual increase of over 42%. Approximately 99% of the American supply of sulphur is mined in the Gulf Coast Region and 85% of the total world supply is mined in the same region.

The three principle producing companies are the Texas Gulf Sulphur Co., the Freeport Sulphur Co., and the Jefferson Lake Oil Co., Inc.

The uses of sulphur in their order of importance are as follows: Heavy Chemicals, Fertilizers and Insecticides, Pulp and Paper, Explosives, Dyes and Coal Tar Products, Rubber, Electro-Chemicals, Fine Chemicals, Paint and Varnish, and Food Products.

Successful mining of sulphur from 1893 up to the present has involved the solution of what seemed to be hundreds of insolvable mechanical problems. During the triumph of modern engineering the Frasch Process has been perfected to the finest details. Since most of the sulphur at the present time has been mined under ideal mining conditions, and since many of these ideal deposits are now becoming exhausted, future developments in the Gulf Coast Country will involve some very interesting new problems. One of the first of these problems is the mining of sulphur from domes under the water or on marsh land. This problem has been more or less solved at Barba, La., although there are many details that will yet have to be contended with. Another problem to be solved in modern sulphur

mining is the mining of relatively deep deposits. In the solution of all of the problems involved is the question of production costs. With the excessive production costs due to severe mining operation comes increased taxation together with royalties; hence, all new departures involving increased costs must be considered carefully, as there is always a possibility of increased competition of pyrites and by-product sulphur.

ECONOMIC FACTORS IN OUR PRESENT CRISIS

By C. E. Bonnett,*

Read before the Society, March 9, 1933.

Our present crisis is the result of many factors, economic and otherwise. In my humble opinion, except from the monetary-banking phase, the other economic conditions would not have produced the worst panic in the whole history of the world. The monetary banking phase is undoubtedly psychological as well as economic and political in its manifestations.

That this is the worst panic in all history is partly due to rapid and world-wide communication, which accentuates the factor of psychology greatly. However, if psychology were the only factor we would never have experienced the 1929 panic, or the 1931 panic, or the present one—three panics in four years. We were told in 1928-29 that we were in a new era and the old economic laws were obsolete,—"Don't Sell America Short." In 1929-30, our theme song was that business was fundamentally sound and that "every day, in every way, it was growing better and better." In 1932, and up to a few weeks ago, we were assured by the great captains of business and finance that prosperity was just around the corner. We have lied to ourselves and to each other, in a vain belief that if we only chanted prosperity loud enough and often enough, we could charm away the depression.

Let us look at some of the economic features. In 1914-18 a world war called into operation the most stupendous economic forces in the history of man. Billion-dollar loan drives were the order of the day. Marvelous machines of destruction were created to wreck havoc in no-man's land, but they destroyed men, "money" and morals in every-man's land. The war left us devastated areas, dislocated business, debauched and disabled men, and debts so enormous that they will burden our children to the fourth generation.

The war also gave unbelievable profits to our profiteers—not only to the industrialists, but also to the financiers. It caused Europe to lose great hoards of gold and the United

* Professor of Economics, Tulane University.

States to gain them. On the basis of that gold, the bank credit of the United States expanded many billions more and yielded untold billions in profits to our shrewd financiers. Mergers at home, stock split-ups—flotation of both foreign and domestic bond issues resulted in profits that made John Law, Jay Gould or Al Capone look like "pikers."

But that wild inflation of bank credit led to the great stock market speculation. Twenty billion dollars expansion in ten years—lifting the total from twenty-nine to forty-nine billion—flowed mostly into the stock market to produce the wildest deflation known to man. Mellon and Coolidge encouraged the expansion. The Federal Reserve Board waited until the situation was out of control and then merely scolded the naughty boys, only to find itself scolded for allegedly trying to break the stock market.

In the meantime mergers and expansions were the rule. Each business planned new expansions in its own field and wide extensions into other fields, apparently unconscious of the great conflict ahead between the new Frankensteins thus being created. Labor-saving machines made greater production with fewer men a fact, and so unemployment mounted, with fewer persons obtaining genuine purchasing power. Installment and other credit plans enabled high-pressure salesmen to load up practically everyone with a burden of debt he could not pay for years to come, should his income remain undiminished.

We had adopted prohibition, and much of the income that went to the saloon and the brewery went to the automobile and accessory dealers and manufacturers. As a result, the entire industry experienced a gigantic mushroom growth. This in turn caused a like growth in the oil industry and others relating to the operation of the automobile. Road building—with almost unlimited bond issues—became a gigantic business which in turn brought boomtime prosperity to many others.

Under the law of alternate costs,—when you spend your dollars for one thing, you cannot have them for another,—there were corresponding reactions,—among others, the farmer suffered. For instance, trucks, fed by gasoline for power, took the place of horses fed by hay and grain. Even on the farm,

the tractor displaced horses in great numbers and produced feed it could not use. Vast areas of land thus were released from the production of horses and their feed. The land was turned to other uses. The tractor not only did not consume the feed it could produce, it increased enormously other sorts of products, so that everywhere there was a surplus of farm products, the prices of which sunk to bankruptcy levels.

The "iron horse" likewise suffered. The passenger automobile, the bus, and the truck—all took traffic from the railroads and made them less and less profitable. The railroad officials—arrogant and stupid—did little or nothing constructive to offset this trend. Only recently have they attempted sanely to meet this competition.

We made enormous loans abroad which directly or indirectly helped to develop foreign industries to compete with our own. To protect our home industries, we raised the tariff barriers higher and higher and sent out a host of our best salesmen to capture and hold foreign markets. Thus we faced the dilemma—that unless the rival foreign industries flourished, the interest and principal on our foreign bonds could not be paid in full—but if they did flourish, our exporting manufacturers would suffer.

Yet by our long-time loans, we gave the foreign nations claims for demand credit, which in turn served as a basis for the gold-exchange standard. Roughly speaking, we loaned to Germany, who transferred the credit to France, and when the crisis of 1931 began to come to a head, France cashed in on her demand credits in gold—Austria and Germany went on moritoria, and England, whose banks had made excessive short-time loans to Germany, went off the gold standard and on to a managed currency, to save her banks. United States, however, continued to remain on the gold standard until many of her banks were wrecked.

One stupid act after another has been the course of the Federal Government, the Federal Reserve Banks, and even the National banks. To recount only a few: Congress, acting under the advice of Hoover, Mills, and the New York bankers, placed a two-cent tax on bank checks (along with a three-cent letter

postage) so that people resorted to currency, instead of drawing small checks. Those of us who had Scotch in our veins drew one large check and used the currency. When a country of over 125,000,000 carry as little as four dollars additional currency—a quarter of a billion in currency is drawn out of the banks and lowers their reserve that much. On the average one-half of a billion in currency or Federal Reserve Bank Credit sustains five billions in Bank Credit—so a fearful contraction of bank credit resulted. It is said that there is a psychological factor that people will buy more with credit or checks than when they part with the currency—at least business went into another slump.

Congress also authorized the Federal Reserve Banks to use Government bonds as a basis for a billion more Federal Reserve Notes, but the Federal Reserve Banks, after a slight expansion, stupidly refused to expand the currency. The National banks were also authorized to expand National Bank Notes one billion dollars. These provisions, however, were so promising that business began to rise in the summer, but failed to carry through when the currency was not inflated further.

Under these contracting influences, banks began to fail. First one city, then another, felt the strain. Chicago, St. Louis, Memphis, then New Orleans. The Reconstruction Finance Corporation and the Federal Reserve Banks prevented the closing of many banks.

In the midst of all these conditions and readjustments, Congress hastily passed the repeal resolution. As we have seen before, the automobile and related industries gained by prohibition, but became greatly ever-expanded especially after the great growth of bootlegging. Already suffering from the general depression as well as the diverted income, the whole financial structure in that industry was in a highly critical position. The slightest adverse factor would send the whole structure crashing. Michigan was the center of the industries and financial institutions, and the repeal resolution supplied the force to bring a crash. Instead of stocks rising with repeal, they sank. One automobile stock slumped 7 points in the day the repeal resolution passed, and all automobile and accessory

stocks declined. Banks in Michigan depending directly or indirectly on these industries were thrown in a further panic. The panic spread to Indiana and elsewhere. Bank withdrawals rose to hundreds of millions in a week. Gold was likewise withdrawn and hoarded because there loomed the possibility of uncontrolled inflation or the devaluation of the dollar.

Yet a controlled inflation of the currency has been necessary for some time in order to check the rapid drift towards universal bankruptcy. We are now off the gold standard and are waiting with much interest to see the outcome of our first great experiment with presumably a managed currency. Like electricity or fire, the force inherent in the currency system may be used for the betterment of mankind when intelligently controlled, but stupidly handled, can destroy both property and life.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Meeting of the Board of Direction, February 13, 1933.

The meeting was called to order by President O'Neill and the following members were present: Messrs. Billingsley, Wiggin, Hoots, Dunlap, Moses, Bres and Muth.

The minutes of the previous meeting were read and approved and bills on hand were ordered paid.

The matter of printing of the Constitution was brought up and the Secretary was authorized to have it printed, including the code of ethics and data relative to the library, which will be furnished as soon as practicable by the proper committees.

Circulars from the American Engineering Council dated January 18th were read and after careful consideration it was voted that there was not enough interest in these subjects to take further action. The matter was therefore tabled.

The matter of activity of the Library Committee was discussed and on motion, duly seconded, it was voted to have a list of books and publications of the Society prepared to date to be available to members upon application to the Secretary. Also it was voted to extend the Library service to out-of-town members after proper details are worked out. This subject was referred to the Library Committee.

The Secretary brought to the attention of the Board the matter of Item 7 of the By-Laws which covers the substance of Article 3 of the Constitution relative to temporary members. After careful consideration the Board decided to permit both paragraphs to remain as is.

Announcement was made of the death of Professor W. H. P. Creighton, who resigned from the Society in 1932, and of the death of Colonel Sidney F. Lewis. On motion, duly seconded, the President was authorized to appoint two committees to draft suitable resolutions or obituaries on these two late members of the Society.

Communication from Roosevelt Hotel was read relative to offering space in the hotel for the Society. After careful consideration instructions were given the Secretary as to reply to be made to the Managing Director of that hotel, advising that Mr. E. S. Bres would confer with the hotel authorities and report to the Board.

Communication from the Chairman of the Entertainment Committee was read, reporting on the expense of the annual meeting, which report was read with pleasure.

The resignations of the following were accepted with regret: Mr. H. N. Old, A. J. Legett, Jr., R. S. Manley.

The Finance Committee submitted a preliminary report and asked for more time for further consideration of the finances of the Society.

There being no further business, the meeting adjourned.

F. A. MUTH, Secretary.

Minutes of the Meeting of the Society, February 13, 1933.

The meeting was called to order about 8:15 p. m., Mr. John H. O'Neill, President, in the chair, F. A. Muth, Secretary, and 83 members and guests present.

The Minutes of the previous meeting were read and approved.

Announcements and committee reports were made and several announcements were made from the Chair and from the floor.

Announcement was made of the Annual Meeting and Ladies' Night which was staged by the Entertainment Committee. On motion, duly seconded, it was voted to thank the Chairman and the members of the committee for the splendid entertainment as a result of their efforts, with the hope that there would be a return engagement, which would be enjoyed by all.

Announcement was made by Professor Robert that Lieutenant-Commander R. L. Schoppe of the Local U. S. Coast and Geodetic Survey office was under orders to proceed to a new station. It was pointed out that, although Mr. Schoppe was not a member of the Louisiana Engineering Society, the members regretted his departure from our midst as he has become one of us. Officers such as Commander Schoppe create the impression that we have in the Government Service men of ability, presenting tangible evidence of their value to the community and that thmey enter into the daily life of the engineering profession while they are on detail and in the localities to which they are sent. Commander Schoppe has assisted the Society greatly in securing pile markers for bench marks in New Orleans for tying in with the primary level net.

The address of the evening was on "Sulphur Mining at Barba, La.," by Mr. L. O'Donnell, General Superintendent, Jefferson Lake Oil Company, New Iberia, La. This address was followed by an interesting discussion. A rising vote of thanks was then tendered the speaker and the meeting adjourned to the usual collation.

F. A. MUTH, Secretary.

Minutes of the Board of Direction, March 13, 1933.

The meeting was called to order by President O'Neill and the following members were present: Messrs. Billingsley, Dunlap, Hoots, Moses, Bres and Muth.

The minutes of the previous meeting were read and approved and bills on hand were ordered paid.

The Chairman of the Finance Committee discussed the matter of finances and on motion, duly seconded, the Finance Committee was authorized to act as a Budget Committee this year.

A code of ethics for the Society was presented by Colonel E. S. Bres, Chairman of the Committee appointed several years ago for that purpose, and on motion, duly seconded, the code, as submitted, was approved by the Board with instructions to the Secretary to have it printed in the forthcoming issue of the booklet covering the Constitution and By-Laws, etc. The committee was discharged with thanks for its services.

On motion, duly seconded, it was voted that in the event there is necessity for a standing committee on ethics that consideration be given to including on the committee the immediate past President of the Society, the President of the Local chapters of the A. S. M. E., and the First Vice-President of the Local Chapter of the A. S. C. E.

In accordance with the Constitution, Mr. W. S. White was elected Life Member.

Mr. L. T. Vivien, Jr., was reinstated, in accordance with the special action of the Board held December 5, 1932. Mr. J. V. Gaudet was changed to Non-Resident Member.

The motion was presented to provide an allotment to send A. S. M. E. students to Birmingham. On further discussion the matter was placed to a vote and it was voted for the Society not to allot the funds for that purpose at this time.

There being no further business the meeting adjourned.

F. A. MUTH, Secretary.

Minutes of the Society, March 13, 1933.

The meeting was called to order by President O'Neill, F. A. Muth, Secretary, and 71 members and guests present.

On motion, duly seconded, the reading of the minutes of the previous meeting were dispensed with in order to porvide time for the speaker and discussions.

Announcements were made by several committee chairmen and from the Chair.

Professor C. E. Bonnett gave a most interesting talk on "The Principal Factors Affecting the Present Financial Crisis." This address was followed by a lively discussion. A rising vote of thanks was then tendered the speaker and the meeting adjourned to the usual collation.

F. A. MUTH, Secretary.

The Proceedings of the Louisiana Engineering Society

Published bi-monthly, February, April, June, August, October, December, under the auspices of the Committee on Publication.

JAMES M. ROBERT, Editor.

Subscription, $2.00 per annum Single copy, 35 cents

Address all communications to
JAMES M. ROBERT, Editor, Tulane University,
New Orleans, La.

Entered as second-class matter July 27, 1916, at the Post Office at New Orleans, Louisiana, under the Act of August 24, 1912.

Acceptance for mailing at special rate of postage provided for in section 1105 Act of October 3, 1917, authorized August 1, 1918.

LOUISIANA ENGINEERING SOCIETY

OFFICERS FOR 1933

President, J. H. O'NEILL, 637 Lowerline Street.
Vice-President, A. L. DUNLAP, 1318 Nashville Avenue.
Secretary, FRANK A. MUTH, 7705 Willow Street.
Treasurer, WALTER B. MOSES, 425 S. Peters Street.

DIRECTORS

E. S. BRES, 311 Maritime Building.
CHARLES WIGGIN, JR., 1105 Maritime Bldg.
PAUL F. HOOTS, 317 Baronne Street.
FRED N. BILLINGSLEY, 702 Interstate Bank Building.

STANDING COMMITTEES

On Technical Papers
Charles Wiggin, Jr., Chairman
James M. Robert
Charles M. Kerr
Carl Schneider

Motivating Committee
James M. Robert, Chairman
W. B. Gregory
George R. Hammett
George P. Rice
James M. Todd

On Library
Ralph Earl, Chairman
C. W. Ricker
A. J. Harris
G. W. Lawes

On Publications—Division "A"
James M. Robert, Chairman
Frank A. Muth

On Publications—Division "B"
D. W. Stewart, Chairman
Harry B. Henderlite
J. A. McNiven
W. H. Scales

On Entertainments and Outings
H. L. McLean, Chairman
S. F. Hottinger
Ole K. Olsen
D. W. Stewart

On Legislation
James M. Todd, Chairman
E. S. Bres, Vice-Chairman
F. N. Billingsley
Donald Derickson
George R. Hammett
Harry Jacobs
George P. Rice
Ira W. Sylvester

On Finance
A. L. Dunlap, Chairman
Walter B. Moses
F. N. Billingsley

On Membership—Division "A"
E. S. Bres, Chairman
Frank G. Frost, Vice-Chairman
A. L. Dunlap
H. B. Henderlite
Harry Jacobs
J. T. Bullen
Ira W. Sylvester
Bryson Vallas
B. W. Pegues

On Membership—Division "B"
W. B. Gregory, Chairman
James M. Todd
B. H Grehan

On Employment
R. H. Baumbach, Chairman
R. Bassich
H. B. Henderlite

On Civic and Industrial Affairs
A. M. Lockett, Chairman
A. B. Paterson, Vice-Chairman
J. F. Coleman
Donald Derickson
A. T. Dusenbury
John Klorer
F. N. Billingsley
James M. Todd

The headquarters of the Society are in the State Museum Building, Jackson Square.

All business communications should be addressed to F. A. Muth, Secretary, 7705 Willow Street, New Orleans, La.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XIX. JUNE, 1933 NO. 3

CONTENTS

EDITORIAL NOTES AND COMMENT

Industrial Recovery and Legal Racketeering. In the industrial recovery which is now in progress, the intent is that overproduction shall be prevented, and that products shall be manufactured in quantities needed under fair wage conditions and sold at a fair profit. This would insure fair treatment for each factor in the economic cycle—even including the poor consumer. This means that the raw goods on its way from source to consumer passes through many hands in processing and thereby has its value increased. It is only natural and fair, therefore, that labor and skill shall be adequately reimbursed out of the values it adds to raw materials. And the new administration has charged itself with the task of seeing that justice is done all around, and that

labor and skill are fairly reimbursed for their efforts, and that the consumer gets value received in the commodities he purchases. A strict enforcement of the principle will prevent *racketeering* at any point. The laborer will not get more than his share at the expense of the consumer, and the consumer will not get *distress* goods at the expense of the laborer.

But is seems to us that the greatest *racket* of them all has been entirely overlooked by the government—we refer to stock gambling on the stock market. We cannot understand the *laissez-faire* attitude of the government on one of the greatest malignancies of our economic set-up—a malignancy which is quite largely responsible for our recent distressing condition.

A person may purchase today a share of a certain stock at a price of say *fifty* dollars. Tomorrow, by some vagary of the *market* that same share of stock may sell at *fifty-five* dollars. And yet, all physical and economic conditions surrounding the stock and the factory it repqresents are the same tomorrow as they are today. Nothing has been added to the stock to enhance its value. This means that the person who bought it for fifty and sells it for fifty-five has received five dollars for which he has not given an adequate return in added value. By the same token the conclusion seems unescapable that if one person has received money for which he has given no return, (and to which he is not logically entitled), some other person or persons must have parted with money without receiving value therefor. This seems to be obvious economic injustice.

Putting salve on a cancer will not cure it. The only way to cure a cancer is to cut it out, growth and roots. Will the new administration have the strength to apply the knife fearlessly to our great economic cancer?

Fusion Welding. The development of reliable welds has been one of the most desirable yet most elusive accomplishments of the modern machine age. The fact that reliable and strong welds are now obtainable is due in no small measure to unremitting effort on the part of many large interests. One of these interests is the Hartford Steam Boiler Inspection and Insurance Company, and we print elsewhere in this issue a very

interesting paper on welding by Mr. William D. Halsey of that company.

It is interesting to note that the trend of modern design and fabrication of metal products, including machinery, is undergoing an almost complete metamorphosis due to the adoption of welding in place of rivets. Welding makes for stronger unions as well as lighter and cheaper products.

Electrolysis and Soil Corrosion. We print elsewhere a paper with the above title. We are glad to publish it because it was written by one of our members, Mr. R. J. Kuhn. But more especially are we glad to publish it because Mr. Kuhn has been quite largely responsible for the development of methods of successfully eliminating electrolysis and soil corrosion in underground metallic structures. Indeed, the methods used locally have proved so successful that they are now being used by public service companies in other cities.

The 1933 Golf Tournament. Over the bristling fairways of the picturesque Metairie Golf Club, on June 2, the Annual Golf Tournament of the Louisiana Engineering Society was held. Florence J. Schwab was the winner, with C. S. Williamson, Jr., in second place, and D. W. Stewart, 1932 Champion, in third place. R. T. Stone was the winner in the guest flight. F. N. Billingsley repeated again this year in the President's Flight.

Twenty-one members and seventeen guests participated in the tournament and dinner, with a total of twenty prizes, and the committee, composed of H. L. McLean, D. W. Stewart and S. E. Hottinger, Jr., are worthy of praise for the manner in which the tournament was staged. A letter of appreciation has been sent to each of the twenty donors of the prizes. We are hoping that the 1934 Tournament will arouse as much, or more, interest as did the tournament of this year.

The Society gratefully acknowledges the golf prizes which were contributed by the following: Rubenstein Bros., Eugene Dietzgen Co., New Orleans Blue Print & Supply Co., Reilly Coffee Co., Dunlap Sporting Goods Co., D. H. Holmes Co. Ltd., R. D. Pitard Hardware Co. Inc., Sears Roebuck & Co., Sam

Bonart Clothing Store Inc., Ben Beekman Clothing Store, Oliver H. Van Horn Co. Inc., Haspel Bros. Inc., New Orleans Public Service Inc., Lighting Fixture & Electric Supply Co., General Electric Supply Corp., General Electric Co., Gray-Bar Electric Co., General Appliance Inc., Mr. M. McLellan.

Federal Employment of Private Engineers. A circular letlet recently addressed to the members of the Louisiana Engineering Society contains information concerning the proposed Public Works Program. It is understood that the policy of Mr. L. W. Robert, Jr., Assistant Secretary of the Treasury Department, who is in charge, will be to utilize to the fullest extent the services of private engineers.

To this end, attention is called to the fact that Mr. George E. Earl, American Bank Building, New Orleans, has been appointed by the Engineering Council as Chairman of the Committee on Engineers and Employment for Louisiana. Engineers desiring employment under this program should address the Engineering Council and send their applications to Mr. Earl in *triplicate*. Each application should be accompanied by a biographical sketch and experience record, also in *triplicate*. No special form of application is required.

Correction. We wish again to call attention to the splendid Book, Vocational Guidance in Engineering Lines. It deserves careful reading and consideration by every thoughtful engineer.

The price as given to us and as published in the last issue of the *Proceedings* was $2.00. The price should have been $2.50.

Our Library Books. The Library Committee has prepared a mimeographed list of books in our Library. This list is available to members on application to the Secretary. By a new arrangement the Library books are now available to out-of-town members.

OBITUARY

J. SIDNEY BARELLI

WHEREAS, It has been the will of the Almighty Ruler of the Universe to remove from our midst on April 13 our friend, member and Past President, J. Sidney Barelli, and

WHEREAS, This Society has sustained a great loss in his death, and in view of the above, and the still greater loss sustained by those who are nearest and dearest to him, therefore be it

RESOLVED, That it is a worthy tribute to the deceased to say that in regretting his departure from this life, we mourn for one who was in every manner worthy of our respect and regard, and be it further

RESOLVED, That we sincerely condole with the family of the deceased on the disposition of an All Wise Providence, who doeth all things for the best, and be it further

RESOLVED, That this heartfelt testimonial of our sympathy and sorrow be sent to the family of our departed friend, and a copy be spread on the minutes of the Society.

R. T. BURWELL,
F. A. MUTH,
EUG. UNSWORTH.

PAPERS AND DISCUSSIONS

FUSION WELDING AS APPLIED TO BOILERS AND OTHER PRESSURE VESSELS

WM. D. HALSEY*

(Read before the Society April 10, 1033)

When an insurance representative presents a discussion of Fusion Welding his audience is likely to ask "Why and in what way is an insurance company interested in welding?"

The company which I represent offers insurance to cover direct and other certain kinds of loss, due to explosions of boilers or other pressure vessels or to accidents to engines, turbines and electrical equipment.

We are, therefore, vitally interested in knowing whether the objects we insure are safely constructed.

Fusion welding, accomplished by the oxyacetylene torch or electric arc has been used as a process of manufacture for many years. But for many years we, as an insurance company, accepted fusion welding only for vessels operating at comparatively moderate temperatures and pressures or where the weld was used only for sealing a joint and not to carry any great amount of stress, that is, where the safety of life and property was not dependent on the strength of the weld.

The word "insurance" carries with it the thought of safety, or protection against loss of life and property. We have the insurance, and while death is unescapable, the efforts of life insurance companies have played an important part in increasing the average life of civilized man. We have fire insurance to protect us against that enemy, Fire—and we likewise have the widespread efforts of the fire insurance companies to remove as far as possible the danger of fire. We may analyze the other forms of insurance and see that the effort is made to make this world of ours a really safer place

*Assistant Chief Engineer, Hartford Steam Boiler Inspection and Insurance Company.

to live. The same analysis is no less true of power plant insurance. It is the practice of those companies affording this class of insurance to endeavor, through inspections, to detect when a boiler, tank, engine or generator has become unsafe to operate, such companies employ inspectors, specially trained for the work, to seek out, in so far as it is possible, those danger signs which tell of impending disaster.

How helpful it would be if the safety of a welded seam could be judged by its external appearance. But "beauty is only skin deep".

To us there seems to be, at present, but one practical way to know that a welded vessel is safe to operate and that is to determine that it was constructed by methods of welding which will produce welds that can be relied upon. This means that the problem must be attacked at its source, namely, the plant of the manufacturer.

About six or seven years ago several prominent manufacturers gave intensive study to this problem and after the expenditure of an enormous amount of time and money they found the answer. We were asked by those manufacturers whether we would accept their fusion welded vessels for insurance. We visited their shops, saw that they had the many important factors under control and we agreed to place our stamp of approval on vessels which they built and which we inspected during construction.

It was not long thereafter that we were asked, by other manufacturers seeking our approval, what method of welding they must pursue to have their vessels accepted by us.

We then saw that we must set up some standard by which we could measure the acceptability of the products of a manufacturer. We have not and do not intend to say how the welding must be done. But there was, we could plainly see, the possibility of setting up a standard which welds should meet. We, therefore, took stock of the situation and said to ourselves "A weld must have three cardinal virtues. It must have tensile strength, it must have ductility, it must be sound. How can we determine when it possesses those three virtues?"

Upon giving further thought to the matter it became very apparent that the production of a joint that is really welded depends very greatly upon the skill of the man who makes it. But the solution of the problem is not in his hands alone. It is to no small degree dependent upon the material we put before that man and the tools we place in his hands.

The solution of the problem is two fold. A proper technique of welding must be carefully worked out and then the individual welder must be carefully and thoroughly trained to apply it.

Without doubt, much of the poor welding that has been done—and in fact is being done today—is the result of leaving the problem entirely in the hands of the individual welder. But he should not be blamed. Almost invariably he has not been shown how he might determine just how good a weld he can make. And so our first reply to the manufacturer seeking our approval is, "Study this problem of welding yourself. Place limitations upon every detail of the process you decide to use. Do not leave the solution to each and every welder you employ. Standardize your practice, train every welder to follow it and make certain that he continues to follow it."

It has been proven repeatedly that the following of a standard technique or "Proceduce Control" by trained welders will produce good welds. But what is a good weld? We have said it must have tensile strength, ductility and soundness. How can we determine when a certain technique of welding is producing those results?

What we desire to know is just what tensile strength does the weld itself possess. So we developed what is now known as the Reduced Section Tensile Test Specimen. In this specimen the weld reinforcement is removed and the specimen is reduced in cross section over a short length not much greater than the width of the weld. This forces the failure to take place in the weld or adjacent thereto where the base metal may have been affected by the welding process.

To detect whether the procedure of welding is producing a sound weld we developed what is known as the Nick Break Test. It consists simply of a specimen of the welded joint,

roughly sheared or torch cut from a welded test plate and having a saw cut on each edge at the center of the weld. It is placed on edge under a falling weight or steam hammer and broken with a sudden sharp blow. The fracture shows up defects in welding such as lack of penetration at the root of the weld, slag and oxide and gas pockets as no other readily available method will do.

An adequate method of determining quantitatively the ductility of a weld is somewhat of a problem and credit for the method we have used must go to the Union Carbide & Carbon Research Laboratory who developed what is known as the Free Bend Test for ductility.

A specimen of the welded plate is machined to a width of 1½ times its thickness and the weld reinforcement removed from both sides. The edges in the vicinity of the weld are rounded off and the specimen is then given an initial bend at each end. Center punch marks or scribed lines are placed on the face of the specimen $\frac{1}{16}''$ inside of each edge of the weld metal section. Measurement is made of the distance between these two reference points and the specimen is then placed as a strut in a testing machine or other suitable device. By pressure on the ends of the specimen it is forced to bend under free bending conditions until a failure or small crack appears in the face of the weld between the two gauge marks. The measured distance between the marks is measured and the ductility is computed from the measure of length which has taken place.

This ductility must not be confused with the ductility obtained in a tensile test specimen. It is a different value but none the less a measure of ductility.

While we have developed a method for determining whether a manufacturer can do acceptable welding we were early faced with the problem as to what should be the requirements for welded vessels in different classes of service. Obviously, the rather costly process used for a pressure vessel operating at high temperatures and pressures was not justified for one used at comparatively low pressure and temperature. Accordingly we decided to classify welded vessels into three groups de-

pneding upon the service for which they would be used, and at the same time adopted a standard for the welding in each class.

The Boiler Code Committee of the A. S. M. E. has long had under consideration the writing of a code for fusion welded vessels. Such a code, covering both fusion welded boiler drums and unfired pressure vessels has now been written and the first draft appeared in the summer of 1931. We have been somewhat flattered by the fact that the Code Committee adopted many of the standards and the general scheme of classification we had set up for our own use. Since its issuance we have adopted the Code as the standard to be followed for a vessel we are willing to approve.

The A. S. M. E. Code has classified fusion welded unfired pressure vessels in three groups depending upon the service to which such vessels are to be subjected. Class 1 vessels are those which primarily are used for pressure above 400 pounds but may be used for any class of service. Class 2 vessels are those used for a maximum pressure of 400 pounds and a temperature or 350° if they contain liquids of 700°F if they contain gases. Class 2 vessels are limited to a plate thickness of 1½". Class 3 vessels are those used for a maximum pressure of 200 pound, a temperature of 250°F and having a maximum plate thicknes of ⅝". Furthermore Class 3 vessels may not be used for gases at temperatures greatly exceeding their boiling point at atmospheric pressure. This means that Class 3 vessels cannot be used for ammonia containers.

Each of these three classes of vessels have certain requirements that the welded seams in them must meet.

In Class 1 the welded seams must be examined for soundness by X-ray. The tensile strength, and ductility of the welded seam must be determined for *each* vessel by making a test weld exactly the same as the welds in the vessel and this test weld must meet rather rigid requirements. A test for specific gravity of the weld metal is also included. Class 1 vessels must be stress relieved by heat treatment.

Class 2 and 3 vessels must be welded by "Qualified Welders". It is not the intent of the A. S. M. E. Code, however, to

encourage any arrangement whereby welders are licensed, but rather to indicate what tests the manufacturer must require his employes to pass in order that the manufacturer, the legal authorities and the public may be assured that the welder is competent to do the work in hand and by the particular process of welding actually used. These tests are those I have previously described and complete detail regarding them is given in the A. S. M. E. Unfired Pressure Vessel Code.

The test requirements which a welder for a Class 2 vessel must meet are slightly higher than the requirements for Class 3, the principal difference being in the degree of ductility.

Class 2 vessels having thick walls with respect to the diameter must be stress relieved. Class 3 vessels need not be stress relieved.

The requirements for fusion welded power boiler drums are practically the same as for Class 1 Unfired Pressure Vessels.

While we maintain the position that we do not write the specifications for the method of welding, but are interested only in the results, we at the same time endeavor to give the best possible service in our shop inspection work. To this end we have given a course of training in welding, both gas and electric, to a number of our inspectors. This instruction has been given by agencies we consider to be authorities in their respective fields. In short, we are trying to do a real job in bringing about the construction of safe welded vessels.

ELECTROLYSIS AND SOIL CORROSION IN NEW ORLEANS

By R. J. KUHN*

(Read before the Society, May 8, 1933)

By Electrolysis, throughout this paper, is meant the decomposition or corrosion of an underground metallic structure such as a water main by the passage of stray direct current from the structure to a surrounding electrolyte such as moist earth.

By Stray Currents are meant electric currents which have flowed into the earth and underground structures due to some form of electrical grounds existing on the electric system from which the currents originate. In corrosion work only those stray currents of a direct current nature are ordinarily considered, since it is generally believed that alternating currents have very little electrolysis effect.

Soil Corrosion may be defined as the deterioration of metallic bodies by the chemical action of surrounding media without the influence of stray currents.

Galvanic Currents are electric currents generated by the chemical action of the soil upon underground metallic structures in the corrosion process. Galvanic currents resemble and are in many cases mistaken for stray currents from electric system.

Coatings are usually layers of inert or chemically inhibiting materials covering pipes or cables in order to prevent the corrosion of these structures. Coatings may include paints, enamels, cement coverings, tars, asphalts, asbestos wraps, or thin layers of other metals.

Electrical Drainage is the method of connecting wires to underground pipes and cables to conduct the electricity away so that it cannot discharge to the currounding earth and cause electrolysis.

---

*Member. Electrolysis Engineer, New Orleans Public Service, Inc.

Cathodic Protection is a special application of electrical drainage especially designed to prevent soil corrosion of underground pipes and cables.

History. The early metallic underground systems in New Orleans were the old low pressure gas distribution system and the old water works water distribution system. These lines, some of which are nearly 100 years old, were laid for the most part in the older sections of the city close to the Mississippi River. These old sections were built upon the relatively high sandy "natural levees" of the river upon a soil which is now considered not as corrosive as some of the soils in the lower sections of the city. Due to the relatively good soil, to the thick wall material used, and to the type of corrosion product formed on cast iron very long life was secured on these old mains.

In 1904 the present water distribution system was started and has been in process of construction since. The first mains were laid in the old sections and paralleled in general the old water works mains in the relatively good soil areas. As the city expanded, mains were laid in the lower sections of the city, such as in Broadmoor and Lakeview, where there had previously been no mains and from where no corrosion experience was available.

In 1893 the St. Charles Street railway line was electrified. This was the beginning of the electric railway era in New Orleans. This was but 10 years before the starting of the new water distribution system. As far as we know, very little trouble was experienced on the old water works system from soil corrosion or from electrolysis during this short period in which the electric railways were just coming into their own.

With the advent of the new water system, the electric railways were well developed. About this time the health authorities were practically forcing the installation of water service in places of the old cisterns, necessitating the installation of many water service pipes under street railway tracks where service had not previously existed.

About this same time underground power, telephone and telegraph cable systems were also installed in the downtown area. These cables were covered with lead sheaths for insulation purposes and these lead sheaths were also susceptible to corrosion as well as the water and gas pipes.

Corrosion troubles developed on these systems in the vicinity of the electric railway substations and it was suspected that electrolysis was the cause of much of this trouble.

These conditions led to a study of electrolysis in New Orleans by the Bureau of Standards in 1917-1918 and again in 1921. As a result of these studies, mitigative measures were systematically inaugurated in 1922, which resulted in a sharp reduction of failures of water pipes. From that time to the present, electrolysis study and mitigative measures have been pursued unceasingly mainly through the initiative of the street railway organization. This work has resulted in practically eliminating all electrolysis of metallic underground structures in New Orleans which are roughly valued at over $15,000,000.

In recent years corrosion has been experienced in the low areas in the rear of the city and discussions have arisen as to the cause of this corrosion. In order to determine the causes of corrosion, a soil corrosion experiment station was established six years ago, and to date has yielded a world of information on the natural corrosive forces of the soil acting on buried pipes.

The results obtained indicate:

(1) That the type of corrosion produced by natural soil corrosion is similar to that produced by electrolysis.

(2) That the natural corrosion process starts without the influence of stray currents.

(3) That the natural corrosion process continues at high rates without the influence of stray currents.

(4) That the corrosion process is the result of galvanic electric currents which act similar to stray currents.

This study of soil corrosion has been extended from the cast iron water mains to the lead cable sheaths of the power, telephone and telegraph systems and to the high pressure welded steel gas lines which have been installed in the past five years.

The study indicates that in all cases of corrosion, the process is electro-chemical; i. e., involving electric currents as well as chemical reactions. Working on this basis the problem has been attacked locally from an electrical viewpoint rather than from a chemical one, and very satisfactory results have been obtained.

Of great interest is the fact that it has been discovered that the proper control of the electrical circuits will not only prevent stray current electrolysis, but will also prevent natural soil corrosion. This principle has been applied in New Orleans on more than one underground system, and shows such promising results for economical and efficient operation that it is being copied by several companies in other parts of the United States.

Electrolysis Due to Stray Railway Currents. The street railways in New Orleans operate on direct current electricity at 600 volts. The system is operated from six railway substations, four 200 kilowatts and two of 3000 kilowatts capacity. The cars are supplied with power through a system of insulated feeds and trolleys which are connected to the positive busses of the generators. The current returns to the generators via the rails which are connected at strategic points to the negative busses of the machines. The joints of the rails are either welded or provided with welded copper bonds and are additionally cross-bonded with cables in order to improve the return conductivity.

Despite the good conductivity of the rails, part of the current leaks into the earth which parallels and indirectly contacts the rails. Water mains, gas mains and cable lines also form parallel conductors, and these structures collect current in certain areas and discharge current in other areas provided protective steps have not been taken.

Where collection takes place, there is generally no decomposition of the metal, but where discharge occurs, the metal goes into solution causing destruction of the cable or pipe as the case may be.

These stray currents leave the rails in areas distant from the substations, flow through the earth and return to the rails or other structures connected to the negative busses near the substations. Due to the concentration of current around the substation, the potential differences encountered in the vicinity are usually high, resulting possibly in relatively rapid deterioration of structures not properly protected.

Electrolysis conditions may be particularly severe where an unprotected pipe line or cable crosses perpendicularly under a street railway track which is at a low potential due to its connection to the negative bus of a substation.

Corrosion due to electrolysis very frequently occurs in the form of pitting or deep isolated spots of corrosion. This phenomenon of pitting, rather than the actual amount of metal lost, is the important problem not only with electrolysis but also in nearly all forms of corrosion.

Although pitting occurs on all materials, the characteristics of the pitting is somewhat different and has a great economic significance. Lead, steel and wrought iron when pitted leave small crater-like holes in the pipe which may in time reach the inner surface and cause failure. Cast iron on the other hand corrodes in such fashion as to leave a skeleton of graphite and corrosion products where the original metal once stood. This skeleton maintains the exact shape as the original metal and cannot be distinguished from the cast iron by visual inspection. Furthermore, this graphitic residue has considerable strength and cast iron pipes will not fail perhaps for several years even though the pipe wall has been penetrated by corrosion. It is this feature plus the thicker walls used that has been greatly responsible for the wide use of cast iron for gas and water mains in city distribfiution systems.

Lead sheaths are highly susceptible to electrolysis due to the continuity of the sheaths, to the thinness of the walls and

to the fact that one ampere of current will carry into solution four imes as much lead as it will iron in a given time.

Methods of Preventing Electrolysis. In addition to the construction of two new substations, the negative busses of all but one of the railway substations were cleared of connections to ground plates and to the station building frames. This step prevented the ground plates and building frames collecting current from the earth to the detriment of surrounding structures.

Insulated negative return feeders were provided between the negative bus and the rails at strategic points and resistance grids were installed in the short feeders so that the resistance and voltage drop in each feeder was approximately the same. As said previously, the rails throughout the city were thoroughly welded, bonded and cross-bonded so that the rail system would be as good a conductor as economically feasible.

To more fully protect underground structures, a system of "Electrical Drainage" was installed in each substation area. This system consisted of connecting the various structures such as water mains, steel gas mains, and all forms of cable sheaths into the negative bus through a system of heavy feeders similar to the rail return feeders. By so doing, the stray current which accumulated on the underground lines was conducted from the lines metallically over wires rather than electrolytically through the earth, and corrosion was prevented.

Cross bonds between various underground lines are also frequently resorted to in order to eliminate differences of potential between different lines which do not connect.

Insulated joints have also been used to advantage in many instances on the various lines, and many other methods too numerous to mention have been used for particular cases.

Natural Soil Corrosion. As stated before, the study of electrolysis led to the study of soil corrosion and allied problems. The study of soil corrosion revealed that the city could be roughly divided into three distinct soil areas. First, the high sandy loam soils bordering on the river; second, the low clay soils in the mid-city section; and third, the low acid muck

soils of the Lakeview area. The Metairie-Gentilly sections resemble somewhat the river front sections.

In addition to these natural soil areas there are the polluted waters and refuse found in the various manholes and duct lines used for power, telephone and telegraph cables. The soils and water found in these lines are highly variable in composition, and almost anything can be expected. In some cases, conditions have been found that had all the earmarks of being very corrosive and in many of these cases corrosion was actually found.

In general, the high sandy soil is least corrosive to pipe lines, the clay soils mildly corrosive and the acid muck very badly corrosive.

A study of the characteristics of these soils shows that high colloidal or clay contest of the clay soils, corresponding high moisture, high amounts of soluble salts, low electrical resistivity and a pH bordering on neutral are characteristics of the corrosive soils. Occasional spots of acid due to roots and decayed vegetation are alsoc ontributing causes of corrosion in the low clay areas.

In the lake front acid muck, the predominating characteristics are high moisture and high total acid content from the decayed vegetation.

From our studies, we have divided the corrosion processes into five classes as follows:

(1) Corrosion due to stray currents.

(1) Corrosion due to so-called long line currents or galvanic currents generated between various sections of a long pipe line, or between dissimilar materials.

(3) Corrosion due to local galvanic currents or galvanic currents generated between different parts of the same piece of material.

(4) Corrosion due to galvanic currents generated on adjacent structures.

(5) Corrosion due to direct chemical action.

All of the four latter types of natural corrosion are encountered in practically all sections of the city, but some types predominate more than others in special soil types. The local galvanic currents generated between various parts of the same pipe line are particularly found in the low resistance clay soils, while the so-called direct chemical attack type of corrosion is found in the acid muck soils along the lake front.

The detection of local galvanic currents on a pipe form an interesting story in the study of corrosion. These minute currents have been detected, studied, plotted, and their magnitudes and characteristics determined by the use of a McCollum Earth Current Meter and auxiliary equipment.

These currents have been found to discharge heavily to the earth from the small pitted areas, flow through the earth for perhaps several feet and collect on the pipe or other large areas which are cathodic to the soil due to mill scale, rust film or other causes.

Galvanic currents not only flow in local paths of several inches and feet, but may also flow for several miles through the earth, and in this form are known as long line currents.

Methods of Preventing Soil Corrosion. Soil corrosion problems may be solved, or partly solved, by the proper choice of material for a pipe line or other underground structure. Cast iron is used for water and low pressure gas lines since the thicker walls and type of corrosion product formed tend to give longer life over other materials. In some cases, back fill material is changed in order to minimize corrosion on cast iron lines. Steel is used for high pressure gas lines on account of the greater strength under certain stresses and on account of the fact that steel can be welded, thereby eliminating a lot of joint troubles.

Steel pipe laid in New Orleans has been coated with asphalt and asbestos felt, thus building up a substantial layer of insulation. Coated welded steel pipe is susceptible to stray current, to long line galvanic currents especially between the steel and cast iron systems, and to direct chemical attack. The protection of these steel lines involves, in addition to the coating, in-

sulated joints in all services, insulation between the steel and other lines, electrical drainage at the railway substation, interconnection with other structures at critical points and cathodic protection on sections where stray railway currents are not available.

The process of cathodic protection has been developed locally in order to meet the corrosion problem on the steel gas system occasioned by the imperfections in the asphalt and asbestos coating. In the cathodic protection method, current is generated by a battery charging rectifier placed on a pole along the pipe line route. The negative side of the rectifier is connected to the pipe line to be protected, while the positive side is connected to a suitable metallic ground plate such as several old buried pipes.

The current is drawn from the pipe line over the wire, passes through the rectifier into the ground plate and then dissipates to the earth, returning to the pipe line through pin holes and imperfections in the coating.

At these holes, all tendency for current either electrolysis or galvanic to discharge and corrode is reversed and no corrosion occurs. With the method, protection is afforded to all the spots on the pipe where corrosion would occur were not cathodic protection provided. By the proper selection of a coating of permanently high electrical resistance, by proper insulation of services and crossings, it is possible to protect as high as five miles or more of 20-inch diameter welded steel pipe so that corrosion will stop completely, with a small battery charging rectifier of 12-ampere capacity and operating at very low voltage. The actual voltage required directly to protect the pipe is about .3 volt but several volts are consumed in other parts of the electric circuit.

Fundamentally all underground structures in New Orleans are being protected from corrosion by the same general process; namely, the regulation of the electrical potential of the structures with respect to the surrounding soil.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Board, April 10, 1933

The meeting was called to order by President O'Neill and the following members were present: Messrs. Bres, Wiggin, Dunlap, Moses, Muth and Billingsley. Mr. Ralph Earl and Mr. H. L. Nolan were present spon invitation.

The minutes of the previous meeting were read and approved and the Secretary was instructed to put in line for payment certain bills on hand.

Colonel Bres presented a report relative to the organization of Student Chapters of the A. S. C. E. and A. S. M. E. in Tulane University and requested that arrangements be made to allot $10.00 per annum to each of these organizations, if organized. On motion, duly seconded, this matter was referred to the Budget Committee.

Mr. Ralph Earl, Chairman of the Library Committee, submitted a report on ways of increasing usefulness of the Library. On motion, duly seconded, the Secretary was instructed to carry out the conditions of the report and to make available to out-of-town members books of the Library as recommended by the Library Committee. The Committee was thanked for its report.

Mr. McLean offered suggestions for an outing to be held by the Society about the middle of June and he was requested to furnish further information at a later date.

There being no further business, the meeting adjourned.

F. A. MUTH, Secretary.

Minutes of the Socviety, April 10, 1933

The meeting was called to order about 8:15 P. M., Mr. John H. O'Neill, President, in the chair, F. A. Muth, Secretary, and 115 members and guests present.

On motion, duly seconded, the reading of the minutes was dispensed with.

Some announcements were made by the Chairmen of various committees and from the Chair.

The members listened to a most interesting address on "Fusion Welding of Pressure Vessels," by Mr. W. D. Halsey. The paper was read by Mr. R. T. Burwell. A lively discussion followed the reading of the paper and a rising vote of thanks was then tendered the speaker. The meeting then adjourned to the usual collation.

F. A. MUTH, Secretary.

Minutes of the Board of Direction, May 8, 1933

The meeting was called to order by President O'Neill and the following members were present: Messrs. Wiggin, Bres, Hoots, Dunlap, Moses and Muth.

The minutes of the previous meeting were read and approved and bills on hand were ordered paid.

Mr. D. W. Stewart presented the plan for the Golf Tournament to be held in Jnue, which was approved by the Board.

Mr. H. L. McLean presented a plan for an outing and on motion, duly seconded, it was voted to defer the matter until the Fall, on account of the Golf Tournament.

Letters relative to the resignations of Messrs. A. J. Jacobi, Eric J. Hanneman and D. A. DuPlantier were read and the Secretary was instructed relative to reply to be made to each of these members, inviting attention to the Constitution.

The Budget Committee submitted its report and on motion, duly seconded, it was voted to accept the budget tentatively pending changes to be made from time to time as found necessary during the year.

In accordance with the Constitution, the following Student Members were transferred to Junior Members: J. K. Mayer, Myrtis M. Norton, L. C. Brune, J. W. Wilson, W. J. Drawe, Jr., W. H. Creighton, J. E. Guidry, Jr., John S. Gentilich, R. C. Prouet, Philip A. Weber, T. L. Estorge, M. E. Crettet, L. M. Tognoni, C. R. Monteiro and Frank MacDonald.

Mr. John McInerny was changed to Non-Resident Affiliate and Colonel A. M. Shaw was reinstated as Resident Member.

There being no further business, the meeting adjourned.

FRANK A. MUTH, Secretary.

Minutes of the Regular Meeting of the Society, May 8, 1933

The meeting was called to order about 8:15 P. M., Mr. John H. O'Neill, Presindent, in the chair, F. A. Muth, Secretary, and 60 members and guests present.

The minutes of the previous meeting were read and approved.

Announcement was made of the Golf Tournament to be held on June 2nd.

Announcement was made by Mr. John L. Porter, Chairman of the Committee on Current Engineering Events.

The resolution relative to the Retirement of Civil Service Employees was adopted, in accordance with the Constitution.

Dr. W. E. Winship gave a brief and interesting talk on the work of the Red Cross.

Announcement was made that Mr. R. J. Kuhn, who would be the speaker of the evening, would have his dues remitted for the year, Mr. Kuhn being the first of the members of the Society to avail himself of the offer of the Technical Papers Committee.

Mr. Kuhn then presented a most interesting paper on "Electrolysis." This was followed by considerable discussion.

The meeting then adjourned to the usual collation.

F. A. MUTH, Secretary.

The Proceedings of the Louisiana Engineering Society

Published bi-monthly, February, April, June, August, October, December, under the auspices of the Committee on Publication.

JAMES M. ROBERT, Editor.

Subscription, $2.00 per annum Single copy, 35 cents

Address all communications to
JAMES M. ROBERT, Editor, Tulane University,
New Orleans, La.

Entered as second-class matter July 27, 1916, at the Post Office at New Orleans, Louisiana, under the Act of August 24, 1912.

Acceptance for mailing at special rate of postage provided for in section 1105 Act of October 3, 1917, authorized August 1, 1918.

LOUISIANA ENGINEERING SOCIETY

OFFICERS FOR 1933

President, J. H. O'NEILL, 637 Lowerline Street.
Vice-President, A. L. DUNLAP, 1318 Nashville Avenue.
Secretary, FRANK A. MUTH, 7705 Willow Street.
Treasurer, WALTER B. MOSES, 425 S. Peters Street.

DIRECTORS

E. S. BRES, 311 Maritime Building.
CHARLES WIGGIN, JR., 1105 Maritime Bldg.
PAUL F. HOOTS, 317 Baronne Street.
FRED N. BILLINGSLEY, 702 Interstate Bank Building.

STANDING COMMITTEES

On Technical Papers
Charles Wiggin, Jr., Chairman
James M. Robert
Charles M. Kerr
Carl Schneider

Motivating Committee
James M. Robert, Chairman
W. B. Gregory
George R. Hammett
George P. Rice
James M. Todd

On Library
Ralph Earl, Chairman
C. W. Ricker
A. J. Harris
G. W. Lawes

On Publications—Division "A"
James M. Robert, Chairman
Frank A. Muth

On Publications—Division "B"
D. W. Stewart, Chairman
Harry B. Henderlite
J. A. McNiven
W. H. Scales

On Entertainments and Outings
H. L. McLean, Chairman
S. E. Hottinger
Ole K. Olsen
D. W. Stewart

On Legislation
James M. Todd, Chairman
E. S. Bres, Vice-Chairman
F. N. Billingsley
Donald Derickson
George R. Hammett
Harry Jacobs
George P. Rice
Ira W. Sylvester

On Finance
A. L. Dunlap, Chairman
Walter B. Moses
F. N. Billingsley

On Membership—Division "A"
E. S. Bres, Chairman
Frank G. Frost, Vice-Chairman
A. L. Dunlap
H. B. Henderlite
Harry Jacobs
J. T. Bullen
Ira W. Sylvester
Bryson Vallas
B. W. Pegues

On Membership—Division "B"
W. B. Gregory, Chairman
James M. Todd
B. H. Grehan

On Employment
R. H. Baumbach, Chairman
R. Bassich
H. B. Henderlite

On Civic and Industrial Affairs
A. M. Lockett, Chairman
A. B. Paterson, Vice-Chairman
J. F. Coleman
Donald Derickson
A. T. Dusenbury
John Klorer
F. N. Billingsley
James M. Todd

The headquarters of the Society are in the State Museum Building, Jackson Square.

All business communications should be addressed to F. A. Muth, Secretary, 7705 Willow Street, New Orleans, La.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XIX. AUGUST, 1933 NO. 4

CONTENTS

EDITORIAL NOTES AND COMMENT

Renewed Society Activity During the Coming Year. We are about to embark on a new year of activity within the Society. Industrial and social conditions in this country—nay, in the world,—are such that it is necessary to keep constantly on the alert in order that the procession shall not pass us by. In the great industrial and social rehabilitation that is bound to come, the engineer must perforce take a leading part. Long deferred repairs, long deferred construction, and long deferred design must now be started and carried on. The engineers must do these things. Our heavy pull out of the mud will also require a great deal of executive ability. The engineer has this executive ability, too. His inherent honesty, his usual fearlessness and his logical processes make him the highest type of executive. He has always shown this when opportunity offered.

This is by way of saying that during the coming year we must do our share toward making the Society activities most valuable to each other and, therefore, to the community.

The fundamental thought behind all such societies as ours is mutual improvement and benefit, but this object is not attained unless all members share the activities. Be sure to write papers, but above all attend meetings and take part in discussions. This is a valuable privilege of which we do not always take advantage. The country needs now, and will soon demand, our type of constructive thinking. Let's be sure we are ready for it when the call comes.

The Economics of Transportation by Waterways, Motor Truck and Railroads. An excellent symposium on the subject of transportation is printed in this issue of the Proceedings. The discussions are by men of unquestioned authority and they are extremely interesting as they give the points of view of three men—men who are naturally and quite logically biased in favor of the means of transportation which they represent. If you are at all interested in transportation and its economics, you will find considerable entertainment and some bewilderment as you survey the different points of view.

PAPERS AND DISCUSSIONS

"ECONOMICS OF WATERWAYS"

By Theodore Brent*

(Read before the Society June 12th, 1933)

The advantages secured sometimes by waterway transport and sometimes by rail are best understood through a view of the essential differences between the two modes of transportation.

First—The waterway is a natural resource and is limited by the numbers of potentially navigable waters; while the railroad is an artificially developed highway whose development and growth is limited only by economical considerations.

Second—The waterways are public highways, open to the use of any individual and to any type of transport, which leads to differentiated service and great competitive effort. Railroads operate over private rights-of-way and tend unceasingly toward monopoly.

Third—Waterway transportation is adaptable to specialized and unregulated service but railroad service and equipment function best when standardized and operated regularly.

The first railroads were built to supplement water traffic by feeders tapping the interior of the country. As these feeders grew in number and mileage and joined each other, they started competing for the long haul to the seaboard.

The almost total elimination of water carriers by the competition of railways has been generally regarded as a "survival of the fittest." This is more apparent than true, though the result was aided by the cheap construction of the first railroad and the bad state of the water channels which made service on the rivers unreliable. Before these channels could be permanently improved, the water traffic was killed by railroad policy that monopolized the really public service of providing highway transportation facilities. This was done by rate adjustments and political pressure. (As in the case of the New York State Canal,

*Transportation Counsel, New Orleans.

where the removal of the low bridges over the developed canal was prevented by political pressure, thus crippling profitable use of this $200,000,000 investment in waterways.)

The national government early in its life recognized the public service of transportation and started building roads into the country. Finding these roads more than they could afford, the states chartered private companies to build and maintain toll highways. Some of these highways were built of steel rails on which the public could drive its own vehicles. The advent of the fast steam locomotive changed this and created a standard service with a monopolistic right to transport persons and property over the steel roads and at any price the traffic would bear.

The profit from these roads were great enough to induce over-building of the railroads, until early in the 20th century there were some 215,000 main line railroads in the United States. This was practically a monopoly of the public service of highways, as the government did not abandon its duty to construct public roads, but confined its building to roads and streets leading to the railroads, rather than paralleling them.

But today, thirty years later, there are over 700,000 miles of hard-surfaced roads paralleling the present 250,000 miles of main line railroads, and there move over them 23,000,000 motor passenger cars and more than 3,500,000 motor trucks.

The public is now aware that the railroads are over-built, and many rail officials admit it. *The question, the answer to which is now paramount, is whether cheap transportation or protection of railroad investments is to be considered of the greater public interest.*

Waterway construction is not in danger of over-building for profit, but it is handicapped by delays incident to public timidity, private greed, and competitive interests.

The early railroads were cheaply built but dearly financed, and this original capitalization is still drawing interest in rates from the public. Also the heavier traffic density of today entails a proportionately high expenditure on rights-of-way and improvements and terminals. Thus, in 1911 the Class I railroads carried 1,161,000 tons of freight per mile of road at an investment in road and equipment per mile that averaged $55,200.00. While in 1928, with average traffic density of 1,972,000 tons

per mile, the investment was $83,500 per mile. For roads of heavy traffic density like the Pittsburgh & Lake Erie, which carries 10,688,000 ton-miles per mile of road, the investment in road and equipment is $317,000 per mile.

Between January 1, 1920, and the close of 1930 the railroads increased their capitalization $3,244,000,000 to meet the increase in transportation effectively and to preserve their monopoly. A study of increased expenditures necessary to provide adequate transportation by rail of the entire traffic of this country dissipates the seeming advantage of low first construction cost of railroads. This consideration urges the encouragement of lower-cost forms of carriage, in the public interest.

The waterways can provide this cheaper transportation.

The high first cost of waterway construction is more apparent than real. It is not economical to improve a stream to less than standard depth and width, which may take care of many sized crafts; so in improving the Ohio River for economic 9-foot navigation, the result was the provision of a system capable of carrying over 175,000,000 ton-miles per mile of stream.

Yet this potential traffic was made possible at a cost of only $121,000 per mile, less than half the cost per mile of the Pittsburgh & Lake Erie, or any of the railroads ranking among the first ten in ton-mile density, although the channel provided could carry more than 17 times as much traffic. Besides cheaper first construction costs, waterway equipment is cheaper than railway; barges to carry 2,000 tons cost $50,000, freight cars for that tonnage cost over $100,000. The same holds true for towboat and locomotives. Another advantage is the comparative small cost of enlarging the traffic capacity of a channel after the first cost of construction. To double the capacity of the Monongahela locks would cost only a fraction of the original investment.

Money is sometimes spent unwisely in waterway improvement, as in rail construction. In the latter case, this expenditure is wiped out in financial reorganization, but in Government accounting all costs are pyramided, and the capital charges against the waterways include every nickel ever spent by the Government, wisely or not.

While the private right-of-way and standardized service of railroads lead naturally to monopoly, the public water highway is open to every person, citizen or alien, leading naturally to free competition. Thus, the railways are paramount in their field of fast, efficient service for high-priced commodities. The waterways are more economical in the transportation of bulk and cheaper commodities, where the cost of transportation is of more consideration.

Water transportation is cheaper because there is a smaller proportion of deadweight to paying load, being generally 20 per cent, against the rail's proportion of 50 per cent. Other economies whose savings pass to the shipper accumulate through less frequent departures and greater size shipments.

Water transportation is essentially flexible and its rates specialized and advantageous to shippers. Differences in size and speed of boats allow different rates for different loads, low rates for slow moving shipment and higher rates for speedier service. Under these conditions, standardization of rates or service would not be in the public interest, which benefits most by unhampered private efforts in fair competition.

ECONOMICS OF HIGHWAY TRANSPORTATION BY BUS AND TRUCKS

By George Montegut*

(Read before the Society June 12th, 1933)

I cannot let this opportunity go by without thanking the engineering profession for allowing me to address them, and to thank them for the great part they have played in making possible the successful operation of motor vehicles over the highways. Also I wish to thank them for making possible the vast network of highways which this country possesses. But I want it understood from the beginning of this discussion that, in my opinion, these are not free highways as the railroads, or rather certain elements in the railroads, have tried to make you believe. To back up my statement I will quote an article from "Motor Freight":

> "**S. A. E. Chapter Condemns Legislative Attacks of Railroads.**—Use of legislative rather than economic types of ammunition by railroads in their warfare against competing transport agencies was condemned at a recent meeting of the Metropolitan Chapter of the Society of Automotive Engineers in New York City.
>
> After describing the facility with which organized minorities have been able to secure the enactment of legislation for the special benefit of their members, David C. Fenner, chairman of the Motor Vehicle Conference Committee, charged that these methods are being employed by railroad interests with the result that legislative halls in some forty states have been flooded with proposals that for the most part were unnecessarily selfish, unscientific and very decidedly not in the public interest.
>
> The need for uniformity among the states in the methods of taxing and of regulating the operation of motor vehicles was regarded as paramount both by Mr. Fenner and by another speaker, Arthur J. Scaife,

*President and Manager, Intercity Express Lines.

> Engineer of the White Company and Past-President of the Society of Automotive Engineers. Reviewing the statutes of the various states, Mr. Scaife found no evidence to support the railroad contention that the operation of motor vehicles, particularly of those which are regarded by the railroads as competitors, is inadequately regulated."

We will now for comparison see which of the three popular methods of transportation compare as to mileage:

> Waterways have 65,000,000 miles
> Railroads have 249,000 miles
> Highways have 3,000,000 miles.

Now just imagine in your mind a country which has more than three million miles of highways and the greatest sum of money invested in them during either modern or ancient times and see what this has brought about in these United States of America. You are bound to come to the conclusion that it absolutely has eliminated sectional hatred. I am happy to state that had the harmonious condition which exist now between the states existed during the Civil War, we would not have had any Civil War. Today, men from Maine to California, from the Great Lakes to the Gulf, think as one, dress as one, eat as one and drink as one. It has helped to obliterate the hay-seed as well as the tenderfoot and it is, in my opinion, the one thing which has made America, more than ever before, conscious of her spirit of nationalism. In this discussion I will deal only with figures of authoritative sources, namely, that body which controls the railroads themselves, the Interstate Commerce Commission; the Coolidge Investigation Committee; the Columbia University; the Louisiana Tax Commission and the Louisiana Highway Commission.

Now what goes to make up revenue which is used in constructing as well as maintaining the highways of Louisiana? Up to the present date there has been invested in their construction the huge amount of 187 million dollars. And keep in mind what the state receives in revenue from the two sources which are most discussed, railroad and motor taxes.

The railroads, in their plea for consideration from the Reconstruction Finance Corporation, say that we, the motor truck and bus operators, are subsidized competition; that we pay no costs for the highways over which we travel; and that they were being constructed for our free use by the state, while the railroads not only have to build their rights of ways, but maintain them at their own expense. I have therefore compiled figures taken from the records of the Louisiana Tax Commission. These figures are for the year 1931. My reason for doing this is that 1932 was an off year as far as the business world was concerned, and I want to be fair to the railroads and use 1931 figures. Yet casually looking at the '32 records, you will find that railroads were taxed $1012 per mile in 1932, while in 1931 they were taxed $1712 per mile, so they get a break of $700 per mile in these figures:

Louisiana railroads were assessed in 1931	$165 million
Louisiana railroads pay (estimated) 3½%) taxes	$ 5 million
Louisiana motor vehicles are assessed	$ 51 million
Louisiana motor vehicles pay taxes	$ 16 million
Number of men employed by railroads in Louisiana	20 thousand
Number of truck drivers in Louisiana	65 thousand
Number of railroads in Louisiana	15
Number of trucks in Louisiana	54 thousand
Increase of railroad mileage in Louisiana	0
Increase in registration of vehicles	30.7
Number of persons engaged by railroads in United States	1,169,229
Total number of persons engaged by motor vehicles	4,020,000
Number of carloads automobile freight handled by railroads in 1931	3,090,000

The last item will show that while the railroads state that the truck and bus are taking all their business from them, the

records of the I. C. C. show that 12% of all freight hauled by the railroads of the United States comes from the commodities used to manufacture motor vehicles and hauling these vehicles to their destination after completion.

The Interstate Commerce Commission records, as a result of an investigation covering a period of two years, show that the common carrier truck which holds itself out for hire to handle any commodities offered them on a regular schedule between any two points is 1.7% of the total freight moved in the United States, and that the privately owned truck carrier is 7% of the freight hauled, leaving the railroads 91.3%.

And again the railroads make a plea despite the fact that they have lost 8.7% of their business to the truck and bus. They go to the R. F. C. for loans, telling them that because of another loss, namely, L. C. L., or less than carload movement of freight which they say has gone to the truck, that they are threatened with bankruptcy, ruin, receivership, curtailment of employment, etc. Yet the records of the I. C. C. show that 27% of all railroad equipment is used in L. C. L. movement and that the revenue from same is less than 2% of the gross income of the railroad. Who is so foolish as to believe that it is not good business for the railroads to have such an industry as the motor truck take over the only business which the railroad records show is, and say is, a total loss to them? Since we have taken all of this business from the railroads it would be most natural that there should be unemployment, so the discussion naturally drifts to that subject.

Long before trucks were used, or let us describe it as the pre-motor and improved highway use, engineers planned and designed for the use of railroads the mogul type of engine, which increased their pulling power to such an extent that one engine now pulls a train of 125 or more cars as against 25 cars in the good old days. Block signals were installed, eliminating long delays by trains on side tracks; heavier rails were laid; larger box cars carrying more weight run over them; grades were cut down; tunnels built through mountains, enabling trains to be run on faster schedules, as well as the elimination of curves wherever possible. From these changes it can

readily be seen that the sole object was to reduce employment wherever possible. The train pulled by a mogul engine itself reduced the number of men in the operating crews five to one.

Now let us take the pre-motor age from 1910 to 1920 and compare it with the beginning of motor age from 1921 to the present. The records will show that the railroads employed 400,000 more people in the pre-motor age than they did since the truck and bus came into existence. What happened to the tonnage? In the period from 1915 to 1921, without any apparent competition by motor, the railroads hauled 9 billion dollars' worth of freight, and during the period from 1926 through 1932, with that terrible competition, namely, motor truck and bus, with the worst depression which the world has ever known, the railroads hauled 21 billion dollars worth of freight with 400,000 fewer employees than in the pre-motor age. I challenge any railroad man to deny these figures. Yet they are audacious enough to still say that because of motor truck competition they are losing business. Who hasn't lost business in proportion to what the railroads have lost?

We now come to the cry of the railroads that if the truck and bus (they dare not mention passenger cars, but they mean it for them as well) are not legislated from the highways or restricted to carrying a limited amount of freight, the railroads will fail and with them will fall the life insurance companies, the savings banks and fiduciary institutions. Because of the limited time I cannot go fully into this phase of the subject, but the report of the Coolidge committee which the insurance companies themselves were part of, report after an extensive investigation that if by some magical whim all of the property which the railroads own were destroyed, the loss to every policyholder would be the staggering sum of $48.00 per policy. Now, don't misunderstand me, I did not say 48%, but $48.00 per policy, whether one held a $100.00 or a $100,000.00 policy. As to the savings banks, they own only 12% of railroad securities, and failures, as far as Louisiana is concerned, was those state banks which were politically controlled. The present investigation of the house of Morgan has acquainted you with

what goes on, as to how stocks and bonds can be manipulated, and watered.

In this connection I must now talk about water. There is only this to state, that if there was not so much of it in the railroad stocks, you engineers would not have such a hard struggle in figuring what to do for the barge lines when the rivers and canals are at their low stage in the northern part of the country. But I am drifting from my subject and will confine my remaining remarks to railroads, as they are the ones which take issue with the truckmen. In my opinion, the railroads should learn more about the evolution of time, not judge the present by the same type of trains that are operating as when I worked for them 22 years ago. In these modern times trucks are the retailers of transportation, while the railroads should be satisfied being the wholesalers. While we are on this part of the subject, let's see what the official of a wide-awake railroad has to say about these destroyers of traffic. I now quote Mr. John F. Deasy, vice-president of the Pennsylvania Railroad: "If highway transportation is more economical than rail transportation, if the two can be co-ordinated and produce a cheaper transportation to the public—and I believe it can be done—then, obviously, that is the thing to do. Under no circumstances do I advocate regulation for the purpose of restricting highway competition for the benefit of rail carriers."

Here is what is happening to our highways. The railways have formed themselves into what might be called saviours of the highways, and last year actually controlled the legislature and had laws passed to obliterate from the highways motor trucks which carry more than five tons of pay load on a highway built of 6—8—6 thickness. This is a type of highway of which Mr. Tom MacDonald, renowned engineer and the present chief of Bureau of Public Roads for the United States, said, on March 30, 1932, as follows: "With reference to your letter of March 18, the vehicular factors that determine the effect upon the road are the wheel load, the proportions of the wheel load above and below the springs, the character and dimensions of the tires, and the speed. Gross load per se is not a determining factor, nor is capacity."

Our tests show that the stress in the road surface is not increased. Thus, with a maximum wheel load of 8,000 pounds, the load that might be placed upon a six-wheel vehicle, resulting in a gross load of 40,000 pounds, would produce no greater stress in the road than the gross load of 24,000 pounds that could, under the same restriction of wheel load, be carried on a four-wheel vehicle.

Assuming the use of pneumatic tires a wheel load of 8,000 pounds is conservative as a maximum, which should be carried with reasonable safety by any improved road.

And now this leads us to the economics of motor transportation, and gentlemen, believe me when I tell you that trucks do more accidentally to help this country than the railroads do on purpose. You all can remember the mud days and the salesmen who made but two trips per year and sold the country merchant a six-months supply of merchandise. What is happening today? A merchant only stocks for his immediate needs. When he is about out of whatever goods he needs he can order by mail and the next day he knows that his supply of goods will be forthcoming on a truck which delivers these goods to his door. He saves freight and his capital is not tied up for an indefinite period. Thucks give employment to the following trades, and amounts of money received by these trades are in addition to the amounts which I previously read:

Mechanics and supplies	$56,760,000
Tires and tubes	21,120,000
Garages	1,452,000
Personal property taxes and interest	11,880,000
Insurance	2,310,000
Gas and oil	53,490,000
Total	$194,502,000

And now we come to the most ridiculous statement: That the railroads in being forced to cut down employment, the discharged men have no field to which they can look to for employment. Well, this statement is not true, as more than 80% of the successful motor truck operators were formerly employed by railroads. Their foresight, intelligence or whatever you might wish

to call it gave them the vision to see the possibilities of motor transportation.

I have but one thought as to why the railroads did not go to trucking before this. Motor truck lines are not promoted by stock selling schemes. Usually they develop from individual owners who finance their own business and do not look to the government for loans. Nor do they pay one hundred thousand dollars a year for private cars to ride parasitic presidents, chairmen of boards and preferred dividend seeking stockholders. Time doesn't permit me to further go into the details of the economic use of motor transportation, and in closing let me remind you that in the view of most railroad men, we are just another type of prostitute transportation. I can't help but answer this accusation in the words of Him who said: "He that is without sin among you let him first cast a stone."

ECONOMICS OF RAILWAY TRANSPORTATION

By SAMUEL O. DUNN*

(Read before the Society June 12th, 1933)

Of all facts regarding the economics of transportation, the one which needs to be emphasized, because it is so commonly disregarded, is the one fact which it would seem would be the most obvious. This is that every kind of cost that is incurred in providing transportation, whether by air, highway, waterway or railway, must be and is paid by somebody. All the costs of transportating freight may be paid in the rates charged the shippers, but if only part of the costs are covered by the rates charged the shippers, then inevitably the rest of the costs are paid by other persons. The most important issue between carriers by highway and inland waterway, on the one hand, and carriers by railway, on the other hand, is as to who should pay, and who actually does pay, for the transportation of freight.

We are confronted with a question of economic principle and a question of fact. The question of principle is whether it is economically sound that those to whom a transportation service is rendered shall be required to pay rates which in the aggregate will cover all the costs of rendering that service. The question of fact is as to whether the tax-paying public does or does not now pay part of the costs of furnishing certain kinds of transportation.

Let us consider first the question of economic principle. At present when freight is transported by railway, the rate paid by the shipper is all that is paid by anybody for the service, and if the Interstate Commerce Commission performs the duty imposed upon it by law, the rate paid will correspond as closely as practicable with the total costs incurred in rendering the particular service. Would it be economically sound and desirable for Congress completely to change this policy by providing by law that all existing railway rates should be reduced, say, 25 or 50 per cent., and that there should be handed over to the railways from the public treasury each year in

*Editor, Railway Age, Chicago, Ill.

future enough money collected from all who pay Federal taxes to reimburse the railways for the reduction made in their rates, and for the costs incurred by them which, in consequence of the reduction, were not covered by the rates collected by them from the shippers?

Surely, whether freight moves over a paved highway, or a water highway, or a rail highway does not determine the question as to whether it is economically sound for the public to be taxed to pay a part of the cost of transportating it. If it is economically sound for a part of the costs of transportation by highway or waterway to be paid by the public in taxes, then it must be economically sound for part of the costs of transportation by rail to be paid by the public in taxes. What argument can be offered, then, in support of the view that it would be economically sound to impose upon the taxpayers a large part of the costs of all kinds of transportation None at all. As a matter of economic principle there is no more reason why any producer of raw materials or of manufactured goods should have part of his transportation costs paid by the taxpayers than why he should have part of his capital furnished or his labor paid for by the taxpayers.

Let us turn now, from the question of principle to the question of fact. Do shippers now have part of their costs of transportation paid by the taxpayers? They do not when they ship by railroad. They obviously do when the ship by inland waterways, because all the costs of maintaining them are paid by the government with money collected in taxes. The way in which to make shippers pay all the costs of transporting freight upon inland waterways seems plain. This would be to require those who operate boats upon the waterways to pay a toll upon each ton transported one mile equivalent to the cost per ton-mile now borne by the taxpayers because of their construction and maintenance of the waterways.

But the advocates of inland waterways are opposed to charging tolls upon them. Why? Principally because if adequate tolls were charged, no freight would be shipped upon most existing inland waterways and the entire inland waterway movement would become "a theory killed by a fact." The average rate per ton per mile of the railways in Ohio

River territory is less than 9 mills. The average rate per ton per mile upon the Ohio River system is only about 6 mills, but average taxes per ton mile paid by the public as interest upon the investment in and for the maintenance of the Ohio River system are about 6½ mills per ton mile, and consequently the average rate per ton per mile that shippers would have to pay on the Ohio River system, if they paid the total costs of transportation upon it, would be about 12½ mills, or 40 per cent more than the average railway rate per ton mile in the same territory.

The figures I have given regarding total costs of transportation upon the Ohio River system are based upon detailed statistics presented in a survey of inland water transportation in the United States published by the Bureau of Railway Economics in 1930, and the approximate correctness of which has never been successfully challenged by any advocate of inland waterways. In the same survey the Bureau of Railway Economics reached the conclusion that the total cost of transportation upon the lower Mississippi is 12 per cent greater than the average rate per ton mile charged by the railways operating in this territory. Shippers would not pay the total costs of transportation upon any inland waterway excepting the Great Lakes and the Monongahela River, because they could ship for less by rail.

Now, how about truck transportation? It costs about $10,000 a mile more to build a highway for heavy busses and trucks than to build one for automobiles and light trucks, and correspondingly more to maintain it, and on sound economic principles the operators of heavy busses and trucks should pay enough completely to reimburse the public for all the costs incurred by it in providing them with public property on which to conduct their private business. It has long been my opinion that there is not a state in the union in which the operators of heavy trucks are paying anywhere near as much for the use of the public highways as they should be paying, and the more I study the facts the more strongly I become of this opinion. One of the few states in which a complete inventory of all motor vehicles is available is Kansas. The current annual cost of the highways in Kansas is about $27,-

400,000. Estimates of what trucks are paying for the use of Kansas highways, and estimates of what they should be paying based upon formulas of highway costs developed by Charles E. Marvin, Jr., mechanical engineer of the United States Bureau of Standards, indicate that the license fees, gasoline taxes and ton mile taxes now being paid in Kansas by the owners of trucks and automobiles weighing one ton or less total an average of $44 per vehicle and should average only $40. On the other hand, the aggregate paid by all operators of trucks of capacities exceeding one ton for the use of Kansas highways in the year ended on June 30, 1932, should have been $1,975,000 in order to have completely reimbursed the public for costs incurred by it in providing highways for heavy trucks, while the amount actually paid by them was only $327,000, or less than 17 per cent. of what it should have been.

The fundamental fact which every real investigation of the subject will demonstrate is that the policy which the Federal and state governments have been following under the dictation of the United States Bureau of Public Roads in building highways for heavy trucks is absolutely unsound economically. Commercial highway vehicles can pay, and should be compelled to pay, much more for the use of the highways than they are now paying, but the figures for Kansas show, and corresponding figures for any other state will show, that the highway costs of heavy truck transportation are so great that if an attempt were made to charge commercial vehicles rentals high enough to yield the taxpaying public an adequate return upon the highway investment it has made for such vehicles, the rentals imposed would drive practically all trucks of more than 2 tons capacity off the highways, excepting for short hauls, because of the inability of their operators to make rates low enough to meet railway competition.

In other words, the *total economic cost* of heavy truck transportation like the *total economic cost* of inland water transportation, is so much greater than the *total economic cost* of railroad transportation, that neither trucks nor inland waterways could successfully compete with the railways for most of the freight now carried by inland waterway and truck if the operators of the trucks and boats, like the operators of the railways, had to

base their rates upon the *total costs* incurred in rendering transportation service, instead of being able to get the public to pay in taxes a large part of those costs.

There are numerous other facts regarding the economics of railroad transportation as compared with the economics of inland water and highway transportation which I should like to emphasize, but to which I can hardly call attention.

The rates the railroads can afford to charge are largely determined by the volume of their traffic. Other things being equal, the larger the volume the lower the rates can be made, and the smaller the volume the higher the rates must be made. The freight handled by the trucks last year would have yielded the railways, if it had been handled by them, five hundred to six hundred millions of revenues. Prevailing government policies which help to divert traffic from the railways make higher railway rates necessary than otherwise would be necessary.

The working hours of railway employees are much shorter and their wages per hour much higher than those of employees of either trucks or boats upon inland waterways. If it is desirable to maintain high wages and a high standard of living in this country, as we all believe, why should our governments, by their policies of regulation and subsidization, discriminate against the railroads and in favor of other means of transportation, when the necessary tendency of such discrimination is to deprive railway men of employment and to reduce wages and standards of living?

The railroads represent a very large investment, and not only have their stocks been bought by hundreds of thousands of persons, but billions of dollars of their bonds have been bought by life insurance companies, savings banks and other fiduciary institutions in the expectation that the people's government would at least not destroy the people's investments in railroads by subsidizing competing agencies of transportation and applying to the railways restrictive regulation not applied to their competitors. Is it sound economics or public policy for the Federal and state governments to persist in following discriminatory policies which have a direct and inevitable tendency to destroy the value of the railroad securities in which billions of dollars of the people's savings have been invested?

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Board of Direction

There was no regular meeting held on June 12th.

F. A. MUTH, Secretary.

Minutes of the Regular Meeting of the Society, June 12th, 1933

The meeting was called to order about 8:10 P. M. by Mr. A. L. Dunlap, Vice-President, F. A. Muth, Secretary, and 342 members and guests present. The meeting was held in the Auditorium of the Eleanor McMain High School.

The reading of the minutes of the previous meeting was dispensed with.

Announcements were made from the chair and the regret of the inability of the President to attend the meeting, due to his absence from the city, was also announced.

On motion, duly seconded, the Society voted to recess for the summer in the usual manner.

The technical exercises consisted of a series of discussions on transportation services. Mr. Theodore Brent discussed "The Economics of Waterway Transportation". Mr. George Montegut discussed "The Economics of Truck Transportation", and Mr. Samuel O. Dunn discussed "The Economics of Railroad Transportation". Mr. A. M. Lockett acted as Master of Ceremonies for the discussion.

The meeting then adjourned.

F. A. MUTH, Secretary.

The Proceedings of the Louisiana Engineering Society

Published bi-monthly, February, April, June, August, October, December, under the auspices of the Committee on Publication.

JAMES M. ROBERT, Editor.

Subscription, $2.00 per annum Single copy, 35 cents

Address all communications to
JAMES M. ROBERT, Editor, Tulane University,
New Orleans, La.

Entered as second-class matter July 27, 1916, at the Post Office at New Orleans, Louisiana, under the Act of August 24, 1912.
Acceptance for mailing at special rate of postage provided for in section 1105 Act of October 3, 1917, authorized August 1, 1918.

LOUISIANA ENGINEERING SOCIETY

OFFICERS FOR 1933

President, J. H. O'NEILL, 637 Lowerline Street.
Vice-President, A. L. DUNLAP, 1318 Nashville Avenue.
Secretary, FRANK A. MUTH, 7705 Willow Street.
Treasurer, WALTER B. MOSES, 425 S. Peters Street.

DIRECTORS

E. S. BRES, 311 Maritime Building.
CHARLES WIGGIN, JR., 1105 Maritime Bldg.
PAUL F. HOOTS, 317 Baronne Street.
FRED N. BILLINGSLEY, 702 Interstate Bank Building.

STANDING COMMITTEES

On Technical Papers
Charles Wiggin, Jr., Chairman
James M. Robert
Charles M. Kerr
Carl Schneider

Motivating Committee
James M. Robert, Chairman
W. B. Gregory
George R. Hammett
George P. Rice
James M. Todd

On Library
Ralph Earl, Chairman
C. W. Ricker
A. J. Harris
G. W. Lawes

On Publications—Division "A"
James M. Robert, Chairman
Frank A. Muth

On Publications—Division "B"
D. W. Stewart, Chairman
Harry B. Henderlite
J. A. McNiven
W. H. Scales

On Entertainments and Outings
H. L. McLean, Chairman
S. E. Hottinger
Ole K. Olsen
D. W. Stewart

On Legislation
James M. Todd, Chairman
E. S. Bres, Vice-Chairman
F. N. Billingsley
Donald Derickson
George R. Hammett
Harry Jacobs
George P. Rice
Ira W. Sylvester

On Finance
A. L. Dunlap, Chairman
Walter B. Moses
F. N. Billingsley

On Membership—Division "A"
E. S. Bres, Chairman
Frank G. Frost, Vice-Chairman
A. L. Dunlap
H. B. Henderlite
Harry Jacobs
J. T. Bullen
Ira W. Sylvester
Bryson Vallas
B. W. Pegues

On Membership—Division "B"
W. B. Gregory, Chairman
James M. Todd
B. H. Grehan

On Employment
R. H. Baumbach, Chairman
R. Bassich
H. B. Henderlite

On Civic and Industrial Affairs
A. M. Lockett, Chairman
A. B. Paterson, Vice-Chairman
J. F. Coleman
Donald Derickson
A. T. Dusenbury
John Klorer
F. N. Billingsley
James M. Todd

The headquarters of the Society are in the State Museum Building, Jackson Square.

All business communications should be addressed to F. A. Muth, Secretary, 7705 Willow Street, New Orleans, La.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XIX. OCTOBER, 1933 NO. 5

CONTENTS

EDITORIAL NOTES AND COMMENT

Our Recovery Program. Say what you will, the latest activities of the Government for the restoration of normal times (through CWA and PWA) seem to be along the right lines.

If it is granted that the Government must put billions of dollars into relieving our national distress, there are only two locations where this money may be put—at the top or at the bottom. Also, a necessary corollary to recovery is that whatever money the Government puts out should go into circulation as quickly as possible, and at the same time should increase the purchasing power of the great mass of the people.

The first experiments were confined to putting in money at the top and they fell woefully short of the desired effect. Loans and grants to banks and large industrial organizations

amounted to enormous sums of money, but somehow or other, a large proportion of this money did not filter down to Mr. Laborer. And the increase of Mr. Laborer's purchasing power is quite essential to recovery.

The latest development, however, is to put the money in at the bottom. Through CWA, PWA and other agencies, government money is put directly into the hands of those who toil, Mr. Laborer. It doesn't have to filter down to him through banking and industrial organizations, with a goodly proportion of it hanging on the numerous ledges of financial manipulation. Whatever money Mr. Laborer gets in return for his toil will go one hundred per cent into circulation not later than next Saturday night.

And, so we watch with interest the effect of putting in Government money at the bottom instead of at the top.

The National Industry Recovery Act. We print in this issue a talk to our members in September by Mr. Orloff Henry, State Engineer, Public Works Administration. In this article Mr. Henry outlines the organization of the PWA and explains its functions. The article should be read by every one of our members.

In the matter of spending the public's money on such a gigantic scale, there looms to the already overburdened taxpayer the dismaying possibility of even greater taxes later on. Any taxes, to the taxpayer, means a minimum for John Public and a maximum for graft and inefficiency and waste.

It is quite reassuring, therefore, to read in Mr. Henry's article the statement that elaborate machinery has been set up by the Government to see that every dollar spent by the PWA will be spent efficiently and for the public good.

Engineering in China. We are glad to welcome the return of our old friend, Col. A. M. Shaw, after an absence of some three years in China. Col. Shaw's interesting article on Engineering in China is printed in this issue. When we think of history in terms of the United States, and then think of it

again in terms of some ancient country such as China, we are likely to have our notions of time somewhat disjointed. For instance, the building of certain flood protection work required a preliminary "promotion period" of a thousand years.

This length of time, while only a comparatively small section of Chinese History, is several times the life of the United States and twice the life of America from the time of the earliest settlement by the whites.

Our Organization and Dues. Again we make an appeal to our membership to be prompt with their dues. Especially are your officers anxious to collect dues which are considerably in arrears. An organization such as this, having no outside means of support, must depend solely on the dues of its members for existence. Hence this appeal once more.

PAPERS AND DISCUSSIONS

THE NATIONAL INDUSTRIAL RECOVERY ACT

ORLOFF HENRY.*

Read before the Society September 11, 1933.

It may safely be stated that the economic conditions which have prevailed throughout the world during the past four years have been without precedent. Depressions and so-called panics of varying intensity have recurred in cycles of unpleasant regularity; have run their courses and have been succeeded by periods of increasingly great prosperity. Measures had been devised to prevent such recurrence, and with the adoption of our Federal Reserve System, it was confidently predicted that another panic would be impossible. And then, in the security of the greatest era of prosperity we had ever known, the crash came.

Perhaps the most disturbing factor in the whole chaotic situation was the collapse of leadership. Among all those to whom the country had become accustomed to look for guidance in business matters there was not one who had a solution to offer. Apparently none had foreseen the condition; certainly none had sounded a warning.

Business was allowed to drag along in the hope that the conditions would cure themselves. They had always done so in the past, why should they not do so now? And so the usual period of economic distress dragged by with no recovery in sight. Unemployment and distress increased, and it became evident that the conditions would not adjust themselves. I think it is one of the greatest proofs of the strength of American manhood and womanhood and the worth of American institutions that there were no disorders. Nowhere was there any tendency to resort to anarchy. The American people would play the game.

And then, as in all great crises in our history, a great leader appeared. Franklin D. Roosevelt became the President of the

* State Engineer, Public Works Administration.

United States. Radical action was necessary and it was taken. Congress rallied to his support as it has not supported any President except in time of war. Party lines, and the considerations of of petty politics were swept aside. And out of the throes of unprecedented executive and legislative thought and activity there was created the National Industrial Recovery Act.

It declared that a national emergency productive of widespread unemployment and suffering existed. It conferred upon the President almost dictatorial powers, and authorized him to delegate these to an organization he was to set up. For this purpose it swept aside the restrictions of Civil Service, and empowered the President to select the best men available for the creation of the organization necessary to effectuate the purposes of the Act. It repealed, temporarily, the provisions of the Anti-trust law which might, in any way, interfere with the conduct of business in the most efficient possible manner. It authorized the setting up of codes of fair competition, through which business enterprises both large and small might be assured of reasonable profits without exhorbitant increases in the prices of their products.

Its primary purpose was to reduce unemployment; to relieve those willing and anxious to work of the blighting necessity of accepting relief, and to make it possible for them to support themselves in a reasonable standard of decency and comfort. And by so doing, its aim was to make it possible for workers to earn sufficient to have money to spend, thereby increasing the purchasing power of the country, and stimulating the recovery of business, which, in turn, would make it possible to employ more.

In order to stimulate constructional activities with consequent employment and the demand for materials, it authorized the formulation of a comprehensive plan of Public Works, and made provision for the necessary funds with which these could be financed. These Public Works were to be tested from the standpoint of public necessity, economic and engineering soundness, their ability to provide employment, and their legal correctness: preference being given, in all cases, to projects which could be started at once or within a short time.

In order to provide immediate employment, $400,000,000 was allocated to public roads through the various State highway departments.

Money has been made available even for private projects which are of a public nature, such as toll bridges, public markets, and hospitals, which may be constructed out of funds furnished under this Act.

The provisions of the Act make it possible for meritorious projects to be financed in their entirety, thus assuring their immediate construction, yet, in all cases, the money is safeguarded, and, with the exception of outright grants, must be repaid within a period not to exceed thirty years with interest. The terms of the loans, however, have been made so liberal that a vast amount of construction in the public interest can and will be undertaken by the States, and their municipalities and other subdivisions.

In all, the vast sum of $3,300,000,000 has been made available. Yet it has been assured that this enormous sum will not be squandered; and so comprehensive and practical is the plan, that even though outright grants of 30% of labor and materials are authorized for Public Works, almost the entire amount will ultimately be repaid in principal and interest.

The organization through which this vast program will be accomplished has practically been completed although less than three months has elapsed since the passage of the Act.

In the carrying out of the intent of the Act, there has been created the Federal Emergency Administration of Public Works. The President has delegated his powers under the Act to the Administrator, who is Secretary of the Interior, Hon. Harold L. Ickes, and through him to the personnel of the organization in their respective duties. The organization has been de-centralized so far as possible, and consists of an executive staff in Washington, with appropriate executive, technical, financial, legal, and accounting assistance; and a field organization made up of a State Engineer in each of the States, who is also the executive officer for that State. Each State Engineer is provided with the necessary clerical, technical, and accounting assistance. In each State there is a

State Advisory Board, usually of three members. The country is also divided into ten regions, in each of which is a Regional Advisor, and a Regional Inspector of the Division of Investigation. As the work progresses, there will also be set up in the office of each State Engineer the necessary Inspection Department through which all work for which funds are provided will be supervised.

Applications for projects are received and examined by the State Engineer and his staff, and by him referred to the State Advisory Board, for which he also acts as technical advisor. After being acted upon by this Board, they are referred to Washington, where they are reviewed, and finally referred to the Special Board of Public Works. If finally approved, a financing contract is drawn and signed, and the money is available. Advertisement for bids is the next step, and the contract is let to the lowest responsible bidder, subject, in all cases to the approval of the State Engineer.

So efficient is the organization that approximately $400,000,000 of projects have already been approved, and it must be remembered that less than three months has elapsed since the passage of the Act.

Hardly can too much credit be given those responsible for the results that have been accomplished. The organization that has been set up compares with the personnel of the largest corporations in existence, all of which have developed from small beginnings and grown gradually through many years.

It is my sincere belief that this Act constitutes one of the most drastic and important pieces of legislation ever passed. Conceived and executed within the short space of a few weeks, it is now in practical operation. It carries with it the hopes and the faith of a sorely tried nation. It must succeed. And it is my firm conviction that it will succeed.

ENGINEERING IN CHINA
SOME MODERN—AND SOME NOT SO MODERN

By Col. Arthur M. Shaw *

Read before the Society, October 9, 1933.

The popular conception of China seems to be that of a people who reached a wonderful stage of development in the dim past, who sank into decay and almost oblivion ages ago, and who are only just emerging into a civilization which is a somewhat grotesque imitation of that of the Western countries.

Only twenty-five years ago, there was published a book called "China in Decay", though in justice to the author, I will say that the greatest error that I was able to find was in the title. The book had to do with the Manchu dynasty and no one can take issue with the contention that this had reached an advanced stage of putresence. The "Old Buddah" was in full control, making away with a weakling emperor, putting an infant in his place and doing the unexpected at every turn.

But the Manchu dynasty was not China. China has had her "Golden Age", her periods of great intellectual development, and also her depressions—but with all these, there has been a continuing development of which the present is only one phase. In illustration of this point, and because this is written by an engineer, for engineers, I shall make use mainly of engineering works of the past and the present, though evidence of a continuing civilization may be found running through all avenues of Chinese life—in literature, philosophy, commerce and social relations. There have been waves, and occasional recessions, but no epoch of general degradation of the Chinese people.

Perhaps one reason for this continuity of Chinese civilization is the fact that there never has been anything approaching the caste system. An aristocracy of education, there always has been and, while the old examinations have passed, education, rather more than breeding, is the stamp of the gen-

* Engineering Examiner, Public Works Administration.

tleman. To illustrate, a friend of mine was curious as to the opinion of the "man on the street" concerning a certain official in Nanking. On making inquiry of his cook (the cook in a Chinese household is an excellent news purveyor) he was told—"He no good—his father send him four years to school in America and he come back China and no have got just *little* college degree."

Turning now to the engineering works of older China, the most widely known is the "Great Wall of China", or as it is poetically called, "The Wall of Ten-Thousand Li". This was conceived by Shih Huang-Ti and was completed within the period of his reign, excepting for a number of short sections of existing ramparts which were incorporated as a part of the new works.

Probably the next in point in size, and certainly far surpassing the wall of its influence on the economic and political life of the country, is the Grand Canal. This has been in continuous operation since its completion a thousand years ago and some portions of it have been in use for two thousands of years. Not long ago, our papers carried news items of the completion of the Russian canal which now connects the Baltic and the White seas. In these accounts, it was stated that this new canal far exceeded in length any artificial waterway constructed for the purposes of commerce. Yet the Grand Canal is fully four times its length.

The salt wells of Szechuen Province have been producing for hundreds of years and new ones are constantly being drilled. Some of these reach a depth of 1200 feet and represent the labor of two or more generations, working with the crudest of tools—a bit forged from iron or possibly steel, cables of twisted strands of bamboo, and hoisting rigs made almost entirely of wood and bamboo.

One of the projects on which I was engaged was the control of the East Tio River, a comparatively small stream which rises in the mountains of northwestern Chekian and flows for about fifty miles into one of the large lakes of the lower Yangtse Valley.

Only a short distance below where the East Tio enters the plains country, there were two large, natural lakes. About

200 years ago, outlets to these basins were controlled by the construction of masonry piers and abutments with wooden gates between. These gates are kept closed until a critical river stage is reached, when they are opened to receive as much of the flood flow as may be necessary to save a break in the levees. These have now served for two centuries but, in that time, considerable silting of the lake beds has taken place and additional protective works are now required.

The Great Hangchow Bore is one of the wonder sights of the world but if left uncontrolled, it would render uninhabitable millions of acres of some of the most fertile and populous sections of the country. A twenty-foot tide rushes into the funnel-shaped Hangchow Bay, the initial wave, with a vertical face, being from five to eight feet in height. For centuries, a precarious protection was secured by means of earthen dykes but failures were so frequent that agitation was started (about 200 B. C.) for a stone facing. Work was started on this in 902 A. D. This "promotion period" of a thousand years may offer some encouragement and inspiration to our own people, who feel that action is too long delayed on their favored project of a new Union Station or some other public improvement.

Early in the history of this masonry protection, a practically standardized section was adopted which has continued up to the present, with the exception of some experimental sections lated referred to. This is a gravity wall, with only a slight batter on the face, a base width of 24 feet and a height of from twenty to twenty-six feet. About 125 miles of shore has been protected by this type of wall. Both limestone and granite were used, the individual stones of the face and top courses being fairly uniform in size. These were about two feet in width, one in thickness, and four feet in length. The entire mass was laid of course masonry, with few stones of much less than half the size stated. Because of sea and river accretions, many miles of the original wall are now miles inland, with new lines of defense built to protect the fields which now occupy what was once the open bay.

Accretion is going on along much of this coast but toward the open sea, the north shore of the bay has receded. On one map which I had occasion to consult, the site of an important

market town was shown which was destroyed about 400 B. C. This point is now twelve miles out from the shore and is covered by forty feet of water.

Those portions of the wall which are exposed to the sea are patrolled daily and repairs are going on continuously, at one point or another. The unfavorable soil on which the wall rests has made it especially difficult to maintain, practically all the failures being attributable, directly, or indirectly, to the rather soft clay foundation, with varying mixtures of fine sand. These failures take the form of a general failure of the foundation, with a settling of the entire mass of a long section; a horizontal movement seaward of the mass; overturning; and, rarely, a disintegration of the wall, with no general movement. One section of granite wall which rests on especially tough, hard clay, has had practically no repairs since the Mongol invasion of about 500 years ago.

Within the past three years, experimental sections have been built which do not impose so heavy a load on the soil. One of these is a sloping pavement, with a return curve at the top, but with no provision to prevent the escape of material from under the pavement. Another is of the same type, but with a sheet-pile cut-off wall at the base and a third is of the step type which also is provided with a sheet-pile cut-off.

As might be expected, the first described type soon began to break up, owing to scour at its base and leaching out of soil from under the lower courses. The other two sections have been in service from one to two years without showing any signs of weakness though they can scarcely be said to have had a fair test as compared to the older sections described.

Among the comparatively recent engineering works of purely Chinese origin are those protecting the Hsiao Hing plains, an alluvial area of 400 square miles, lying south of Hangchow Bay. The Pu Yang River originally ran through this section for a distance of about thirty miles. Floods were so frequent that in about 1430, a cut-off was constructed diverting the Pu Yang to the Chient Tang, a much larger stream which enters at the head of the bay. This artificial channel, about six miles in length, was dug through an alluvial flat excepting that passed through a low saddle between two moun-

tains where solid rock excavation was required for several hundred feet.

A hundred years later, a set of tide gates was constructed at the original mouth of the Pu Yang river, to keep out sea water and to permit the escape of drainage water from the inclosed area. These gates, twenty-eight in number, have now served the purpose for which they were designed, for more than 400 years and apparently can continue to so serve for another 400 years. The works consist of a series of massive stone piers, with clear openings between of eight feet. These openings may be closed by means of wooden stop logs which are inserted in grooves cut into the masonry. Over each gate is a massive stone slab on which is carved the name of the gate, the names being selected from those of celestial bodies. In the records of maintenance, we may read that on a certain date, Venus was supplied with a new set of stop logs, or that the leakage through the masonry between Polaris and Jupiter was becoming alarming.

Every fifty years, cofferdams are constructed above and below the gates and the intervening space unwatered to permit a thorough inspection of the foundations and for general repair work. Through the kindness of a Chinese friend, I was able to secure a number of excerpts from the records of early repair jobs. It is obvious that the greatest difficulty was to find a satisfactory substitute for lime mortar for pointing up the joints between the stones. Various expedients were tried, such as mixing the lime with "rice juice" (water in which rice had been boiled to extract the gluten); admixtures of broken crockery; driving into the joints "broken pieces of old farm tools"; the use of wool mixed with the mortar, and various other experimental methods and mixtures. On two occasions, "melted tin" was poured into the spaces between stones.

I was fortunate in being able to make an inspection of the gates while they were undergoing repairs last November. The site had been entirely unwatered and the work was well under way, the preliminaries following closely the accounts of previous operations. A centrifugal pump was used however, instead of the old method of unwatering by means of foot-power wooden pumps. After clearing out all the mud from around

the base of each pier, the exposed rock and all joints in the masonry were thoroughly cleaned by water from a hose, fed by a high-pressure force pump. Considerable scour in the natural rock had taken place at the base of the piers. All such surfaces were restored by filling with portland-cement concrete. Joints between the coursed masonry were filled with rich cement grout, forced into the joints by a modern cement gun.

It is doubtful if any of the previous repair jobs were done either as thoroughly or as effectively as this one.

Among the works on which I was engaged while in China were the construction of 260 miles of railway; plans for two harbor projects; two river control projects; municipal planning; several irrigation works and plans for new projects; and a number of sanitation plans. The work was handled entirely by Chinese engineers, my own services generally being purely of an advisory nature.

The engineers of China have suffered in the past from lack of opportunity for practical experience, and especially for lack of experience in administrative positions, but this is now being overcome and they are getting excellent results from the limited funds which are being placed at their disposal. They are finding that Western methods, materials and equipment are not to be adopted, but are to be adapted to their local needs, and that it is not necessary to discard old methods for new, simply because they are old. Hand labor still is the cheapest in many lines, as was demonstrated in the construction of the Hangchow-Kiangshan Railway. The bulk of the earthwork was done at a cost of about four cents (gold) per cubic yard, a price which could not have been approached by machine methods. The earth was excavated by a heavy, broad-blade mattock, pulled into baskets and two of these slung from the ends of a carrying pole to be transported on men's shoulders to the dump. The most modern machines could not compete with this method, either in economy or flexibility of operation.

Chinese engineers are contributing their share to the advance of their country.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Meeting of Board of Direction, September 11, 1933

An informal meeting of the Board of Direction was held prior to the meeting of the Society. Matters brought before the Board were later discussed at the meeting of the Society.

F. A. MUTH, Secretary.

Regular Meeting of the Society, September 11, 1933.

The meeting was called to order about 8:10 p. m., Mr. John H. O'Neill, President, in the chair, Mr. E. S. Bres, acting as Secretary, and 72 members and guests present.

The reading of minutes of the previous meeting was dispensed with. The matter of a clause in the Fire Insurance regulations relative to architects and engineers was brought up for discussion and upon motion, duly seconded, the President was authorized to appoint a committee to make further study and report.

Mr. H. L. McLean, Chairman of the Entertainment Committee, presented report relative to the proposed Outing and Inspection of the H. P. Long Bridge. It was announced that the Secretary would send postcard notices of the actual date selected.

Mr. Orloff Henry, State Engineer, Public Works Administration, gave a most interesting address on the Administration of Public Works in the State of Louisiana. This address was followed by an interesting discussion.

A rising vote of thanks was then tendered the speaker and the meeting adjourned to the usual collation.

F. A. MUTH, Secretary.

Minutes of the Meeting of the Board of Direction, October 9, 1933.

The meeting was called to order by President O'Neill, and the following members were present: Messrs. Billingsley, Bres, Moses, Hoots, Dunlap and Muth.

There were no minutes of the meeting of the Board for the previous meeting.

The financial report was read and bills on hand were ordered paid.

The Secretary presented a report on the status of transferring Student and Junior Members to higher grades and he was instructed relative to action to be taken in accordance with the Constitution. The following were transferred to grade of Member: John M. Guillory, J. H. Saucier, Jr., H. C. Swan, A. A. DeFraites, Lucien Devall, Philip H.

Campbell, E. M. Naberschnig, Jr., and S. A. Theard to Non-Resident Member.

The following names were ordered passed to ballot for Member: Gerald L. Rhodes and David Moodie.

A communication from Dean Anderson relative to award of scholarship to a post-graduate student was read and was carefully considered. On motion, duly seconded, it was voted that the award of scholarship be continued to under graduate students rather than to graduate students and thereby carry out the original desire of the Board to assist in providing an engineering education leading to degree for the recipient of the scholarship. The Secretary was instructed to communicate with the Dean asking if he could suggest the name of some undergraduate student who would be worthy of the scholarship and thereby carry out the original intention of the Board in the matter. Subsequently, the members of the Board, upon request for reconsideration, approved the award of the scholarship to a graduate student for this session.

On motion, duly seconded, it was voted that the board make a study of a plan to announce to its membership the scholarships which are available to students in engineering at L. S. U. and Tulane, so that the matter can be open to nominations. Colonel Bres was appointed Chairman of a committee to look into the matter and submit report.

In accordance with the Constitution, the Board selected and the President appointed the following nominating committee to submit nominations for officers for the ensuing year: Professor Donald Derickson, Chairman; Messrs. Ole K. Olsen and Frank G. Frost.

The success of the recent outing and inspection trip to the new Public Belt Bridge was discussed and on motion, duly seconded, a vote of thanks was accorded to Mr. McLean, Chairman of the Entertainment Committee.

The Finance Committee submitted its report relative to the tentative budget, which will be continued the remainder of the year. The Finance Committee recommended that sufficient sum be withdrawn from the savings account to defray the scholarships for the current scholastic year. Communication was read from the Bondholders Committee of the Title Guarantee Colateral Trust Bond, Series D, relative to a proposed meeting of the Bondholders on October 12th. On motion, duly seconded, it was voted to have Professor A. L. Dunlap represent the Society at the meeting with authority to use his discretion.

Colonel Bres referred to the program for the November Meeting and on motion, duly seconded, it was voted that that Meeting be considered to be allocated as the A. S. C. E. Meeting for the year.

Colonel Bres presented a brief report of the progress made in forming Student Chapters of the A. S. M. E. and A. S. C. E. at Tulane Uni-

versity, and on motion, duly seconded, the President was authorized to appoint a committee to make a study of the relation of student chapters to Student Memberships in the Louisiana Engineering Society, etc., and to report at next meeting. The following committee was appointed: Colonel E. S. Bres, Chairman; Mr. James M. Todd, Chas. Wiggin, Jr.

There being no further business, the meeting adjourned.

F. A. MUTH, Secretary.

Minutes of the Regular Meeting of the Louisiana Engineering Society, October 9, 1933

The Meeting was called to order about 8:10 p. m., Mr. John H. O'Neill, President, in the chair, F. A. Muth, Secretary, and 82 members and guests present.

On motion, duly seconded, the reading of the Minutes of the previous meeting was dispensed with.

Several announcements were made and several committee reports were made.

Mr. McLean, Chairman of the Entertainment Committee, reported on the recent trip to the new Public Belt Bridge, and on motion, duly seconded, he was tendered a rising vote of thanks. Mr. McLean also reported on the progress of the work a special committee was performing in connection with the Engineers and Architects' clause which is being considered by the Louisiana Insurance Commission, and it was stated that it is expected a more complete report will be made at the next meeting.

Interesting reports were presented by Messrs. Billingsley and Bres relative to the work being accomplished by the Engineers and Architects collaborating in connection with the Public Works Program in Louisiana.

Colonel Arthur M. Shaw presented a most interesting address on "Engineering in China—Some Modern and Some Not So Modern". This talk was followed by a very interesting discussion. A rising vote of thanks was then tendered the speaker and the meeting adjourned to the usual collation.

F. A. MUTH, Secretary.

The Proceedings of the Louisiana Engineering Society

Published bi-monthly, February, April, June, August, October, December, under the auspices of the Committee on Publication.

JAMES M. ROBERT, Editor.

Subscription, $2.00 per annum Single copy, 35 cents

Address all communications to
JAMES M. ROBERT, Editor, Tulane University,
New Orleans, La.

Entered as second-class matter July 27, 1916, at the Post Office at New Orleans, Louisiana, under the Act of August 24, 1912.

Acceptance for mailing at special rate of postage provided for in section 1105 Act of October 3, 1917, authorized August 1, 1918.

LOUISIANA ENGINEERING SOCIETY

OFFICERS FOR 1933

President, J. H. O'NEILL, 637 Lowerline Street.
Vice-President, A. L. DUNLAP, 1318 Nashville Avenue.
Secretary, FRANK A. MUTH, 7705 Willow Street.
Treasurer, WALTER B. MOSES, 425 S. Peters Street.

DIRECTORS

E. S. BRES, 311 Maritime Building.
CHARLES WIGGIN, JR., 1105 Maritime Bldg.
PAUL F. HOOTS, 317 Baronne Street.
FRED N. BILLINGSLEY, 702 Interstate Bank Building.

STANDING COMMITTEES

On Technical Papers
Charles Wiggin, Jr., Chairman
James M. Robert
Charles M. Kerr
Carl Schneider

Motivating Committee
James M. Robert, Chairman
W. B. Gregory
George R. Hammett
George P. Rice
James M. Todd

On Library
Ralph Earl, Chairman
C. W. Ricker
A. J. Harris
G. W. Lawes

On Publications—Division "A"
James M. Robert, Chairman
Frank A. Muth

On Publications—Division "B"
D. W. Stewart, Chairman
Harry B. Henderlite
J. A. McNiven
W. H. Scales

On Entertainments and Outings
H. L. McLean, Chairman
S. E. Hottinger
Ole K. Olsen
D. W. Stewart

On Legislation
James M. Todd, Chairman
E. S. Bres, Vice-Chairman
F. N. Billingsley
Donald Derickson
George R. Hammett
Harry Jacobs
George P. Rice
Ira W. Sylvester

On Finance
A. L. Dunlap, Chairman
Walter B. Moses
F. N. Billingsley

On Membership—Division "A"
E. S. Bres, Chairman
Frank G. Frost, Vice-Chairman
A. L. Dunlap
H. B. Henderlite
Harry Jacobs
J. T. Bullen
Ira W. Sylvester
Bryson Vallas
B. W. Pegues

On Membership—Division "B"
W. B. Gregory, Chairman
James M. Todd
B. H Grehan

On Employment
R. H. Baumbach, Chairman
R. Bassich
H. B. Henderlite

On Civic and Industrial Affairs
A. M. Lockett, Chairman
A. B. Paterson, Vice-Chairman
J. F. Coleman
Donald Derickson
A. T. Dusenbury
John Klorer
F. N. Billingsley
James M. Todd

The headquarters of the Society are in the State Museum Building, Jackson Square.

All business communications should be addressed to F. A. Muth, Secretary, 7705 Willow Street, New Orleans, La.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XIX. DECEMBER, 1933 NO. 6

CONTENTS

EDITORIAL NOTES AND COMMENT

Model Experimentation. The method of model experimentation is finding increasing favor in the investigation of engineering problems which do not admit of solution by rigorous analytical methods. It is intermediate between rigorous analysis (which is not always possible) and full size "cut and try" methods which are always too costly.

Without model experimentation in the wind tunnel the aircraft industry could not possibly be where it is today. The present "streamlined" automobile bodies, radical and otherwise, are also the result of wind tunnel experiments. And along these lines the end is not yet. Indeed, a wind tunnel test has shown recently that if an automobile body were properly and quite radically streamlined, at speeds above 40 miles per

hour the mileage per gallon of gasoline could be practically doubled—"a consummation devoutly to be wished."

The almost universal applicability of the model experimentation method makes it nearly impossible to tell where it will "break out" next. An illustration of this,—one of the large electric companies, in its study of modern street lighting, has recently constructed in miniature a perfect reproduction of city business streets. Buildings, sidewalks, even miniature automobile traffic, are reproduced, and the full-sized human investigators, walking around in these Lilliputian streets can look down and observe the varied effects of different lighting systems. At Vicksburg, model experimentation is used by the United States Engineers in their investigations of river and flood problems.

The U. S. Waterways Experiment Station. Does model experimentation pay? This question has often been asked. As far as the activities of the U. S. Waterways Experimentation Station at Vicksburg goes, it has been answered quite emphatically in the affirmative.

Lieutenants Vogel and Nichols, in charge of the work of this station as Director and Assistant Director, respectively, both read papers at the November meeting. The papers are printed in this issue and they make interesting reading, indeed.

Previous papers by the Director, Lieutenant Vogel, have been printed in the *Proceedings*.

In his paper in this issue, Lieutenant Vogel calls attention to the fact on one project alone the investigation at the Experiment Station showed that a dike system costing two hundred and fifty thousand dollars could be made to do the same work as another plan costing three times as much—a clear saving of half-million dollars.

Another investigation at the Experiment Station showed that three times the effect could be secured at one-twelfth the cost by the substitution of one plan for another. The papers are well worth reading.

Increasing Interest in Society Activity. Attendance at recent meetings of the Society has been on the increase.

This is indeed a welcome sign that members gradually are whipping the depression. And at the same time they are finding that the Society fills a real professional need. Keep up the good work! Let's make each meeting bigger and better in point of attendance. The Program Committee and officers are certainly doing their share. Let us do ours.

And, by the way, the Society, operating as economically as it does, still needs your dues. Pay them promptly.

Society Scholarships for Engineering Students. We wish to call attention to the fact that each year the Louisiana Engineering Society makes one scholarship award each for Tulane and Louisiana State Universities.

The rules for making the scholarship awards were recently amended and we print below the rules as amended. Since the awards for next year will not be made until after April, they are printed here merely for information. They will be printed again in the April issue.

1. The announcement of the Scholarship Award shall be set up and carried in the *Proceedings*.

2. The cards sent out by the Secretary for the notice of the April meeting shall include a statement relative to the Scholarship Award and request members to make recommendations or nominations. The April issue of the *Proceedings* shall also carry an article on the Award.

3. The scholarships shall be set up as honor awards to the children of the members of the Society or to other worthy students who are financially unable to begin or continue their Engineering studies. Awards shall be made, preferably, to a dependent of a member of the Society or of an Engineer.

4. The scholarships shall be awarded in the Colleges of Engineering for undergraduate study only. The scholarships awarded to a student in Tulane University will be $125.00 per annum, and to a student in Louisiana State University $40.00 per annum.

5. The Award shall be made for one year and may be renewed annually until the undergraduate course of study has been completed, provided proper scholastic grades have been maintained in accordance with the regulations set up by the Universities for the annual renewal of scholarships.

6. An Awards Committee consisting of three members of the Society shall be appointed annually by the President.

7. Applications for Scholarship appointments shall be made to the Awards Committee. In the event that no award is made by the Awards Committee, the Dean of the College in question shall be requested to nominate a candidate for the scholarship.

8. All applications shall be referred to the dean of the College of Engineering of the proper university. The dean shall rate the applications and submit the entire list to the Awards Committee together with all available information and such recommendations as he may deem fit.

9. The President shall make the award on the recommendation of the Awards Committee.

PAPERS AND DISCUSSIONS

RECENT PROBLEMS OF THE U. S. WATERWAYS EXPERIMENT STATION

HERBERT D. VOGEL.*

Read before the Society, November 13, 1933.

Experimentation with hydraulic models is one of the oldest and yet newest of scientific pursuits: oldest because experiments of a certain crude nature can be traced back to Galileo, Da Vinci, and Newton; and newest because in the last few years the old principles have been revived and revised to supply engineers in charge of waterways development with a powerful weapon for attacking their most serious problems. The hydraulic laboratory of the Mississippi River Commission, at Vicksburg, Mississippi, constitutes the newest, largest and most modern of many institutions which have been created in various corners of the world for taming wild rivers, and with respect to character of organization, methods of research, scope of activity, and natural facilities it stands apart from all others in existence. Designated the U. S. Waterways Experiment Station when it was established in 1931 it has lived up to its name by undertaking the solution of problems from nearly every section of the country, although it was designed to render service primarily to Engineers of the Lower Mississippi Valley.

Experiments conducted within the last year have included investigations relative to the placement and location of contraction works in rivers; tests on various proposed types of revetment; tests of railway embankment protection works; studies of the cause and prevention of erosion at the toe of spillway aprons; tests on the backwater effects of submerged sills; tide and wave investigations as related to the maintenance and development of harbors; tests to determine critical

* First Lieutenant, Corps of Engineers. Director, U. S. Waterways Experiment Station, Vicksburg, Miss.

tractive forces for movement of bed material found in the Mississippi River and its tributaries; and experiments for the determination of methods applicable to the problem of diverting the bedload of the Mississippi River as desired. Sixteen major experiments have been undertaken for U. S. Engineer Districts outside the geographical limits of the Lower Mississippi Valley Division, as follows: Cincinnati (1), Louisville (2), St. Louis (2), Detroit (1), 1st Chicago (1), Charleston (1), Galveston (3), Mobile (1), 1st New Orleans (1), and Jacksonville (3). These latter investigations have ranged all the way from determinations of effects of jetties and breakwaters in harbors to research aimed at the devising of methods for preventing shoaling at the entrance to lock chambers. Research and experimentation is being continuously prosecuted for the solution of general problems relating to the control and improvement of the Mississippi River system.

In all, more than one hundred investigations have been conducted by the U. S. Waterways Experiment Station, and in practically every case the outcome has been to save the government large sums of money. Sometimes the saving results from observance of a warning by the model to the effect that the suggested plan can result in nothing but failure; other times a more economical solution may be indicated by the tests performed; in every instance a great amount of information is obtained and made available to the field engineers, who then return profits on future designs proposed by them. While it is impossible to cite figures for every experiment in this brief description it can be safely said that the Experiment Station has passed the point of being an experiment in itself and that it has definitely come of age. Its original cost has been returned many times over and it continues at the present to render large interest on the investment. As one example of savings effected may be cited the case of Island No. 9, where a dike system costing two hundred and fifty thousand dollars was shown capable of doing the same work as that of another plan costing three times that amount. Again, when consideration was given to lowering stages in the Yazoo backwater basin it was found as a result of experimental methods that three times the effect could be produced at one-twelfth the

cost by substituting a river shortening project for a plan of levee extensions. And so the story goes! Time after time answers obtained from the models are to the effect that savings can be accomplished and the work performed more efficiently by leaving out something here or substituting something else there. The field of possibilities for experimentation with hydraulic models is being so rapidly expanded that the future is difficult to see clearly, but it seems more and more that a model study should be made of every major hydraulic project before the final design is accepted.

THE CONDUCT OF FLUVIAL EXPERIMENTS

K. D. Nichols.*

Read before the Society, November 13, 1933.

The United States Waterways Experiment Station has developed a very efficient technique for conducting fluvial model experiments. In less than three years over 100 experiments have been conducted. This large volume of work has necessitated the development of a large personnel, trained to do efficient work at a high rate of speed. Accuracy can not be sacrificed for speed. Time must be saved by expeditious handling of the vast multitude of details incident to the design, construction, and operation of the model. The Experiment Station is so organized that the men in charge of the experimental work do not need to devote time to administrative details, construction of the model, care and maintenance of the model after construction, or any other detail not bearing directly on design, operation, or interpretation of the model results.

When the United States Waterway Experiment Station is directed to undertake a model study the first step in the procedure is a general study of the problem and the acquisition of all pertinent data by the experimental group. The District Office provides all topographic and hydrographic data that are available. The past history of the problem is studied as well as information concerning other problems of a similar nature.

At this point it must be emphasized that during the course of the experiment, representatives from the field maintain close contact with the laboratory, observe the results indicated by the model, and report on existing conditions in nature. Members of the laboratory staff also visit, when possible, the locality represented by the model, in order to visualize the problem completely. By rigidly maintaining this intimate contact between laboratory and field it has been found possible to

* Second Lieutenant, Corps of Engineers. Assistant Director, U. S. Waterways Experiment Station, Vicksburg, Miss.

evolve results which are practicable, economically sound, and based on good engineering practice.

After the data have been assembled the next step is a comprehensive analysis of the problem and a determination of the area to be represented in the model. The limits of the model are determined by allowing a sufficient length of river both upstream and downstream from the critical reach to insure representative inflow and outflow characteristics. The size of the model is then determined by the horizontal scale selected. In this selection of scale values it is of course necessary that requirements for extreme accuracy must be balanced against increased costs, and here, as before, judgment and experience are necessary. The horizontal scale having been chosen, a vertical scale is next selected which will provide measurable depths in the model, insure turbulent flow as in nature, and yet not distort the model too radically. These two scales, plus any additional slope provided in the model for the production of tractive force adequate to move the sand bed, fix the velocity and discharge scale.

The scale values and model limits having been determined, a detailed plan drawing is made showing moundaries of the model, locations of the templates, and all other essential features such as the weir-box, entrance flume, tailgate, discharge flume and gages. This plan, together with the templates which have been previously plotted on paper, transferred to sheet metal, and cut, are taken in charge by the construction group which then proceeds with actual building. During the period of construction a representative of the experiment group inspects the construction of the model for accuracy of detail.

Upon completion the model is turned over to the experiment group, all working features and topographic details of the model are carefully checked, the weir is calibrated, and the gages are set to required elevations. If the model is of the movable bed type the sand bed is then molded to the exact contours as indicated by the field maps and water is passed through the model for several hours according to a pre-determined hydroghaph representative of a typical year of rising and falling stages. This is called the first verification run, and upon its completion the configuration of the model bed is

compared with maps representing its natural prototype. Some change is expected as the natural river bed is constantly changing, but any radical change indicates an error in the configuration of the model. In case of close agreement the next verification test is a flat bed run, which consists of repeating the typical hydrograph many times with the bed troweled originally to a horizontal plane. This is the most crucial test and, at the same time, the most fascinating one, for to watch the miniature river mold itself before one's eyes is suggestive of a miracle. Each little shoal or pool appears as if by magic in the very place its counterpart is found in the natural river, and not only does it form in the right place but in the right proportions. This provides a definite check on the reliability of the model and gives a starting point for tests designed to determine the effects of proposed works.

To illustrate the methods employed in conducting an experiment let us now consider an actual problem submitted to the U. S. Waterways Experiment Station for solution. This particular problem centered about the improvement for navigation of a portion of the Mississippi River commonly known as Hotchkiss Bend. In this stretch of the river, which lies about sixty-five miles downstream from the City of Cairo, Illinois, the channel grows wider and shallower so that at low stages the river divides into two channels, separated by a middle bar. Plans have been under consideration for elimination of the divided flow condition, and for creating a deeper, more stable channel for river traffic. The purpose of the experiment was to determine the most economical system of permeable pile dikes that would be effective in accomplishing the stated aims.

For making the investigations outlined above, a movable bed model was designed, with a horizontal scale of 1 to 600 and a vertical scale of 1 to 150. A longitudinal tilt was provided to produce a mean low water slope which had been indicated by experiments to be necessary for the production of sand movement at normal operating depths. Water surface slopes and elevations were determined by four point gages installed in the model and discharges were read by means of a weir box at the head of the model.

With everything in readiness for experimentation the model bed was molded in simulation of conditions in nature and a run was conducted during which gage readings, sand and water discharges, tailgate settings, and length of operating cycle were determined or checked. The behavior of the model was then verified by causing it to show its ability to reproduce natural formations from a flat model bed. Following the adjustment and verification phases of the study, four tests were made to determine effects of various proposed dike systems. These included locations on each side of the river and different arrangements of the several proposed structures. It was found that a series of permeable dikes from the right bank would give best channel conditions and would at the same time be subject to less individual attack than when placed on the left bank. A material saving in cost was indicated over what had appeared necessary prior to the experiment.

Upon completion of the study a report is made to the interested District Engineer, giving a complete description of the model, methods used, plans tested, and the results obtained. If the problem was of general interest, if new methods of technique were developed, or if any information of genuine scientific interest was obtained the report is published in printed form.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Meeting of the Board of Direction, November 13, 1933.

The meeting was called to order by President O'Neill, and the following members were present: Messrs. Dunlap, Billingsley, Hoots, Bres, Wiggin, Moses and Muth.

The minutes of the previous meeting were read and approved with the alterations in the paragraph regarding award of scholarship to indicate that the subject under consideration of the action of the Board in awarding scholarship to a graduate student was upon request.

The financial report was read and bills were ordered paid.

Upon recommendation of the Deans of the Engineering Colleges in L. S. U. and Tulane, the scholarships were awarded to Messrs. John H. Gillum of L. S. U. and L. M. Tognoni of Tulane.

The Finance Committee submitted report, and the Chairman was requested to continue to attend the meetings of the Bond Holders Committee.

Colonel Bres submitted report with tentative outline relative to the amendment of the present method of awarding scholarships. After some modification, and on motion, duly seconded, it was voted to have the Secretary send the proposed amendments to the Deans of L. S. U. and Tulane, and to secure their comments for a report at the next meeting. Colonel Bres also submitted progress report on organization of the student chapter at Tulane. Further report will be submitted later. There being no further business the meeting adjourned.

F. A. MUTH, Secretary.

Minutes of the Regular Meeting of the Louisiana Engineering Society, November 13, 1933.

The meeting was called to order about 8:15 p. m., John H. O'Neill, President, in the chair, F. A. Muth, Secretary, and 110 members and guests were present. On motion, duly seconded, the reading of the minutes of the previous meeting was dispensed with.

Several announcements were made and several committees submitted their reports. The Committee on Current Engineering News Events submitted a most interesting report on engineering activities. As this was a joint meeting of the Louisiana Engineering Society and the Louisiana Section of the A. S. C. A., the meeting was turned over to Mr. John Riess, President.

Mr. Riess referred to the recent passing of Mr. G. W. Hillman, member of the A. S. C. E., and on motion, duly seconded, it was voted to authorize the President to appoint a committee to draft resolutions on the passing of Mr. Hillman.

The technical exercises consisted of papers on "Recent Problems of the U. S. Waterways Experiment Station" by Lieutenant Herbert D. Vogel, and the "Fluvial Experiments" by Lieutenant K. D. Nichols. These interesting addresses were illustrated with lantern slides and motion pictures, and a very instructive discussion followed.

A rising vote of thanks was then tendered the speakers, and the meeting adjourned to the usual collation.

F. A. MUTH, Secretary.