THE PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

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

ARTHUR M. HILL, Editor.

Subscription, $2.00 per annum Single copy, 35 cents

Address all communications to
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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

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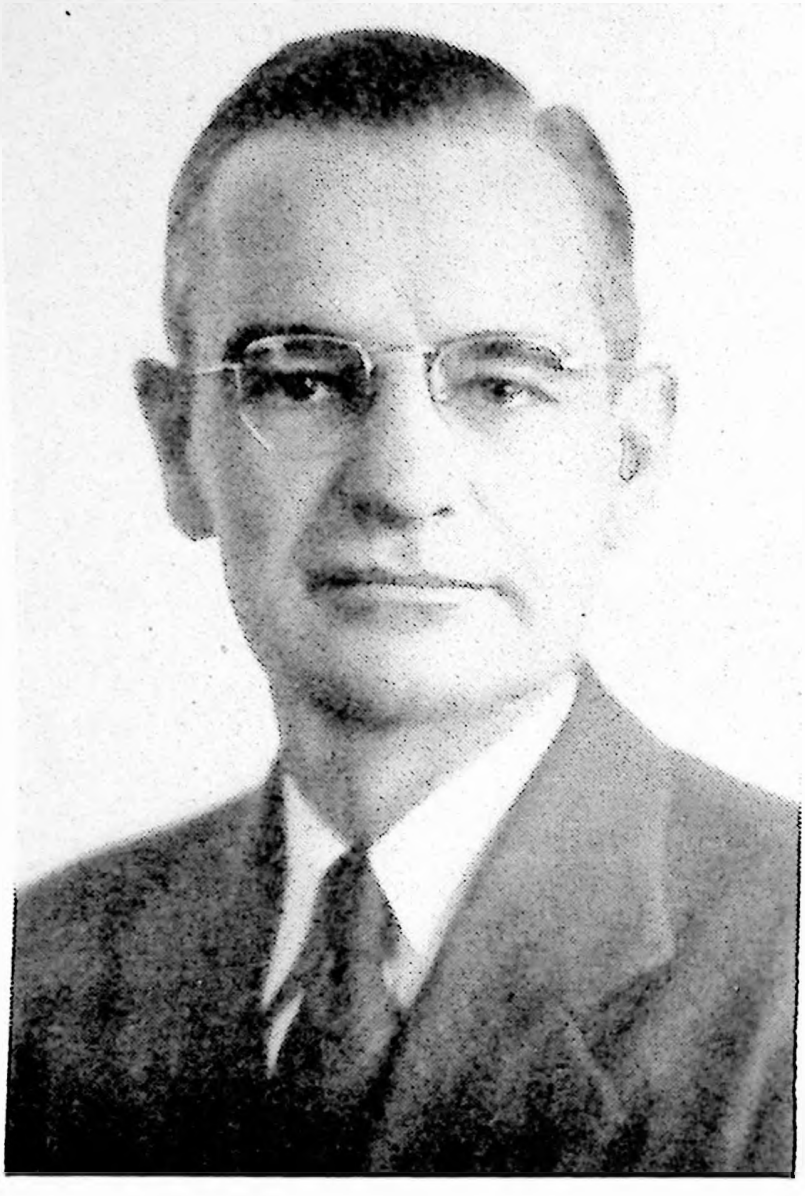

President Karl P. Kammer

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXIX. FEBRUARY, 1943 NO. 1

CONTENTS

EDITORIAL NOTES AND COMMENT

Our New President. On the page opposite is our new President for this year, Karl P. Kammer. He is a past chairman of the New Orleans Section, American Society of Mechanical Engineers; past General Chairman of the L. E. S. Annual Meeting; Member of the American Institute of Electrical Engineers; Electrical Association of New Orleans; Rotary Club.

At the New Orleans Public Service he holds the position of General Superintendent of the Electrical Department.

His favorite sport is golf, and he always takes part in L. E. S. tournaments whether held here or in Baton Rouge.

The Society is fortunate in having so able an engineer and such a splendid citizen at its head.

New Officers and Board of Direction. The following were elected with President Kammer:

First Vice-President	Charles M. Kerr Sales Engineer American Creosote Works
Second Vice-President	Reinhard A. Steinmayer Assoc. Prof. of Geology Tulane University
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	W. Stone Leake Sales Engineer General Electric Co.
Director for One Year	Robert E. Gosa Contractor W. Horace Williams Co.

Mr. C. Glenn Cappell is also a member of the Board since he is the retiring President.

Our Annual Meeting. Chairman Clayton Nairne and those who assisted him in arranging the Annual Meeting in 1943 deserve much credit. January 14, 15, and 16 were days of real activity for members and guests. The total registration was 315.

The papers presented were interesting and well attended. All meetings and banquets took place at the St. Charles Hotel.

Inspection trips of the harbor facilities and Delta Shipbuilding Co. were particularly timely and interesting. Ideal weather added to the occasion.

The three day session opened with War Production Board Panels on Thursday night. Panels were sponsored by American Society of Mechanical Engineers. The four group discussions were preceded by a banquet presided over by Mr. Pendleton Lehde, President of Pendleton Shipyards, Inc. Mr. L. R. San-

ford, Regional Director of Construction, U. S. Maritime Commission was the principal speaker.

Mr. J. M. Todd proved himself an able chairman in making arrangements for the clinic. He was assisted by Mr. L. J. Cucullu.

The grand finale was the banquet on Saturday night with an attendance of 287.

The President's Message. "I wish that it were possible to greet each and every member personally. Many of you I already know; some I have not been fortunate enough to meet.

It is a privilege and an honor to be your president, and with this office comes a great responsibility. Fortunately for you and for me, this responsibility will be shared by able officers and the Board of Direction, together with various committees.

We are fortunate in beginning the year with the Society in such a healthy financial condition and with a membership of 568.

Our prospects for an active year are bright. With the help of each member we should increase the numbers in our Society.

It is my desire to serve the membership to the best of my ability—call upon me when I can be of service. Tell us your suggestions for making this state wide organization more effective and far reaching."

Karl P. Kammer

New Members and Transfers. One of the most important pages in the PROCEEDINGS is the New Members page. Each year the membership increases, and this is through efforts of individual members in most cases. On the back of this issue is a card. This can be mailed back to the Secretary who will send the "prospect" an application blank and information about the Society. Do it now!

The following are recently elected members, who in joining have expressed their desire to take part in our activities. Let's welcome them on every possible occasion.

Carruth, Joe Allen. Junior Member. Age 30. 1933 B. A. in E. E., Miss. State College. Employed for past 8 years by Gulf States Utilities Co.—of which 1½ as Clerk, La. Station; 2 yrs. as Clerk and Typist, Distribution Dept.; balance as En-

gineer, Elec. Trans, & Dist. Dept. Endorsed: A. J. Dubus, P. J. Guelfi, H. L. Lehmann. 151 Bedford Dr., Baton Rouge.

Champeau, Arthur E. Member. Age 28. Endorsed: G. H. Tunner, H. P. Newton, D. W. Stewart. 1934 graduate with distinction in Marine & Elec. Engr., Mass. Nautical Scholo. 1935-40 Marine Engr., Dollar Steamship Co., Gulf Oil Co. & Grace Line, Inc. in various capacities. 1940-41 Boiler and Machinery Inspector and Safety Engr., Travelers Insurance Co. Jan. 1942 to date, active duty, U. S. Navy, attached to U. S. Merchant Marine Cadet Basic School, New Orleans, duties of Assoc. Instructor of Engr., Engr. Officer of School and Chief Officer of the T. V. North Star. Holds National Board of Boiler and Pressure Vessel Inspectors commission, New York State Boiler Inspectors commission, and commissions to inspect boilers from the City of New Orleans and the State of Louisiana. 4666 Venus St., New Orleans.

Coile, Eugene Leland. Member. Age 47. Endorsed: H. L. Lehmann, H. B. Henderlite, R. B. Richardson. June 1920-May 1933, Tennessee State Highway Dept. in successive capacities of Junior Engr., Resident Engr. Dist. Mtce. Engr., Equipment Engr., Asst. Mtce. Engr. Oct. 1933-Jan. 1935, C. W. A., T. E. R. A. and W. P. A., Project Supv. and Purchasing Agent. Feb. 1935-Feb. 1936, Exec. Sec'y., Tenn. Coal Institute, Nashville. Feb. 1936-May 1937, Knox County Engr., Knoxville, Tenn. June 1937-Sept. 1938, State Purchasing Agent, Nashville, Tenn. Sept. 1938-Jan. 1940, Knox County Engr., Knoxville, Tenn. Jan. 1940 to date, Field Engr., Portland Cement Ass'n., Baton Rouge, La. Box 1185, Baton Rouge.

Frater, Marion Ellis. Member. Age 32. Endorsed: C. G. Cappel, R. E. Gosa, R. J. Drueding. 2 yrs. C. E., Vanderbilt Univ. 1936 graduate of Tulane Univ. in Arch. After graduation employed as Architect, Dept. of Interior—duties included design and supervision of small bldgs. With W. Horace Williams Co. for about last 5 yrs.—drafting, quantity survey, estimating, supervision of construction and chief engr. on Naval Facilities contract. 2504 Audubon St., New Orleans.

Gurney, William Brewster. Member. Age 42. Endorsed: A. J. Dubus, P. J. Guelfi, K. P. Kammer. Graduate in M. E., Mass. Inst. of Tech. 1923-30 Mech. Engr., Stone & Webster Engr. Corp. 1930 to date Mech. Engr., Gulf States Utilities Co. Member of Am. Soc. of Mech. Engr. 2631 Hundred Oaks Ave., Baton Rouge.

Hughes, William J. Member. Age 45. Endorsed: H. L. Lehmann, R. B. Richardson, H. Waugh. 1924-27 County Engr., Adams, Amite, Wilkinson Counties, Miss. 1927 to date Resident Engr., District Engr., Construction st'ds Engr., Dept. of Hyws., State of Louisiana. 333 West Drive, Baton Rouge.

Matherne, Allen Jumel, Jr. Member. Age 39. Endorsed: A. J. Dubus, P. J. Guelfi, M. C. Schwartz. 1926 B. S. in E. E., La. State Univ. 1926 to April 1930 various positions in Operating Dept., Neches Power Station, Gulf States Utilities Co., Beaumont, Tex. April 1930 to date Test Engr., La. Steam Electric Generating Station, Gulf States Utilities Co., Baton Rouge, in responsible charge of Test Dept. 454 Florida St., Apt. 4, Baton Rouge.

Melville, C. Glennon. Member. Age 46. Endorsed: C. G. Cappel, D. Derickson, C. M. Kerr. 1920 C. E., Lehigh Univ., Bethlehem, Pa. 1935 Doctor of Engr., Tulane Univ. U. S. Navy Steam Engr. School, Stevens Inst., Hoboken, N. J. Engr. of Construction, Ralph Modjeski & Frank Masters, Consulting Engrs., 12 yrs. In charge of various bridges as follows: Louisville, Ky., Evansville, Ind., Maysville, Ky., Paducah, Ky., Miss. River Bridge, New Orleans, Kansas City Bridge Co., Baton Rouge Bridge Piers., Steel Construction Co., Baton Rouge Bridge approaches. With Horace W. Williams Co. 1940 to date. Member Am. Soc. of Civil Engr. Licensed in State of Louisiana. 833 Howard Ave., New Orleans.

Murphy, Joseph Robert. Member. Age 26. Endorsed: A. J. Dubus, P. J. Guelfi, M. C. Schwartz. 1936, Graduate, Williamson Free School of Mech. Trades, Williamson, Pa. in Power Plant Engr. 1936-August 1938 Station Clerk, La. Steam Electric Generating Station, Gulf States Utilities Co., Baton

Rouge—preparation of Operating Reports and Statistics, Minor Engr. Work, Drafting, etc. August 1938 to date Office Engr. for same—includes about 1 yr. in Test Dept. as Asst. Test Engr. 400 Laurel St., Apt D., Baton Rouge.

Pottharst, John E., Jr. Junior Member. Age 24. Endorsed: A. M. Hill, C. M. Kerr, J. K. Mayer. 1940 B. E. in Mech. Engr., Tulane Univ. 1938 to 1941 in Engr. Contracting Business. 1940 to date, Chief Engr. in charge of all installations and design for company ingaged in Gen. Engr. Manufacturing and Machinery installation Work. Student Member of La. Engr. Soc., 1939-40 session. 861 Carondelet St., New Orleans.

Wilkerson, Richard Knowles. Member. Age 49. Endorsed: A. J. Dubus, P. J. Guelfi, G. R. Hammett, A. M. Hill. 1913-Feb. 1917, Operating and Maintenance Depts., Jacksonville Traction Co., Jacksonville, Fla. 1917-June 1928 Asst. Chief Engr. for same. 1922-Dec. 1923, Asst. Chief Engr., Key West Electric Co., Key West, Fla. 1923 to date with Gulf States Utilities Co. as follows: 1923-26, Chief Engr., Tevis St. Power Sta., Beaumont, Tex.; 1926-28 Asst. Chief Engr., Neches Power Sta., Beaumont: 1928-31 Chief Engr., Lakeside Steam Elect. Generating Sta., Port Arthur, Tex.; 1931 to date, Chief Engr., La. Steam Elect. Generating Sta., Baton Rouge. 4085 Park Drive, Baton Rouge.

Wilson, Friend Asbury, Jr. Member. Age 33. Endorsed: A. J. Dubus, P. J. Guelfi, M. C. Schwartz. 1925-27, completed 3 yrs. in M. E., Texas Univ. 1928 graduated International Correspondence School, Scranton, Pa., in E. E. June 1927-Feb. 1928 Operating Dept., Sabine Power Sta., Gulf States Utilities Co., Orange, Tex, Feb.-May 1928, Operating Dept., Neches Power Sta., G. S. U., Beaumont, Tex. 1928-May 1930 Draftsman and Clerk, Production Dept. at same. *April 1930-34 Office Engr., La. Steam Elect. Generating Sta., Baton Rouge. *April 1934 to date, Asst. to Supt. at same. 4125 Oak Dr., North Highlands, Baton Rouge.

Woolf, John King. Member. Age 53. B. S. in C. E., Univ. of Alabama. Endorsed: C. G. Cappel, C. M. Kerr, O. K. Olsen.

*Responsible charge of power station office and storeroom force.

30 yrs. experience in Engr.—Contracting. At present with W. Horace Williams Co., New Orleans. 1825 Calhoun St., New Orleans.

Young, Lovett. Member. Age 38. Endorsed: A. J. Dubus, P. J. Guelfi, K. P. Kammer. 1923-25 completed 2 yrs. Academic course, Univ. of Tex. July-Sept. 1926 Operator, Lakeside Power Sta., Gulf States Utilities Co., Port Arthur, Tex. 1926-Oct. 1929 various operating positions, Neches Power Sta., G. S. U., Beaumont, Tex. April 1930 to date Chief Chemist, La. Steam Elect. Generating Sta., G. S. U., Baton Rouge. 2404 Hale St., Baton Rouge.

Transfer from Junior Member to Member:

Argus, Wilbert N., B.E. in C.E., 1936, Tulane U., Elected 1938; Aurioles, Gabriel G., B.E. in Ch.E., 1938, Tulane U., Elected 1938; Bartley, John C., B.E. in C.E., 1936, Tulane U., Elected 1939; Ferguson, Arthur J., B.E. in M.E., 1938, L. S. U., Elected 1938; Fortier, Jacques L., B.E. in M.E., 1938, Tulane U., Elected 1938; Godchaux, Walter, Jr., B.S. in Ch.E., 1935, M. I. T., Elected 1938; Haney, Ben J., Jr., B.E. in M.&E.E., 1936, Tulane U., Elected 1939; Heft, George A., B.E. in C.E., 1937, Tulane U., Elected 1939; Jarreau, Alphe G., B.E. in M.&E.E., 1934, Tulane U., Elected 1939; Levert, William F., B.E. in M.&E.E., 1938, L. P. I., Elected 1939; McLellen, Edward A., B.E. in M.&E.E., 1934, Tulane U., Elected 1938; Morehiser, John E., Jr., B.E. in M.E., 1938, Tulane U., Elected 1938; Morris, DeWitt L., B.E. in M.E., 1937, Tulane U., Elected 1938.

Books for Our Armed Forces. Most of us who are truly thoughtful in selecting gifts at Christmas and on other occasions give something which we ourselves would appreciate. So it should be in giving books for our armed forces. Give books which are modern, interesting and which will be enjoyed by young men in their leisure hours. Put yourself in their places. When you have an hour or two off for reading, would you want to make your selection from "attic editions"? Give the books you have enjoyed and brighten someones lonely hours. Leave books at 422 St. Charles Hotel, or at any collection center.

Baton Rouge Ssction. In the minutes will be found an interesting account of a meeting recently held in Baton Rouge. The Baton Rouge Section is active and growing. Mr. N. E. Lant is President; Professor F. F. Pillett, 1st Vice-President; Mr. H. A. Flanahin, 2nd Vice-President; and Mr. H. L. Lehmann, Secretary-Treasurer. They are a live-wire group, and the general meeting held in Baton Rouge each year with them is enjoyable.

PAPERS AND DISCUSSIONS

PUBLIC WORKS—POST-WAR PLANNING

Presented before the Joint Meeting of the Louisiana Engineering Society and the New Orleans Chapter of the American Public Works Association, at New Orleans, on December 14, 1942, by Henry L. Howe*, President of the American Public Works Association.

Mr. Marks, Mr. Cappel, Members of the Louisiana Engineering Society, and Members of the New Orleans Chapter of the American Public Works Association, and guests:

It is with a feeling of pleasure that I again find myself in your fine city. The contrast between our cold, snow-covered city of Rochester, and New Orleans, with its warmth and flowers, is very pleasing.

The American Public Works Association, or its predecessor, met in New Orleans in 1919 and again in 1941. The meeting in 1941, which I attended, was outstanding, under the efficient direction of your Local Arrangements Committee, headed by Mr. Arthur J. Naquin, ably assisted by Carl Schneider, David Godat, and other workers. Mrs. Godat, I remember, did a fine job as Chairman of the Ladies Entertainment Committee.

I note that Mr. John Klorer, formerly Commissioner of Public Property of New Orleans, was President of the American Society of Municipal Improvements, one of the predecessors of the present Association, in 1929.

The American Society of Municipal Improvements, which later became the American Public Works Association, was organized in 1894. As you know, the Charter of the New Orleans Chapter of the American Public Works Association was granted in January, 1933.

This Association, with headquarters in a fine building on the campus of the University of Chicago, is showing a very healthy growth in membership and services; in fact, the membership

*City Engineer, Rochester, N. Y.

has increased over 25% in the last two years, the present membership being approximately 860. We have every reason to expect this membership to grow to over one thousand by the end of next year. The Association membership is made up not only of Commissioners of Public Works and City Engineers or technicians, but includes many operating officials and others interested in the public works field in local, State and Federal governments. To extend our services and influence in the public works field, it is imperative that we increase our membership as greatly as possible. I see no reason why membership in this organization should not be doubled, provided we can impress upon the officials of our cities and other levels of government the importance of the services rendered by this organization, to their city engineers and other officials in the public works field.

A meeting of the new Board of Direction of the American Public Works Association was held at the Chicago headquarters on December 5th. Consideration was given at the meeting to the program and policies of the Association for the coming year.

Now considering, for a moment, the title rather hurriedly given to my talk–that is, Public Works and Post-War Planning–I am not coming to you as an expert in any any sense of the word on post-war planning. I simply determined upon this title due to the fact that as the City Engineer and a member of the City Planning Board of Rochester, N. Y., I realize that this subject is of vital importance at this time to all of the municipalities and other levels of Government in the United States, as well as to industry as a whole.

The National Resources Planning Board has set up a post-war agenda, covering nine classifications of plans—the first covers plans for demobilization, including the release of men in our armed forces—men from our war employment—the use of war plants and war developed areas—the relaxation of war-time economic controls and the use of surplus materials and property.

Second: Plans for private enterprise for the encouragement of private initiative, with the necessary government aid and

controls for both industry and agriculture, to insure that they may operate free from monopolistic practices. Plans in this category will consider the location of production—that is, the geographic distribution of industry to insure the most effective use of human and material resources.

Third: General plans for public activity for the improvement of our physical facilities in urban development as well as rural public works; the conservation of our national resources and development of our energy resources, including development of river basins and development of transportation. The study of the modernization and integration of transportation facilities is one of the most interesting bulletins of the National Resources Planning Board.

Under general plans for public activities would be included the development of certain activities covering health, nutrition, education, youth activities, recreation, etc.

Fourth: Plans for social security, such as unemployment insurance, old-age pensions, sickness and accident, relief and other correlated activities, as well as studies for the improvement of low levels of income from gainful gainful employment.

The fifth plan covers the study of population and man power such as population trends, labor, migration problems, immigration problems, control of working conditions and related subjects.

The sixth plan, is for a financial and fiscal policy, including government revenue and the Federal government's relation with local and State revenue systems and policies.

The seventh series of plans to be studied are for regional, State and local participation, with the purpose of the development of regional resources in harmony with national objectives.

Eighth—Plans for effective administration covering the establishment of adequate public and private administrative institutions.

Ninth—Plans for international collaboration with the objectives of the maintaining of world peace and promotion of higher world standards of living.

These are post-war objectives of the National Resources Planning Board.

They are found in comprehensive outline published November, 1942, in a brochure entitled "Post-War Agenda" by the National Resources Planning Board.

To win the war as swiftly as possible, American energies are now directed toward the development of a mass production program; toward a mobilization of the resources of the nation's materials and personnel, and towards aid for the democracies of the world in our joint struggle against agression. However, as the public works construction being carried on by our cities and other units of government decreases with the curtailment of expenditures because of the war effort and increasing difficulties in obtaining materials, we probably could find no more important work for our engineers and other employees than in the field of post-war and public works programming and planning. The reasons for this are obvious, as many thinking people expect and fear a post-war depression; the demobilization of armies; shut-downs of defense industries; unemployment; deflation; bankruptcy and hard times. Even though the war may be followed by a temporary boom due to a heavy demand for durable and non-durable consumers goods, we realize that the shift from defense production to normal production will require the reconversion of the plants for peace-time goods. This, in combination with the millions of returning veterans, will no doubt result in a temporary but probably serious unemployment situation, which must be met as far as possible by properly worked out long-term or post-war planning.

It has been estimated that there will be approximately twenty-five million people employed in the defense industries in addition to the men in our armed forces of three and one-half to six million, who will have to find re-employment when hostilities cease. As our experts in planning express it, we must plan to balance our national production-consumption budget at a high level with full employment, not at a low level with mass unemployment. We must plan for full employment for maintaining the national income at one hundred billion dollars a year at least, rather than let it slip back to eighty, seventy or sixty billion again. Such high level of employment must be gained without requiring work from the youth or from

the aged or from the women who choose to make their contribution in the home—all to be accomplished without loss of those freedoms without which even material prosperity is not worth the price.

In 1933, the total public construction fell to a low of one billion, three hundred and fifty-four million dollars. In 1939 it rose to three billion, five hundred and twenty million dollars, financed by both Federal State and local funds. These investments were practically equalled by private construction expenditures, resulting in 1939 in a total expenditure for construction of over seven billions of dollars. Since the defense program has come into being, it is obvious that the total construction has again risen to a high point. Who can say what the total public works and private construction investments will be after the war under a well-planned program of public and private construction projects? Certainly such a program should exceed the totals reached in 1939 given above, if we are to maintain the desired high level of national income and full employment. From the data I have reviewed on the subject, the total public and private construction program, including housing, will have to reach 10 billions of dollars per year to accomplish these objectives.

There are at least three objectives which might be set up for such a program of public construction in the post-war period.

1. To further the physical development of the United States in the best possible manner.
2. To stimulate and support the nation's income through orders of materials and the wage payments that are occasioned by the construction projects.
3. To provide opportunities for employment for those who would otherwise not be employed.

If the primary aim of a program is business stimulation or is employment creation, it does not necessarily follow that maximum national development will automatically be achieved. One of the most important lessons we have learned since 1933 is that a series of emergency programs will not be entirely

satisfactory to accomplish these three principal objectives. We all remember the emergency programs and dead-line type of administration and the attempts through W. P. A. and similar agencies to put large numbers of men to work simply to relieve unemployment without insuring through proper planning that the results of their work would lead toward accomplishing our first objective, that is, the proper physical development of the United States.

We also remember the fine work done under the Public Works Administration which, however, because of the nature of the projects and the lack of long-term planning for the emergency, was not always able to get work actually under way in the field as rapidly as was necessary to meet the unemployment situation.

To the National Resources Planning Board has been given the responsibility for organizing a planned program of public works to be undertaken when the end of the war makes it possible to devote our energies to the task of building up the nation.

The Board cooperates with the other Federal construction agencies in the preparation of their 6-year public works programs with estimates, showing projects allotted to each year. These agencies are required under Federal acts to keep these 6-year programs up to date by annual revisions of the plans and estimates for an additional year.

In January, 1939, the National Resources Planning Board undertook, through the appointment of a Public Works Committee, to make further studies of public works to assist in the preparation of the Federal 6-year program for public works, and to encourage State and local governments to prepare similar programs. Through one of the sub-committees of this Public Works Committee, with Mr.Frank W. Herring, our former Executive Director of the American Public Works Association, as Chairman, studies were made of the experience of states and cities which had been engaged in programming their public works. Representatives of this committee visited Cincinnati, Milwaukee, New York, Richmond and San Diego, where local programming procedures were discussed with the officials of

these cities. From the informtaion thus gathered, a tentative outline of procedure was prepared and tested in a nation-wide series of "administration studies", in cooperation with interested municipal officials in seven cities, Winchester, Mass., Nashville, Tenn., Kalamazoo, Michigan, Dallas, Texas, Fargo, N. Dak., Sacramento, California, and Spokane, Wash. Each of these administration studies culminated in the publication by the municipal officials of a report setting forth a long-range program of municipal improvements, and recommending procedures for continuance of the operation in the future. From these studies and the experience gained came the preparation of the report of the Public Works Committee to the National Resources Planning Board in June, 1941, entitled "Long-Range Programming of Municipal Public Works."

The real problems resulting from a war arise after a war is over. When this war is won, we can lose many of the privileges we are fighting to defend, and we may lose many of the social and economic gains that it is possible to attain immediately after this war, if, in the transition to peace, we slip back to a low national income, with its inevitable unemployment, suffering and loss of freedom, with resulting chaos. To discover ways, and to work out plans for swift transition from full employment for defense to full employment for peace, without a loss of our basic freedoms, is a matter of outstanding public concern.

Henry L. Howe,
President, American Public Works Association.

December 14, 1942.

1943

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T. BAKER SMITH, (S.), (1919), *Civil Engineer*, P. O. Box 266, Houma, La.

EDWIN J. SONIAT, (J), (1940), *Electrical Engineer*. Adrress unknown.

J. COOPER SPENGLER, (S.), (1942), Gas Department, Gulf States Utilities Co., 2903 Hollywood Drive. *Mail:* Gulf States Utilities Co., Baton Rouge La.

ENS. WILLIAM F. STANDKE, III, (J.), (1940), *Structural Engineer*, U. S. Naval Reserve. *Mail:* 8236 Cohn St., New Orleans.

DAVID STAYER, (N. R.), (1926), *Electrical Engineer*, Assistant Engineer, U. S. Army Engineer Corps., Federal Bldg., Room 552. *Mail:* 2709 Virginia Ave., Louisville, Ky.

REINHARD A. STEINMAYER, (1924), Professor of Geology, Tulane University. *Mail:* 7933 Oak St., New Orleans, La.

FRED W. STEVENS, (L. M.), (1904), *Electrical Engineer*, District Sales Manager, Allis-Chalmers Manufacturing Co., 3380 State St. Drive. *Mail:* 1124 Canal Bldg., New Orleans.

FRANK M. STEVENSON, (1941), *Right of Way Engineer*, Southern Bell Telephone & Telegraph Co., 820 Poydras St. *Mail:* 84 Maryland Drive, New Orleans, La.

GEORGE FRANKLIN STEVENSON, (S.), (1942), *Highway Engineer*, Resident Engineer, Louisiana Department of Highways. *Mail:* P. O. Box 31, New Roads, La.

DAVID WHYTE STEWART, (1919), *Mechanical Engineer*, Chief Engineer, Market Street Power Station, New Orleans Public Service, Inc., 1623 Pine St. *Mail:* 317 Baronne St., New Orleans.

HAROLD H. STREAM, Jr., (J.), (1942), *Chemical Engineer*, Cadet, Naval Air Corps. *Mail:* 1518 Henry Clay Ave., New Orleans.

HERBERT C. SWAN, (1933), *Mechanical & Electrical Engineer*, Instructor Air Corps Technical School, Delgado Trades School, 615 City Park Ave. *Mail:* 6314 Magazine St., New Orleans, La.

— T —

BRETCH TAULBEE, (N. R. Aff.), (1941), *Mechanical Construction Engineer*, 9906 El Patio Drive, Dallas, Texas.

FRANCIS M. TAYLOR, (1938), *Chemical Engineer*, Assistant Professor in Chemical Engineering, Tulane University, 1312 Fern St. *Mail:* College of Engineering, Tulane University, New Orleans.

WILLIAM W. TENNANT, (S), (1937), *Civil Engineer*, Head Coordination Dept., Standard Oil Co. of La. *Mail:* 520 Convention St., Baton Rouge.

L. W. TERRY, (S), (1940), *Building Contractor*, Manager and Owner, Terry Lumber Co., 115 No. Stewart St., 502½ No. Pine St. *Mail:* P. O. Box 349, DeRidder, La.

S. A. THEARD, (S), (1920), *Civil Engineer*, Engineer and District Sales Manager, Oyster Shell Products Corp., Morgan City, La. *Mail:* 8114 Freret St., New Orleans.

IRA L. THOMAS, Jr., (S), (1939), *Civil Engineer*, Traffic and Planning Engineer, La. Dept. of Highways, Main Highway Building, 1254 Ingleside Dr. *Mail:* Box 1284, Baton Rouge.

ENS. GEORGE H. THOMPSON, (N. R. J.), (1941), *Chemical Engineer*, U. S. Naval Reserve. Address Unknown.

W. L. THOMPSON, (S), (1939), *Civil Engineer*, District Engineer, Louisiana Department of Highways, 1511 North 7th St. *Mail:* P. O. Box 1852, Monroe, La.

STEWART TICKNOR, (S), (1922), *Civil Engineer*, 155 Royal St., Baton Rouge.

MAJOR JOHN PAUL TOBIN, (N. R. J.), (1940), Corps of Engineers, U. S. Army. *Mail:* 592 Regiment, APO 3383, c/o Postmaster, San Francisco, Calif.

JAMES M. TODD, (1923), *Mechanical & Electrical* Engineer, Consulting Engineer, James M. Todd, 17 Richmond Place. *Mail:* 405 Citizens Bldg., New Orleans, La.

LOUIS MILTON TOGNONI, (1933), *Mechanical & Electrical Engineer*, Industrial Sales Engineer, New Orleans Public Service, Inc., 317 Baronne St. *Mail:* 4466 Spain St., New Orleans, La.

NELSON W. TREMBLAY, (1933), *Mechanical & Electrical Engineer*, 750 Orion Ave., New Orleans.

SIDNEY E. TROUARD, Jr., (1928), *Electrolysis Engineer*, New Orleans Public Service, Inc., 317 Baronne St., New Orleans.

WILDAY TUDURY, (J.), (1941), *Mechanical Engineer*, Dixie Machine Welding & Metal Works, 1031 Annunciation St. *Mail:* 155 Homestead Ave., Metairie, New Orleans, La.

WILLIAM NEWTON TULLER, (S.), (1937), *Chemical Engineer*, Acting Supervisor of Laboratory, Freeport Sulphur Co. *Mail:* P. O. Box 691, Port Sulphur, La.

GEORGE H. TUNNER, (1939), *Safety Engineer & Boiler Inspector*, Resident Engineer & Chief Inspector, Travelers Insurance Co., 2830 Palmer Ave. *Mail:* 611 Union Bldg., New Orleans.

W. O. TURNER, (1931), President and General Manager, Louisiana Power & Light Co., 142 Delaronde St., Algiers, La.

JOHN R. TUSSON, (N. R. J.), (1942), *Chemical Engineer*, 1109 Columbia Ave., Sheffield, Ala.

— U —

WILLIAM URBAN, Jr., (N. R. Aff.), (1942), *Construction Engineer*, General Delivery, Panama City, Fla.

— V —

ROBERT H. VAUGHAN, (S.), (1942), *Civil Engineer*, District Construction Engineer, La. Dept. of Highways, 1508 East Kings Highway. *Mail:* P. O. Box 38, Shreveport, La.

ENS. WALTER J. VERLANDER, (N. R. J.), (1942), *Mechanical Engineer*, U. S. Navy. *Mail:* 1140 Louisiana Ave., New Orleans.

A. P. VILLA, (S.), (1939), Chief Coding Clerk & Assistant Inventory Analyst, La. Department of Highways. *Mail:* 2143 Hood Ave., Baton Rouge, La.

LUCIEN T. VIVIEN, Jr., (1930), *Mechanical & Electrical Engineer*, Assistant Superintendent of Construction, Gulf Refining Co., 941 Maison Blanche Bldg. *Mail:* 3129 Derby Place, New Orleans, La.

WILLIAM VON PHUL, (L. M.), (July 1, 1908), *Civil Engineer*, President, Ford, Bacon & Davis, Inc., 39 Broadway, N. Y. C., Green Acre Lane, Westport, Conn. *Mail:* 39 Broadway, New York, N. Y.

ALVIN A. VOSS, (N. R.), (1927), *Civil Engineer*, Assistant Structural Engineer, U. S. Navy, Naval Air Station. *Mail:* 1420 E. Lee St., Pensacola, Fla.

— W —

FRANK H. WADDILL, (L. M.), (1910), *Civil Engineer*, 2003 Ursuline Ave. *Mail:* 1240 Canal Bank Bldg., New Orleans, La.

GEORGE D. WADDILL, (L. M.), (1911), *Chief Engineer*, U. S. Engineers, M. R. C., Ft. of Prytania St. *Mail:* 7433 Maple St., New Orleans, La.

1st LT. BATTAILLE HARRISON WADE, (S.), (1942), *Civil Engineer*, U. S. Army. *Mail:* Box 307, Jennings, La.

LT. RICHARD E. WAGNER, (1933), *Civil Engineer*, U. S. Naval Reserve. *Mail:* 4201 Elba St., New Orleans.

J. D. WALKER, (L. M.), (Jan. 8, 1908), *Civil Engineer*, Engineer, Craven-Lang Co., 1104 Nashville Ave. *Mail:* 1703 American Bank Bldg., New Orleans, La.

WAYNE PAUL WALLACE, (S.), (1936), *Civil Engineer*, Assistant Proffessor of Civil Engineering, Louisiana State University, 420 Stanford Dr. *Mail:* Atkinson Hall, Louisiana State University, Baton Rouge.

WILLIAM WALLACE, (L. A.), (1931), *General Contractor*, 131 No. Jefferson Davis Parkway, New Orleans.

CAPT. STEPHEN J. WALLBILLICH, (S.), (1926), *Civil Engineer*, Corps of Engineers, U. S. Army, P. O. Box 490, Hammond, La. *Mail:* 4214 State St., New Orleans.

KYLE WARD, Jr., (1941), *Chemical Engineer*, Chief, Cotton Film Research Division, Southern Regional Research Laboratory, 2100 Robert E. Lee Blvd. *Mail:* 937 Wilson Drive, New Orleans, La.

HARRY W. WATERFALL, (S.), (1937), *Mechanical Engineer*, Professor & Head of Mechanical Engineering, Louisiana State University, 416 State St. *Mail:* College of Engineering, Louisiana State University, Baton Rouge.

THOMAS A. WATSON, (S.), (1942), *Civil Engineer*, Industrial Sales Engineer, Gulf States Utilities Co., 340 Florida St. *Mail:* 3340 Hollywood Dr., Baton Rouge.

HARRY WAUGH, (S.), (1941), *Civil Engineer*, Road Design Engineer, La. Dept. of Highways. *Mail:* 2707 Morning Glory Ave., Baton Rouge, La.

1st. LT. ALVIN A WEHRMANN, (N. R.), (1940), *Civil Engineer*, Corps of Engineers, Mobile Engineering Procurement District, Box 210, Mobile, Ala.

LEO S. WEIL, (1920), *Consulting Engineer*, Leo S. Weil & Walter B. Moses, 478 Broadway. *Mail:* 425 So. Peters St., New Orleans, La.

CHESTER O. WEILBACHER, (N. R. J.), (1940), *Electical Engineer*, Designer of D. C. Machines, Allis-Chalmers Company, Electrical Dept., Milwaukee, Wis. *Mail:* 7527 W. National Ave., Apt. 202, West Allis, Wis.

LEON C. WEISS, (1918), Weiss, Dreyfous & Seiferth, Architects, 600 Maison Blanche Bldg., New Orleans.

WILLIAM WHIPPLE, (S.), (1936), *Mechanical Engineer*, Professor of Steam Engineering, Louisiana State University, 4666 Vanderbilt Drive. *Mail:* Box 8524, University Station, Baton Rouge, La.

RICHARD KNOWLES WILKERSON, (S.), (1943), Chief Engineer, Gulf States Utilities Co. *Mail:* 4085 Park Drive, Baton Rouge, La.

LAWRENCE V. WILLEY, (S.), (1939), *Construction Engineer*, Robinson & Young, Contractors, 430 Centenary Dr. *Mail:* 910 La. National Bank Bldg., Baton Rouge.

GERALD CIRE WILLIAMS, (1940), *Mechanical Engineer*. Address unknown.

ROBERT W. WILLIAMS, (S.), (1940), *Chemical Engineer*, Process Engineering Division, Standard Oil Company of La. *Mail:* 2936 Adams Ave., Baton Rouge, La.

W. HORACE WILLIAMS, (L. M.), (1908), *Civil Engineer*, Member of Firm & General Manager, W. Horace Williams Co., 221 Northline Ave., Metairie. *Mail:* 833 Howard Ave., New Orleans, La.

C. S. WILLIAMSON, (1916), *Chemical Engineer*, Head, Chemical Engineering Tulane University, 1334 Webster St. *Mail:* Chemical Engineering, Tulane University, New Orleans, La.

CAPT. GEORGE F. WILLIAMSON, (N. R. J.), (1939), *Civil Engineer*, Operations Officer, Bn. 3, U. S. Marine Corps, Engineer Battalion Headquarters. *Mail:* Headquarters, Engineer Bn., TC, Camp Lejeune, N. C.

VICTOR L. WILLOZ, (L. M.), (Jan. 1, 1900), Distribution Engineer, New Orleans Public Service, Inc., 4439 So. Miro St. *Mail:* 317 Baronne St., New Orleans, La.

FRIEND ASBURY WILSON, Jr., (S.), (1943), *Mechanical Engineer*, Assistant to Superintendent, Gulf States Utilities Co. *Mail:* 4125 Oak Drive, North Highlands, Baton Rouge, La.

JAMES NORMAN WILSON, Jr., (L.M.), (1911), Assistant Technical Engineer, Sewerage & Water Board of New Orleans, 8821 Spruce St. *Mail:* 2425 Audubon St., New Orleans.

LT.-COMDR. A. R. WINGATE, Jr., (N.R.), (1924), *Civil Engineer*, U. S. Naval Reserve, Public Works Bldg. # 1, Navy Yard, Philadelphia, Pa.

WILLIAM A. WINTZ, Jr., (S.), (1942), *Civil Engineer*, Instructor in Engineering Mechanics & Civil Engineering, Louisiana State University. *Mail:* 3029 Highland Road, Baton Rouge, La.

W. A. WOOD, Jr., (J.), (1941), *Chemical Engineer*. Address unknown.

A. ALFRED WOODS, (N.R.), (1914), *Civil Engineer*, Chief Engineer, Maintenance of Way and Structures, Southern Railway System, Western Lines, 2492 Observatory Road. *Mail:* 307 East 4th St. Cincinnati, Ohio.

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

JOHN KING WOOLF, (1943), *Civil Engineer*, Member of Firm, W. Horace Williams Co., 1825 Calhoun St. *Mail:* 833 Howard Ave., New Orleans.

CHARLES J. WYLER, (1919), *Mechanical Engineer*, Assistant Chief Engineer, A. M. Lockett & Co., Ltd., 308 Whitney Bank Bldg. *Mail:* 530 Jackson Ave., New Orleans, La.

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LOVETT YOUNG, (S.), (1943), *Chief Chemist*, Gulf States Utilities Co. *Mail:* 2404 Hale St., Baton Rouge, La.

— Z —

COMDR. ANTHONY MICHAEL ZIBILICH, (1941), *Civil Engineer*, U. S. C. G., Assistant Maintenance Office, Senior Coast Guard Officer, 8th Naval District, 327 Customhouse Bldg. *Mail:* 119 Ringgold St., New Orleans, La.

ROBERT W. ZIFFLE, (1937), Research Dept., New Orleans Public Service, Inc. 715 Pelican Ave. *Mail:* 317 Baronne St., New Orleans, La.

Student Engineers

WILLIAM S. ADAMS, 2101 Elliot St., Alexandria, La.
WORTLEY BATTY, 3622 Chestnut St.
ROY E. BRADY, 5342 Laurel St.
JOHN S. BURWELL, 7911 Freret St.
A. B. BUSH, 5107 Conti St.
HUBERT CLOTWORTHY, JR., 1418 Hillary St.
EDWIN ROBERT COUSINS, 3301 Baudin St.
TIMOTHY A. CRAIN, 8002 Willow St.
GEORGE L. CUNNINGHAM, JR., 9 Trianon Plaza
DAVID D. DAVIS, 3016 Tulane Ave.
FRANK C. FROMHERZ, 1430 Henry Clay Ave.
ALVIN G. GOTTSCHALL, 1716 Pine St.
RICHARD A. HEEHS, 700 Broadway
FRANCIS JOHN HIGGINS, 8002 Plum St.
NEILL P. JEFFREY, JR., 7035 Freret St.
ROY E. JOHNSON, JR., 4807 St. Claude Ave.
NORMAN KAUFFMANN, JR., 7722 Hampson St.
GARY E. KIDD, JR., 1628 Fern St.
EDWIN LAFAYE, 911 Lowerline St.
OWEN V. LeBLANC, 2927 Bell St.
GEORGE LONG, 1542 Calhoun St.
JAMES H. MARTIN, JR., 2714 Palmer Ave.
LOUIS J. ROSENBOHM, 347 Joseph St.
ROBERT E. SCHNEIDER, JR., 221 So. Genois St.
ROBERT WILLIAM SCHUPP, 1455 Exposition Blvd.
JAMES K. SIMPSON, 2921 Leonidas St.
A. DALE STANCLIFF, JR., 4735 Carondelet St.
CHARLES E. STEIDTMANN, JR., 1421 Hillary St.
SAM J. STOKES, 4460 Music St.
JOHN Y. TALOR, 20 Newcomb Blvd.
HAROLD ANDREW TIMKEN, JR., 5922 Laurel St.

Summary

Honorary Members	2
Charter Members	3
Life Members	38
Local Members	198
State Members	131
Non-Resident Members	70
Associate Members	2
Local Affiliate Members	13
State Affiliate Members	3
Non-Resident Affiliate Members	2
Local Junior Members	21
State Junior Members	10
Non-Resident Junior Members	45
Members: Unknown Address	20
Student Members	31
Total	590

Past Presidents

*Sidney F. Lewis	1898	R. S. Manley	1921
*Thos. L. Raymond	1899	Donald Derickson	1922
Henry J. Malochee	1900	*J. S. Bareli	1923
*Frank M. Kerr	1901	James M. Robert	1924
*Alf. F. Theard	1902	Marcel Garsaud	1925
*Alf. Raymond	1903	Farrar P. Hamilton	1926
J. F. Coleman	1904	Edward S. Lanphier	1927
W. B. Wright	1905	John L. Porter	1928
*W. H. Hoffman	1906	Frederick H. Fox	1929
*G. W. Lawes	1907	James M. Todd	1930
*C. W. Wood	1908	*Frank G. Frost	1931
*J. T. Eastwood	1909	Frederick N. Billingsley	1932
W. B. Gregory	1910	John H. O'Neill	1933
*J. C. Haugh	1911	A. L. Dunlap	1934
D. S. Anderson	1912	Edward S. Bres	1935
*A. M. Shaw	1913	Allen S. Hackett	1936
W. H. Williams	1914	C. S. Williamson	1937
*L. C. Datz	1915	Bernard H. Grehan	1938
*Samuel M. Young	1916	David W. Godat	1939
A. T. Dusenbury	1917	William H. Rhodes	1940
John Klorer	1918	David W. Stewart	1941
Ole K. Olsen	1919	C. Glenn Cappel	1942
John Reiss	1920		

* Deceased

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Joint Meeting of the Society with the Delta Chapter, American Society of Heating and Ventilating Engineers, November 9, 1942

The meeting was called to order by 1st Vice-President Kammer with approximately 70 members and guests present.

It was voted to dispense with the reading of the minutes of the last meeting.

Vice-President Kammer read a portion of a letter from Mr. Alcee Legendre requesting that the Society designate a representative to attend an OCD class leading the formation of a technical avisory committee to assist in civilian defense work in this locality. Mr. J. C. Baehr was appointed to represent the Society.

It was announced that a Nominating Committee composed of D. W. Stewart, Chairman, F. P. Hamilton and W. H. Williams had been appointed by President Cappel and would consider suggestions for nominations for a period of ten days following this meeting.

The coming Fall Meeting of the Baton Rouge Section of the Society on November 18 was announced and all members invited to attend.

Mr. T. Houston Lynch made a brief appeal for volunteers for the Bomb Reconnaissance Division, OCD. A number of those present volunteered for this work.

The meeting was turned over to President G. C. Kerr of the Delta Chapter, American Society of Heating and Ventilating Engineers, who introduced the speaker of the evening, Prof. E. O. Eastwood, National President of A. S. H. & V. E. and Director of the Guggenheim Laboratory, University of Washington, who presented a very interesting, illustrated paper on "The Development of the Airplane for its Function in the War". At the conclusion of the paper several questions were answered.

The meeting adjourned with a rising vote of thanks to the speaker.

J. K. Mayer,
Secretary-Treasurer.

Minutes of the Meeting of the Board, December 7, 1942

The meeting was called to order by President Cappel with the following members present: Kammer, Kerr, Kohnke, Steinmayer and Mayer.

The minutes of the last meeting were read and accepted.

The following letters were read and accepted:

R. L. Nall—Report of initial meeting of local committees to arrange for a War Production Board sponsored Production Clinic to be held in conjunction with the Annual Meeting of the Society in January.

D. W. Godat—Request that the Society appoint a commitee to work with an American Society of Civil Engineers committee to confer with the Louisiana Civil Service authorities and with the State Board of Engineering Examiners to clarify the status of examination of engineers for employment under the Louisiana Civil Service Act. The American Society of Civil Engineers committee composed of Leo M. Odom, Chairman, N. E. Lant and B. W. Pegues was appointed by President Cappel to also represent the Louisiana Engineering Society.

R. J. Kuhn—Request that the Society assist in entertaining Mr. Henry L. Howe, visiting speaker for the coming joint meeting of the Society with the American Public Works Association. Mr. K. P. Kammer was designated to represent the Society.

D. W. Godat—Report on present status of the proposed Technological Mobilization Bill.

The report of the Committee on Professional Advancement with reference to the establishment of a comprehensive employment service was again read and discussed. It was the unanimous opinion and decision that this Board accept the Committee's recommendation that such a service not be undertaken at this time due to war conditions. Action on the Committee's suggestion that the Society consider affiliating with some national organization for the purpose of improving the status of members of the engineering profession was deferred pending further information.

A letter from Chairman Cucullu was read suggesting that the Secretary be designated the Society's representative for the New Orleans Association of Commerce Membership. After some discussion it was voted to affirm the Board's earlier decision that the immediate past president represent the Society in this capacity.

A letter from Mr. Pascal Pareti, Jr. was read requesting that his dues for 1941 be reduced to $5.00, since he was not engaged in engineering work during that year. The Board decided that such a request could not be granted.

Mr. J. Thad Floyd was appointed Chairman of Membership Committee "A" to fill the vacancy occasioned by the entrance of Mr. C. E. Cassagne into the Army.

A report of Mr. J. C. Baehr, the Society's representative at a recent Office of Civilian Defense sponsored meeting on bomb damage to buildings, was read and accepted with appreciation.

A recommendation of General Chairman Nairne that the Society underwrite the expenses of the coming Annual Meeting to the extent of $600.00 was approved.

It was decided that $740.00 of the Society's checking account be invested in a Series "F" War Bond (1,000.00 maturity value in 12 years).

The Secretary-Treasurer was authorized to have the Society accounts audited at the end of the year.

It was voted to again waive the entrance fee for membership and that this action be retroactive to July 1, 1942, the expiration date of the last waiver.

An appeal for a donation by the New Orleans Tuberculosis Committee was read. It was decided that Society funds should not be donated to such organizations, although the cause was considered most worthy.

The following names were ordered placed on a letter ballot for submission to the membership:

For Junior Member: Joe Allen Carruth, John E. Pottharst, Jr.

For Member: Arthur E. Champeau, Eugene Leland Coile, Marion Ellis Frater, William Brewster Gurney, William J. Hughes, Allen Jumel Matherne, Jr., C. Glennon Melville, Joseph Robert Murphy, Richard Knowles Wilkerson, Friend Asbury Wilson, Jr., John King Woolf, Lovett Young.

Transfer from Junnor Member to Member: Wilbert N. Argus, Gabriel G. Aurioles, John C. Bartley, Arthur J. Ferguson, Jacques L. Fortier, Walter Godchaux, Jr., Ben J. Haney, Jr., George A. Heft, Aiphe G. Jarreau, William F. Levert, Edward A. McLellan, John E. Morehiser, Jr., DeWitt L. Morris.

The following members having paid dues for 30 years automatically become Life Members at the Annual Meeting in January:

B. N. Davis, Ralph Earl, W. T. Hogg, C. M. Kerr, L. A. Loustalot, W. B. Moses, G. A. Seaver.

There being no further business the meeting adjourned.

J. K. Mayer,
Secretary-Treasurer.

Joint Meeting of the Society with the New Orleans Chapter, American Public Works Association, December 14, 1942

The meeting was called to order by President Cappel with approximately 60 members and guests present.

The minutes of the last meeting were read and accepted.

Chairman D. W. Stewart of the Nominating Committee submitted the following list of nominees:

For President	Karl P. Kammer
1st Vice-President	Charles M. Kerr
2nd Vice-President	Reinhard A. Steinmayer
Secretary-Treasurer	John K. Mayer
Directors for 2 years	W. Stone Leake and Clayton L. Nairne
Director for 1 year	R. E. Gosa

No nominations were received from the floor and it was voted that the nominations be closed.

The Secretary announced the opening of another tuition free Engineering, Science and Management War Training Course in Industrial Safety at Tulane University.

The names of several members whose addresses are unknown were read and information as to their whereabouts requested.

President Cappel then turned the meeting over to President N. L. Marks, Jr. of the New Orleans Chapter, American Public Works Association, who introduced the speaker of the evening, Mr. Henry L. Howe, National President of the American Public Works Association and City Engineer of Rochester, New York. Mr. Howe presented a very interesting paper on "Public Works and Post-War Planning".

At the end of the paper President Marks made some announcements and comments with particular regards to New Orleans. The meeting was then turned back to President Cappel.

Chairman C. L. Nairne announced plans for the coming Annual Meeting in January.

The meeting adjourned with a rising vote of thanks to the speaker.

J. K. MAYER,
Secretary-Treasurer.

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society

Date: Thursday, December 17, 1942. Time: 7:30 p. m.

Place: Hotel Heidelberg, Baton Rouge.

Officers Present: N. E. Lant, President; F. F. Pillett, 1st Vice-President; H. L. Lehmann, Secretary and Treasurer.

After enjoying a delightful meal, the Annual Meeting of the Baton Rouge Section of the Louisiana Engineering Society was called to order by President N. E. Lant.

Mr. Lant first introduced the guests of the Baton Rouge Section, beginning with one of the Society's Members and the speaker for the evening:

Mr. C. Glenn Cappel—Partner, W. Horace Williams Co.
Mr. W. Prescott Foster—Director, La. Department of Highways
Mr. H. C. Leonard—President, Gulf States Utilities
Capt. M. D. Hogan—Area Engineer, A.U.S.A.
Mr. J. S. Logan—Sr. Engineer, U. S. Public Roads
Major John G. May—U. S. Army Engr. Depot
Mr. F. A. Billhardt—Chief Engineer, Aluminum Co. of Am.
Mr. J. T. Bullen—Supt. Public Works, E. B. R. Parish

The president then introduced the officers of the Baton Rouge Section. Upon suggestion by Member, J. Clifton Hill, all members and guests arose one at a time and introduced themselves—giving name and business connection.

The meeting was well attended having a total of sixty-nine present—forty-two members and twenty-seven guests. A cross section of the attendance is as follows: Department of Highways 20; Gulf States Utilities 17; L. S. U. 7; Standard Oil Company 6; U. S. Army 4; and others from 1 to 3 are W. Horace Williams Co., Aluminum Co., Robinson & Young Contractors, Forcum-James Co. Contractors. Ethyl Gasoline Corp., Stone & Webster, Public Roads and East Baton Rouge Parish Public Works.

Mr. Lant gave a short but very inspiring address with reference to the years activities and aims of the Society.

The president then called on the chairman of standing committees present.

Membership Committee Chairman Lehmann reported a total of fifty-eight applications submitted for consideration and an analysis of this number showed:

Accepted as—Members, 36; Junior Members, 7; Affiliated Members, 2. Being balloted as—Members, 8; Junior Member 1.

Four applications submitted needed additional personal references and the chairman advised that this would be attended to. Four new applications were received to be submitted to Mr. J. K. Mayer, Secretary and Treasurer, for the committee's consideration.

Report was made by Professor Whipple, Chairman of Entertainment Committee, which had reference particularly to the annual meeting.

The Acting Secretary and Treasurer, Lehmann, reported the status of finances as follows:

Total money on hand and received during the year	$93.17
Total disbursements, including cost of annual banquet (guests and programs)	56.73
Balance on hand	$36.44

All outstanding bills paid.

The next order of business was nomination of members as officers for the coming year. The nominations were numerous. The two receiving the largest numbers of votes were put up for election. The officers and individuals nominated were as follows: President, F. F. Pillett (29), P. J. Guelfi (9); 1st Vice-Pres., H. L. Lehmann (26), Wm. Whipple (10); 2nd Vice-Pres., Hamilton Johnson (20), R. B. Richardson (16); Secretary and Treasurer, A. J. Dubus (25), W. P. Wallace (11).

The above numbers in parenthesis are the results of the vote for election.

The speaker, Mr. C. Glenn Cappel, Vice-President and Chief Engineer of W. Horace Williams Company and President of the Louisiana Engineering Society, read and discussed a very interesting and informative paper entitled "Concrete Dock Construction in New Orleans". He brought along and passed around to the group a large number of very interesting progress pictures. The speaker also showed some charts and graphs relative to the construction.

This subject was well received as was indicated by the number of questions asked the speaker.

The meeting was brought to a close by Mr. Lant thanking Mr. Cappel for this splendid paper and also the guests for attending.

There being no further business, the meeting was adjourned.

H. L. LEHMANN,
Acting Secy. and Treas.

Minutes of the Meeting of the Board, January 11, 1943

The meeting was called to order by President Cappel with the following members present: Kammer, Kerr, Kohnke, Kuhn, Stewart and Mayer.

The minutes of the last meeting were read and accepted.

Since the Governer has not yet appointed a member to fill the vacancy on the State Board of Engineering Examiners, it was suggested that other names be added to the list already submitted. The following additional names are to be submitted: S. E. Huey of Monroe, N. E. Lant of Baton Rouge, T. B. Smith of Houma.

The following committee was appointed to prepare an obituary on the recent death of Mr. J. T. Eastwood, Past-President and Life Member of the Society: Ralph Earl, Chairman, C. M. Kerr and H. J. Malochee.

The Secretary read a list of members delinquent in dues for more than one year and stated that these men had recently been advised of the section of the By-Laws concerning termination of membership for delinquency of dues. Action was deferred until the next meeting of the Board.

The Secretary-Treasurer submitted the financial report for 1942. This report is to be published in the February issue of the Proceedings.

President Cappel announced that Mrs. A. M. Shaw had given to the Society a large portion of the late Colonel Shaw's engineering library. Mrs. Shaw is to be assured of the Society's appreciation and the Library Committee requested to arrange for placing the books in the Library.

A letter from F. E David was read requesting suspension of membership while in the army. He is to be informed of the reduction in dues for members in the services.

A letter from Charles J. Phillips was read requesting transfer from Affiliate Member to Member. The matter is to be referred to Membership Committee "B" for study and recommendation.

Recommendations by Professor Pegues and Dean Robert for the following scholarship awards were approved: Leland L. Morgan, Louisiana State University; Emile S. Sherrard, Tulane University.

Several letters were read regarding the work of the joint American Society of Civil Engineers—Louisiana Engineering Society Committee appointed to investigate the State Civil Service Act insofar as it pertains to the proposed classification of certain employees of the State as "Civil Engineers". Due to the efforts of this Committee the Department of Highways has now classified certain employees as "Highway Engineers". The action of the Committee was approved.

A letter from Mr. H. F. Peckworth, Assistant to the Secretary, American Society of Civil Engineers, giving information on the progress of the Kansas Engineering Society in reorganizing so as to act as the bargaining agency for engineers in that state was read. The Board requested the Secretary to thank Mr. Peckworth for this information.

There being no further business the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

ANNUAL REPORT
BY
PRESIDENT LOUISIANA ENGINEERING SOCIETY
1942

I have now to report the general results of the activities of the Society during my incumbency in office for the past year. Our Secretary-Treasurer has given a factual report covering the status of the Society's activities.

We are going ahead! We have gained in membership! We have gained in finances! Neither gain is material in itself, but I believe indicates an unexpectedly healthy condition in times like these. Frankly, I expected a material reduction in membership and that our finances would be in the red. It is particularly pleasing to me to report that neither of my prognostications materialized. We have held our business sessions and our regular monthly meetings on schedule, well attended and instructively presented each month during the past year.

All of us have been under heavy strain but we have put out additional effort over and above that required of us by our effort in this war, to keep our Society going on an unexpectedly high plane.

I wish to take this opportunity of thanking a most able Board of Directors, most active and conscientious Committees and Chairmen of Committees, some of whom have been indefatigable in their efforts. What one man alone can accomplish is practically negligible, but with the aid of cooperative and understanding associates, there is no limitation to what can be accomplished.

We all recall the fable of the man who had seven sons and on his deathbed called them together and took seven sticks, tied them securely together and had each one of the sons endeavor to break the bundle. Of course they couldn't. Then he untied them and himself with his weakened hands, broke each individual stick with very little effort. The moral of this fable is particularly applicable to our Society.

Actually our activities during the past year are well known to you. You have attended the meetings and you have received the Proceedings outlining all these activities. I shall not review them.

I do have two problems which I wish to recall to your attention—problems which in my opinion are distinctly up to this Society to do something about. The first is the duty of this Society within its limitations of assisting our Government to an uninterrupted supply of trained Engineers. As you know, we passed a resolution requesting deferment from military service of Engineering students until the completion of their studies. As a matter of fact, this is not a request for deferment from military service primarily, but an effort on our part to see that the

supply of trained Engineers for the armed forces as well as necessary civilian purposes, is not interrupted. None could be better fitted to advise our Government along these lines than this Society and others like it.

The second problem is that pertaining to the social or economical well-being of our members and members of the Engineering profession. It is my considered opinion that a solution of this problem should be had as quickly as may be and along lines thought out by thinking men and leaders in the Engineering profession. If we sit supinely by and allow organizers of various kinds and the uneducated and unthinking to out-line our policies for us, we will deserve what we get. I say to you—that it is your duty to face this problem four-square and arrive at a solution.

Upon taking over the office of the President of the Society in January last year, I remember well saying that I was humble in my appreciation of the honor done me. Now, after having completed my year of service, I am humble in my thanks to those staunch friends and fellow workers who have so ably carried the burden.

FINANCIAL REPORT OF SECRETARY-TREASURER FOR 1942

RECEIPTS—1942

Dues	$3345.38	
Advertising	341.49	
LASEC News	36.36	
Pro Rata of Joint Meeting Costs	43.63	
Sale of Proceedings	2.00	
Income from Investments	97.50	
Dividens from Frozen Deposits	64.61	
Sale of Membership Certificates and Buttons	135.24	
Total Receipts		$4066.45

EXPENSES—1942

Cost of Proceedings	$1158.86	
Entertainment and Outings	99.98	
Scholarships	102.50	
Printing and Postage	462.31	
Presents for Retiring President	28.72	
Library	28.28	
Bond for Secretary-Treasurer	10.00	
Refreshments for Meetings	252.37	
General Expenses	120.55	
Annual Meeting, 1942	473.50	
Salary for Secretary-Treasurer	600.00	
Porter for 422 St. Charles Hotel	26.50	
Rebates to Baton Rouge Section	53.67	
Refund of Dues	20.00	
Cost of Membership Certfficates and Buttons	147.75	
Delta Junior Engineers	5.00	
Public Address System	93.15	
Membership in New Orleans Ass'n of Commerce	25.00	
Total Expenses		$3708.14
Total Receipts		$4066.45
Total Expenses		3708.14
Net Income		$ 358.31

ASSETS—JANUARY 1, 1943

Cash, Whitney National Bank, Checking Account		$1976.33
6th District Building & Loan Association	$ 500.00	
Greater New Orleans Homestead Association	1364.82	
Union Homestead Association	500.00	
Commonwealth Homestead Association	304.94	
Security Building & Loan Association	500.00	
Columbia Building & Loan Association	354.45	
Savings Account, National Bank of Commerce	759.79	
*Series "F" U. S. Savings Bond	740.00	
Total Insured Investments		$5024.00
Total Available Assets		$7000.33

*Purchased in December, 1942.

FROZEN FUNDS

Canal Bank & Trust Co., Book Value	$ 173.57
Interstate Bank & Trust Co., Book Value	1917.81
Total	$2091.38

MEMBERSHIP REPORT FOR 1942

Members Elected:

Members	54
Affiliate Members	4
Junior Members	10
*Student Members	27
Total	95

Changes in Grade of Membership:

From Member to Life Member	7
From Junior Member to Member	13
From Student Member to Junior Member	13

Members Lost

†Dropped for delinquent dues	52
Resignations	12
Deaths	7
Total	71
Members in Armed Forces	75
Total Membership on December 31, 1942	568

*Total number of Student Members.

†Not included in February, 1942 membership list.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

FEBRUARY, 1943

"PATRONIZE OUR ADVERTISERS"

INDEX TO ADVERTISEMENTS

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXIX. APRIL, 1943 NO. 2

CONTENTS

EDITORIAL NOTES AND COMMENT

Do You Know? That there have been introduced in the U. S. Senate two bills for the regimentation of engineers? They are Senate Bills Nos. 607 and 702. The activities of all engineering and scientific personnel will be controlled by a board, composed of an administrator (qualifications as to training unspecified, but the salary is $12,000 per year) and six board members consisting of one representative each from agriculture, labor, the consuming public, and two scientists or technologists. The administrator makes the sixth.

Assuming the need or necessity for such regimentation of engineers or scientists, think of the "fat chance" for intelligent direction of their activities when only one-third of the board is composed of the profession that is being regimented.

Can you feature an organization of lawyers being moved around like chessment by a group of engineers? The bill, of course, specifically excludes doctors, for the politicians well

know that the American Medical Association would not stand for such meddling. Such things as this stress the need for a single national engineering organization which would prevent such interference on the part of professional politicians with activities of professional engineers and scientists. Write or wire your senator or congressmen today. Following is a list of their names. Remember the "Rules for Robots" are contained in Senate Bills Nos. 607 and 702.

Senators:

John H. Overton	Allen J. Ellender

Representatives:

F. Edward Hebert	Paul H. Maloney
James Domengeaux	Henry D. Larcade, Jr.
Overton Brooks	A. Leonard Allen
Charles McKenzie	James H. Morrison

Faster and Faster. The rubber shortage is still critical, but we in our usual American way are forgetting and cars are being driven faster and faster. The economical speed for tires is a slow speed, and increased tire wear is of vital importance. Keep the speed down; don't be a "heel" and cheat at the wheel.

Other Sections. Contained in the minutes of meetings are notes on the Baton Rouge Section. This section has been very active in building membership in the Society. The prospects seem bright for establishing chapters in other parts of the state.

In This Issue. "New Developments in Lubrication and Their Relation to Industry and the War Effort" by Harold M. Fraser of the International Lubricant Corp. appears in this issue. It depicts war-time problems of lubrication, and how they have been overcome.

Mr. John C. Baine, Jr., General Superintendent of the New Orleans Public Service Railway Department, gives us an inside glimpse of a one hundred seventy-five million passenger headache. You will find it interesting reading and it shows how industrial and business houses are cooperating in this transportation problem.

PAPERS AND DISCUSSIONS

"NEW DEVELOPMENTS IN LUBRICANTS AND THEIR RELATION TO INDUSTRY AND OUR WAR EFFORT"

Harold M. Fraser *

In this discussion I shall endeavor to give you a brief summary of a few of the new developments in the field of lubrication and their relation to industrial progress. Since we are all primarily War minded, I shall also touch quite frequently on the military value of these developments.

During last winter's Russian offensive we read many reports of stalled German tanks, trucks, airplanes, etc., due to the extreme cold. The news commentators did not go into detail as to why the Russians were able to move their own equipment in these same low temperatures, but the answer is simple. The Russians had planned for winter warfare, and were much farther advanced in low temperature lubrication research than the Germans. Whether or not the Germans have overcome their deficiency has, as yet, not been determined.

Our own men are fighting on all fronts, in Arctic and Desert temperatures, in moist and dry climates; in fact, the military equipment of no other country is subjected to as many varied climatic conditions as that of our own Armed Forces. This brings up the question, "Is American prepared for all emergencies?". I can assure you that, as far as lubricants are concerned, we are. Never has there been such a feverish search by chemists and engineers in our Country during the past few years for the answers to so many problems. Results have been so satisfactory that the entire civilized world is looking, and will continue to look, after the War, to American for lubricants that will perform miracles.

Demands by the Bureau of Aeronautics have resulted in the development of a new grease which will satisfactorily lubricate

* Vice President in charge of Production, International Lubricant Corp.
Delivered January 15, 1943, Annual Meeting.

an aeroplane while idling in the hottest desert temperature, and, in just a few moments, also satisfactorily lubricate that same plane at an unbelievably high altitude at temperatures below -65° F. Newer ideas are suggesting further improvements of the grease to lubricate at temperatures below -100° F. This grease will also satisfactorily lubricate in either very wet or dry climates, or on industrial equipment operating at temperatures approximating 300° F. It can also be adapted to either high speed or heavy duty industrial equipment in either friction or non-friction bearings.

Nearly everyone remembers the trouble we had a few years ago with hypoid gear lubricants when they were introduced into passenger cars. The truck owners will certainly remember the difficulties they had when hypoids were introduced in trucks and attempts were made to lubricate them with passenger car hypoid lubricant. The troubles and tribulations of the fleet truck operator and the industrial plant superintendent were many and great during those months when it was necessary to carry in stock passenger car hypoid lubricant, truck hypoid lubricant, as well as all the other types of gear oils necessary for the many different kinds of gears.

That is all different now—one kind of lubricant will do the work of all the others. Hypoids, spur gears, bevel gears, and practically any kind of industrial transmission equipment can be lubricated with what is now called Universal gear lubricant. One can readily see the advantage this gave military engineers when our Country entered the War and jeeps, tanks, trucks, tractors and various other kinds of machinery, equipped with a variety of transmissions, began rolling off the assembly line ready to be lubricated. One lubricant ready for all certainly helped ease the minds of many military engineers. Recent improvements have been made in low temperature properties so that one filling is satisfactory the year round, except for extreme Arctic climates.

High speed Diesel engine lubricants , long the nightmare of many plant engineers, have also come in for their share of improvements. Diesel engine design has progressed beyond the point where Mother Nature could give us, without the help

from Man, proper lubricants for satisfactory operation. Man came to nature's aid, and by means of chemical additives or addents, new lubricants were made which show infinite improvement over the old type sludge and gum producing oils. There are several types of these oils, but most of them are made from solvent extracted oils, i.e., oils low in carbon and high in paraffinicity, to which are added anti-oxidents to keep gum and sludge formations to a minimum. They also usually contain chemicals which give the oil film much greater strength. All of them contain so-called detergents that scour what gums may be produced from the piston walls and rings and hold them in suspension in the lubricant. The result has been much longer operation between overhauls and, consequently, lower cost of operation.

Our military ground equipment contains many different kinds of engines, some diesel, some gasoline. You can readily see the difficulty and possible chaos if it were necessary for each expeditionary force to carry different oils for each kind and size of engine. Because of the high film strength of these new Diesel oils, they can be made in light Viscosity ranges (S.A.E. grades) and will lubricate both high speed and heavy duty engines. This type of oil has been adapted to lubricate all types of military equipment—jeeps, tanks, tractors, trucks—whether they be powered by Diesel or gasoline engines.

Ball bearing greases have been a thorn in the side of ball bearing manufacturers for many years due to the fact that all greases and oils when exposed to the air in thin films in contact with metals, unless properly treated, have a tendency to oxidize and form products which are harmful to good lubrication. A ball bearing which has been packed with old style grease may be useless, due to oxidation of the grease, after it has lain on the dealer's shelf for a year or so unless repacked with new grease. Most dealers do not care to go to this trouble or expense, or are not equipped to do it, and as a result faulty operation follows due to poor lubrication. When installed in the machine, if it can be re-greased readily, usually no harm results, unless the bearings have been pitted, but many bearings are packed with grease by the manufacturer for the life of the

bearing and these bearings have no facilities made for relubrication. Oxidized grease in these bearings means a breakdown in a very short time. Anti-oxidents can be added to greases which delay or prevent oxidation, and most ball bearing manufacturers are now demanding and specifying that the greases they buy be properly inhibited. These new ball bearing greases have added materially to the life of ball bearings, reducing breakdowns and loss of time in operations. No ball bearing should be used unless inspected thoroughly to see if the grease is good and if the bearings are pitted. A little care at this point may save serious trouble later.

Just imagine the amount of labor and attention this saves the mechanics in our Armed Forces. Bearings that ordinarily would need attention every few days now need no attention due to these "packed for life" ball bearings.

All of these developments may not be noticed to any great extent in industry until after the War, but I feel sure that the research program planned by the Petroleum Industry during the past few years will eventually be, at least, one good that will come from the War.

TRANSPORTATION PROBLEMS IN NEW ORLEANS

John C. Baine, Jr.*

The nation's urban transit industry is faced today with the greatest problem in its history. The former all-time peak of traffic was seventeen billion passengers in 1927. This dropped to a low of eleven billion in 1933, and preliminary figures for 1942 indicate it will rise over the eighteen billion mark, well above the previous high of 1927. It is estimated that the twenty-two billion mark will be reached in 1943 with the full impact of nation-wide gasoline rationing having its effect. Urban transportation must function ceaselessly and efficiently if war workers are to get to their factories and work benches, regularly and on time.

The transit system of New Orleans, like that of many another city, has experienced an unprecedented increase in traffic for the past eighteen months due to increased industrial and military activity. In 1941 we carried about 133,000,000 passengers compared with 175,000,000 in 1942, or an increase of about 32 per cent. During the early period of upward trend we ordered new equipment to meet the demand. However, even before Pearl Harbor the production of buses and street cars was curtailed. Then further restrictions were placed on the construction of transit vehicles during 1942, so that today the only equipment available is the ODT "pool" of less than 1,000 buses to be parceled out to those cities which are centers of war production and have the most critical transportation shortage. Since we are not considered to be in a "critical area", it is evident now that no additional equipment will be available to us.

To add to our problems, the increase in passenger traffic was further accelerated by the stopping of automobile production, followed by tire rationing, and now gasoline rationing. In addition, we are confronted with a manpower shortage caused by

* General Superintendent, Railway Department, New Orleans Public Service, Inc. and member of the Society. Delivered at the Annual Meeting, January 15, 1943.

employees entering military service or leaving to accept more lucrative positions in war production plants. Replacement parts have been difficult to obtain, and one eye has to be kept on bus tire quotas.

Recently the problem was further complicated by the issuance of ODT Order No. 21 which definitely limits the mileage that can be operated by our bus fleet. When it is considered that a large number of the war production plants and military establishments are located in outlying sections of the city which can only be served by our buses, this latest ODT order may seriously affect our present bus operations.

Even before our entry into World War II, our company recognized that considerable study would have to be given to the transportation problem, and measures were worked out to relieve the situation and prevent a breakdown of facilities. A Working Committee on Emergency Transit Problems was formed and this group composed of Railway Department Division Heads began studying ways and means of obtaining the most efficient use of the existing equipment in light of anticipated abnormal traffic increases. The possibilities of leveling off the peaks by staggering of working hours, the feasibility of fewer stops and turn-back service, the practicability of increasing vehicle capacity by seating rearrangements, and various other expedients were given careful consideration.

This preliminary work proved invaluable in helping us plot our course when the ODT issued their 12 Point Statement of Policy in April, 1942, and asked for the cooperation of all Transit Companies. At this same time Mr. Eastman, Director of ODT, urged the Mayor and City Officials to form a War Transportation Committee.

The principal points carried by the original ODT Local Transport Policy Statement included fewer stops, staggered hours, full use of street railway lines, use of turn-back service and curtailment of bus service in non-rush hours. We have already put into effect many of these recommendations and I will now outline to you the steps that have been taken and the progress that has been made up to this time.

Fewer Stops—A selective stop program was initiated on our bus lines in November, 1942, and new bus stops were established during that month.

There are many advantages to the Selective Stop System which should be pointed out:

1. Resultant additional carrying space.
2. Saving in critical materials such as rubber tires, steel car wheels, bronze trolley wheels, etc.
3. Patrons get a faster ride.
4. The speed and smoothness of flow of traffic are improved
5. Passenger loading becomes more uniform.
6. There will be more chance for an operator to "catch up" rather than "blow up" when behind in schedule.

In the final selection of stops the following factors, in addition to distance and number of passengers served by each stop, were considered:

1. Transfer Points.
2. Heavy loading points, such as high school, hospitals, public buildings, etc.
3. Traffic Signals and Stop Signs.
4. Safety factors.
5. Uniform spacing between stops.

The number of street car stops was reduced from 1446 to 724 and the average spacing was increased from 350 feet to 700 feet. Bus stops were changed from 1744 to 830 and the stopping distance from an average of 388 feet to 815 feet.

After selecting the stops a standardized marking arrangement was decided on. Because of the critical materials situation, stop signs were made of wood and for the most part were mounted on wooden posts. Temporary "No Stop" signs were printed on cardboard and arranged to show the effective date of the line changeover. They were put in place a few days before the change.

The reaction of the riding public to this plan has been most encouraging. Complaints have been few and far between and in most cases were due to lack of understanding of the factors involved in the selection of a particular stop. A simple explana-

tion of the reasons for eliminating stops has usually been sufficient to satisfy the complainants.

Our preliminary checks since completing the installation bear out our original estimates that a 7 to 10 per cent faster ride would result. The "created" capacity or saving in equipment should amount to about fourteen cars and twelve buses when our schedules are completely revised.

Staggered Hours—According to Joseph B. Eastman, Director of Office of Defense Transportation, "A carefully prepared plan of staggering working, store and office hours by far the greatest opportunity for increasing the carrying capacity of existing transit vehicles." Accordingly, the War Transportation Committee was requested by the ODT to inaugurate such a program, and this was one of the first jobs they tackled.

There is really nothing new about the idea of staggering hours. Traffic engineers have long held that traffic congestion could be reduced and existing traffic peaks could be spread by shifting working hours. However, custom and habit are difficult to change. In typical business districts and commercial areas the usual working hours generally were from 8:00 a. m. to 5:00 p. m., with a one-hour lunch period. This schedule of work which has been in effect for many years produced three daily traffic bottlenecks, one just before 8:00 a. m., and one during noon hour and one shortly after 5:00 p. m. The noon hour peak particularly affected the elevators and restaurants, while the morning and evening peak meant overcrowded cars and buses and congested traffic arteries.

With the aid of a favorable press, plus a goodly amount of explaining and selling, our War Transportation Committee has succeeded in obtaining the necessary community cooperation to successfully initiate a program of this type. The results have been helpful but we have by no means completed the job. We must look for the close cooperation of all employers. Employers with two and three, or ten to twenty employees constitute the majority in this community and they must each take part when called upon if staggered hours is to be a success.

Employers must realize that as peak hour crowds exceed capacity and force overcrowed vehicles to pass up passengers

they will suffer and production losses due to their workers not getting to work on time. On the other hand, if the employee must allow more time to get to and from work he is in effect staggering, but on his own time. This consideration added to the inconveniences and discomforts of traveling during peak hours (accentuated in our bad weather seasons) helps make the employee cooperative.

The first group to stagger their hours was that made up of the department stores, clothing and specialty shops. These establishments shifted their hours from 9:00 a. m.-5:30 p. m. to 10:00 a. m.-6:00 p. m. on June 1 of last year. The transit system would be hard put to carry today's peak loads if this change had not been made. This arrangement not only affected 5,000 store employees, but the riding habits of additional thousands of store customers were changed and these riders were advantageously distributed over a longer period of time at the point of our highest peak.

Factories and general business concerns located in the central business area were approached. In connection with this undertaking it was necessary to gather information concerning prevailing working hours in these organizations. 25,000 questionnaires were filled out by employees in these firms. These questionnaires, when tabulated formed the basis for this portion of the staggered hour plan. Firms employing approximately 10,000 persons have been asked to shift their hours and already over 5,000 people are observing new hours, with more agreeing to the changes as each day passes. Cooperating groups in the central business district include Federal offices, factories, steamship, insurance and oil companies, motion picture distributors and hardware and construction firms. In addition, we have had complete cooperation from the new war plants which are situated in outlying locations. For example, Delta Shipyard, which is the largest single employer, has arranged their shifts in nine sections completely staggered throughout the day. Their schedule of working hours almost completely removes the workers from our peaks and is a good example of how large plant cooperation can help ease the transportation problem.

For the staggered hour plan to be fully effective it will be necessary for the street cars and buses to make at least three trips during peak hours, instead of the one trip formerly made by a large number of vehicles. Since the average round trip time on the car and bus lines is slightly over one hour this would require a morning peak period of, say, 7:00 a. m. to 10:00 a. m. and an evening peak of 4:00 p. m. to 7:00 p. m. Present peak periods are from 7:30 a. m. to 9:00 a. m. and from 5:00 p. m. to 6:15 p. m., so this indicates we are far from accomplishing our aims and must continue hammering on the staggered hours program to realize the desired spreading of peaks. One disconcerting fact that our studies show is that 10,000 passengers ride in the evening peak who do not ride in the morning peak. We are now working on plans to find out who these people are, and whether they can be removed from this peak.

Rearrangement of Car Seats—Since the load per vehicle is is an important factor in efficient vehicle use, we decided early in 1942 to experiment with a rearrangement of car seats to increase the peak capacity of these units. Longitudinal seating plus a staggered arrangement of stanchions were installed in 30 cars (sufficient to equip one heavy car line) at a cost of approximately $500 per car. The seats were in effect an extension of the original side seats or "beauty" seats which are located at each end of the car ahead of and behind the cross seats.

Although these rearranged cars seat only 48 passengers compared with the 52 passengers seated by the conventional car, they have considerable more "peak" capacity. Whereas we consider the cross seat car to have a normal loading standard of 85 passengers, the rearranged cars on the same basis have a loading standard of 98 or a 15 per cent increase. In other words, if we were to convert 100 cars for "peak" use, we would gain a "created" capacity of 15 additional cars, or looking at it in another way, we would be able to haul 1300 additional passengers in any hour of the peak.

To check our preliminary estimates, we placed the 30 converted cars in operation on the Magazine Line for a period of two months during the past summer. Riding checks indicated

that these cars, in addition to carrying heavier loads, were better able to maintain peak schedules because of the improved loading and unloading. The increased aisle space and stanchion arrangement facilitated passenger movement so that more even distribution of loading was obtained. In addition, passengers would use the stanchions to move to the exit door while the car was in motion and were ready to alight when their corner was reached.

We received some complaints regarding these cars during the trial on the Magazine Line when they were in service in both the peak and off-peak periods. However, since distributing the cars over the entire system and using them in the peaks only we have not received any additional complaints. Naturally the longitudinal seats are not as comfortable as the cross seats and there is a tendency to slide in the seat during starting and stopping. On the other hand, for "peak" use, the standee passenger who is in the majority is provided with better facilities.

A more radical departure in seating rearrangement is the so-called "Stand-Sit" seat sponsored by the ODT and now getting its share of national publicity. These seats are so designed that they can be spaced 18 inches apart instead of the conventional 28 to 32 inches and thus increase seating capacities from 25 to 40 per cent, depending on the type of unit involved. Passengers sit in a semi-vertical position about 25 inches from the floor instead of the usual 18 inches in a conventional seat. Two foot rests are furnished to compensate for patrons of various heights.

Our entire Maintenance System has been geared to "Keep 'Em Rolling" and, in addition to reducing our spare equipment needs, we are continually and conscientiously struggling with the problems of tire and materials conservation. All known methods of tire saving are employed, such as frequent inflation to proper pressures; inspection for cuts and material objects that enter the tire; checking all wheel alignment with special testing equipment; proper mating of dual tires; examination of brake drums for out-of-round conditions and wheels for trueness. In addition, tires are removed for retreading or

recapping before the tread rubber is completely gone. Our rubber consciousness did not start with the War, as we have been operating on a mileage rental basis for several years. This plan includes a bonus clause which is an incentive to the operator to obtain the maximum possible mileage per tire. Last year our average mileage per new bus tire was approximately 50,000 miles; and per retread or recap was about 20,000 miles, which is remarkably good mileage considering our loads and operating conditions.

In order to insure ourselves of spare parts which are becoming increasingly difficult to obtain we make full use of salvaging operations such as metal spraying, welding and machining.

Other Expedients—Besides the various conservation measures already adopted, there are several other expedients which our Working Committee has studied that can be used to good advantage as the situation demands. For example, on certain of our longer lines to outlying districts "turn-back" service could be used. This consists simply of turning back some vehicles at intermediate points instead of having them all go to the outer end of the line. The possibilities of mileage saving by parking buses at the ends of lines or in suitably located parking lots between peaks instead of returning them to the garage is also being studied.

Group Riding—No discussion of the over-all transportation problem would be complete without mentioning the group riding plan as sponsored by ODT and OPA. Encouragement of share-the-ride plans is designed to be confined to situations where workers have no adequate public transportation service available to them. As a practical matter, however, there is no doubt that many group riding clubs are being organized in places where the workers could, in reality, use public transportation without undue hardship. At the same time it is obvious to all that the "shared car" does not have the same economy characteristics as to rubber and fuel savings enjoyed by common carrier vehicles, since a much higher rate of passenger mileage per pound of rubber and gallon of fuel can be obtained by the mass carrier.

We are of the belief that car-sharing has a definite place in the scheme of things today and should be encouraged by the

management of industrial plants situated in the outlying sections of the city. It must be kept in mind, though, that the schedules of riding groups will be dislocated by the progress of the staggered hours program. It has been suggested, therefore, that the active promotion of Group Riding should come only after working hours have been stabilized under the staggered hours plan.

Manpower Problem—I would like to close with mention of this problem which may yet prove to be the most difficult to solve of any of these outlined. At the present time we employ approximately 1200 motormen, conductors and bus operators. During 1942 we lost about 400 men to the Armed Services and War industries. We hired 600 new operators, 500 of whom qualified in our training school. This made up for our losses and took care of added runs due to increased riding. A tremendous amount of instruction and training work was entailed as each man is put through a 30-day training course.

Within recent months serious manpower shortages have led several transit companies to employ women as conductors, motormen and even bus operators. So far, the concensus of opinion is that women operators are proving to be very satisfactory. They have been accepted wholeheartedly by the riding public and are extremely sincere and conscientious about their work. They are reported as handling the equipment well and their accident record is said to be equally as good as that of men.

In conclusion, it is a source of gratification and encouragement to review the resourcefulness which our industry has displayed in coping with the transportation problem. The establishment of the Local Transport Division of the Office of Defense Transportation indicates recognition on the part of those directing the war effort that this is a national problem. For our part we acknowledge that as a company we cannot do this wartime job alone. We will need the cooperation and asistance on the entire community, and in addition, will have to ask for the patient consideration and tolerant understanding of our patrons if our service does not measure up to Pre-War standards.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Annual Meeting of the Society, January 14, 1943

The meeting was called to order by President Cappel with approximately 180 members and guests present.

Mr. John Eberhart led the singing of the National Anthem.

It was moved to dispense with the reading of the minutes of the last meeting.

The Presidents or Chairmen of the local sections of the various engineering societies were introduced by President Cappel.

Dean James M. Robert of the College of Engineering, Tulane University, gave a most interesting and inspiring keynote address concerning the responsibilities which must be assumed by the engineering profession after the war.

The Secretary-Treasurer presented a brief report on the finances and membership of the Society.

President Cappel presented a general report on the progress of the Society during the year.

Chairman Stewart of the Nominating Committee announced that the nominees selected by the Committee had been unanimously elected by letter ballot. Mr. Stewart escorted the President-Elect, Mr. Karl P. Kammer, to the chair, where he received the gavel from the retiring President, Mr. Cappel. The following newly elected officers were escorted to the front and presented to the members and guests:

Charles M. Kerr	First Vice-President
R. A. Steinmayer	Second Vice-President
John K. Mayer	Secretary-Treasurer
W. Stone Leake	Director for 2 years
Clayton L. Nairne	Director for 2 years
Robert E. Gosa	Director for 1 year

President Kammer spoke briefly on plans for the year's activities and then called upon several committee chairman for announcements regarding the program of the Annual Meeting.

Mr. F. N. Billingsley moved a rising vote of thanks to the 1942 officers of the Society.

The meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Board, February 1, 1943

The meeting was called to order by First Vice-President Kerr due to illness of President Kammer. The following members were present: Cappel, Gosa, Kuhn, Leake, Nairne, Steinmayer and Mayer. President F. N. Billingsley, Louisiana Section, American Society of Civil Engineers, and Messrs. F. P. Hamilton and O. K. Olsen were present by invitation.

Mr. Billingsley explained that the supplementary data on foundation surveys in the vicinity which had been gathered by the W. P. A. is to be published by the Louisiana Department of Public Works, since the W. P. A. will soon cease to operate in Louisiana. This material is to be published as an addenda to the volume published by the W. P. A. in 1939. Before publication, however, the Department of Public Works has requested that this material be reviewed and edited by a committee appointed jointly by the Louisiana Engineering Society and the Louisiana

Section, American Society of Civil Engineers. The following joint committee was appointed: Donald Derickson, Chairman, J. H. O'Neill, Vice-Chairman, A. J. Negrotto, Leo Odum and Mr. N. Strachan (W. P. A.). Mr. Billingsley is to prepare letters to the above for joint signatures of the presidents of the Society and the Louisiana Section, American Society of Civil Engineers.

It was stated that the W. P. A. office still has on hand some volumes of the foundation survey which are to be disposed of shortly. The Secretary was directed to request that these be given to the Society for distribution for persons having a bona fide need for this information. A list of persons to whom this publication has been sent is also requested so that the addenda, when published, may be sent to these persons.

Messrs. Billingsley and Hamilton asked to be excused from the rest of the meeting.

The minutes of the last meeting were read and accepted.

A letter from Mr. Ralph Earl was read explaining that his work in Mobile prevented him from serving on the committee to prepare an obituary on the death of Mr. J. T. Eastwood. Mr. John L. Porter was appointed chairman of this Committee to replace Mr. Earl.

The Secretary stated that payment had been received from 12 of those members reported at the last meeting as being delinquent in dues by more than one year. It was voted that the remaining members on this list be dropped if no payment was received within one month, except for those serving in the armed forces—the latter to be carried on the records.

It was voted to again waive the entrance fee for the year 1943. Also that all members maintaining residence in New Orleans be classed as Resident Members and required to pay regular resident dues. The Secretary was directed to advise the few members thus affected of this action and to request payment of full resident dues for 1943.

A letter from the Baton Rouge Section was read requesting that the funds remitted by the Society to the Section be increased from $1.00 to $3.00 per member annually. Since $1.00 per member is the maximum allowable under the Constitution, it was decided that the Baton Rouge Section be asked to submit its request in the form of an amendment to the Constitution so that it may be acted upon according to the provisions for amending the Constitution.

A letter from Mr. W. H. Scales was read concerning the pending Technological Mobilization Bill in Congress. It was agreed that this is a matter of utmost importance to the engineering profession and the new Legislation Committee is to be requested to give it serious consideration.

A letter from Lt.-Comdr. W. J. Amoss was read explaining that his resignation had been tendered the Society in 1927 while he was employed in South America, but had not been received by the Board and consequently he had been dropped in 1931 for delinquency in dues. Reinstatement was requested pending waiver of these back dues. The Board decided that these dues should not have been charged and that reinstatement could be made with a clear record. It was also decided that any member dropped for delinquency of dues may be reinstated upon payment of 1 year's back dues, since according to the By-Laws membership shall cease when dues are delinquent for 1 year.

The following resignations were accepted with regret:

N. Lewis Buck, Homer Lee Davis, Charles B. Dicks, Jr., Erich R. Stephan.

It was decided that the policy of charging one half the meeting costs to Local Sections holding joint meetings with the Society be continued.

Mr. Clayton L. Nairne reported that the cost of the Annual Meeting would be well within the amount appropriated, but that the detailed report was not yet complete. The Secretary-Treasurer was directed to pay the expenses incurred.

District Contact Representative and Chairmen of the Standing Committees were selected pending the approval of President Kammer.

There being no further business the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Joint Meeting of the Society with the New Orleans Section, American Society of Mechanical Engineers, February 8, 1943

The meeting was called to order by First Vice-President Chas. M. Kerr with approximately 150 members and guests present. Mr. Kerr expressed his regrets that President Kammer could not preside due to illness.

It was moved to dispense with the reading of the minutes of the last meeting.

Mr. Kerr introduced Captain Scaling who spoke briefly on the need for all kinds of technical specialists in the U. S. Marine Corps.

Mr. N. E. Lant of Baton Rouge briefly explained that the $1.00 per member remitted annually to the Baton Rouge Section was insufficient to maintain the activities of the Section and proposed an amendment to the section of the Constitution concerning payments to Local Sections. The proposal was to change Paragraph 1 of article X to read as follows:

> "The Board of Direction may annually assign, from the funds of the Society, to each Local Section a sum varying in proportion to its needs not to exceed $3.00 for each member belonging to that section, except Life, Honorary, Junior and Student Members, and $1.50 for each Junior and each Student Member belonging to that Section."
>
> "The functions of the Local Sections shall be such as will facilitate the enjoyment of the stated objects of the Society by members living within the area of the Section."

Mr. Lant also advised that the Society make a definite effort to establish Local Sections in several other cities throughout the state and suggested that this might be accomplished by the financing of a trip around the state by some older member of the Society who has the time available.

Mr. Kerr turned the meeting over to Mr. A. M. Hill, Secretary-Treasurer of the New Orleans Section, American Society of Mechanical Engineers, who read a telegram from Chairman Cucullu expressing his regrets for not being in New Orleans and the appreciation of the Section to the speaker. Mr. Hill then called upon Mr. M. C. Abrahm, Chairman of the A.S.M.E. Program Committee to introduce the speaker.

Mr. J. W. Devross, New Products Division, U. S. Rubber Co., presented a most interesting and informative paper on "Structural Rubber for Vibration and Impact". A number of slides were shown and various types of rubber springs exhibited. Mr. Devross answered numerous questions at the conclusion of his paper.

Mr. Kerr expressed the appreciation of both the A.S.M.E. and the Society to the speaker for his trip to New Orleans and the excellent paper presented.

The meeting was adjourned with a rising vote of thanks to the speaker.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Board, March 1, 1943

The meeting was called to order by President Kammer with the following members present: Gosa, Kerr, Nairne, Steinmayer and Mayer. Chairman Olsen of the Finance Committee was present by invitation.

The minutes of the last meeting were read and accepted.

The far-reaching effects of proposed Senate Bills 607 and 702 upon the engineering profession were discussed. It was decided to refer this matter to the Committee on Legislation with the request that the question be studied and, if deemed advisable, a resolution expressing the Society's attitude on these bills be framed for introduction at the coming meeting of the Society.

A letter from the Louisiana Architectural Association was read requesting that the Society endorse a resolution recommending more extensive employment of Louisiana architects and engineers on war construction projects within the State. The Committee on Legislation was requested to delegate one of its members to attend a joint meeting on March 8th for the discussion of this matter with the architects and representatives of the local engineering groups. The Legislation Committee is then to advise the Board as to the action to be taken.

The proposed amendment to Article X of the Constitution presented in behalf of the Baton Rouge Section of the Society by Mr. N. E. Lant at the last meeting of the Society was discussed. The Board recommended the increase in rebate to a maximum of $3.00 per year for each Member of a Local Section, but recommended that the rebate for each Junior and Student Member remain a maximum of $0.50 per year as at present. The later recommendation was due to the fact that the greater part of the dues paid by Junior Members and more than that paid by Student Members is consumed in sending "Proceedings" and meeting notices to these members. The Baton Rouge Section is to be advised of this recommendation and requested to have a representative at the coming meeting of the Society if possible.

Several letters were read regarding the formation of an engineering organization in Lake Charles. It was decided that President Kammer write this organization informing them of the provision for the establishment of Local Sections of the Society and inviting them to meet with the Board to discuss the establishment of a Local Section in Lake Charles.

Chairman Olsen reported that the Secretary-Treasurer's Financial Report for 1942 was correct as to disbursements. A complete audit of the accounts is being made by an accountant. A budget submitted for 1943 showed a small margin of net income after making allowances for an increase in the number of members going into the armed services. These reports were accepted by the Board with thanks to Mr. Olsen.

A report of Mr. R. P. Bassich, Past Chairman of the Employment Committee, was read covering the work of the Committee during the last four months of 1942. The report was accepted with thanks.

A Committee consisting of D. A. Hunt, Chairman, W. S. Nelson and E. J. James was appointed to prepare an obituary on the death of Mr. I. W. Sylvester, Life Member of Alexandria, La.

Resignations of F. T. Clarke and I. C. Daniel were accepted with regret.

A letter of appreciation from Mr. Leland Morgan, recipient of the Louisiana Engineering Society scholarship award at Louisiana State University, was read.

A letter ballot was ordered for the following applicants for membership in the Society, having been approved by Membership Committee "B".

For Member: Chaille Claude Bernard, Charles Carter Brown, Felix Bernerd Camors, Frank Culpin Carey, Ralph Chambers, Jeffery Herbert Collins, Robert Matthews Craig, Edwin A. Davis, Waldeck Ferdinand Guilbeau, Nelson L. Hawkins, Rudolph Hertzberg, William deYoung Kay, John P. Lessley, Leroy Emory Savage, Wallace Edmonston Sharp, Dalton B. Shourds, Leonard Robert Swinney, Guy Willard Witmer.

For Affiliate Member: A. Wylie McDougall.

For Junior Member: Walter E. Blessey, W. Horace Williams, Jr.

For Reinstatement as Member: Walter James Amoss, Lyman Coleman Reed.

For Transfer from Affiliate Member to Member: Charles J. Phillips, Jr.

Mr. Olsen stated that the Louisiana Architectural Association was desirous of working more closely with the Society on certain matters affecting both engineers and architects, also in holding occasional joint meetings. It was suggested that a joint meeting of the two Boards of Direction might be held to further discuss these matters. President Kammer is to contact the President of the Louisiana Architectural Association.

Mr. C. L. Nairne presented a most complete report on the 8th Annual Meeting of the Society, giving valuable suggestions for improving certain details in future meetings. The net expense was reported as $419.38. The report was accepted with thanks and congratulations for a job splendidly done.

There being no further business the meeting adjourned.

J. K. Mayer,
Secretary-Treasurer

Minutes of the Meeting of the Society, March 8, 1943

The meeting was called to order by First Vice-President Kerr due to illness of President Kammer. Approximately 40 members and guests were present.

It was voted to dispense with the reading of the minutes of the last meeting.

Chairman Rhodes reported that due to delay in the mail the notices calling a meeting of the Legislation Committee were not received in time and no meeting was held. Another meeting is to be called next week.

Reports of the Employment Committee were read and accepted.

Professor Steinmayer moved that the proposed amendment to the Constntution be changed to read as follows: "The Board of Direction may annually assign, from the funds of the Society, to each Local Section a sum varying in proportion to its needs not to exceed $3.00 for each member belonging to that Section, except Life, Honorary, Junior and Student Members, and $0.50 for each Junior and each Student Member belonging to that Section." The motion was unanimously carried. A vote on the amendment in the above form is to be taken at the next two regular meetings.

Vice-President Kerr introduced the speaker of the evening, Mr. Don L. Gibb, Plastics Division, Dow Chemical Company of Midland, Michigan, who presented an interesting and informative paper on "The Development and Application of Saran Plastic Tubing." A large assortment of plastic products were exhibited. Mr. Gibb answered a number of questions at the conclusion of the paper.

The meeting adjourned with a rising vote of thanks to the speaker.

J. K. Mayer,
Secretary-Treasurer.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

APRIL, 1943

"PATRONIZE OUR ADVERTISERS"

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PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXIX. JUNE, 1943 NO. 3

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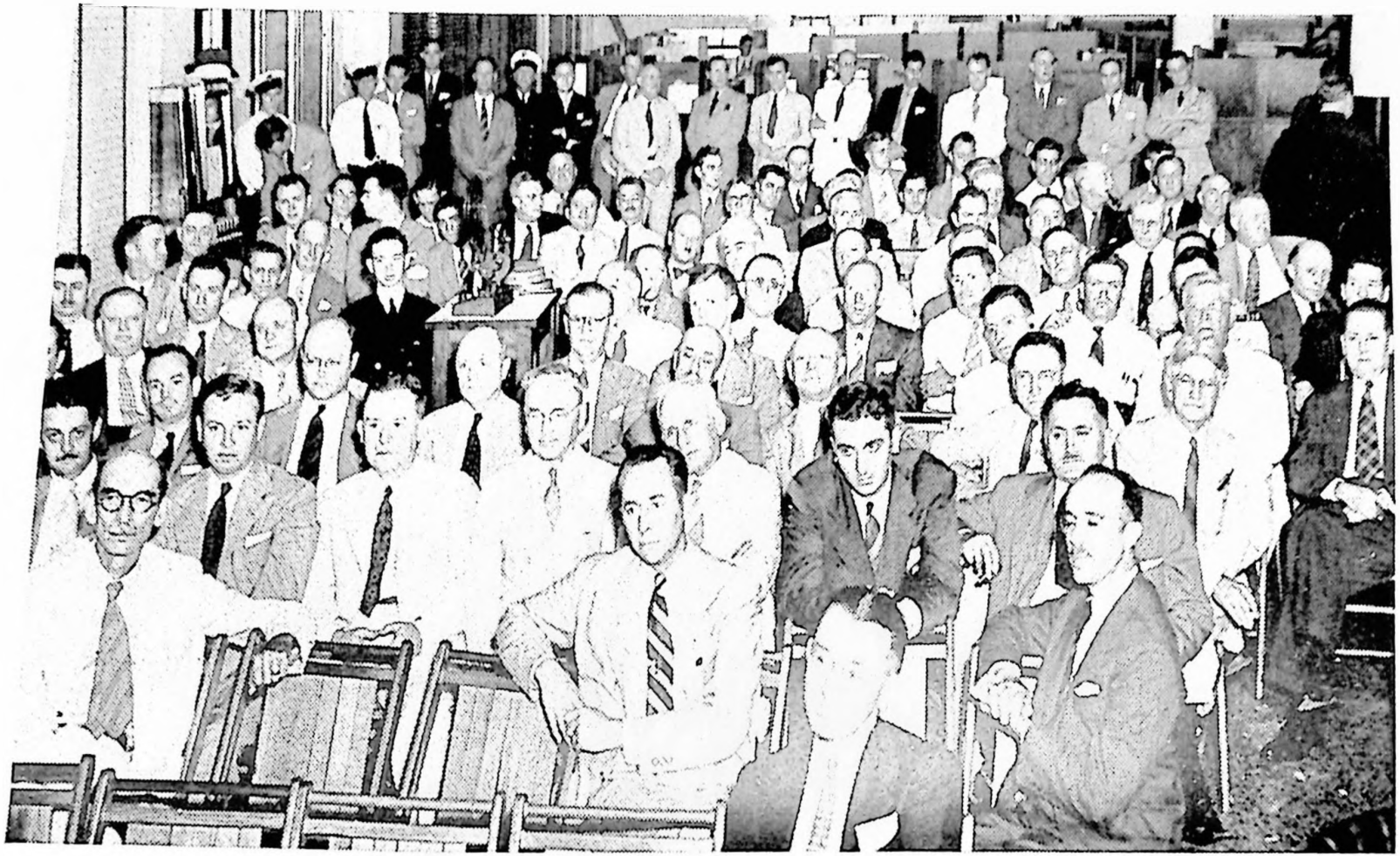
EDITORIAL NOTES AND COMMENT

Cream of the Crop. In normal times, in the month of June, the faculties of various southern engineering colleges witness a discouraging sight which has been common for some years—the migration of our best engineering graduates to northern industry.

If carefully analyzed, it is disheartening to have these young men, educated with southern funds, public or private, frequently both, take up engineering work in the north or east. The companies taking these men usually give additional engineering training in their own particular lines of activity.

Perhaps with the ending of the war, and with the greater industrialization of the south, these young men will not be lost to us as they have been in the past. It is a grave question for the management of southern industry and public utilities to ponder. Frequently these young southerners in going north or east, give their best knowledge and ability to competitors of southern industries.



Our May Meeting at Higgins Industries, Inc.

May the time come when opportunities are offered which are great enough to keep "the cream of the crop" of engineering graduates here in their homeland—their southland—for the betterment of themselves and our southern engineering profession.

Our May Meeting. The membership was privileged to visit the City Park Plant of Higgins Industries, Inc. at the regular meeting time on May 10. Movies were shown on the various performance tests of PT boats, etc. The remainder of the evening was devoted to a trip thru the plant, members being able to see the various steps in boat construction. The Society is indebted to Mr. Higgins for allowing the members to make such a plant visit.

Obituary of
JOHN THOMPSON EASTWOOD

In the death of John Thompson Eastwood on January 2, 1943, the Louisiana Engineering Society has lost a distinguished member, and his associates have lost a personal friend and counselor.

"John T." as he was affectionately called by his associates, was born in Portsmouth, Virginia, December 15, 1868.

After attending the public schools and Norfolk Academy in his birthplace he entered the University of Virginia, graduating in 1890 with the degree of Civil Engineering.

Following graduation he entered the employ of the United States Engineers, War Department, at Vicksburg, Mississippi, later being transferred to the Norfolk, Virginia office.

Engaging in private pactice of his profession in Portsmouth, Virginia, early in 1894, he became associated with the Engineering Department of that City, serving as Principal Assistant Engineer in charge of sewer construction from August, 1894 to July 1896.

Returning to private practice at this time he remained in Potsmouth until March 1898 when he came to New Orleans as Assistant Engineer for the National Contracting Company who were engaged in constructing one of the major drainage canal systems of this city.

In June, 1900, Mr. Eastwood entered the employ of the Sewerage and Water Board of New Orleans, created by act of the legislature in 1899, serving as assistant Engineer until 1906; and from then until he left the employ of the Sewerage and Water Board in 1931 he served as Principal Assistant Engineer—Sewerage and Water. After leaving the Sewerage and Water Board, Mr. Eastwood engaged in the private practice of his profession until his death.

During the thirty-one years of his service with the Sewerage and Water Board Mr. Eastwood devoted his time and efforts unstintingly to the responsibilities of his position; and the successful design, construction and maintenance of the sewer and water systems were due in no small measure to his foresight and engineering ability.

John T. Eastwood took an active part in the civic and social activity of his adopted city. He was a life member of the American Society of Civil Engineers, and of the Louisiana Engineering Society, of which he was President in 1909. He served two terms as President of the Paul Morphy Chess Club, and was President of the Society for the Prevention of Cruelty to Animals. He was also a member of the Southern Yacht Club.

John T. Eastwood was widely known for his ability and integrity, and enjoyed the trust and confidence of the public whom he served so faithfully.

It is only fitting that the Louisiana Engineering Society, recognizing its sense of loss, should pay tribute to our late fellow member, John T. Eastwood by adopting resolutions attesting that fact.

Therefore: BE IT RESOLVED, that the Louisiana Engineering Society adopt resolutions embodying the facts as expressed above; and

BE IT FURTHER RESOLVED, that these resolutions be spread upon the minutes of the Society and published in its Proceedings, and that a copy be sent to Mrs. Eastwood and son, together with an expression of our heartfelt sympathy and sincere condolences.

Respectfully submitted,
HENRY J. MELOCHEE,
CHARLES M. KERR,
JOHN L. PORTER, Chairman

Obituary of
IRA WALLACE SYLVESTER

The death of Ira Wallace Sylvester at Alexandria, Louisiana, on November 7, 1942, was deeply regretted by engineers and other friends throughout the state, who felt that his passing marked the passing of a tradition in municipal engineering and civic service. Mr. Sylvester, as engineer for the city of Alexandria for over fifty years, held a unique place in the hearts of his fellow engineers, by whom he was regarded as an example of steadfast and continuing devotion to the duties of his profession.

Born in Portland, Maine, January 10, 1868, Ira W. Sylvester was brought to Louisiana at an early age to join his father, then opeating the Holly Grove Plantation in St. Landry Parish. He attended school in Illinois, and later studied at Rennselaer Polytechnic Institute in Troy, New

York, returning afterwards to Louisiana to start his life work as an engineer in his home and surrounding parishes.

He located in Alexandria about 1890, and was employed by the city, one of his first assignments being the preparation of a complete and accurate map of the city, which with current revisions, is still used. He then turned his interests and abilities wholeheartedly to the development of the municipal facilities, and their growth under his direction has always paced the parallel development of the practice of municipal engineering in this country.

Mr. Sylvester was active in the conception and construction of the municipally owned power and water plants which serve Alexandria, and he designed and supervised the construction of the city sewer system, the first municipally owned sewer system in the state. The third and latest extension of this system is now under construction, as originally planned by him in 1900.

In 1901 he supervised the installation of the first paving in the city of Alexandria, and in 1905 he was engineer in charge of construction of the Alexandria-Pineville bridge over the Red River. In 1916-18, together with others, he was instrumental in securing the location of Camp Beauregard in the vicinity of Alexandria, and in insuring its subsequent use as a National Guard training center.

Early experience in the Red River basin made Mr. Sylvester keenly interested in flood control, and he was frequently consulted concerning levee work by the Red River, Atchafalaya, and Bayou Boeuf Levee Districts, with whom he battled many a flood. He was active in municipal engineering services for the towns of Crowley, Marksville, Lecompte, Washington, Opelousas, Eunice, Natchitoches, Pineville and others, and he was consulting engineer for the parish of Rapides on its road system.

Always concerned with civic affairs, Mr. Sylvester frequently took an active part in them beyond the call of duty, and accomplished much for the cause of municipal development. In 1911 he was the first president of the Louisiana State Board of Engineering Examiners. In 1912 he was instrumental in securing the passage of the Lauason Act in the State Legislature, authorizing the adoption of the commission form of government by cities upon the vote of the electorate. This form of government was adopted by the city of Alexandria in 1913, and it has continued to operate under it ever since. In 1928 Mr. Sylvester served as a member of the State Legislature.

Mr. Sylvester was a Life Member of the Louisiana Engineering Society, a member of the American Society of Civil Engineers, a member of the Society of Military Engineers, and had the rank of Lieutenant-Commander, United States Navy (CEC.R.), having been appointed in 1927.

At the time of his death he was actively engaged in supervision of construction of additions to the water supply and sewer system of Alexandria, in an attempt to keep pace with

the rapid increase in population resulting from the location of many army installations in the vicinity.

Of a personable disposition, Mr. Sylvester was always cheerful and friendly with his associates, and his loss will therefore be the more keenly felt. He is survived by his sisters, Miss Brownie Sylvester and Miss Lillie Sylvester, and by his sons, Captain Evander Wallace Sylvester, U.S.N.; Lt.-Commander Harold McTavish Sylvester, U.S.N.; and Commander Malcolm D. Sylvester, U.S.N. To these and to his many friends throughout Louisiana, the Society sends its deepest sympathy and regret at the death of one of the State's outstanding engineers.

Respectfully submitted,
D. A. HUNT, Chairman
E. J. JAMES
W. S. NELSON

In This Issue. With present day emphasis on noise control, the paper on "Vibration Absorption with Structural Rubber" is timely. The speaker, Mr. Devross, was secured thru the efforts of Mr. Abrahm, of A.S.M.E. as the February meeting was a joint affair with the Society.

New Members. In this issue we list a total of twenty-three new and reinstated members. Splendid work is being done by some of our members in interesting these new comers in our organization. Are you doing your part? A few minutes spent in reviewing the following list will help you get acquainted with these new members.

FOR MEMBER

Bernard, Chaille Claude. Age, 46. Endorsed: N. E. Lant, H. L. Lehmann, C. A. Myers. 1917 B.E. in C.E., Univ. of Miss. 7/17-6/18 3rd Dist. Miss. River Comm., Surveyman in charge of party. 6/18-12/18 E.O.T.C. Comm., 2nd Lt., Engr. Reserve. 12/18-10/19 Private Utility work. 10/19-12/20 Elk Tanning Co., Costello, Pa., Operations Engr. 12/20-2/22 Asst. to J. R. Adams. East Carroll Parish Engr. 2/22 to date with La. Dept. of Highways. as follows: 2/22-6/27 Field work and Drafting; 6/27-9/29 Estimate Engr.; 9/29-2/41 Asst. Office Engineer; 2/41 to date Contracts Engr. Registered professional engineer —state of Mississippi. 2040 Oleander St., Baton Rouge, La.

Brown, Charles Carter. Age, 30. Endorsed: L. M. Odom, F. F. Pillet, D. L. Pyburn, S. C. Smith. 1934 B.S. in C.E., La.

State Univ.; registered C.E. since that time. 1 yr. U.S. Coast and Geodetic Survey. 6 yrs. Jr. Agric. Engr., Soil Conservation Service, in charge of erosion control work in Washington, east Tangipahoa and north St. Tammany Parishes. 5/31/41 to date with a. Dept. of Public Works.—until 8/42 in eng. design dept., since then as Chief of Planning Section. Dept. of Public Works, Capitol Bldg., Baton Rouge, La.

Camors, Felix Bernerd. Age, 29. Endorsed: F. G. Downs, A. D. Jackson, H. Waugh. 1931-33 Ouachita Parish Jr. College. Attended Tulane U. for 2 yrs. changing from Medical to Engr. School last year. Fall, '34-'40 Construction and Location Survey Party, Officeman, Instmn. and Inspector; fall '40 to date, Draftsman, Drafting Room—both with La. Dept of Highways. 821 North 8th St., Baton Rouge, La.

Carey, Frank Culpin, Lt.-Col. Age, 48. Endorsed: C. M. Kerr, R. B. Kohnke, R. A. Steinmayer. 27 yrs. with U.S. Govt. on railroad evaluation, flood control, rivers and harbors, airport const. at various ratings from Jr. Engr. to Principal Engr. 15 yrs. in responsible chg. of work as Chief of Engr. Div. or Asst. Chief. 7 months as Lt.-Col. Corps of Engr., U.S. Army. No college education, but graduate of Int. Corres. Schools in C.E. Member of Am. Soc. Civ. Engr. 1229 Calhoun St., New Orleans.

Chambers, Ralph. Age, 64. Endorsed: F. G. Downs, A. D. Jackson, H. Waugh. 1899 B.S. in C.E., La. State Univ. June '98, left for Spanish American War. July 1900-December 1904 L. & N. Ry., Instmn., Surveys and Location. 1904-Oct. 1914 U.S. War Dept., Corps. of Engr., Computer, Draftsmn, Levee Survey and Const., Creosoted barge treated & Const. Sept. 1912-May 1915 La. Hwy. Comm., Field Engr., Drafting, etc. 1915-Sept. 1931 Standard Oil Co. of La., Baton Rouge, Designing Engr., Layout and Const. Engr., Asst. Engr. 1931-Sept. 1933, Private wk., Beaumont, Tex., Gen. Surveys, Est. Designs. 1935-June 1936 W.P.A., Beaumont, Sr. Estimator. 1936-June 1937 Lummis Const. Co., Const. Engr. June-Dec. 1937 Badger Const. Co., Const. Engr. 1938-Feb. 1941 Co. Com'rs City Beaumont, Designing, Const. Engr. March-Nov. 1941, City of Gal-

veston, Asst. Engr. 1942 to date, La. Dept. of Hwys., Draftsmn. Member, Sabine Chapt., Texas Engr.; registered and licensed Engr. in Texas, La. and National Soc. of Prof. Engr. 929 Camelia Ave., Baton Rouge, La.

Collins, Jeffery Herbert. Age, 42. Endorsed: H. M. Blain, C. L. Nairns, C. S. Williamson. 1923 B.E. Tulane U. 1923-27 Chemist, Gas Pl.; 1927-28 Asst. Supt., Gas Pl.; 1929-32 Supt., Gas Meter Shop; 1932-34 Asst. Supt., Meter & Appliance Dept.; 1934-40 Supt. of same; 1940 to date Supt., Gas. Dist. Div.—all with N. O. Public Service, Inc. Member of Amer. Gas Ass'n,; Amer. Pub. Wks. Ass'n. 5830 Memphis St., New Orleans.

Craig, Robert Matthews. Age, 40. Endorsed: J. B. Coltharp, A. J. Dubus, C. M. Scott. 1928-B.S. in E.E., Texas A. & M. July '28-'30 Stud. Engr., Gulf States Utilities Co., Beaumont, Tex. 2 yrs. Asst. to Supt. of Rys., Eastern Texas Electric. Rest and to date with Gulf States Utilities Co. as follows: 3 yrs. Elect. Transm. and Dist. Dept., Narasota Div.; 6 yrs. Engr., same dept. Lake Charles; 1 yr. Elect. Engr., Dept., Baton Rouge. 416 Terrace Drive, Baton Rouge, La.

Davis, Edwin A. Age, 39. Endorsed: N. E. Lant, H. L. Lehmann, C. A. Myers. 1925 B.S. in C.E., La. State Univ. 1925-30 Chief Engr., A. G. Seifried, Inc., Landscape Arch'ts. and Engr. 1930-33 Draftsmn., La. Hwy. Comm. 1934-42 Proposal Engr. (Sr. Prop. Engr. during last yr.); 1942 to date Works Program Engr. in chg. of Wks. Program Unit—La. Dept. of Hwys. Registered C.E. state of Louisiana; Civil Service Class. State of Louisiana, C.E. II; U.S. Civil Service Comm.—Assoc. Engr. —Civil (Hwys.). 604 Laurel St., Baton Rouge, La.

Gilbeau, Waldeck Ferdinand. Age, 42. Endorsed: E. L. Dennis, H. L. Molaison, J. Pominski. 1924-B.S., Sugar Chem., La. State Univ. 1922-23 Chem., Godchaux Sugar Co., Raceland. 1924-25 Chem. Engr., C. & H. Sugar Refinery Corp., Crackett, Cal. 1926-39 Chem. Engr. & Supt., Hershey Sugar Co., Hershey Corp., Hershey, Cuba. 1940 Asst. Supt., Industrial Sugar Corp., Chicago. 1941 Chem. Engr., Seagram Distillery, Louisville. 1941-42 Chem. Engr., U.S. Sugar Corp., Clewiston, Fla. 1942 to

date, Chem. Engr. U.S. Dept. of Agriculture, Southern Regional Research Laboratory, New Orleans. 6667 Memphis St., New Orleans.

Hawkins, Nelson L. Age, 50. Endorsed: C. G. Cappel, B. H. Grehan, R. N. Habans, O. K. Olsen, G. A. Seaver. 1911-14 Surveyor,C. M. & S. P. Ry. 1914-17 Surveyor, Erie Ry. 1919-23 Testing and Inspection Engr., Chicago, Rock Island. 1923-24 Testing and Inspection Engr., Robt. W. Hunt. 1924-30 Sales Engr., Kilby Car & Foundry Co., Annison, Ala. 1930 to date, Owner and President, Orleans Material & Equipment Co., Inc. 1556 Tchoupitoulas St., New Orleans.

Hertzberg, Rudolf. Age, 36. Endorsed: A. L. Dunlap, B. S. Nelson, G. D. Waddill. 2 yrs. M. & E. E., Tulane Univ.; 3 yrs. art training. 14 yrs. U.S. Engr. Office, drafting, supervising drafting; 5 yrs. of this time in chg. of preparation of specification drawings, survey directions, etc. Now Asst. Engr. in levee design. Head instructor in Cartography, Tulane Univ., E.S.M.W.T. for past 18 months. 8019 Hickory St., New Orleans.

Kay, William deYoung. Age, 51. Endorsed: B. H. Grehan, W. E. Koch, D. W. Stewart. Graduate E.E., Mass. Inst. Tech. 1913-16 Power Engr., Brooklyn Edison Co. 1915 awarded Doherty Gold Medal, Nat'l. Elec. Light Ass'n. 1919 Capt., Chem. Werfare Service. Vice-Pres. and Gen. Mgr., Nat'l. Straus Duparquet Co. (Mfg's. Hotel Equip.) Member N. Y. Stock Exchange for past 15 years. Chairman Local Draft Board No. 1, N. Y. City, 2 yrs. Treasurer, Lane Cotton Mills Co., New Orleans, since 1942. Member Am. Inst. of Elec. Engr.; member Soc. of War of 1812. Lane Cotton Mills Co., New Orleans.

Lessley, John P. Age, 50. Endorsed: A. D. Jackson, A. J. Landry, H. Waugh. 1910-13 E.E. Course, La. State Univ. 1913-1616 and 1917-21 General Mill Const. 1921-23 Operating Auto Repair Shop. 1923-27 and 1934-40 Mill Maintenance and Operation. 1930-31 Paper Mill Const. 1931-32 Road Drafting. 436 Fifth St., Baton Rouge, La.

Savage, Leroy Emory. Age, 34. Endorsed: H. W. Gleason, B. H. Grehan, W. E. Koch. B.S. in C.E., Univ. of Maine. At

present Chief Engr. Asst., Celotex Corp., Marrero Pl. Prior to this with Hollingsworth & Whitney Paper & Pulp Mfgs., member of engr. dept. and handled plant expansion and development work for 7 yrs.. Prior to this did work in construction field on hydro-electric plants for New England Public Service Co. c/o Celotex Corp., Marrero, La.

Sharp, Wallace Edmonston. Age, 37. Endorsed: F. G. Downs, A. D. Jackson, A. J. Landry. Highway Engr. from 1926 to date as follows: 4/26-3/27 Rodman, Inspector and Tester in Lab.; 3/27-4/29 Jr. Instmn., Const. and Location; 4/29-3/35Draftsman; 8/35-10/37 Sr. Instmn.; 1937 to date Sr. Road Draftsman. R. F. D. No. 2, Baton Rouge, La.

Shourds, Dalton B. Age, 53. Endorsed: F. N. Billingsley, J. A. McNiven, B. Moses, L. S. Weil. 1911 graduated U. of Notre Dame, Arch. and Structural Engr. Lt.-Col., C. of E., U.S. Army Reserve. Consulting Engr. and Arch. with numerous professional commissions in Ind., Ill., Ky., Miss., La. and N. Car. Also various commissions in Designing, Valuation and Construction Engineer. 1941-42 Resident Plant Engr. for U.S. Maritime Comm. during construction of shipyard on Industrial Canal, New Orleans. 1942 to date with Shourds-Hooton and Assoc., Engrs., Arch., and Management, New Orleans. Consulting Engr. and Arch. for Delta Shipbldg. Co. and River Terminals Co., etc. Member: Am. Inst. of Archs., Am. Soc. of Engrs., Soc. of Am. Mil. Engrs., Miss. Soc. of Prof. Engrs. Licenses: Civil Enrgs. license in La., Prof. Engrs license in Miss. and Ind., Reciprocal license by exam. in all states recognizing such licenses. U. S. Civil Service Rating: Principal Engr. and Principal Arch. by exam. P. O. Box 676, Gulfport, Miss.

Swinney, Leonard Robert. Age, 30. Endorsed: D. Derickson, N. E. Lant, H. L. Lehmann. 1935 B.E. in C.E., Tulane U. 3 yrs. Supt. of Levee and Drainage work, Swinney and Coleman, Baton Rouge. 2 yrs. Mgr. and Partner for same. These 4 yrs. spent supervising operations of levee and drainage work,

including surveying and layout in some cases; estimating costs; also mechanical supervision and actual work on equipment repairs. Jr. member Am. Soc. of Civil Engrs. Licensed Civil Engr. in La. Box 986, Baton Rouge, La.

Witmer, Guy Willard. Age, 35. Endorsed: A. J. Dubus, P. J. Guelfi, G. W. Hill. 1927 Graduate, Williamson Free School of Mech. Trades, Williamson, Pa., in Power Pl. Engr. Completed special courses at La. State U. in Adv. Elect., Calculus and Safety Engr. 1927-6/19/28 Stud. Engr., Savannah Elect. & Power Co., Savannah, Ga. 6/28-4/30 Asst. Efficiency Engr. as above. 6-10/27 Arch. Draftsmn, Ellis Contracting Co., Savannah. 4/30 to date with Gulf States Utilities Co. as follows: 4/30-4/31 Water Pl. Operator, La. Steam Elect. Generating Sta., Baton Rouge; 31-5/32 Water Pl. Foreman at same; 32-10/33 Repairman at same; 33-3/40 Turbine Maintenance Engr. at same in responsible charge of maintenance and insertion work of steam turbines of power sta.; 3/40 to date, Maintenance Foreman, Asst. Maintenance Engr., supervising and directing maintenance, inspection, mech. equip. repair, minor const. work at same. 1870 Walnut St., Baton Rouge, La.

FOR AFFILIATE MEMBER

McDougall, A. Wylie. Age, 42. Endorsed: C. G. Cappel, C. L. Nairne, D. W. Stewart. 2 yrs. in Engr., Upper Canada College, Toronto, Canada. Roper Straus-Fuerst, Hollow Mfgs., Birmingham, Ala. Tennessee Coal, Iron & Railroad Co., Birmingham. Southern Cement Co., Birmingham. H. H. Robertson Co., Pittsburgh, Pa. 729 Toulouse St., New Orleans.

FOR JUNIOR MEMBER

Blessey, Walter E. Age, 23. Endorsed: D. Derickson, J. K. Mayer, W. F. Scofield. 1940 B.E. in C.E., Tulane Univ. 1940-3/41 Engr., United Gas Pipe Line Co. 3/41-6/42 Asst. City Engr., New Orleans, in charge of field surveys. 6-10/42 Engr., Geo. P. Rice, various duties. 10/42 to date, Asst. Prof., Experimental Engr., Tulane Univ. Licensed C.E., State of Louisiana; member of Am. Soc. of Civ. Engr.; Tau Beta Pi. 4227 Elba St., New Orleans.

Williams, W. Horace, Jr. Age, 26. Endorsed: C. G. Cappel, R. E. Gosa, R. Holt. Tulane Univ., C.E., 3yrs., no degree. Estimator and Eng., W. Horace Williams Co., since 1938. Engr. and Supt. of Const. of Wharf F., Algiers Naval Sta. Engr. for rehabilitation of Algiers Naval Sta. Engr. and Supt. of Wharf J, Algiers Naval Sta. Chief Engr. for completion of const. of U.S. Naval Ammunition Depot. 2611 Octavia St., New Orleans.

FOR REINSTATEMENT AS MEMBER

Amoss, Walter James, Lt.-Comdr. Age, 43. Endorsed: B. H. Grehan, C. L. Nairne, J. M. Todd. 1923 B.S. in C.E., Tulane Univ. 1923-25 Engr. on various const. projects, hwy, embankments, dredging contracts, Hampton Reynolds, New Orleans. 1926-31 Engr., River and Harbor Improvements in eastern half of U.S., Argentina, Venezuela and Columbia. 1931-42 Utilization Engr., mgr. Industrial Sales, Gen. Sales Mgr., Director of Adv., N. O. Public Service, Inc. 1942 to date Lt. and Lt.-Comdr., U.S. Naval Reserve. Member of Tau Beta Pi. 1227 Webster St., New Orleans.

Reed, Lyman Coleman. Age, 67. Endorsed: F. E. Johnson, L. L. Newman, D. W. Stewart. 1893-99 Supt. Meter Dept., Edison Elect. Co., N. O. 1899-1916 elect. const. work and mfg. 1916-19 Mfgs. agent, elect. equip. 1919-24 Elect. jobbing business. 1924-43 Mfgs. agent, elect. equip., also ventilating fan mfg. from 1935 to date. 811 St. Charles St., New Orleans.

FOR TRANSFER FROM AFFILIATE MEMBER TO MEMBER

Phillips, Charles J., Jr. Age, 34. Endorsed: A. M. Fromherz, S. F. Jones, O. K. Olsen, H. J. Patterson, 1927-32 Arch. Designer and Draftsman, Dixie Bldg. Matl. Co. 1932-35 Supervising Arch., Historic American Bldg. Survey. 1935-37 Engr. Dept., La. Hwy. Comm. 1938-39 Engr. Dept., Geo P. Rice, Consulting Engr. 1939-41 Engr. Dept. Housing Authority of N. O. 1941 to date Designing Engr., M. W. Kellogg Const. Co., Lake Charles. Present duties—designing of reinforced concrete, structural steel and timber. 1940-41 completed Defense Training Courses at Tulane U. in Naval Arch., Marine Engr., and Modern Timber Design. 1123 Reid St., Lake Charles.

PAPERS AND DISCUSSIONS

VIBRATION ABSORPTION WITH STRUCTURAL RUBBER

J. W. Devorss, Jr.*

The subject of this paper is the application of structural rubber, that is, load supporting rubber used as a mechanical building material, to the insulation of objectionable mechanical vibration. This is a very specialized field of rubber technology and represents a very small section of the rubber industry. Of the several thousand rubber compounds used by the United States Rubber Company, only five or six are considered as standard for use as structural materials; data on the structural qualities of these are quite complete.

The principal use of structural rubber are to reduce the transmission of (1) vibration, (2) impact shock and (3) noise. Of these, its use to reduce the transmission of vibration is the most important.

In order to apply rubber to vibration insulation, the mechanical fundamentals must be known. Vibration transferred from a mechanism can be reduced by (1) supporting the entire mechanism on resilient mountings of the proper flexibility and proper design, (2) by securing the mechanism to a heavy foundation, or (3) by the use of counter-vibrators. The resilient suspension of a machine is generally the most practical and economical method and, therefore, is the most extensively used.

The mechanical fundamentals of vibration absorption are readily demonstrated with a chain of rubber bands and a weight. Consider the weight suspended from one end of the chain of rubber bands; the other end held in the hand. Now, if the hand is moved rapidly up and down, it will be noticed that the weight stands practically still. In other words, the vibration is not transmitted through the rubber bands. Now,

* Assistant to the Manager, New Products Dept., Mechanical Goods Division, United States Rubber Co.; delivered before the Society at its joint meeting with the New Orleans Section, American Society of Mechanical Engineers, February 8, 1943.

if the chain is shortened and the experiment repeated, the weight moves with a larger amplitude than before. It can also be shown that if the hand is moved more slowly, more vibration will be transferred to the weight.

A resilient suspended mechanism acts just like the weight suspended from the rubber bands. The rubber bands are a type of spring.

When a weight is suspended on a spring, the spring elongates. This is called the **static deflection** and is generally measured in inches. The spring rate, (sometimes called spring coefficient) of a spring is defined as the number of pounds required to deflect the spring one inch statically; a spring rate of ten pounds means that a ten-pound load placed on the spring will deflect it statically one inch.

If the weight on a spring is pulled downward and suddenly released, it will oscillate up and down. The number of oscillations per minute is called the **natural frequency** of the spring system. The natural frequency is a function of the static deflection, which in turn is determined by the stiffness of the spring and the weight of the sprung load. With given conditions, therefore, the natural frequency is fixed and cannot be changed. An example of this fact is the well-known tuning fork.

Figure 1 shows that where the static deflection is small the natural frequency is high. Where the static deflection is large, the natural frequency is low. The natural frequency of a mounting suspension can be found from this chart if the static deflection of the mountings is known.

Ordinarily a mechanism is forced (by electricity or other power) to operate, and if it vibrates, its vibration is known as **forced vibration.** Some small part of the mechanism may be forced to move rapidly up and down. This reciprocating action usually forces the entire mechanism to vibrate in a smaller amplitude but at the same frequency, and in the same direction as the reciprocating small part. Usually the frequency of this reciprocating movement is known or can be easily determined. If one cycle of movement takes place for every revolution of a shaft, than the frequency per minute is the same as the r.p.m. of the shaft. Note that if there are

two equally-spaced reciprocating movements for each shaft revolution, then the forced frequency per minute is twice the shaft r.p.m., and so on.

If a mechanism is supported on resilient mountings arranged so that its natural frequency on the mountings is considerably

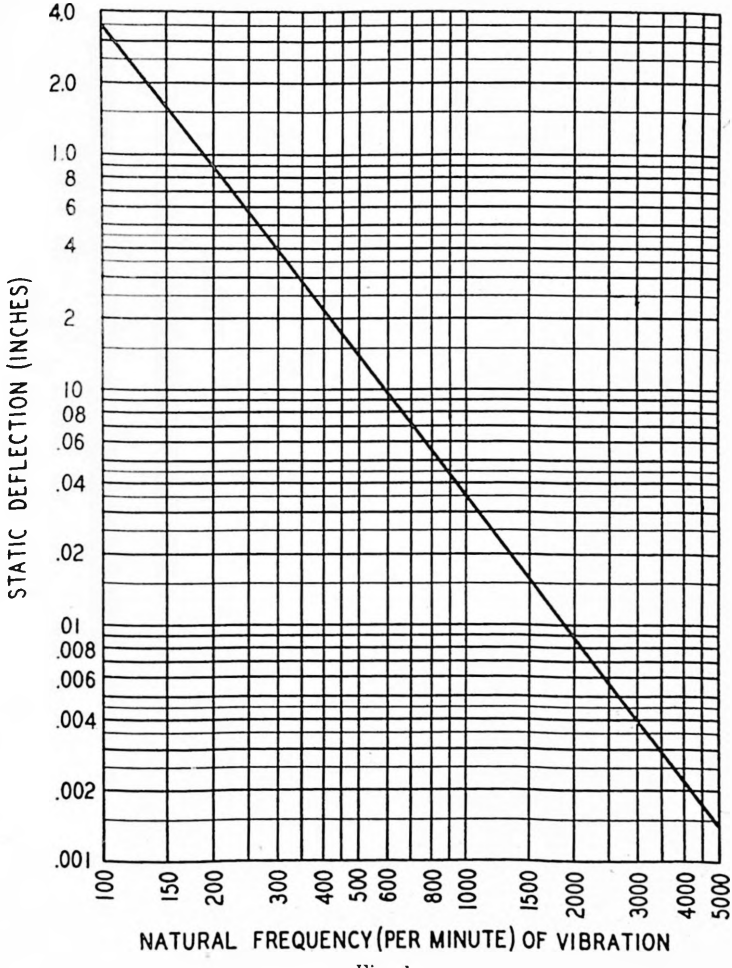


Fig. 1

lower than the forced frequency of vibration, then a considerable portion of the vibration of the mechanism will be isolated by the mountings.

A measure of the effectiveness of a resilient mounting installation is given by the **insulation ratio,** i.e., the quotient of

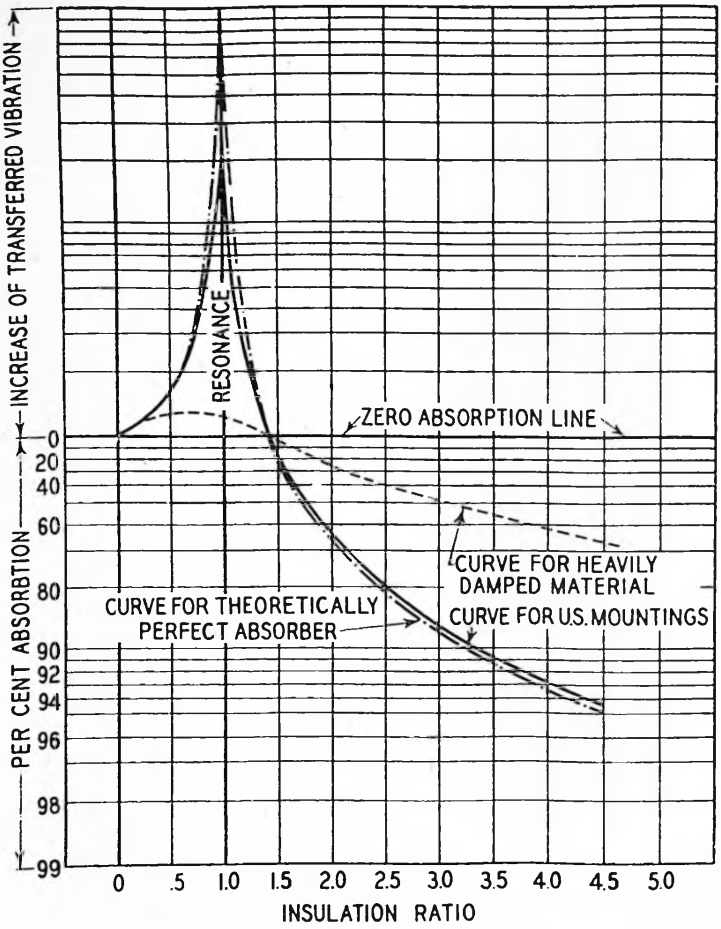


Fig. 2

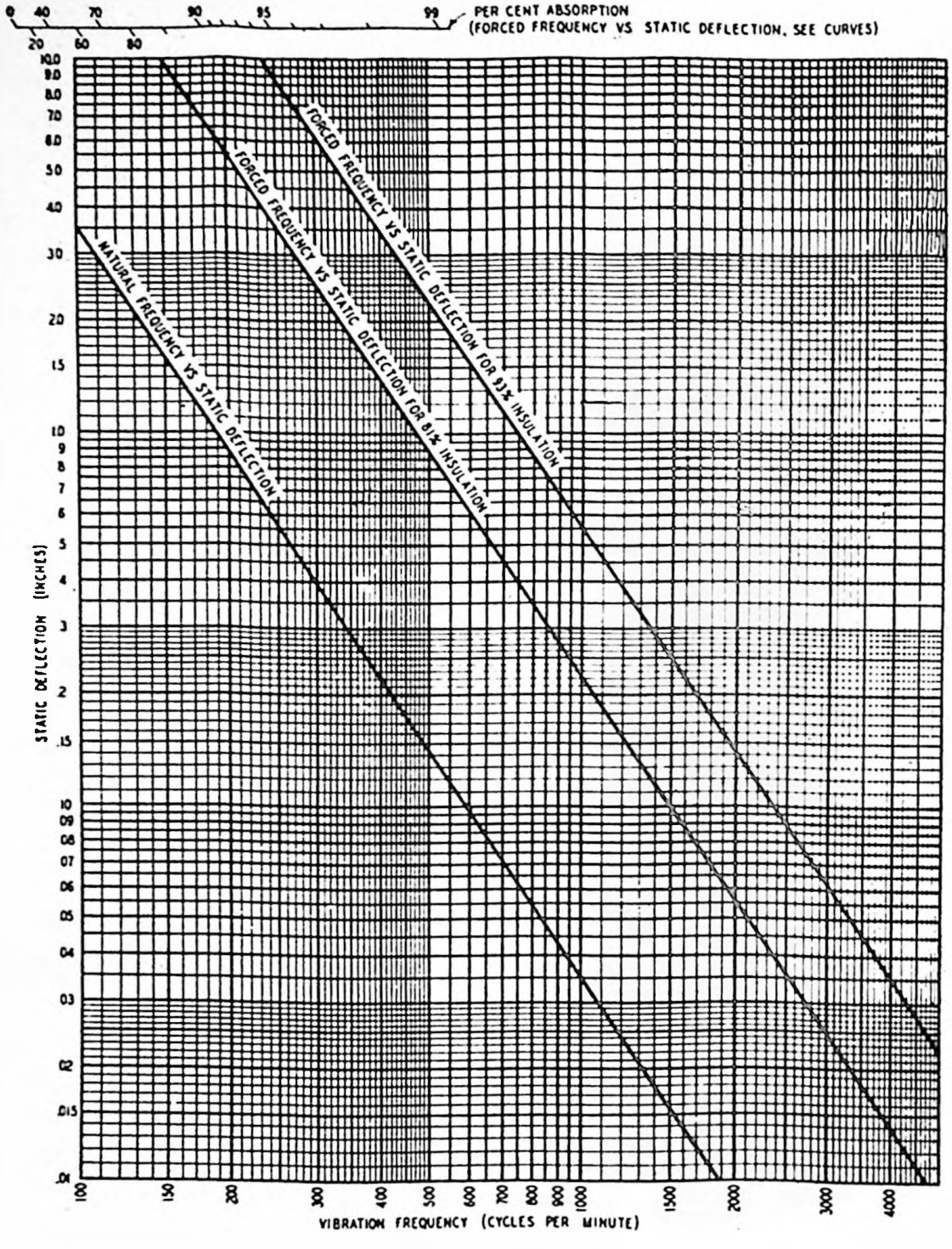
forced frequency by natural frequency. Figure 2 shows the actual effectiveness of rubber mountings.

	Insulation Ratio	Percent of Vibration Insulated by Mountings
Where forced frequency is 4 times natural frequency	4	93 (Excellent)
Where forced frequency is 3 times natural frequency	3	87.5 (Very good)
Where forced frequency is 2.5 times natural frequency	2.5	81 (Good)
Where forced frequency is 2 times natural frequency	2	66.6 (Fair)
Where forced frequency is 1.5 times natural frequency	1.5	20 (Very bad)
Where forced frequency is 1.4 times natural frequency	1.4	None

When forced frequency equals natural frequency, the result is worse than if no mountings were used. This condition is known as **resonance.** Satisfactory results are usually obtained when the ratio of forced to natural frequency is 2.5 or slightly greater.

The graph in Figure 3 relates static deflections and absorption percentages, as well as static deflections and frequencies.

A photographic record of a vibration is shown in Figure 4. The equipment when bolted rigidly to the floor vibrated as shown in the top records, which indicate the horizontal and vertical vibration. After the proper installation of mountings underneath the equipment, the vibration from the floor to the equipment was reduced as shown in the lower group of records, which indicate the reduction in amplitude of movement. The actual reduction of vibration transmission was in the neighborhood of 64 to 1. The record indicates that vibration very seldom, if ever, occurs linearly. The vibration in the stationary parts of reciprocating and rotating machines is generally in a plane at right angles to the crank shaft. Depending upon the structure, the plane may occur tilted at some angle to the hori-



STATIC DEFLECTION – FREQUENCY CHART

PLOTTED ON LOG-LOG COORDINATES, THIS CHART SHOWS THE RELATIONSHIP BETWEEN STATIC DEFLECTION AND NATURAL FREQUENCY FOR ANY SPRING SYSTEM. IT INDICATES, TOO, THE PERCENTAGE OF VIBRATION ABSORBTION THAT CAN BE EXPECTED FOR A GIVEN FORCED FREQUENCY AND STATIC DEFLECTION.

Fig. 3

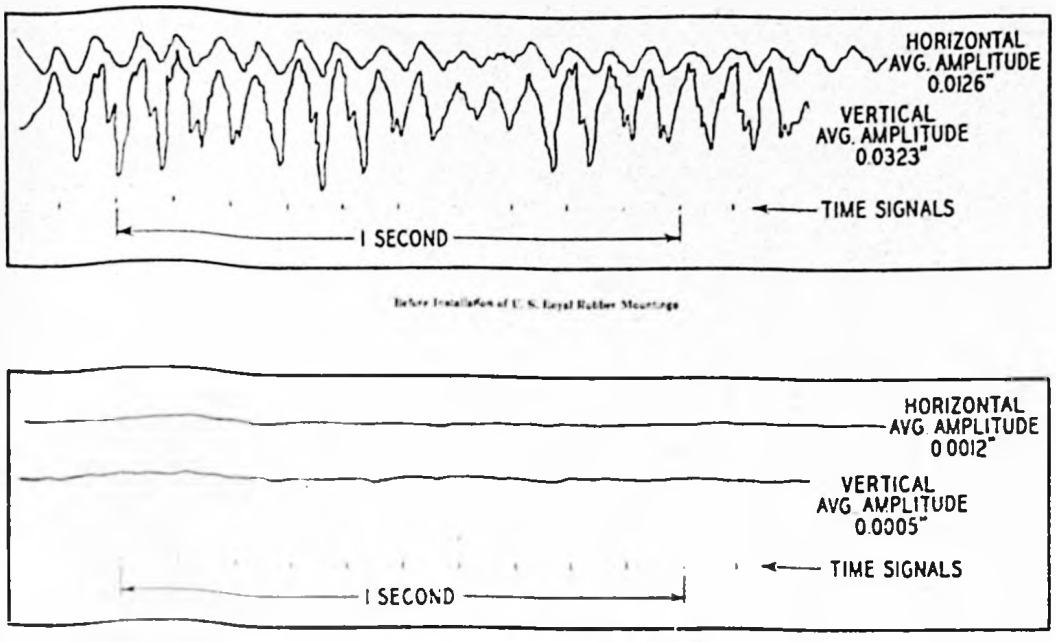


FIG. 4.

zontal, hence components of the vibration exists along all three principal axes. In order to absorb vibration of this type properly, it is necessary that the direction of vibration be considered and that the spring rate of the resilient supports be properly calculated along all three principal axes.

Structural rubber is generally adhered to steel to facilitate its application as a mounting for mechanisms. Some standard mountings are shown in Figures 5 and 6. Figure 5 shows the simpliest type of mounting consisting of a column of rubber with steel studs adhered to each end. This type of mounting can be used to absorb relatively low impressed frequencies in three directions. Figure 6 shows what is generally known as a channel type mounting. This design will absorb relatively low frequencies in two directions, or in a plane which is determined by the longitudinal and vertical axes. In the channel type mounting illustrated, the load of the resiliently sprung unit is carried on the inside smaller channel by means of a spacer which extends through a large clearance hole in the outside channel. It can be seen that should the rubber be burnt or accidentally destroyed, the supported unit would not be released, for the inner channel would interlock with the outer.

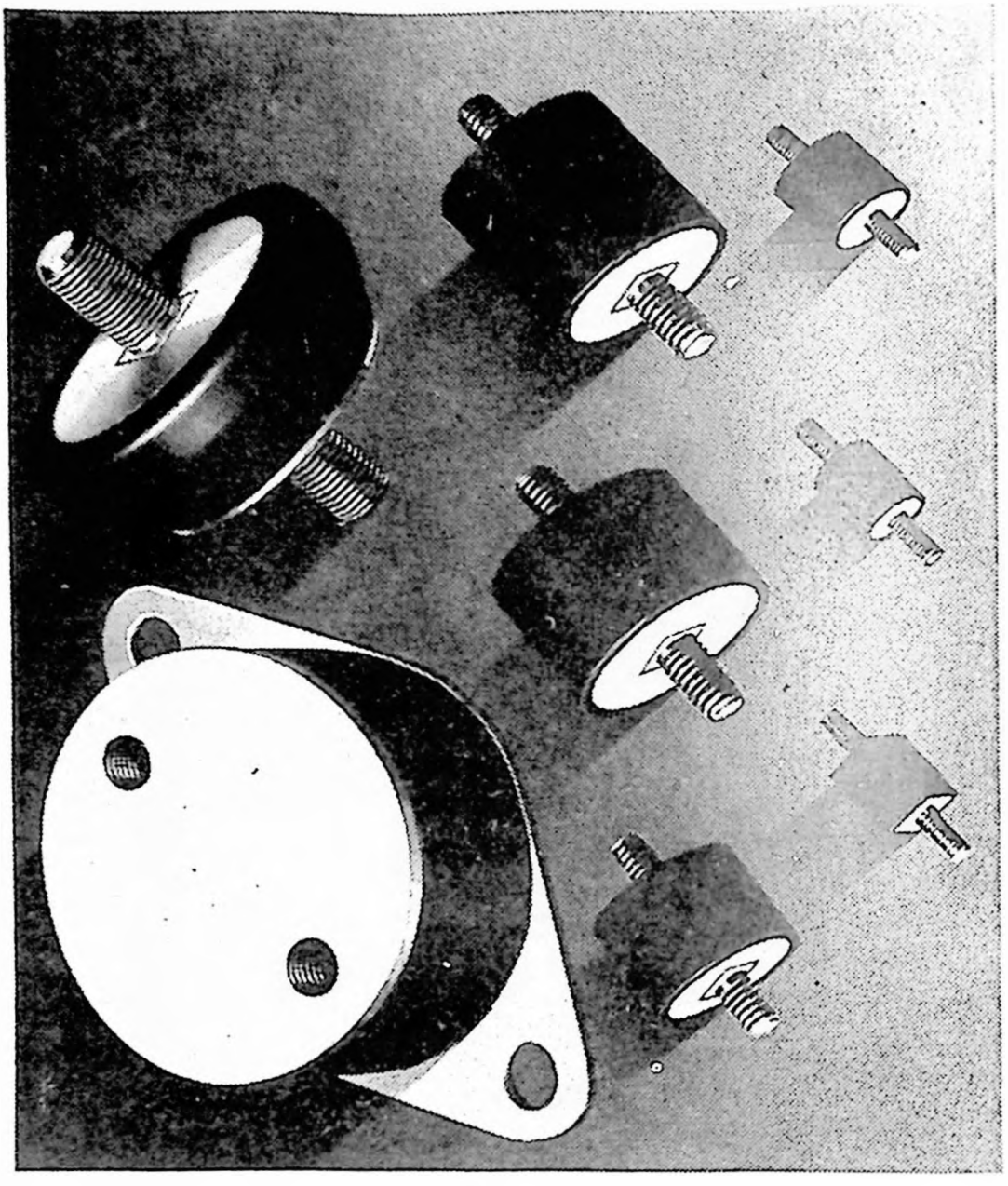


Fig. 5

Standard types of mountings are used for many purposes in industry. Figure 7 shows the use of cylindrical mountings to insulate the frame of a grinder from motor vibration. The motor was isolated to maintain high quality on precision work. Resiliently supported ventilating equipment must be provided with flexible connections for piping, conduits, control rods, and the like. The stiffness of these connections add to the stiffness of the supporting springs.

In order to design mountings employing structural rubber, it is necessary to have complete data on the physical characteristics of the material. One of the most important characteristics of the rubber is its incompressibility; **rubber is less compressible than water.**

Rubber can be used in compression, in shear, in flexure, in torsion, and in tension. It is primarily used in shear and in compression. By compression is meant subjecting the rubber to a load which tends to squeeze it. The deflection of rubber in compression for different slabs which are not dimensionally proportional can be related by a ratio called the **area ratio.** This ratio is determined by dividing the load-bearing area of the

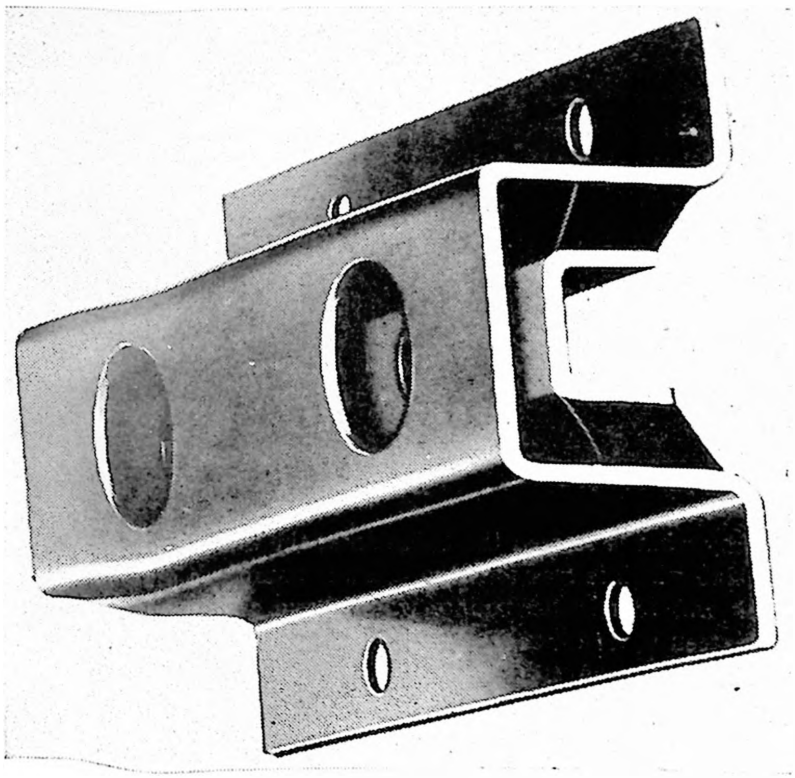


Fig. 6

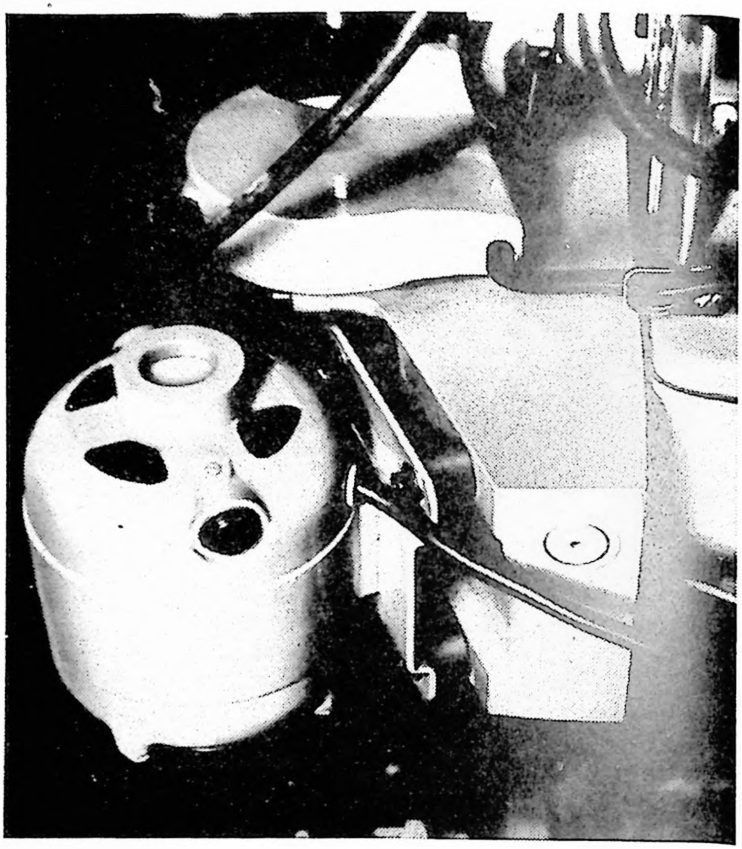
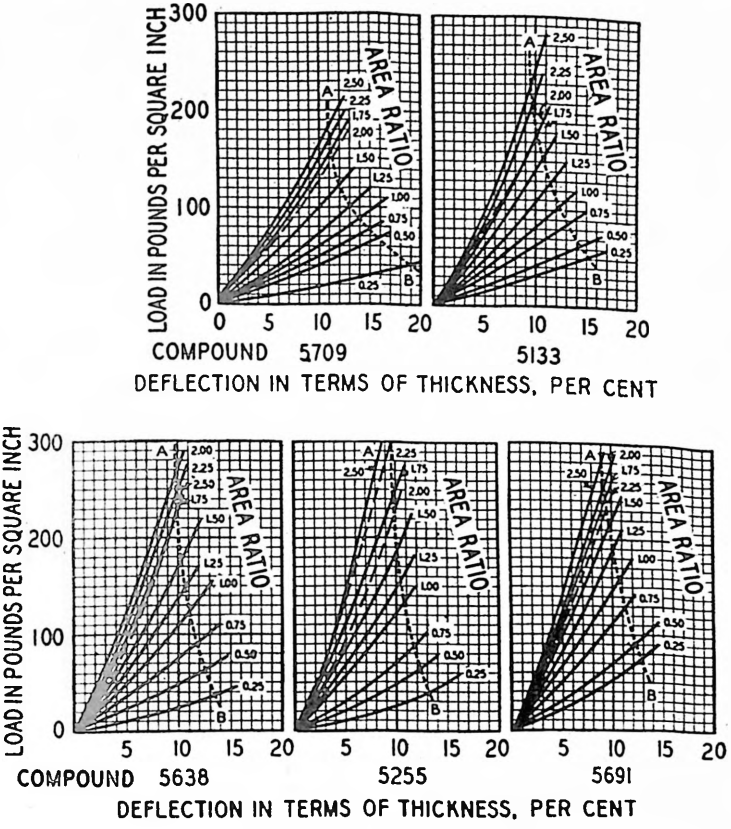


Fig. 7

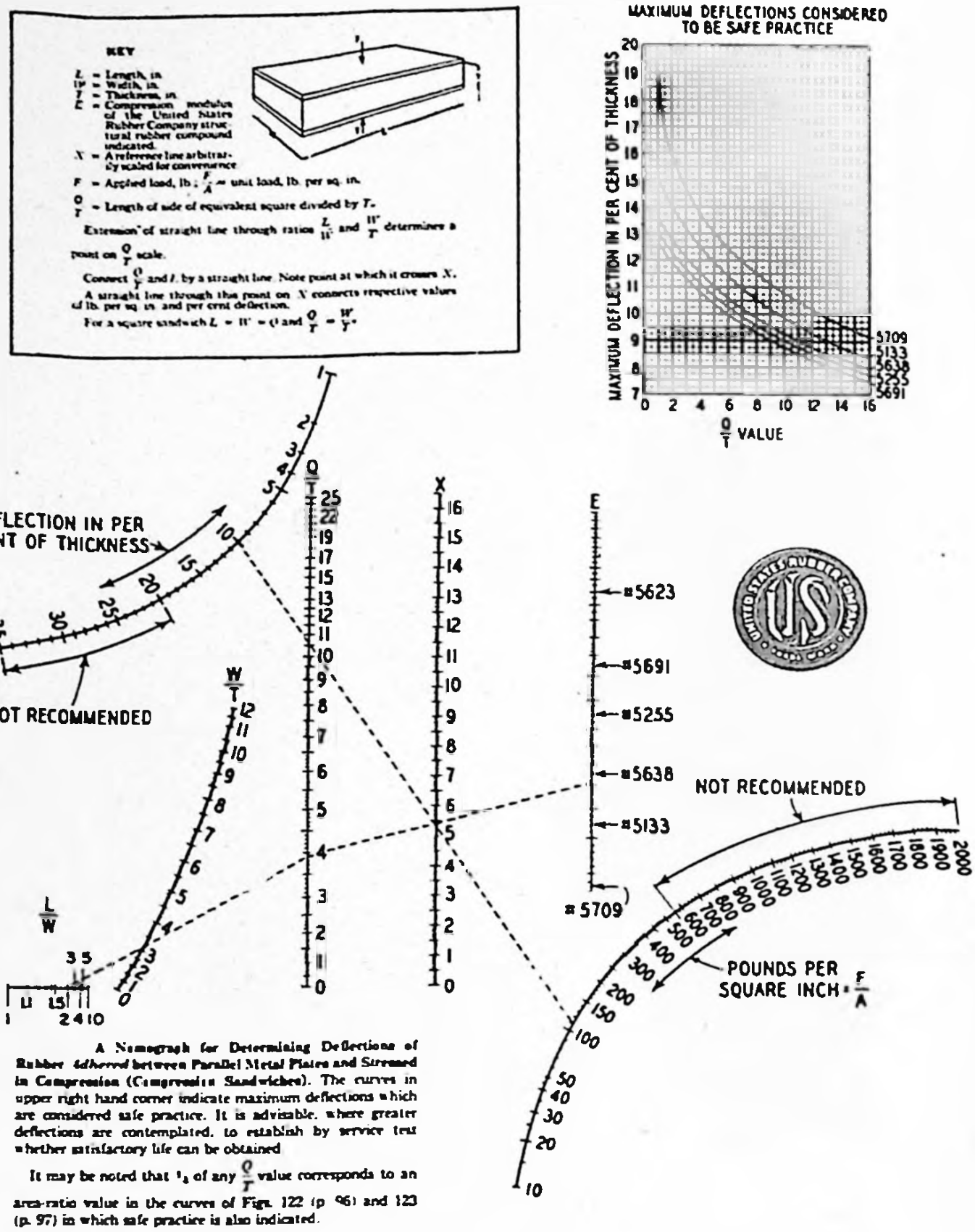
slab by what is termed the bulge area, the unrestricted area of the slab which is free to bulge. As an example, a slab one inch thick and four inches square would have a load-bearing area of sixteen square inches. The area ratio determined as above would be one. A slab one inch thick and two inches square would have a load-bearing area of four square inches and a bulge area of eight square inches. The area ratio is 0.5. Referring to the curves shown in Figure 8, we can see that the deflections of these two slabs with different area ratios, although



ENLARGEMENTS OF USABLE PORTIONS OF LOAD-DEFLECTION CURVES

Fig. 8

subjected to the same load in pounds per square inch, are different. It is possible to determine the load deflection characteristics of any rubber slab, not adhered to metal plates, from Figure 8 provided the area ratio of the slab is calculated as above. It should be noted that in the higher area ratios, the positions of the curves are not consistent. The data are given



A Nomograph for Determining Deflections of Rubber *Adhered* between Parallel Metal Plates and Stressed in Compression (Compressitn Sandwiches). The curves in upper right hand corner indicate maximum deflections which are considered safe practice. It is advisable, where greater deflections are contemplated, to establish by service test whether satisfactory life can be obtained.

It may be noted that $\frac{1}{4}$ of any $\frac{Q}{T}$ value corresponds to an area-ratio value in the curves of Figs. 122 (p. 96) and 123 (p. 97) in which safe practice is also indicated.

Fig. 9

exactly as determined experimentally from tests on hundreds of samples. It is believed that a certain slippage exists between the pressure faces of the slabs, accounting for the irregularity. Actually rubber used structurally is adhered to metal to facilitate its application. When rubber is used in this manner, slippage does not occur between the pressure faces and a nomograph as shown in Figure 9 has been designed to facilitate the

determination of deflection characteristics of rubber in this condition. The nomograph can also be used for designs which are not rectangular in shape by determining the equivalent rectangular shape for whatever design is under consideration.

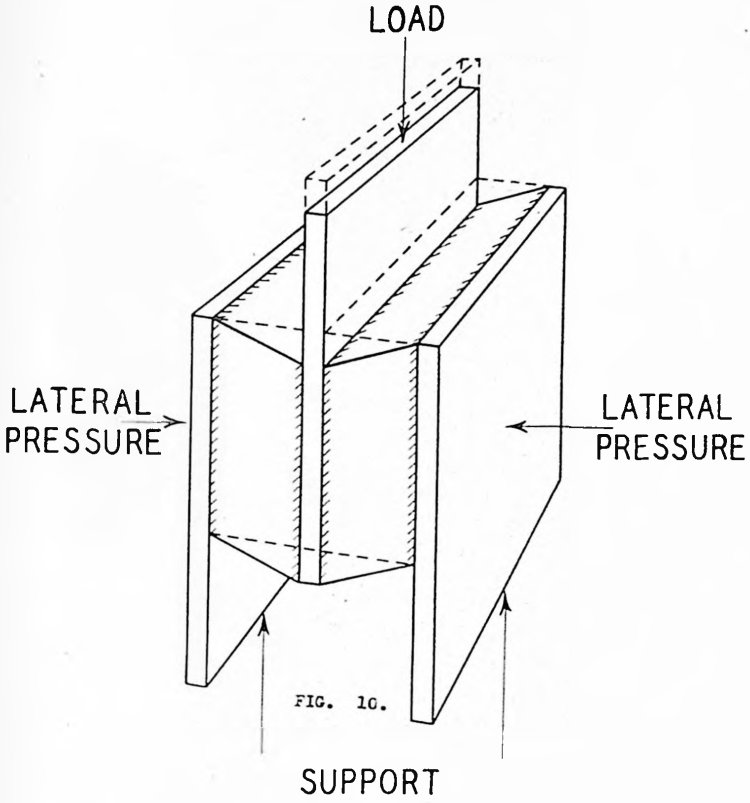


FIG. 10.

The use of rubber in shear is illustrated by the shear "sandwich" in Figure 10. By sandwich it is meant that the rubber is bonded between two steel plates, or as shown in the illustration, two layers of rubber are bonded between three steel plates; here the load is applied to the center plate and the two outside plates are held by a suitable support. The shear modulus of various rubber compounds can be determined as can be done

for steel. The shear moduli of structural rubbers, however, run between 50 and 150 pounds per square inch.

We have spoken primarily of the static properties of rubber. It should be mentioned that the natural frequency of a rubber spring system does not always follow the calculations made from the static deflection. Curves are available which show the factor by which the calculated natural frequency should be multiplied in order to obtain the actual dynamic frequency. In most calculations, however, this refinement can be neglected, particularly when dealing with the softer rubbers on general industrial applications.

Knowing the physical characteristics necessary for structural design, it is possible to devise special and unusual applications of structural rubber for many purposes.

It is often necessary to maintain the stability of a mechanism when resiliently supported. Hints as to how this stability can be obtained have been given diagrammatically.

The use of structural rubber in shear and in compression has been described above. It should be noted that it is undesirable to stress rubber in tension and also that its use in flexure is limited. Its use in torsion, of course, is related to the discussion given for shear.

It is generally advisable when special applications are to be made to consult some authoritative source to obtain their experience as related to the individual problem.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Meeting of the Board, April 5, 1943

The meeting was called to order by First Vice-President Kerr with the following membes present: Cappel, Gosa, Kuhn, Leake, Nairne and Mayer.

The minutes of the last meeting were read and accepted.

Mr. Nairne reported that a bill amounting to $35.63 for signs for the Annual Meeting had not been received at the time the report of the meeting was made up and should now be included in the cost. A letter from Chairman L. J. Cucullu of New Orleans Section, American Society of Mechanical Engineers, was read stating that it had been agreed that the Society would absorb the cost of painting signs for the War Production Board Production Clinic held in conjunction with the Annual Meeting. These signs amounted to $23.69, but no bill was sent to the Society as the A.S.M.E. found sufficient funds to absorb the cost. Chairman Cucullu further stated that since an invoice for $15.80 had been received from the Society to cover one-half the cost of the joint meeting in February, the A.S.M.E. was not in a position to absorb this also and suggested that the respective organizations cancel their bill and call it square. The Board decided, however, that the difference of $7.89 should be paid to the A.S.M.E.

The Secretary reported on the meeting of the Legislation Committee and the actions resulting therefrom. Chairman Rhodes is to be requested to report on Senate Bills 607 and 702 at the next meeting of the Society.

Letters from H. L. Lehmann and C. J. Phillips, Jr. regarding the possibilities of establishing a Local Section of the Society in Lake Charles were read. It was decided that Vice-President Kerr write President Courtney of the Southwestern Association of Engineers suggesting that a joint meeting of the Association and representatives of the Society be held in Lake Charles for the purpose of discussing the establishment of a Lake Charles Section.

A letter from the Louisiana Architects Association was read requesting that the Society endorse their resolution regarding employment of local architects, engineers, contractors and man power on Federal work in Louisiana. The letter also requested that the Society send a delegate to Washington to promote the intent of this resolution or to subscribe toward the expenses of another delegate. The resolution concerned was read and discussed. The Board voted to endorse the resolution in principle expressed as follows; "We believe that engineers and architects most familiar with conditions peculiar to the locality in which construction work is to be performed should be entrusted with the design and execution of the work." The Louisiana members of Congress are to be advised of this action. It was decided that no money could be subscribed toward sending a delegate to Washington.

A letter from President Pillet of the Baton Rouge Chapter was read inviting the Society to hold the June meeting in Baton Rouge as guests of the Local Section. This was approved by the Board provided that the Technical Papers Committee has not already made definite arrangements for the June meeting. It was reported that the Woman's Auxiliary had suggested a joint meeting with the Society during a summer month. Motion pictures or some general interest paper would be presented. The Board recommended that such a meeting be held at a date to be arranged later.

A note from Mr. J. M. Todd was read suggesting that the Society act as a clearing house for meeting dates of the various local engineering groups in order to prevent conflicts. The Secretary suggested that if each group would furnish a schedule of its meetings each month, that this information could be assembled and distributed to the secretaries of these groups in the form of a monthly meeting calendar. The idea was approved and the Secretary directed to contact the various groups in order to determine whether such a service is desired.

A letter from Emile S. Sherrard, recipient of the Louisiana Engineering Society scholarship award at Tulane, expressing his appreciation of this award was read.

The following members were dropped because of delinquency of dues extending prior to January 1, 1942: Fred R. Adams, A. W. Brodtman, H. M. Clanton, Linton C. Cooper, Howard F. Davis, Jacques L. Fortier, Patrick E. Garner, Joseph A. Holland, Joseph A. Holliday, Volney F. Landry, William F. Levert, Chas. S. McCowan, Merwyn H. Nabors, Chas. M. Pecot, Crawford Powell, Nelson W. Tremblay, Robert W. Ziille. Members delinquent for 1942 dues only are to be advised that if payment is not received within 30 days, their membership in the Society shall cease.

Vice-President Kerr reported that he and some members of the Board had attended a recent luncheon for the organization of a War Bond Drive to be held in New Orleans during the week of April 12th. A speaker is to address the Society briefly on this subject at the next meeting. It was decided that the Society purchase a $740 Series F bond during this drive.

There being no further business the meeting was adjourned.

J. K. Mayer.
Secretary-Treasurer.

Minutes of the Joint Meeting of the Society with the New Orleans Chapter, Illuminating Engineering Society, April 12, 1943

The meeting was called to order by First Vice-President Kerr with approximately 110 members and guests present.

It was voted to dispense with the reading of the minutes of the previous meeting.

Mr. Sol Weiss made a brief plea for the purchase of bonds during the Second War Bond Drive. Vice-President Kerr assured Mr. Weiss of the cooperation of the Society and announced that the Board of Direction had decided to purchase a $1,000.00 bond in the name of the Society.

A report of Chairman Fithian of the Employment Committee was read. Mr. H. L. McLean reported on plans to hold the May meeting at the City Park Plant of Higgins Industries. Mr. Noel Kammer reported on the establishment of a joint Student Guidance Committee composed of representatives of the various local engineering groups. Mr. A. J. Dubus, Secretary-Treasurer of the Baton Rouge Section, spoke briefly on the need of additional funds by the Baton Rouge Section.

A vote on the proposed amendment to the Constitution regarding increase in payment to Local Sections showed 34 favorable and none negative. A second vote on this amendment will be taken at the next meeting.

An obituary prepared by Messrs. D. A. Hunt, E. J. James and W. S. Nelson on the death of Mr. Ira W. Sylvester, Life Member of the Society and a resident of Alexandria, Louisiana, was read by the Secretary. Mr. John L. Porter read an obituary prepared by himself, Messrs. C. M. Kerr and H. J. Malochee, on the death of Mr. John T. Eastwood, Life Member. It was voted that these obituaries be published in the Proceedings and that copies be sent to the bereaved families.

The meeting was turned over to President M. G. Zervigon of the New Orleans Chapter, Illuminating Engineering Society, who introduced the speaker of the evening, Mr. Samuel Hibben, Director of Applied Lighting, Westinghouse Electric Company. Mr. Hibben gave a most interesting talk on "Wartime Illumination Problems and Post-War Development", and exhibited numerous types of lights and phosphorescent materials. Several questions from the floor were answered at the conclusion of the talk.

President Zervigon thanked the speaker and turned the meeting back to Vice-President Kerr who asked for an expression of appreciation in the form of a rising vote of thanks. The meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXIX. AUGUST, 1943 NO. 4

CONTENTS

EDITORIAL NOTES AND COMMENT

The Coast and Geodetic Survey. One of the oldest organized engineering activity is that of the Coast and Geodetic Survey. By Act of Congress in 1807 the groundwork for this governmental agency was laid. First surveys were carried out by a Swiss named Hassler, who went about procuring instruments and equipment in a most thorough and scientific manner.

While in most cases our coast line has been adequately charted, Alaska and the Alutians are exceptions. Few people realize that Alaska has a coast line greater than that of all forty-eight states.

Our Society has always numbered among its members engineers from the Survey. Mr. Frank Muth, who for many years served our organization as Secretary was on the staff of the Survey.

The organization has always been most cooperative with engineers of our community and its members have materially

aided in the progress and welfare of our Society. For a state like our own, with considerable coastal exposure, support of the Survey is particularly important.

At present charting and mapping offices are on two and three shifts to meet war time demands of the armed forces, a tremendous aid to our war efforts.

Golf Tournament. Our anual meeting of golf and horseshoe pitching was held on July 22 at the Colonial Country Club. We missed our fellow members from Baton Rouge and other near-by cities, who have been with us other years when rationing was not in effect. The attendance was 102.

The general arrangements were made under the direction of Chairman Bell and his able committee, the whole affair was a grand success. Attendance was excellent and the weather man was most cooperative. Mr. George R. Hammett took the honors in golf, Mr. J. B. Simes won the horse-shoe contest. A floor show followed the dinner.

No account would be complete without the mention of Ole K. Olsen and his vitamins that come in kegs. It was the kind of a day (and night) when vitamins were most welcome.

Baton Rouge Section. In this issue are published minutes of the meetings of the Baton Rouge Section.

On July 12 a joint meeting of the Baton Rouge and New Orleans members were held. The arrangements consisted of an evening meal followed by a technicolor picture on the aluminum industry. Approximately ninety-five were present, these joint meetings have always been enjoyable, offering an opportunity for the Baton Rouge and New Orleans members to become better acquainted. Time was when we had annual golf tournaments also, that time will come again.

Additional Foundations Data. In 1937 a valuable treatise on "**Some Data in Regard to Foundations in New Orleans and Vicinity**" was published. An addendum is now available to owners of the first publication. Requests should be addressed to Mr. DeWitt L. Pyburn, Director, State of Louisiana Public Works, Baton Rouge, La.

Invisible Red Ink. Every thirty minutes of every day and every night of 1942 an essential worker was killed—think of it, 18,500 occupational deaths. This figure does not include traffic fatalities.

Why do accidents happen? Carelessness? Frequently not. Most accidents are preventable thru education and proper engineering and safeguarding.

The responsibility for stopping this murder of our essential workers starts with management. Sometimes management realizes what accidents are costing, many times not, this is the invisible red ink. Hidden cost are there, four dollars hidden for every dollar appearing as direct costs for medical treatment, and compensation.

To a management interested in saving lives, helping our war effort and saving money in addition, National Safety Council, 20 N. Wacker Drive, Chicago will offer free assistance. Our own fellow engineer and member Arthur J. Naquin will be glad to offer his services where desired. He is chairman of the Industrial Advisory Committee of Delta Society of Safety Engineers and Safety Counselor of New Orleans Public Service.

Conserve Manpower for Warpower!

New Members. Again it is a pleasant duty to call attention to the list of new members which follows. During the past few months our Society has enjoyed a great increase in its membership.

The awards listed at the end of "New Members" consist of a year's dues as Junior member in L.E.S.

Billhardt, Fred A. Age, 35. Endorsed: N. E. Lant, P. J. Guelfi, J. B. Coltharp. 1934 B.S. in M.E., Ohio State University. 1934-35 Employed in Mech. Testing Lab'y., Aluminum Co. of Am., Cleveland Plant. *1936-37 in charge of above lab'y. *1937-39 Mech. Engr., Al. Co. of Am., Cleveland. *1939-41 Asst. and Acting Plant Engr., same. *1941-42 Const. Supt., Al. Co. of Am., Bauxite, Ark. *1942 to date, Const. Supt., Al. Co. of Am., Baton Rouge. *Indicates responsible charge. Professional

Engr's. License in Arkansas. Member Am. Soc. of Mech. Eng. 6379 Government St., Baton Rouge, La.

Doyle, Jr., James M. Age, 40. Endorsed: R. B. Richardson, Harry Waugh, W. J. Hughes. B.S. in E.E., La. State University, 1925. 3 yrs. Instrumentman and inspector on concrete roads and bridges, La. Hwy. Comm. 3 yrs. Locating and laying out levee roads and drainage required for same, La. State Board. 9 yrs. Resident Engr. in charge of concrete roads, streets, drainage, bridges, etc., La. Hwy. Comm. 2 yrs. Survey Party Chief making land maps, strip maps, surveys and other work in connection with the right of way acquisitions, Right of Way Dept., State of La. Registered Surveyor in La. since 1927. P. O. Box 687, Ferriday, La.

Durning, Augustus W. Age, 38. Endorsed: D. W. Stewart, W. B. Moses, C. L. Nairne. 1926-27 Chemist, Commercial Chemical Co., Memphis, Tenn. 1927-28 Chemist and Engineer, Barrow-Agee Laboratories, Memphis, Tenn. 1928 Gas Engineer, N. O. Public Service, 1929 to date Engineer, La. Light & Power Co. 12 Forest Ave., Metairie, New Orleans, La.

Fraser, Harold M. Age, 45. Endorsed: H. L. McLean. W. H. Rhodes, H. A. Levey. 2 yrs. with Worthington Pump & Machinery Corp. 3 yrs. with American Radiator Co. 3 yrs. with National Cast Iron Pipe Co. 14 yrs. Vice-President, International Lubricant Corp, New Orleans. 1604 Audubon St., New Orleans, La.

Gilbert, Riley L. Age, 43. Endorsed: B. S. Nelson, A. J. Harris, G. R. Hammett. 1926 B.S. in Mech. Engr., Cal. Inst. of Tech. *1927-31 Pulp & Paper Mill Design & Construction, V. D. Simons, Inc., Engrs., Chicago. 1931-32 Public Utility Power Plant Design & Economy, Management & Engrg. Corp. Chicago. *1932-33 Chem. Process Sewage & Industrial Waste, H. A. Brassert & Co., Engrs., Chicago. *1933-35 Public Utility Appraisal, Mech., Management & Engrg. Corp., Chicago. 1935 Mech. Design, cranes and hoists, The Harnischfeger Corp., Milwaukee. *1935-39 McWilliams Dredging Co., Chicago and New Orleans, Design, Construction & Operation. *1939 to date Chief

Engr., Gulf Engr. Co., New Orleans. *Indicates responsible charge. Professional Engr's. License in Texas. 4466 Eastern St., New Orleans, La.

Mallette, John F. Age, 48. Endorsed: N. E. Lant, L. V. Willey, H. L. Lehmann. 1918-20 International Correspondence School Course in Surveying and Mapping. 1918-21 Chief of Party and Transitman, U. S. Coal & Coke Co., Gary, W. Va. 1923-42 La. Dept. of Hwys., Bridge Dept., Inspector, Asst. Resident Engr. and Resident Engr. Asst. Engineer on Miss. River Bridge at Baton Rouge, 3 yrs. U. S. Civil Service Rating—Asst. Engr. (Hwys.) 2215 Cable St., Baton Rouge, La.

Mundinger, Adam George. Age, 62. Endorsed: H. L. Lehmann, F. F. Pillet, W. W. Tennant. 1902 was graduated from La. State University. 1902-08 Railroad location and construction. 1908-43 General practice of Civil Engineering and Surveying. 4559 Highland Rd., Baton Rouge.

O'Brien, Paul Sirois. Age, 42. Endorsed: E. L. Mire, N. E. Lant, F. A. Boyle, M. C. Hudgins. 1922 B.S. in Mining Engr., Mass. Inst. of Tech. 3 yrs Metallurgical development work, Research Bureau, Aluminum Co. of Am. 4 years Sales and promotional work, Al. Co. of Am., New York City. 5 yrs. in charge of Sales Promotion, including Technical Services of Architectural Sales Section, Al. Co. of Am., New York City. 8 yrs Sales, Promotion, Technical Service, Socony Paint Products Co., New York City, 2 yrs., La. 6 yrs. At present covering La., Ark., Miss., Ala. and parts of Texas and Tenn. Apt. 7, 630 Laurel St., Baton Rouge, La.

Pollard, James J. Age, 35. Endorsed: J. M. Robert, A. L. Dunlap, A. M. Hill. 1929 B.S. in Civil Engr., Emory University. 1942 Bachelor of Arch., Harvard. 1929-38 Engaged in general contracting field. 1941 to date, Instructor in Drawing and General Engineering, Tulane University. Licensed Engineer and Architect in Mississippi. Resident of Mississippi prior to 1941. 347 Millaudon St., New Orleans, La.

Ritchie, Frank M. Age, 36. Endorsed: P. T. Seashore, T. B. Smith, A. T. Dusenbury. 1923-28 Engr's. Asst., Eddick Reclam-

ation Co., Chainman, rodman and instrumentman. 1928-32 Surveyor, Delaware-Louisiana Fur Trapping Co. 1932-33 Surveyor, Steinberg & Co. 1933 Surveyor, associated with James S. Webb, New Orleans. 1933-34 Surveyor, Steinberg & Co. 1934 Surveyor, associated with James S. Webb. 1934-35 Surveyor for Geophysical party, The La. Land & Exploration Co., Houma. 1936-40 Superintendent in charge of Geophysical Party, same. 1940 to date Superintendent of Lands, same. Licensed Surveyor in La. P. O. Box 892, Houma, La.

FOR REINSTATEMENT AS MEMBER

Bringhurst, Robert W. Age, 65. Endorsed: R. S. Cooper, D. A. Hunt, C. H. Fenstermaker. Studied engineering under special instructors. Practiced engineering and land surveying from 1901 to 1919. Doing main line location work for Rapides Lmbr. Co., Cady Lmbr. Co., and others. Elected Commissioner of Streets and Parks, Commission Council, Alexandria, La. Aug. 1919. Re-elected ever since, still hold Commission Streets and Parks. Member of La. Engr. Soc. prior to 1930. Member Am. Inst. of Park Executives. Instrumental in building all of the present parks in Alexandria. 2301 Lee St., Alexandria, La.

FOR JUNIOR MEMBER—L.E.S. AWARDS FOR 1943

Craig, Emmett Thompson. Age, 21. Award recommended by Dean L. J. Lassalle. B.S. in Chemical Engr., La. State University 1943. Route 2, Baton Rouge, La.

Pastorek, John Joseph. Age, 20. Award recommended by Dean J. M. Robert. B.E. in Chemical Engr., Tulane University, May 1, 1943. Now employed by Standard Oil Co. of La. 206 Louisiana Ave., Baton Rouge, La.

TRANSFER FROM STUDENT MEMBER TO JUNIOR MEMBER

The following Student Members were graduated by Tulane University on May 1, 1943.

Buwell, John S. B.E. in Mech. Engr.
Clotworthy, Jr., Hubert B.E. in Mech. Engr.
Fromherz, Frank C. B.E. in Civil Engr.
Gottschall, Alvin G. B.E. in Mech. Engr.
Jeffery, Jr. Neill P. B.E. in Civil Engr.
Johnson, Roy E. B.E. in Civil Engr.
Lafaye, Edwin A. B.E. in Mech. Engr.
Martin, Jr., James H. B.E. in Elect. Engr.
Schneider, Jr., Robert E. B.E. in Mech. Engr.
Schupp, Robert W. B.E. in Mech. Engr.
Stancliff, Dale B.E. in Civil Engr.
Taylor, John Y. B.E. in Mech. Engr.

In This Issue. At August 9 meeting Mr. John Van Brunt, Vice-President in Charge of Engineering, Combustion Engineering Co. of New York gave a most interesting and informative talk on modern boiler units. His ability as a designer and his wide experience in the field of steam generation was evident in his presentation of the subject. For those who could not attend, the article is printed here.

PAPERS AND DISCUSSIONS

DESIGN OF HIGH-PRESSURE HIGH-CAPACITY BOILERS

By John Van Brunt*

John Van Brunt

In the design of high-pressure high-capacity boilers there are two major problems: one, designing for strength, the other designing for performance. The latter case frequently presents the further problem of fitting a new unit into an existing building and between existing columns. Sometimes this can be done, sometimes not.

This talk will not deal with the problem of design for strength. The A.S.M.E. Boiler Construction Code is the designer's authority for all matters pertaining to the construction of boilers, including materials, thickness of drums, tubes, number and size of safety valves, etc.

Within the Code the designer has enough latitude to design and build a boiler that would not operate an hour.

The basic circulation path of any natural circulation boiler is the U tube which may be vertical or nearly so, or which may be but a few degrees from horizontal as in many low head boilers.

A modern high-pressure unit is a completely coordinated and balanced assembly of furnace, boiler, superheater, economizer, air heater, pulverizing mills, feeder, burners and forced and induced draft fans with which may be included automatic combustion control.

* Vice-President in Charge of Engineering, Combustion Engineering Co., New York. Presented at meeting of the Society August 9, 1943.

Oil or gas, or both may be either primary or auxiliary fuel.

Stokers may be considered for firing such units but it is not economically possible to compete with pulverized coal in units of over 250,000 pounds of steam per hour.

Such figures that are presented will be relative and while perhaps not absolutely correct will serve to show the principles and steps involved in design calculations.

Practically all designs start from a specification issued by a prospective purchaser. Such a specification may be two or three pages of a simple statement of what is required or it may be one of 100 or more pages covering every possible detail.

No specification, however, will insure a job that will be any better than the designer and manufacturer are able to build.

In order to follow the steps taken by the designer we will assume a specification issued by a utility company proposing to purchase new generating capacity which will require 400,000 lbs. of steam at 1350 p.s.i. and 925 F total steam temperature; feedwater to unit 380 F and the steam temperature of 925 F is wanted at all loads from 160,000 lb. up to a peak of 425,000 lb. This peak is wanted for a period of two hours not more than once a day.

The unit will be base loaded and is expected to operate at 400,000 lb. for 24 hours daily for six days and at 250,000 to 300,000 lb. on Sundays and holidays.

Such a problem is subject to easy solution if oil or gas is the fuel, but if low fusion ash coal is to be burned the problem is far from simple. Let us assume that the specified coal is a middle western coal of 10,200 Btu as fired, volatile 38, moisture 10 to 15, ash 10—12, softening temperature of ash 1970, and fusion temperature 2050 F.

Obviously, this is a slagging ash and unless care is taken there will be troublesome slagging of boiler and superheater.

If the typical load is as specified the buyer will pay a lot for the wide range of superheat control which is not justified by the economies of the case.

In order to justify the superheat specifications we will assume that within two or three years the unit will operate on a varying load such that the wide range of control is economically desirable.

A unit designed for base load operation is very different from one designed to operate on an average load factor of 50 to 55 per cent.

In the latter case the varying load and low load every morning prevents continuous slag accumulation and the swings of load tend to remove some ash from the furnace walls.

The furnace will average much cleaner and can, therefore, be made somewhat smaller.

The base load specification is somewhat more difficult to meet and will better illustrate the nature of the problem.

From experience we know that in units of this size we can get satisfactory furnace and boiler proportions with an output of 18,000 to 20,000 lb. of steam per foot of boiler width so we tentatively select a boiler and furnace 22 ft wide.

A longitudinal section of a three drum boiler with 28 or 29 ft. drum centers is prepared.

Operating and test data of similar designs is used for short cuts to actual figures so the steps next outlined are not usually necessary.

The design of this type of unit is largely built around the superheater, so, as our next step we must determine the temperature of gas entering the superheater that is necessary to obtain 925 F. steam temperature at 160,000 lb. load. If we select a simple multiple loop of reasonable size, the temperature of the gas leaving should be at least 200 degrees above the mean temperature of superheated steam at this load. For this condition the gas must enter the superheater at 1865 F.

With three rows of boiler tubes ahead of the superheater the temperature of gas entering the boiler would be about 2085 F and at 400,000 lb. the temperature of gas would rise to 2400 F entering the boiler and 2200 F entering the superheater.

For the proposed fuel these temperatures are much too high so we will try a counterflow type of superheater. This we find requires a gas temperature of 1780 F entering superheater and 1980 F entering boiler at 160,000 lb. and 2280 F entering boiler at 400,000 lb. The necessary surface would require fairly close spacing of the elements and the correspondingly high velocity of gas at 2080 F would foul the superheater.

In view of the base loading and peak requirements we select a third possible arrangement. With this two stage arrangement about 5 per cent of the heat absorbed is from direct radiation from furnace and having an added counterflow effect we need a gas temperature of but 1705 F entering superheater at 160,000 lb. Entering boiler the temperature will be 1900 and at 400,000 the respective temperatures will be 2000 and 2200.

These temperatures will be had with a moderately dirty furnace and may be held within this range by the use of wall blowers or wall lancing. More frequent use of either will lower these temperatures a considerable amount.

Since 2200 F is somewhat above the fusion temperature of the ash it will be necessary to provide adequate means for cleaning the superheater and the upper furnace walls.

Curves are available for the three types of superheaters just described.

Actually it is not necessary to check each type of superheater to find out which one must be used. From past experience it is usually possible to select at once the proper type to suit conditions, after which the required surface is determined.

With coal of the kind specified a slagging bottom with continuous discharge of melted ash is a preferred design. Because of the high degree of turbulence in the bottom of the furnace this type will have a lower furnace exit gas temperature than a dry bottom unit of the same size.

The coal being high in moisture, air at high temperature must be supplied to the pulverizing mills as the coal must be dried during pulverization in order that the mills will deliver the required capacity. The air temperature required is about 550 F.

With an expected efficiency of 87½ per cent, a heat balance will be about as follows:

Dry gas loss	5.5
Hydrogen and Moisture	5.4
Carbon loss	0.3
Radiation	0.5
Unaccounted for loss	0.8
Efficiency	87.5
	100.00

For this dry gas loss the gas temperature must be about 325 F and to get these air and gas temperatures the temperature of gas entering the air preheater must be about 720 to 750 F, depending on the ratio of air and gas weights.

We have that to obtain the required range of steam temperature the gas will enter the boiler at 2200 F at 400,000 lb. capacity and for the required air temperature will leave the economizer at about 720 to 750 F.

The superheater will lower the gas temperature to, say, 1175, leaving 425 to 450 to be removed by economizer and boiler convection surface between superheater and economizer.

The second boiler bank will lower gas temperature from 150 to 175 F, depending on the number of tubes in that bank and on the mass flow.

The second bank of tubes is proportioned to provide ample downcomer area to unload the front drum of the water discharged into it by the furnace walls and front boiler tubes.

Having figured the required economizer surface and the downcomers we have all the essential surfaces except the furnace. From data on many water cooled furnaces we know that the relation of heat absorbed to that released varies with the rate of release and also with method of firing and the dirtiness of the furnace walls.

Curves are available representing the performance of a tangentially fired furnace with clean walls, and a horizontally fired furnace with moderately dirty walls. Most furnaces will

fall between these lines, that is, when designed for a heat release of 140,000 Btu per sq. ft. the furnace walls will absorb from 40 per cent to 55 per cent of the heat liberated, depending on the method of firing and the cleanliness of the furnace walls. For gas and oil the absorption rate will follow the upper curves.

Whether a furnace will be clean, moderately dirty or extremely so will depend on several factors such as coal quality, ash fusion temperature, amount of ash in coal, method of firing and rate of heat release, also to a great extent of continuity of load.

In design we must assume a dirtiness factor which will not be exceeded and which may be controlled by periodic cleaning of walls by lancing or by wall blowers.

In our case, because of the continued high capacity, we assume a moderately dirty furnace which can be maintained in a condition that will realize an absorption rate of approximately 50 per cent of the release rate.

From the curve we find that at 125,000 Btu per sq. ft. release rate the absorption rate will be 50 per cent or 62,500 Btu per sq. ft. 50 per cent of 500,000,000 is 250,000,000 and $\frac{250,000,000}{62,500}$ is is 4,000, which is the sq. ft. of projected area of furnace walls.

The 250,000,000 Btu left in gas will result in a gas temperature of about 2200 F entering boiler at 400,000 lb. We now have a unit that looks very much like that shown in Fig. 1.

So far nothing has been said about the combustion rate expressed in Btu's per cu. ft. of furnace volume. Combustion rate does not indicate anything but time and by itself has but little bearing on furnace performance.

To get a picture of the relation of wall area and combustion rate on the cooling effect of a furnace, consider three furnaces each a cube and cooled on all six sides. The relative cooling value is given by the relation $\frac{A}{V}$. The first consideration is a cube, 1'x1'x1'=1 cu. ft.=6 sq. ft. of wall area. If combustion rate is 30,000 Btu per cu. ft. the release rate is 5,000 Btu per sq. ft.

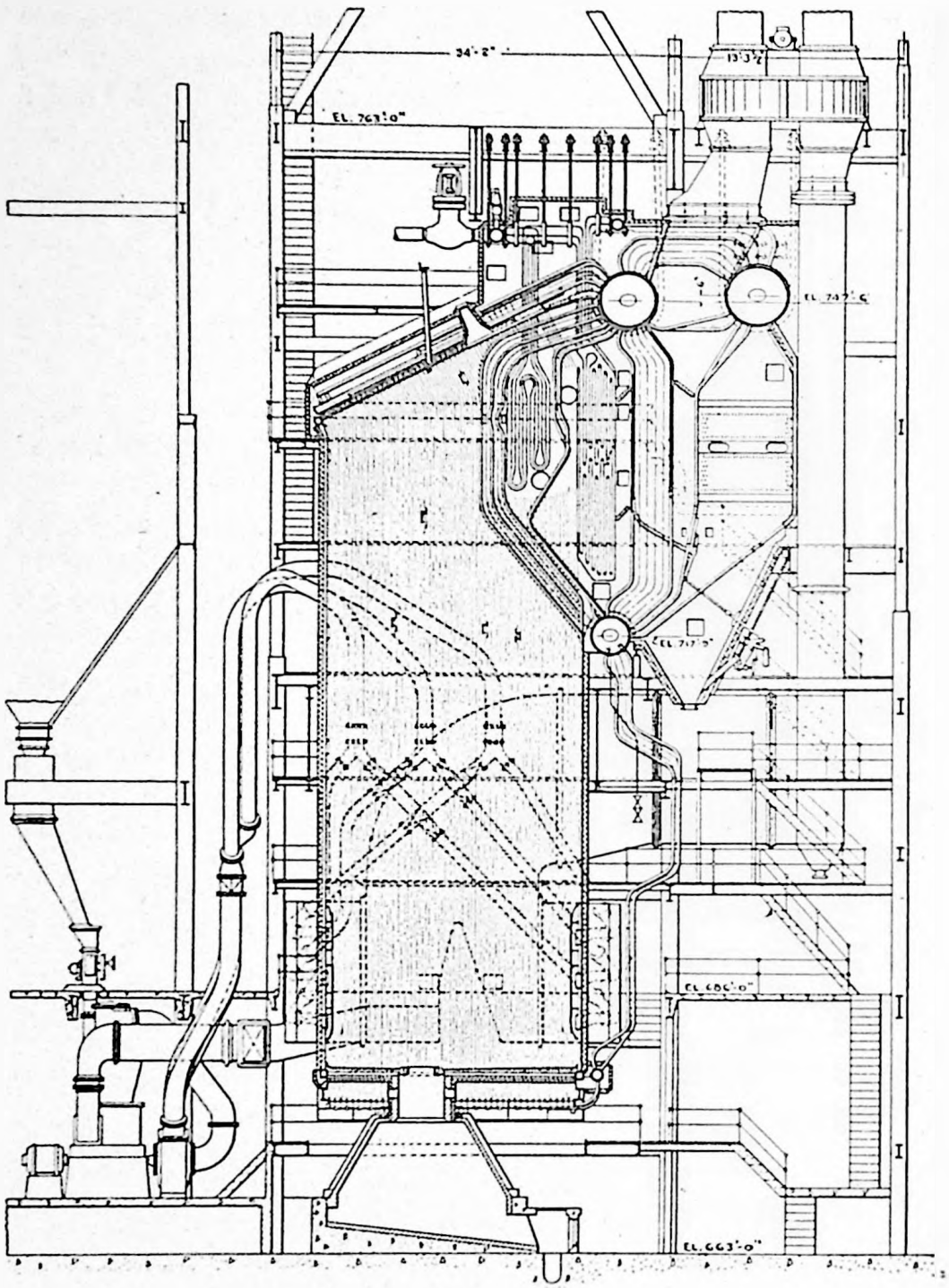


FIG. 1.

Second, consider a cube 10'x10'x10'=1,000 cu. ft.=600 sq. ft. with the same combustion rate the release is 50,000 Btu per sq. ft.

Third, 40'x20'x60'=57,600 cu. ft.=9600 sq. ft., 180,000 Btu release per sq. ft.

The relative cooling effect of these imaginary furnaces are as $\frac{A}{V}$ or 100 — 10 — 2.77.

Having an arrangement of the approximate dimensions outlined it must be determined if sufficient space is available for the required superheater surface.

As previously stated the gas temperature at 400,000 lb. is higher than necessary for 925 F steam temperature. From curves we find that at this load the steam temperature would be 1025 F, therefore, something must be done to reduce that temperature to 925 F. We must either remove some of the heat from the steam or not put so much heat into it. There is about 50 Btu per lb. excess heat which can be removed by an interstage desuperheater which will lower the temperature of the partially superheated steam, the desuperheated steam then going through the final stage of superheater.

For most conditions we believe a gas bypass damper provides the most simple and satisfactory form of control of steam temperature and at a comparatively low cost.

Opening the damper allows a portion of the gas to bypass the last two thirds of the superheater. Various arrangements are possible. If feasible, the damper is located at a point where the gas temperature is not over 1500 F.

Provisions must be made to clean both the front rows of boiler tubes, as well as the superheater. Three methods are in common use—lancing, retractable or telescopic blowers, or mass blowers. Fixed rotating blowers cannot be used at these temperatures.

There are several factors which determine the spacing of tubes along the drums, among which are the superheater element spacing and, where the back wall of furnace is extended

to the upper drum, the spacing of furnace tubes. This spacing may be anything from 9 in. to 12½ in.

For pressures of 900 lb. or less it is often possible to design a unit without an economizer. Such designs require a maximum of boiler heating surface and usually will incorporate two rear banks of 2 in. tubes spaced on an average of 4 in. centers longitudinally.

Generally, dry bottom furnaces are operated at slightly lower rates of heat release. Gas and oil fired furnaces are built with flat water cooled refractory floors.

For most cases the slag tap furnace with continuous flow of slag is recommended. The principle exceptions are where the load is below 40 per cent of full load for long periods, are the boilers that are held on bank and where the coals used have extremely high ash fusion temperatures. It is possible to handle coals of ash fusion temperature up to 2600 to 2700 F but only at sustained high loads. We suggest a high limit of 2500 F ash fusion temperature for slag tap furnaces.

To illustrate the difference in furnace size and design for gas fuel as compared with those for coal, assume a furnace designed to burn twenty-five tons of 11,800 Btu coal of low fusion temperature ash. In a furnace 20 ft. by 20 ft. by 60 ft. high having 5,250 sq. ft. of projected area of water cooled walls, the heat release per square foot of wall area will be 120,000 Btu and with moderately dirty walls the absorption will be about 45 per cent or 54,000 Btu per sq. ft. and the total heat absorbed will be 283,000,000.

If we design a furnace for natural gas to absorb the same amount of heat we find that one of the same plan dimensions and 30 ft. high will have 2,850 sq. ft. of wall area and a release rate of 206,000 Btu per sq. ft. Because of the clean walls we may expect an absorption rate of 100,000 Btu per sq. ft., or a total of 285,000,000

Reducing the size of the furnace still further has very little effect on the amount of heat absorbed.

However, if gas is used there is no necessity of holding the furnace exit temperature to the same low figure as required for coal. Higher gas temperature allows a smaller superheater.

With a water cooled furnace our problem is to get a sufficiently high gas temperature to obtain the required steam temperature.

We, therefore, select a well proportioned furnace and provide only enough furnace cooling to reduce the gas temperature to the point where a superheater of moderate cost will give the required steam temperature.

The usual practice is to use plain tubes variously spaced in front of a refractory wall.

This condition also applies to oil.

Large high-pressure units are all tailor-made, designed to meet a rather rigorous specification as to performance and sometimes also to fit within a limited space. Such designs are neither necessary or desirable for moderate capacities, pressures, and temperatures.

A vertical two drum boiler has been fully standardized to cover a wide range of capacities and pressures, and is particularly adapted for oil or gas fuel.

An interesting unit to paper mill operators is the chemical recovery unit. This comprises a boiler and water cooled furnace. Sulphate liquor from the digesters is first concentrated in multiple effect evaporators then further concentrated in disc evaporators by the gaseous products of combustion. The necessary make-up is then added and the concentrated liquor is sprayed in the furnace. The combustible matter is burned and the recovered chemical is tapped from the bottom of the furnace.

Roughly, the chmical recovered from the manufacture of one ton of paper will produce 10,000 lbs. of steam. Chemical recovered is approximately 0.6 tons per ton of paper.

Marine boilers are a recent addition to our product and at the present time constitute about 80 per cent of our total business. This was brought about by the urgent necessity of producing boilers for thousands of ships—Liberty, Victory, C-2 and C-3, tankers, aircraft carriers, naval auxiliaries, coast

guard vessels, tugs and other miscellaneous vessels. Most of these are supplied to the Maritime Commission.

In order to produce boilers for the large number of Liberty ships, the design had to be such that many of the small boiler shops could undertake part of the work.

The sectional header type was selected as being one that would best fit a mass production schedule.

All boilers for Liberty ships are identical; parts manufactured in any plant are interchangeable, thus simplifying repair parts stock.

Liberty ship boilers are designed for 24,000 lbs. per hour capacity at 250 psi pressure and 750 F total temperature.

Victory ships are also powered with this type of 40,000 lbs. capacity at 525 psi and 750 F total temperature.

The C-2 and C-3 cargo vessels are fitted with both sectional header and two drum vertical bent tube boilers. Capacity of each type—38,000 lbs. per hour, 525 psi and 750 F total temperature.

Another boiler frequently used is the three drum express type for capacities up to 100,000 lbs. at 300 psi and 650 to 750 F total temperature.

This shows a small tug boat boiler. The design, however, is suitable for capacities up to 25,000 lbs or more.

And this type, which we believe will come into increasing use, is a two drum or three drum boiler with separately fired superheater. This design is suitable for 800 psi and 850 F controlled steam temperature.

All of the marine boilers shown are fired with oil. The capacities given could not be reached with coal.

A large number of forced circulation marine boilers have been built abroad, many of them for the German Navy and merchant marine.

A few have been built here and are now on trial but we are not at liberty to present any data on these boilers at the present time.

In the class of boilers under discussion the forced circulation boiler cannot be omitted and as pressures rise to the 2000-2500 lbs range this type of unit will be increasingly used.

There are three distinct types of forced circulation boilers, of which the Benson typifies the straight through; the Sulzer, in which the steaming tubes discharge to a small drum or separator with a small amount of water; and the type represented by Combustion Engineering Company forced circulation unit in which the amount of water circulated varies from eight times at low pressure to one and one half times at pressures of, say, 2500 lbs.

In the forced circulation boiler a pump is used to provide the necessary head for circulation—or the pump is a substitute for the static head in natural circulation boilers.

Where the various circuits of such a boiler differ in length, heat input and consequently the resistance, it is obvious that some means must be provided to insure flow of water to each tube in proportion to the evaporation in that tube.

This is done by orifices at the inlet end of each tube, with screen to keep small pieces of scale from plugging the orifice.

A boiler is now in operation at the Montaup plant of the Fall River Electric Company, having a maximum capacity of 650,000 lbs., 1825 p.s.i., total steam temperature 960 F, reheat 770 F at 480,000 lbs. There is no convection surface, all evaporation is done in the furnace.

While no acceptance tests have been made, heat balances show that guaranteed performances are being met.

There have been a few difficulties of a minor nature, such as, some corrosion in the furnace tubes, due, I think, to insufficient deaeration and excessive leak-off from the circulating pump seals. Both of these have been corrected and the unit is now carrying most of the station load. Another unit of this type is one in the Koppers Company Synthetic Rubber Plant at Monaca, Pennsylvania. The maximum capacity—350,000 lbs., 800 p.s.i., 725 F. As in the Montaup unit there is no convection surface. Erection is complete but unit is not yet in operation.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society March 21, 1943

The meeting was called to order by Mr. F. F. Pillet, President, with 55 members and guests present. Since the Secretary was out of town, Mr. P. J. Guelfi acted as Secretary.

The Secretary read the minutes of the annual meeting held at the Heidelberg Hotel on December 17, 1942. The minutes were approved as read. Correspondence with the New Orleans office concerning the proposed change in financial return to the Baton Rouge Section was read. Under the proposed change, the Baton Rouge Section would receive $3.00 per year for each member instead of 50 cents. Return for Junior Members would be 50 cents.

Mr. Lant reported on the proposed amendment to the Constitution and By-Laws of the Section regarding the election of officers. The present method is considered unwieldly and cumbersome. The President appointed a Committee to draft an amendment to the By-Laws. Mr. N. E. Lant is Chairman, with Dean LaSalle and Professor Germano as members.

The President then introduced the speaker of the evening, Mr. James K. Jennings, Superintendent of the Production Department of the Standard Oil Company. Mr. Jennings spoke on his experience in Sumatra after the Japanese attack. The address was most timely and interesting and the great interest of the audience was evidenced by the large number of questions asked Mr. Jennings at the conclusion of his address.

The meeting adjourned with a rising vote of thanks to the speaker. Refreshments were provided by the Entertainment Committee, Mr. Whipple, Chairman.

P. J. GUELFI,
Acting Secretary

Minutes of the Meeting of the Board, May 3, 1943

The meeting was called to order by 1st Vice-President Kerr with the following members present: Messrs. Cappel, Leake, Nairne, Steinmayer, and Mayer. The minutes of the last meeting were read and approved.

A letter from Mrs. D. W. Godat of the Woman's Auxiliary to the L.E.S. wes read, stating that the Auxiliary had not only been successful in obtaining motion pictures on the construction of the Alaska-Canadian Highway, but had received an offer from Brigadier General C. L. Sturdevant, Assistant Chief of Engineers, U. S. Army, to show these pictures and to speak on this subject on either June 9th or 16th. In view of General Sturdevant's gracious offer the Auxiliary requested that a special joint meeting of the Society and the Woman's Auxiliary be called in June, since the regular June meeting of the Society has already been arranged. It was decided to honor General Sturdevant with this special joint meeting when he comes to New Orleans, providing it is not on the regular meeting date of the Society. It was understood that the joint meeting with the Auxiliary, originally scheduled for July is cancelled and Chairman Seago is to be requested to secure a speaker for the regular meeting in July.

The question of holding a meeting in Lake Charles to discuss the formation of a Local Section there was considered. Mr. Kerr is to contact some of the Lake Charles engineers regarding a meeting date.

A report of Chairman Nelson of the Library Committee was read and the condition of the Library discussed. Action on the report was deferred pending further study.

A letter of appreciation from Miss Brownie Sylvester on the resolutions passed by the Society on the death of her brother, Ira W. Sylvester, Life Member was read. A letter from Mrs. Martha C. Eastwood and Mrs. Benjamin C. Eastwood was read expressing their appreciation on the resolutions passed on the death of John T. Eastwood, Life Member and Past President of the Society.

The resignation of Glenn H. Holloway was accepted with regret.

The 1943 Junior Membership Awards for outstanding undergraduate work in engineering were awarded to Mr. Emmett Thompson Craig of Louisiana State University and Mr. John Joseph Pastorek of Tulane University upon the respective recommendations of Deans L. J. Lassalle and J. M. Robert. Both recipients are senior students in Chemical Engineering.

It was decided that the Annual Golf Tournament be held again this year as usual and Chairman B. H. Bell of the Entertainment and Outings Committee is to be requested to start the necessary arrangements.

The following members were dropped for delinquency of dues:

Raymond I. Allen
Clem B. Binnings
Carl E. Bottolfs
Edward S. Bres
G. P. Caruso
John F. Cassidy
William A.Castille
Ernest A. Couloheras
D. J. Daigle
Raymond J. Daigle
Francis E. David, Jr.
William D. de Laureal
William A. Dobbs
S. G. Dupree
Fred H. Fenn
Faurie E. Ferchaud
Mayer Godchaux
Perry Leaming
Ellis Levin
Frederic B. Medford
DeWitt L. Morris
D. W. B. Murphy
Leo J. Muse
George P. Rice
C. O. Roome
C. Lee Sens
Spencer G. Smith
Edwin J. Soniat
George H. Thompson
Louis M. Tognoni
A. P. Villa
W. A. Wood, Jr.

There being no further business the meeting adjourned.

Respectfully submitted,
J. K. Mayer,
Secretary-Treasurer.

Minutes of the Meeting of The Society, June 14, 1943

The meeting was called to order by President Kammer with approximately 70 members and guests present. President Kammer thanked the officers and members for handling the affairs of the Society for him during his recent illness. It was voted to dispense with the reading of the minutes of the previous meeting.

The report of Chairman Fithian of the Employment Committee was read and accepted.

A letter from Mr. L. B. Eddy, President of the Southwestern Association of Engineers, Lake Charles, was read, inviting a group of members of the Louisiana Engineering Society to attend their meeting in Lake Charles on June 24 for the purpose of discussing the formation of a Lake Charles Section of the L.E.S. President Kammer announced that the Board of Direction has been considering the formation of a Section in

Lake Charles, and if possible arrangements will be made to have a delegation attend the meeting.

Chairman Seago of the Technical Papers Committee reported that the July meeting would be held in Baton Rouge and sponsored by the Baton Rouge Section of the Society. It was voted that the date for the July meeting be that selected by the Baton Rouge Section.

Chairman B. H. Bell of the Entertainments and Outings Committee reported that plans were being made for the Annual Golf Tournament and that the date has been tentatively set for July 15. Further details are to be sent to the members in the near future.

Mr. Charles Dunbar was introduced and spoke briefly on the merits of the Louisiana Civil Service. He asked that members of the Society and their friends back this movement by joining the Louisiana Civil Service League.

President Kammer introduced the speaker of the evening, Mr. G. L. Breese*, who presented an interesting paper on "Hydraulic Dredging" and showed an interesting series of colored moving pictures on this work. Mr. Breese also answered a number of questions at the conclusion of the paper. The meeting adjourned with a rising vote of thanks to the speaker.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Board, July 5, 1943

The meeting was called to order by President Kammer with the following members present: Cappel, Gosa, Kerr, Leake, Steinmayer and Mayer. The minutes of the last meeting were read and accepted.

Mr. Kerr reported that the Entertainment and Outings Committee thought it advisable to postpone the Golf Tournament to July 22 on account of the meeting in Baton Rouge on July 12. The Board was in favor of this postponement.

Mr. Kerr reported that a telegram from Mr. L. B. Eddy of the Southwestern Association of Engineers of Lake Charles, inviting a group of members of the Louisiana Engineering Society to attend the meeting in Lake Charles on June 26 had not been received until several days after this date. Mr. Kerr reported that he had been unable to contact Mr. Eddy by telephone to explain the matter, but that he had contacted Mr. C. J. Phillips, Jr. in Lake Charles. Mr. Kerr was to write Mr. Eddy explaining the situation, and was to request that another date for a meeting be set.

Professor Steinmayer reported that he had not had sufficient time to consult Mr. Usher in regard to moving the Society library to the Howard-Tilton Memorial Library. A report was promised at the next meeting of the Board.

Mr. Cappel moved that the Society purchase a beaded glass projection screen for use at Society meetings. The motion was duly seconded but not passed.

The question of the Society's endorsement of the ship channel from Industrial Canal to Chandilier Island was brought up. Mr. C. G. Cappel was to draw up a resolution recommending the construction of such a channel and present this resolution at the coming meeting of the Society in Baton Rouge.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

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* Chief Engineer, McWilliams Dredging Co.

Minutes of Meeting, Baton Rouge Section, Louisiana Engineering Society
July 12, 1943

Officers Present: F. F. Pillet, President
H. L. Lehman, 1st Vice-President
Hamilton Johnson, 2nd Vice-President
Andre J. Dubus, Secretary-Treasurer

Officers Present New Orleans Sect. Karl P. Kammer, President
John K. Mayer, Secretary-Treasurer

A joint dinner meeting of the New Orleans and Baton Rouge Sections was held in Baton Rouge on July 12, 1943.

The meeting was called to order at 8:00 p. m. by Mr. F. F. Pillet, President of the Baton Rouge Section, with 95 members and guests present.

After dinner, Mr. Pillet introduced past presidents of the Baton Rouge Section. The usual business of the Section was postponed and the meeting was turned over to President Kammer who introduced the officers and members of the Board from New Orleans. Mr. Cappel offered a resolution in which the Society would go on record as endorsing the proposed ship channel from New Orleans to the Gulf. The resolution will be voted on at the next regular meeting of the Society.

A technicolor motion picture titled "Unfinished Rainbows" was shown. The picture, which was prepared by the Aluminum Company of America, traced the development of aluminum from its early history through the discovery by Charles Hall of a cheap way to extract the ore to its present position as a vital metal of war and peace. Mr. Carr Smith, Superintendent of Production of the Aluminum Ore Company of Baton Rouge, gave a talk on the processing of aluminum and on the production of alumina which is the function of the Baton Rouge plant. Mr. Smith had kindly consented to substitute for Mr. L. E. Henson who was originally scheduled to be the speaker. Unfortunately Mr. Henson became suddenly ill and was unable to be present. Many questions were answered by Mr. Smith at the conclusion of his address.

There being no further business, the meeting adjourned at 10:30 p. m.

Andre J. Dubus,
Secretary and Treasurer.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXIX. OCTOBER, 1943 NO. 5

CONTENTS

EDITORIAL NOTES AND COMMENT

A Correction. In the last issue of the "Proceedings" an announcement concerning the addendum to "Some Data in Regard to Foundations in New Orleans and Vicinity" was made. Through error, the committee associated with this most important work was not listed. The committee is composed of Prof. Donald Derickson as Chairman, with Messrs. F. P. Hamilton, A. J. Negrotto, J. H. O'Neill, L. M. Odom and N. F. Strachan. The original volume was prepared at the request of the Louisiana Engineering Society and has enjoyed wide circulation among the engineers in this and other localities. The engineers on the committee have contributed generously of their time and talents in this publication. Fof the beneft of those who may have missed the announcement in the August issue, owners of the first volume may secure the addendum by writing to Mr. DeWitt L. Peyburn, Department of Public Works, Baton Rouge, La.

Now or Never. For thirty years committees have been appointed, reports rendered, on the unification of some seventy engineering societies. To date, very little concrete action action has resulted. With post war planning and reconstruction days ahead, a united front of engineers could do much to replace the waste and inefficiency which results when lawyer-politicians attempt to plan and direct engineering work.

Most individuals in each of the societies realize the importance of establishing one organigation for representing purposes. Let a vote of the membership be taken on the following plan, which has been suggested by engineers who have given the matter their careful consideration.

The A.I.Ch. E., A.I.E.E., A.S.C.E., A.S.M.E. etc: would remain in operation as at present, yet each member of these organizations would also hold membership in a national all-inclusive engineering society, entitled say, The American Engineer's Association. Such a group should be sustained by a contribution of $1.00 per year from each member, either as an additional assessment, or to be taken out of the present dues as paid to the some seventy national bodies. Such a group would have a voice so powerful as to have indisputable national prestige, instead of some seventy squeaks as at present.

During the fall and winter months many of you attend national or regional conventions of your organizations. If each one will insist that this idea of a united engineering organization be given immediate consideration on the agenda, and be brought before the entire membership for vote at an early date, then the engineering profession will exert a power-influence as has never been exerted by them before. Post war planning and post war projects are vital to the welfare of the nation and are works for the engineers. The golden opportunity is at hand. It is NOW OR NEVER!

Joint Meeting. Our September meeting was held jointly with the Louisiana Section, American Society of Civil Engineers. Both President Kammer and President Fromherz presided over portions of the meeting. Such gatherings are indeed pleasant affairs, enabling engineers to make friends and renew old acquaintances.

In This Issue. It would have been difficult to have found a more timely topic than that discussed at the September meeting "Air Transport, Present and Future." The author of the paper, Mr. George A. Allward is a native of Bristol, England. He received his technical education at Temple Tehnical College and Bristol University. During his association with the aircraft industries during the past twenty years he has been Director of Research for Howard Hughes, Chief Engineer of Clark Aircraft Corporation, Assistant Chief Engineer, Crouch-Bolas Aircraft, Inc. and Assistant to Chief Engineer at George Parnall, Bristol. At present he is with Higgins Aircraft, Inc., New Orleans, La., as Chief Engineer.

New Members. Following is a list of members recently elected. We extend to them a hearty welcome, and hope they will take an active part in the affairs of the Society.

For Member

Clark, Frank H. Age, 77. Endorsed: A. M. Hill, M. C. Abrahm, L. J. Cucullu. B.S. Degree in Mech. Eng'g., University of Ill., 1890. 4 yrs. with a railway consulting engineer in Chicago as draftsman and general assistant. 16 yrs. with the Chicago, Burlington & Quincy R.R. in the following positions: Chief Draftsman, Motive Power Dept., 1894 to 1899, *Mechanical Engineer, 1899 to 1902. *Supt. of Motive Power, 1902 to 1905. *Gen. Supt. of Motive Power, 1905 to 1911. 8 yrs. with the Chinese Government R.R., Republic of China. Technical Advisor, 1919-1927. 15 yrs. as a consulting engineer in New York and holder of a license as Professional Engineer in the State of New York. *Indicates responsible charge. Member of Am. Soc. of Mech Engrs. and Research Secty. of the R.R. Division Am. R.R., Mech. Division. Former member of Am. Soc. for Testing Materials. Former member of Am. Rwy. Engr. Assn. P. O. Box 485, Chalmette, La.

Cooper, William Franklin. Age, 70. Endorsed: C. M. Kerr, B. W. Pegues, W. L. Thompson. Graduate 1896, L.S.U., Mechanical Course, B.S. Degree, 1898-1899, Res. Engineer, Ark. So. R.R., Junction City to Ruston, 1900-1901, Res. Engineer and Chief Engr. Ark. So. R.R., Ruston to Winnfield. 1902, Locating

Engineer, L.&A. R.R., Winnfield to Jena. 1903, Office Engineer, L.&A. R.R., Winnfield to Jena. 1917-1922, Asst. State Highway Engineer, La. 1922-1924, Vice-Chairman, La. Highway Comm. 1925-1928, Engr. Location to Maintenance Engr., La. Highway Dept. 1931-1932, Asst. Construction Engineer, La. Highway Dept. 1932-1940, Maint. Supt. at Winnsboro, La., Highway Dept. 1941-1943, Asst. Constr. Engr., Monroe, La. 905 Pine St., West Monroe, La.

Demers, Armand Horace. Age, 37. Endorsed: A. J. Dubus, P. J. Guelfi, H. L. Lehmann. 1922 graduate in E.E., Holyoke Vocational & Trade School. Nov. 1923-June 1930, Elec. Const. Dept., Stone & Webster Engr. Corp. June 1930 to date, Station Electrician, La. Steam Elec. Generating Station, G.S.U., Baton Rouge, in charge of electrical maintenance and construction. 1915 Walnut St., Baton Rouge, La.

Duhe, John S. Age, 29. Endorsed: H. J. Molaison, W. F. Guilbeau, A. M. Hill, B. S. Nelson. Completed junior year, Mechanical-Electrical Engineering, Tulane University, 1936. Engineering clerk, A. M. Lockett and Co., 1936-38. Inspector, Dredging, U.S. Engr. Dept., 1938-1939. Asst. to Resident Engr., U.S. Dept. of Agriculture, in construction of Sou. Regional Lab., 1939-1941. Engineering & Development Div. Sou. Reg. Res. ab., Design of Research Equipment & Systems, 1941 to date. B.E. Degree in Mechanical Engineering, Tulane University, 1943. 2107 Robert St., New Orleans, La.

Fernandez, John P. Age, 35. Endorsed: J. K. Mayer, W. E. Blessey, J. C. Baehr. B.E. in Mech. & Elect. Engr., Tulane U. 1930. 1935, Supervising Engr. with Rural Elect. Adm. June 1936 to June 1938 Engr. Aide with U.S. Engrs., N.O. Dist. (Discharge measurements, gage maintenance, hydraulic studies). June 1938 to June 1940 Jr. Engr. with U.S. Engrs., Galveston, Texas (Design of sector gate locks). June 1940 to July 1943, Asst. Engr. with U.S. Engrs., N.O. Dist. (Hydraulic design and report writing). Since July 1943, Asst. Prof. of Experimental Eng., Tulane University. 9011 Apple St., Ne w Orleans, La.

Louree, C. Harold. Age, 40. Endorsed: A. W. McDougall, M. H. Bell, C. J. Wyler. Graduated from I.C.S. course in Structural Engr. Attended Washington U. (Engr.), St. Louis. Began engineering experience as steel detailer, Miss. Valley Structural Steel Co., St. Louis, 1925. Constr. Engr., Skelly Oil Co., Tulsa, Okla., March 1937-Jan. 1938. Engr. and Estimator, Patterson Steel Co., Tulsa, Feb. 1938-April 1942. Designing Engr., Austin Steel Co., Oklahoma City, April 1942-April 1943. District Mgr., Ingalls Iron Works, April 1943-present. Registered Engineer in the State of Oklahoma. Associate member of both A.S.C.E. and the Am. Welding Soc. Member of Oklahoma Soc. of Prof. Engrs. and the Nat. Soc. of Prof. Engrs. 6037 Perrier St., New Orleans, La.

Marquart, Harold O'Neal. Age, 30. Endorsed: F. A. Boyle, F. P. Hamilton, N. E. Lant. Sept., 1929-May, 1930, U.S.C. of E., 1st N.O. Dist., Axe-man, Chainman & Recorder; May-Sept., 1930, La. Hwy. Comm., Rodman; Sept.-Nov., 1930, Humble Oil Co., Houston, Surveyman; Nov., 1930-Aug.,1931, La. Hwy. Comm., Leveler and topographer; Aug.-July, 1934, Motor Sales & Service Co., Franklinton, La., Partsman—Assisted in land surveying and engr. estimating part-time; July, 1934-Aug., 1935, La. Hwy. Comm., Jr. Instrumentman. Aug.-March., 1936, W.P.A., Parish Engr. of Wash. Parish; Mar.-Oct. 1936, Jones Boessle, Olschner & Weiner, Arch., Res. Engr. in full charge of constr. of reinf. conc. courthouse and jail, Greensburg, La.; Oct.-Jan. 1929, W.P.A. Field Engr. & Asst. Dist. Engr.; Jan.-Sept. 1934, L. J. Voohries, Res. Engr. in full charge of const. of $150,000 sewer and disposal plant, Sulphur, La.; Sept. 1934-Sept. 1941, W.P.A. Dist. Planning Engr. and Area Engr.; Sept. 1941-Sept. 1942, L. J. Voorhies, Designer, Draftsman & Field Contact Engr.; Oct. 1942-present, Al. Co. of Am., Baton Rouge, Const. Engr. in field charge of approx. one-third of original plant const. Later in charge of design and layout and supervision of installation of all Sinter Plant piping and pump setting. Have completed approx. two-thirds of complete I.C.S., C.E. course begun 1936. 1835 Birst St., Baton Rouge, La.

Semmes, Joe Murray. Age, 55. Endorsed: N. E. Lant, S. A. Theard, W. H. Rhodes. University of Arkansas 3 years, 1906-

1909. 1910-1921, Private Engineering (Levee, Drainage & Highways); 1921-June 1925, Resident Engineer, La. Highway Comm. June 1925-Aug. 1928, Dist. Maint. Supt. La. Highway Comm. Aug. 1928-Aug. 1939, Asst. Maint. Engr., La. Highway Comm. Aug. 1939-Dec. 1941, Maint. Engineer, La. Highway Comm. Dec. 1941-present date, Safety Engineer, Dept. of Highways. 759 Concordia, Baton Rouge, La.

Walker, Arthur L. Age, 60. Endorsed: M. C. Abrahm, P. Jahncke, F. C. Cary. B.S. in Civil Engineering, Purdue University, 1907. Asst. Engineer, bridges and buildings for Milwaukee Lines (R.R.) and Union Pacific R.R. Asst. Engr., Wyoming State Engineers Office, 1914-1936 employed by Canal Const. Co. of Chicago and Memphis. 1936 to date, Vice-President , Sternberg Dredging Co., New Orleans Office. Major experience with contractors on heavy construction, principally hydraulic excavation. Treasurer of La. Post. American Society of Military Engr. Member of Engrs. Society of Memphis, Tenn. 1709 Pere Marquette Bldg., New Orleans, La.

For Reinstatement as Member

Zervigon, Mario G. Age, 35. Endorsed: J. M. Robert, C. W. Ricker, A. M. Hill. B.S. in E.E., U. of Tenn., 1931. M.S. in E.E., U of Tenn., 1936. Tenn. Public Service Co., 1928-1930, 2 yrs. as co-op student; U. of Tenn., E.E. Lab'y. Asst. 6 mo., 1931; General Elec Co., Test, 1931-1933; U. of Tenn. Exp. Station, 1933-1936, research and development of instruments for testing cotton; Tulane U., 1936-1940, Instructor in E.E.; Tulane U., 1940-present, Asst. Prof. of E.E.; Member A.I.E.E., Tau Beta Pi. Member L.E.S. from March 1937 to Oct. 1941. No. 8 Palm Terrace, New Orleans, La.

PAPERS AND DISCUSSIONS

AIR TRANSPORT, PRESENT AND FUTURE

George A. Allward*

Millions of words have been printed on tons of paper describing in glowing phrases the present and future possibilities of the airplane, as a transport and cargo carrier. The prospect is exceedingly bright and when the activities of the Air Transport Command can be told, even the most air-minded of us will be amazed at the development in air transportation that has been brought about by the necessity for supplying our forces in the many combat areas of this global war.

Prior to the war a few hundred transport airplanes were pioneering a new and faster transport system. Today literally thousands of planes are daily spanning the oceans and continents of the world with clocklike precision. Flying in all kinds of weather from the sub-zero temperatures and fogs of the Arctic to the tropical heat and sand storms of the Sahara Desert our intrepid airmen have, and sometimes through bitter experience, provided us with invaluable data with which to better engineer our planes. In the normal course of events it would have taken many years of operational research to secure this information and the net result will be that we will emerge from the war with aircraft capable of operation to and from any part of the world and in any and all weather conditions. Actually air transportation has progressed some twenty years due to new developments necessary for quick delivery of troops and cargo to combat areas. Yet in this development, cost of carrying freight by air is not presently a factor because of the tremendous need for quick delivery of materials. However, when hostilities cease, and commercial airlines take up the task of establishing a vast network of highways of the sky, ton-mile cost will be a big factor. Especially will this be so from the standpoint of competing with surface transportation rates.

* Chief Engineer, Higgins Aircraft, Inc., New Orleans, La. Presented before a joint meeting, La. Sec. American Society of Civil Engineers and La. Engineering Society on September 13, 1943.

It is obvious that no one type of plane will fulfill all the requirements of cargo and passenger operations as there are many variables in each route and type of operation. To understand this situation more closely let us examine some of the basic criteria governing the weight, size, and load carrying capacity of transport aircraft.

First of all, the airplane must be able to take off and land with complete safety using existing airfields. To insure a safe take-off and a reasonable climb the power loading of the gross weight of the airplane divided by the total horsepower at take-off should not exceed eleven pounds per horsepower. Similarly for a safe landing speed and landing run the wing loading or the gross weight of the airplane divided by its wing area should probably not exceed thirty pounds per square foot. This wing loading corresponds to a landing speed of 85 to 95 miles per hour. Having established the power loading at eleven pounds per horsepower, we can now proceed to break down the weight of the airplane. Experience has taught us that the design weight of an aircraft power plant, which includes engine, propeller, exhaust manifolds, air intake system, fuel system, oil system, engine and propeller controls, and engine accessories will approximate 2.1 pounds per horsepower. Thus, the power plant absorbs 2.1 divided by 11 or 19% of the gross weight of the airplane.

The structure weight, which is made up of wings, fuselage, empennage, landing gear and engine nacelles has been found to vary between thirty and forty percent of the gross weight with thirty-five percent being a very good average. Fixed equipment, which is made up of surface controls, radio and electrical installations, instruments, hydraulic system, and furnishings will account for another 11% of the gross weight.

The total of these three items is known as the weight empty, which if you will add them up, equals 65% of the gross weight. A survey of the weights of transport planes designed and built in all parts of the world has been found to agree very closely with this result.

The remaining 35% of the gross weight is known as useful load and consists of gasoline, oil, crew, provisions, and payload. The crew and provisions are fixed items but we can juggle with fuel and payload. The longer the range the less payload and vice verst. Published performance figures are sometimes apt to be misleading in this respect, for quite often the maximum range and maximum payload are quoted as if they occur at the same time when in reality the maximum range is only obtainable with little or no payload and the maximum payload for a minimum range.

The factor that is of paramount interest to the airline operator is maximum payload per pound of airplane and maximum payload per pound of fuel for any given range. The range will have an important bearing on the most economical size of airplane to do a given job as will be shown by the following analysis.

Transport airlines are normally operated at their optimum cruising speed and altitude, but to maintain schedules it is sometimes necessary to adjust both altitude and speed to suit weather and wind conditions. For instance, if a head wind is encountered power must be increased to maintain a constant ground speed. A tail wind of course will have the opposite effect and power would be decreased. Deviations from the optimum altitude is often necessary to avoid rough air and must be considered from the point of view of passenger comfort, as I expect some of you have experienced first hand.

For the purpose of this analysis, standard or normal conditions are assumed to obtain in which case the operational power will be taken as 50% maximum at optimum altitude and gasoline consumption at .46 pounds per brake horsepower per hour. An engine rated at one thousand brake horsepower would thus be operated at five hundred horsepower and its gasoline consumption would be 230 pounds or 38.4 gallons per hour. Based on the foregoing assumptions and a clean aerodynamic design, the following variation of cruising mileage with gross weight can be expected.

Gross Weight	Miles per Gallon
25,000 lbs.	2.8
45,000 lbs.	1.29
75,000 lbs.	.87
115,000 lbs.	.74
150,000 lbs.	.68

You will notice that the drop off in mileage is slight as the gross weight is increased beyond 75,000 pounds.

Having established a relationship between gross weight and mileage it is now possible to determine the variation of payload per pound of airplane and per pound of fuel with gross weight.

An airplane carries a half-pound of oil for every six pounds of gasoline so that for the purpose of the calculations fuel weight is figured on the basis of 6½ pounds per gallon.

Since the number of crew members and quantity of provisions will vary with the size of the airplane, it is expedient to include their weights with the payload. In other words, the useful load which earlier in this paper was established at 35% of the gross weight will be split up into two parts; namely, fuel and payload.

Based on the foregoing assumptions, it will take a 22,000 pound airplane to carry 5,000 pounds a distance of 1,000 miles, a 42,000 pound airplane to carry the same load 2,000 miles, and an 84,000 pound airplane to carry a like load 3,000 miles.

To carry 20,000 pounds a thousand miles an 82,000 pound airplane would be required, while to transport a similar load 3,000 miles the size of the airplane would have to be increased to 240,000 pounds.

For a range of 500 miles a 25,000 pound airplane is found to have a payload of 7,950 pounds which is .3035 pounds per pound of airplane and 6.54 pounds per pound of fuel. For 2,000-mile range the same airplane would have a payload of 4,100 pounds or .164 pounds per pound of airplane and .882 pounds per pound of fuel. At the other end of the scale for a range of 500 miles, a 150,000 pound airplane would carry a payload of 62,240 pounds, which is .319 pounds per pound of airplane and a 9.78 pounds per pound of fuel. The same airplane will carry a pay-

load of 48,000 pounds a distance of 2,000 miles which is equivalent to .221 pounds per pound of airplane and 1.7 per pound of fuel.

You will notice that payload per pound of airplane remains sensibly constant regardless of the size of airplane varying from .294 to .319 for a range of 25,000 pounds to 150,000 pounds. Since the rest of an airplane can be figured at so many dollars per pound, first cost, interest on capital investment, insurance, depreciation, and probably maintenance costs per pound of payload carried, are to all intents and purposes a fixed quantity.

Payload per pound of fuel is indicative of the running cost and this factor remains constant at about six pounds up to a gross weight of 75,000 pounds and then improves rather rapidly. Based on a 500-mile range a 150,000 pound airplane will carry 63% more payload per pound of fuel than a 75,000 pound airplane. Based on a 2,000-mile range a 150,000 pound airplane will carry 133% more payload per pound of fuel than a 75,000 pound airplane. It appears, therefore, that the airline operator will be able to operate three 25,000 pound airplanes for roughly the same cost and carry the same load as one 75,000 pound airplane, but the running cost can be expected to diminish as the airplane is further increased in size.

As a matter of interest, let us see how another means of transportation, the private automobile, compares with the airplane on the same basis.

An automobile weighing 3,000 pounds empty having a payload of five passengers at 170 pounds each and 200 pounds of baggage and gasoline for a trip of 500 miles at 15 miles per gallon, would have a payload per pound of automobile of .247 pounds and a payload per pound of fuel of 5.25 pounds. The comparative figures for the airplane are .3 and 6 pounds respectively. Thus, the airplane is a more efficient means of transportation than the automobile since it carries 21% more payload per pound of vehicle and 18% more payload per pound of fuel at roughly four times the speed.

From the point of view of first cost, the price of an automobile is roughly 32 cents per pound, while the airplane is in the neigh-

borhood of $6.00 per pound. This sounds like a formidable differential but when one considers that the life of the average automobile is only 100,000 miles as compared to two and one-half million miles for the airliner, the price of the airplane on a mileage basis or useful life is 33.3% less than the automobile. These figures are very illuminating.

Irrespective of the size of the airplane the effect of increasing range is to seriously reduce payload. For instance, increasing range from 500 to 1,000 miles results in a decrease in payload per pound of fuel of 55 to 60% and for 500 to 2,000 miles a decrease of 82 to 88%. From the point of view of operational costs it will, therefore, be obviously desirable to make frequent stops so that the airplane carries maximum payload and minimum fuel. Frequency of stops will probably be dictated by the necessity for maintaining a time advantage of perhaps not less than two to one over the fastest surface transportation between the same two points and when I say the same two points I mean from downtown district of A to downtown district of B. Due to the large area requirements and the need that surrounding territory be free from obstructions, airports are invariably located many miles from the centers of cities. By taxi it takes anywhere from fifteen minutes to an hour to get from downtown to the airport. This time must be added to the flight time when comparing with surface transportation as bus and railroad terminals are usually located in or near the downtown area. For instance, in traveling from St. Louis to Chicago the flight time is one hour and forty-five minutes, taxi time forty-five minutes at each end making a total of three hours and fifteen minutes. The distance is 251 miles so the average downtown to downtown speed is only 77 miles per hour. After the war we can expect faster train service, perhaps even approaching our present average of 77 miles per hour by air. Something must and will be done to reduce the time consuming taxi ride to the airport. The helicopter which in small sizes is now out of the experimental stage and in production offers an attractive solution to this problem. It isn't at all fantastic to look forward to being picked up from your hotel roof top and transported to the airport at a speed of 120 miles per hour. The forty-five

minute taxi ride would thus be cut to ten minutes, making the average speed 121 instead of 77 miles per hour. This would make the trip far more attractive to the traveller and suggests that the minimum distance between stops might be in the region of 200 to 300 miles. Long hops since they have been shown to be uneconomical will be avoided where possible. Plans are already in existence for seadromes or floating airports which will be anchored at sea to form a chain of stepping stones across the oceans of the world. By placing three such seadromes along the 3,470-mile "Great Circle Route" between New York and London, the payload and hence gross revenue per flight would be at least doubled. The advantages of such a scheme where mass transportation is involved is more than obvious and there is little doubt that seadromes will be used on all sea routes where the volume of traffic warrants the initial and maintenance costs. Perhaps you will be interested in hearing a few details of a proposed seadrome designed by Edward R. Armstrong who has been working on the problem for many years. The flat topped structure somewhat resembling the deck of an aircraft carrier is to be some 3,500 feet long by 350 feet wide and will be supported 70 feet above the water level on a large number of relatively small buoyancy units of great length. Due to their great length and draft, the individual buoyancy units are not appreciably affected by displacement. Thus, a change of water level due to wave motion does not, for all practical purposes, change the buoyancy of any unit making up the seadrome structure. The structure can therefore be expected to remain steady even in a rough sea.

The columns on which the seadrome deck rests are in three main parts. That part which appears above the surface, streamlined to permit easy flow of wind and wave supporting the usable structure some seventy feet above sea level, is merely the connecting legs between the deck and the buoyant elements. The buoyant elements themselves consist of closed cylinders, and below them for a draft of one hundred and seventy feet extend telescoping ballast tank columns supporting the ballast tank, which will be loaded with sand and water ballast when the seadrome is anchored under service conditions. These

members are made telescopic within the buoyancy chambers to permit shipyard construction in shallow inshore waters and to facilitate towing to deep water anchorage. The structure is moored by a bridle at one end and will thus always swing in the wind.

Present seadrome designs have two decks beneath the flying deck; one for the accommodation of personnel and passengers and a lower deck for aircraft service and repairs. This lower deck would also contain the stores of gasoline, oil, water, and the machinery for the operation of the lighting, pumping, radio, and other utilities. Each seadrome will also be equipped with the latest improvements in radio and aids to navigation. So much for the seadrome; now let us sum up the situation with a view of predicting the probable trend in transport aircraft. Since there appears to be little or no economic advantage in running few large units in preference to a frequent schedule of smaller transport planes, it is likely that a large percentage of domestic passenger airways will continue to use airplanes approximating the size of the Douglas DC-3 and increase their schedules until such time as the volume of traffic warrants the use of larger craft. It might be pointed out here that with the present limited schedules and the pressure of wartime travel, the airlines are only averaging 80% capacity. Before the war it was considerably less.

For transcontinental and transoceanic runs it would appear desirable to use airplanes in excess of 100,000 pounds gross weight to take advantage of the increased mileage per pound of payload. However, when possible, stops will be made at intervals of perhaps 1,000 miles to avoid carrying gasoline instead of payload and by so doing tremendously increase the revenue per trip. Incidentally, an airplane of 100,000 pound gross weight would carry about one hundred passengers and their baggage a distance of 1,000 miles which is approximately four times the capacity of airliners presently in operation.

The post war period will also see the introduction of airplanes designed purely for the transportation of freight. These airplanes will differ from the conventional transport in that

they will be provided with facilities for rapid loading and unloading of heavy objects. They will in fact be flying boxcars but will still preserve a streamline form for aerodynamic efficiency. For ease of loading and ground handling they will undoubtedly be equipped with tricycle landing gears and further it seems likely that practically all cargo plane types will be high winged monoplanes for improved fuselage loading and accessibility.

Aerodynamically and structurally speaking, the size of future planes is unlimited and although we know that within limits the larger the plane the lower the direct flying cost in proportion to the load carried it is extremely important not to lose sight of the value of frequency service. This point has been proven in bus-railroad competition where a bus line because of smaller units can offer five round trips a day between two cities against the railroad's average of one. While only experience and study will develop the proper size of plane for each operation, it is likely that post war cargo planes will range between 25,000 and 100,000 pounds for domestic purposes, and from 75,000 to 150,000 for transoceanic service. A large percentage of existing airport runways are designed for airplanes up to 50,000 pounds gross weight so until such time as these runways can be reinforced and lengthened, the airlines will be obliged to operate smaller units. Special provisions will also have to be made for the handling of cargo in order that this operation can be segregated from the handling of passengers. Much planning remains to be done along these lines.

All cargo will revolutionize the movement of freight, develop short cuts to old markets with new routes, develop new markets and sources of supply, and reduce travel from weeks to hours.

These are all parts of the job the air transport will do after the war to improve relationship between peoples of the world.

MINUTES OF THE MEETING AND BUSINESS OF THE SOCIETY

Minutes of the Meeting of the Board, August 2, 1943

The meeting was called to order by President Kammer with the following members present: Cappel, Kerr, Nairne and Mayer.

The minutes of the last meeting were read and accepted. Mr. Kerr reported that he had written President L. B. Eddy of the Southwestern Association of Engineers in Lake Charles, explaining our inability to attend the last meeting in Lake Charles and requesting an opportunity to meet with the group in the near future. An invitation subsequently received from President Eddy to meet in Lake Charles on August 7 was accepted and plans were made for the trip.

The following resolution introduced at the July meeting of the Society in Baton Rouge was read and approved by vote of the Board. It was ordered carried on the notices for the August meeting so that it may be voted upon by the members at that meeting:

> "Be it resolved that the Louisiana Engineering Society in its proper function of public interest, go on record with the proper authorities of the Federal, State and Municipal Governments as favoring the completion of a Tidewater Ship Canal connecting the present Industrial Canal at New Orleans directly with the Gulf of Mexico."

President Kammer is to advise the Dock Board as to the present status of this resolution and with Mr. Kerr is to attend the public hearing on the proposed Tidewater Ship Canal on August 5.

The Board voted that a sum, not to exceed $15.00 per month, be alloted the Secretary-Treasurer for the employment of stenographic assistance.

A report on the Golf Tournament was read and the outstanding bills ordered paid.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Society, August 9, 1943

The meeting was called to order by President Kammer with approximately 75 members and guests present. The minutes of the last meeting were read and accepted. A report of the Employment Committee was read by the Secretary.

The following resolution was read and passed by a unanimous vote of the members present:

> "Be it resolved that the Louisiana Engineering Society in its proper function of public interest, go on record with

the proper authorities of the Federal, State and Municipal Governments as favoring the completion of a Tidewater Ship Canal connecting the present Industrial Canal at New Orleans directly with the Gulf of Mexico.''

Vice-President C. M. Kerr reported that several members had attended the meeting of the Southwestern Association of Engineers in Lake Charles on August 7 in order to explain the details of establishing a local section of the Society in Lake Charles. The question is being considered by the Lake Charles engineers at present.

Mr. B. H. Bell gave a report on the recent Golf Tournament. Lieut. Col. F. C. Carey invited the membership to attend a meeting of the Society of American Military Engineers on August 12.

Mr. John Van Brunt, Vice-President in Charge of Engineering, Combustion Engineering Co., New York, the speaker of the evening, was introduced by President Kammer. He presented an interesting illustrated paper on ''High Pressure, High Capacity Boiler Units.'' The Speaker answered a number of questions at the conclusion of his paper. The meeting adjourned with a rising vote of thanks to Mr. Van Brunt.

J. K. MAYER.
Secretary-Treasurer.

Minutes of the Meeting of the Board, September 7, 1943

The meeting was called to order by President Kammer with the following members present: Kerr, Kuhn, Leake, Nairne, Steinmayer and Mayer. Mr. L. J. Cucullu was present by invitation.

The minutes of the last meeting were read and approved.

It was voted that due to the increased load and expense thrown upon the Secretary-Treasurer by the increasing membership of the Society, the salary be increased to $75.00 per month. This increase is to cover all stenographic assistance required by the Secretary-Treasurer and recinds the action passed at the last meeting of the Board regarding a drawing account for stenographic assistance.

Professor Steinmayer read a letter from Mr. R. J. Usher stating that the Howard-Tilton Memorial Library would accept the Society's library collection only as an outright gift or as a permanent deposit. Since this stipulation is contrary to the provision of the motion passed by the Board on June 7, requiring the Society's collection be affiliated with the Howard-Tilton Memorial Library on a loan basis, Mr. Usher is to be advised that his conditions cannot be accepted. The Board expressed its appreciation to Professor Steinmayer for his efforts in this matter.

Mr. Kerr reported that he had written several of the Lake Charles engineers thanking them for the hospitality extended the delegates of the Society who recently attended the meeting in Lake Charles.

Mr. Cucullu read a letter which he had received from President H. V. Coes of the A.S.M.E. stating that the War Production Board had requested the formation of a committee to continue the War Production Conferences as held in conjunction with the Annual Meeting in January. It was decided that this Conference be repeated at the 1944 Annual Meeting, details to be handled by a committee to be appointed by the General Chairman.

Mr. Cucullu was appointed General Chairman for the 1944 Annual Meeting and instructed to select chairmen for the various committees required.

The resignation of Mr. E. L. Coile was accepted with regrets. This resignation is to become effective December 31, 1943.

A letter ballot was ordered for the following applicants for membership, the applications having been duly approved by the Membership Committee B:

For Member

Clark, Frank H.
Cooper, William Franklin
Demers, Armand Horace
Duhe, John S.
Fernandez, John P.
Louree, C. Harold
Marquart, Harold O'Neal
Semmes, Joe Murray
Walker, Arthur L.

For Reinstatement as Member

Zervigon, Mario G.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Joint Meeting of the Society with the Louisiana Section, A.S.C.E., September 13, 1943

The meeting was called to order by President Kammer with approximately 90 guests and members present. The minutes of the last meeting were read and accepted.

President Kammer announced that an Addendum to the Soil and Foundation Survey had been published and is being distributed by the Louisiana Department of Public Works. President Kammer thanked the committee, under the chairmanship of Professor Donald Derickson, which edited this Addendum and also expressed the Society's appreciation to Mr. DeWitt L. Pyburn and Mr. Leo M. Odom of the Louisiana Department of Public Works for the publication of this material.

President Kammer also announced that Mr. L. J. Cucullu had been selected by the Board as General Chairman for the 1944 Annual Meeting and that the W.P.B. Production Conference would be sponsored by the Society at the Annual Meeting.

Mr. J. H. O'Neill stated that he had noted the dropping of several members of the Society for non-payment of dues and stated that these members have been on foreign duty for sometime. He moved that the Society request the Board of Direction to recind its action of dropping for delinquency of dues those members who are on foreign duty and to suspend further action until such members can be contacted after the duration of the war. The motion was seconded by Col. V. J. Bedell. Mr. W. A. Scales proposed the motion be amended to include all members in the armed services. The amendment was accepted by Col. Bedell and the amended motion passed by a vote of the members present. President Kammer explained the action previously taken by the Board in the reduction of dues to members in the service and stated that the motion would be brought before the next meeting of the Board.

President Kammer turned the meeting over to President A. M. Fromherz of the Louisiana Section, A.S.C.E. who presided over a short business meeting of the Section. President Fromherz introduced the speaker of the evening, Mr. George A. Allward, Chief Engineer, Higgins Aircraft, who presented an interesting paper on "Air Transport, Present and Future." Mr. Allward answered a number of questions at the conclusion of the paper. President Fromherz thanked the speaker and turned the meeting back to President Kammer, who in turn thanked the A.S.C.E. for presenting such an interesting program. The meeting adjourned with a rising vote of thanks to Mr. Allward for a splendid paper.

J. K. Mayer,
Secretary-Treasurer.

PROCEEDINGS
OF THE
LOUISIANA ENGINEERING SOCIETY

VOL. XXIX. DECEMBER, 1943 NO. 6

CONTENTS

EDITORIAL NOTES AND COMMENT

Our Annual Meeting. Again preparations for the Annual Meeting are about complete. This is the ninth such meeting which this year is scheduled for the dates January 13, 14, 15, 1944. A tentative program is as follows:

Outline of Program for Ninth Annual Meeting
January 13, 14, 15, 1944

"Planning for Louisiana's Post War Problems" (Keynote address) by Mr. A. B. Paterson, Dist. Chairman, Committee for Economic Development.

"Electronics, the New Science" by Mr. E. S. Lammers, Industrial Engineer, Westinghouse Electric & Mfg. Co.

"Marine Piping Systems and Their Design" by Mr. O. A. Page, Chief of Engineering Plant Approval Section, Maritime Commission.

"Tidewater Seaway Project" by Mr. Lester F. Alexander, President, Lester F. Alexander Co.

"Port Developments in New Orleans" by Mr. Pendleton E. Lehde, President, Pendleton Shipyards, Inc., and the Dock Board.

"Sulphur—Yellow Magic of Louisiana" by Dr. P. D. Peterson, Freeport Sulphur Co. (Dixon Hall.)

"Fundamentals of Pressure Cabin Operation" by Dr. John E. Younger, Head, Mechanical Engineering Dept., University of Maryland.

"Synthetic Rubber" by Mr. John T. Cox, Jr., Technical Director, Defense Plant Corp.—Lake Charles, Firestone Tire & Rubber Co.

"High Octane Motor Fuels" by Mr. M. J. Rathbone, President, Standard Oil Co. of La.

Student papers will also be presented.

War Production Conference.

Panel Discussions:

Man Power Problems.
Preventive Maintenance.
Industrial Safety.
Welding Problems.

Inspection Trip to Higgins Aircraft Plant.

Banquet and Dance, Saturday, January 15, 1944.

KNOW YOUR RIGHTS!

Recently the Officers and Board of Direction of the Society, together with representatives from other engineering societies had the pleasure of hearing Mr. Howard Peckworth speak on collective bargaining by professional engineers. Mr. Peckworth is the Assistant Secretary of the American Society of Civil

Engineers and for the past eighteen months has been touring the nation gathering material and surveying situations in connection with collective bargaining by professional engineers.

He cited numerous instances in which the sub-professional or labor groups had taken upon themselves the authority for speaking in behalf of the professional engineers. Although the professional engineers are usually in the minority in such cases, yet this small group, according to law, can set up its own organization for collective bargaining. Unfortunately however, the professional engineers do not as a rule act quickly enough to prevent the labor union from assuming jurisdiction.

The American Society of Civil Engineers has been most helpful in assisting the organization of professional engineers when needed to prevent their control by sub-professional groups and labor unions. This aid has not been confined to civil engineers; other classifications and engineers not members of A.S.C.E. have benefited.

This matter is a serious one. Our Society, in order to serve the best interest of the members, will probably give the matter publicity at its meetings. Any professional group of any size by following a shush-shush policy on this matter is failing to recognize a grave situation facing the professional men.

Such a condition as this again brings to mind the much-talked-of and the little-done-about-it question of uniting all engineering groups into a single powerful national group of professional engineers. An organization of that caliber could afford field representatives, and legal talent in Washington which would prevent such a disgraceful bill as that introduced by Senator Kilgore—a slap in the face of engineers and scientist who have done so much to speed our war efforts.

Engineers, **KNOW YOUR RIGHTS**! Let labor leaders speak for labor, but let professional engineers speak for professional engineers. Don't sit idly by and let labor unions be your representative. If a condition arises where organization is necessary to protect your identity, take immediate action. A delay of a few days may nullify your efforts.

The American Society of Civil Engineers deserves much credit for taking the initiative in this matter. From Mr. Peckworth's statement, apparently many engineers are either ignorant of what is going on or are indifferent to their own future.

Our Joint Meeting With the American Institute of Chemical Engineers. Mr. Herman F. Willkie of Seagram Distilleries gave a very interesting talk on November 8 on the subject of engineering developments in grain distilleries.

A portion of the meeting was presided over by Chairman E. A. Gastrock of the A. I. Ch. E. Complete details of the meeting will be found in the minutes of the Society.

Joint Meeting With American Institute of Electrical Engineers. On December 13 a joint meeting with the A.I.E.E. was held at the St. Charles Hotel. The attendance was excellent, about 200 being present.

Two very interesting papers were presented, one is reprinted in this issue.

Chairman Charles P. Knost assisted by Secretary-Treasurer Frank E. Johnson handled the A.I.E.E. portion of the program.

Meeting of Baton Rouge Section. On October 14 the Baton Rouge Section held an interesting meeting, with Mr. R. H. Odom of the State Department of Public Works speaking on maps. Professor F. F. Pillet, President of the Section presided. Complete details will be found in the "Minutes."

In This Issue. Mr. Robert M. Cust, Marine Instructor, Sperry Gyroscope Company delivered a most interesting paper with demonstrations on the gyroscope compass and pilot.

Mr. N. J. Hutchins, Aero Engineer, Sperry Gyroscope Company commented on various passages in the booklet "The Gyropilot in Military Aircraft."

PAPERS AND DISCUSSIONS

THE SPERRY GYRO COMPASS*

For many centuries the magnetic compass has been the principal aid to navigation. Then iron propulsion machinery supplanted sail, steel replaced wood in the ship's hull and cargoes of materials with magnetic properties demanded transport. The compass was improved, but not sufficiently to overcome the handicaps a modern age was presenting. Then came electrical motors and their power circuits aboard ship, trade lanes in higher latitudes where the compass' directive force declines sharply, and finally war. War brought heavy guns aboard cargo ships, and De-Gaussing which in itself set up heavy magnetic fields to further impair the reliability of the compass. A more accurate and dependable aid to navigation became an imperative need. Almost over night marine men turned to the gyro compass which had been known and respected for many years but not so desperately required until then.

So it isn't a bad idea to get acquainted with the "Gyro" and to find out what it really is. Isn't it interesting to know that we are living on one? The earth is a gyroscope, and like it all gyroscopes are a rotating mass—so suspended as to be able to move in any direction. To forestall complications, here are a few definitions and examples to help us understand what we are talking about. What do we mean by a "rotating mass, free to move in any direction"? Put a wheel in a gimbal mounting like the old-fashioned lamps used to be mounted on ship board, and you have a revolving mass that can be moved in any direction, or about any axis—sort of a universal joint arrangement. (See figure 1) This shows a simple gyroscope mounted in this manner which is known as "three degrees of freedom"—free-

* Presented before the joint meeting of the Louisiana Engineering Society and the New Orleans Chapter, American Institute of Electrical Engineers, December 13, 1943 by Robert M. Cust, Marine Instructor, Sperry Gyroscope Company.

dom about the spinning axis, the vertical axis and the horizontal axis. This is the difference between the gyro and any other revolving wheel, like the fly wheel of an automobile or the turbine rotors on ship board. These are not true gyroscopes because they are mounted differently, and are sometimes called Gyrostats because they are tied down to their foundations. They have gyroscopic forces just the same. These forces make themselves known in additional bearing pressures when they are moved, as when the automobile goes around the corner or the ship changes course. This, then, is one of the reasons why

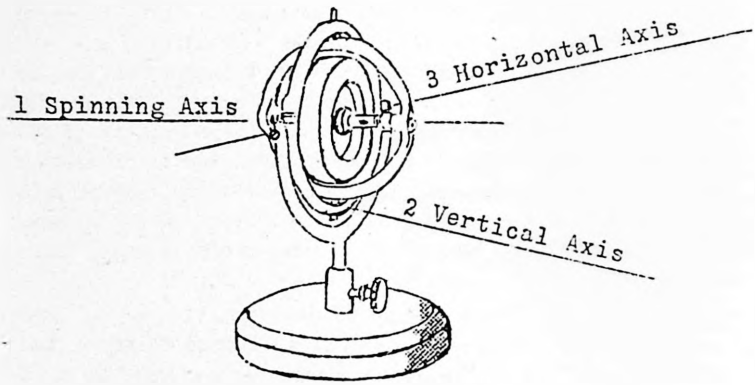

FIGURE 1

high speed turbo generators and other high speed auxiliaries are placed with their axes lengthwise to the ship and not athwartships; a ship usually pitches only a few degrees as compared with its roll, and the gyroscopic forces resulting from motion of this kind and therefore smaller, reducing the stresses in the high speed parts and also possible extra pressure on the bearings.

A familiar example of the gyroscope is the rolling hoop which seems to defy gravity to remain upright while its forward motion continues, but quickly falls flat when its rolling energy is exhausted. Similarly, the spinning top can no longer resist the pull of gravity when its store of spinning force is spent, but

until then it stands rigidly upright. And the earth, our largest and most perfect gyroscope maintains the plane of its spin axis undeviatingly through the centuries, pointing always to the North Star. The man-made gyroscope, with its free vertical, horizontal and spin axes, will also continue to point to any chosen star until, like the hoop or the top it comes to the end of its spinning power. If you observed the gyro in action you could easily believe the axle was rising and turning, until you looked carefully and found it still pointing true to the star. Only then would you believe it was your room and your table and chair that had moved—not the gyro. This characteristic gyroscopic inertia of "rigidity in space" is made use of in many applications of this unique device. To mention but one, the science of ballistics is built around the ability of the spinning bullet to maintain its axis rigid in space throughout its flight.

Not only does the gyro rigidly maintain the direction of its axis in space, but it is very difficult, even when exerting force, to move it off this direction. This is accounted for by Newton's first law of motion which states that all matter is "pig-headed" by possessing inertia. Now even when the gyro wheel is not revolving, it feebly opposes, by the inertia of its mass, a force which tries to turn it. But when it is revolving it multiplies this inertia by its speed and any force tending to turn it is vigorously opposed. It really seems to possess a devil when you grab it and try to point its axle in another direction. It is cranky because it not only refuses to move in the direction you are trying to move it, but persists in turning at right angles. If you endeavor to tilt the axle up or down it opposes this motion and turns sideways instead, and this resultant motion is called **precession**, another peculiar characteristic of the Gyroscope.

A popular illustration of precession is seen in the rolling of a hoop. And here's something about the common ordinary hoop you have most likely never thought of before. A boy rolling a hoop down the street, steers it by pushing sideways on the top and not at the back of it as is commonly thought. But when he does this, the hoop, instead of leaning sideways as you would expect, opposes the push and turns, or precesses, changing the direction in which it is rolling. Now, if the boy tried to steer it

by pushing sideways at the back, the hoop would have fallen over on its side, not changing its direction much. To explain why it turns in this manner at right angles to the force applied, suppose we carefully watch some spot on the hoop, say a nail embedded in the wood, and as the hoop rolls the nail will be seen to go around and around in the plane of the hoop. Note the direction in which the nail is going as it comes up around the hoop to the top. Now as the boy pushes here sideways with his stick, the push is opposed by inertia; the nail refusing to immediately move sideways gives opposition to the turning

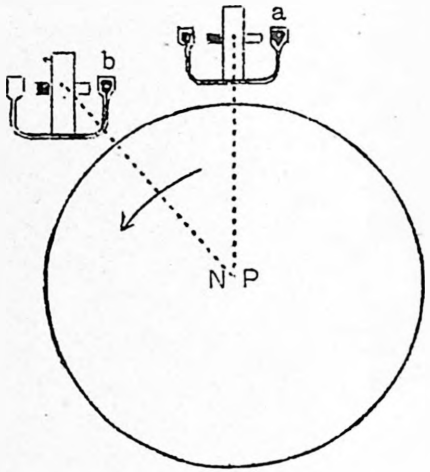

FIGURE 2

force. However, the push finally succeeds in moving the nail sideways a little bit. Thereby the nail is forced to make a **change in direction** in which it is going, the result being a deflection to a new path. The manifestation of this change in direction in which it is going, as the nail continues on this new path, then, is apparent in the hoop changing the direction in which it is rolling; in other words, **precession.** If the boy pushes at the back of the hoop, then precession causes it to fall over.

The nail represents one particle in the hoop and it takes a great many particles to make up the hoop. The faster it rolls,

the greater number of times the nail, or each particle in the hoop passes the boys stick at the top and hence the greater is the opposition to the side push here. Also, each particle passes by the stick at a faster rate of speed and the side motion caused by the boy's push is therefore a smaller component as compared with this speed in rotation, hence the resultant change in direction is less and the hoop turns, or precesses less in azimuth. In other words a peculiar thing happens when the hoop rolls faster —it takes a harder push at the top to steer it.

So when you try to tip the axle of the gyro, you have to exert a considerable force to change the direction of the path of **all the particles** in the spinning wheel. All particles add their inertia opposing this tipping force. And the resultant change in path that this force actually imparts to the particles as they traverse the top half of the wheel, causes the axle to turn in the same direction as when they transverse the lower half of the wheel, and so all the particles gladly participate in this precession motion.

Thus we see the gyroscope to be a rotating wheel mounted so that it can turn in any direction and having two peculiar properties: when unmolested it points in the same direction **(rigidity in space)** and when an attempt is made to force it to tip vertically, it gives opposition and turns horizontally. **(precession)**

The gyro-compass itself has a gyro rotor or wheel which revolves inside the case and is so mounted in a ring that the axle can tip up or down. The ring is vertical being supported by a tortionless wire suspension at the top and is thus rendered particularly free to turn without friction which it would have if a step bearing were used. Thus the gyro is mounted so as to have its axle free to turn in any direction similar to the wheel of the model gyro. (Figure 1) Now, if this element alone were suspended in a ship by the upper end of the wire and the ship turned, the gyro remaining stationary, the suspension would twist. So this element is guided and hung by its suspension in a surrounding member called the **phantom**, which also carries

the compass card on which the degrees are marked. (See figure 3) **A trolley** on the gyro element making connection with a **contactor** on the phantom, controls a motor called the **azimuth motor,** which keeps the phantom and the top end of the suspension vigorously following up the position of the gyro element in azimuth, thus preventing the suspension from the slightest twisting as the ship changes course. This gives an exact powerfully driven duplication of the gyro direction in azimuth indicating the ship's heading. This is a most valuable feature

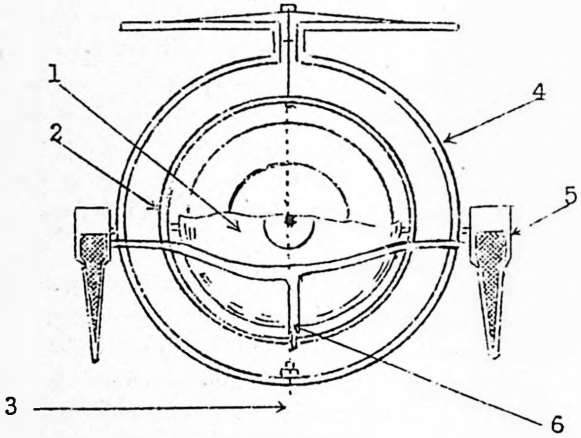

FIGURE 3

making it possible to connect many useful auxiliaries to the Gyro Compass. In later models a magnetic "pick-up" is mounted on the phantom element and an armature on the gyro element—the two being separated by a narrow air gap. A voltage signal is induced when the phantom and vertical rings are set out of alignment. This signal, properly amplified, controls the power to operate the azimuth motor in the proper direction to align the rings. The sensitive element and phantom hang free like a pendulum in the binnacle allowing the ship to roll and pitch, being supported in a sort of Cardan's mounting analogous to that which supports chronometers and ship's compasses.

Now pivoted on the phantom which is always in line with the gyro element and connected with the gyro case at the lower end so as to tilt with it, is a simple controlling device which makes the gyro behave and act as a true compass. (Refer to figure 3). This is composed of a couple of little boxes on each side connected by pipes, and is partially filled with mercury. It can be seen that when the gyro and boxes tip up, the mercury flows from the high side to the lower side. (Figure 2). The low side becomes heavier and gravity works more on this side. Gravity, therefore, is the controlling force in this device and the action is as follows: When the compass is on the meridian (i. e. pointing to the true North) the gyro axle is horizontal, or nearly so, and about the same amount of mercury is in all the boxes with gravity acting equally all around. In other words everything is in a satisfactory state of equilibrium and the gyro is well content to remain in this position and be carried around by the earth—as the earth revolves. So we find that in any position except when the gyro axel is pointing to the true North the axle will tilt—and in so doing it will bring into play the force of gravity acting through the mercury ballistic to precess the compass to the meridian. We now have an instrument, totally independent of magnetism, which will seek North and, once attaining that direction, will maintain it.

The master gyro compass is below deck in the ship, not conveniently located for use in steering the ship and in taking bearings or azimuth observations. To serve these needs repeater compasses are located at convenient places throughout the ship. These compasses repeat exactly the reading of the master compass, utilizing a direct current transmitter on the master compass and a step-by-step motor in each repeater compass, together with the necessary cable connections.

Once such repeater motor is incorporated in the Course Recorder which draws a line on a chart showing the ship's heading each minute of the voyage. Such a record has been found valuable to the Master and the owners—it is frequently admitted in evidence in Admiralty Courts.

Another interesting application of the repeater compass is in the Gyro-Pilot often referred to by merchant marine men

as the "Metal Mike". The Gyro-Pilot utilizes the signals sent from the master compass to steer the ship, in fair weather or foul, undeviatingly holding the true course without human aid. On entering or leaving port, or in maneuvering, the helmsman can instantly take control from the master compass and use the Gyro-Pilot's wheel to steer the ship in the conventional manner.

Radio directional finders gain much from the accuracy of the repeater compass which is frequently incorporated in their design.

The Gyro-Compass requires little care and attention, and, given that minimum, will faithfully and accurately serve throughout the life of the ship.

MINUTES OF THE MEETINGS AND BUSINESS OF THE SOCIETY

Minutes of the Meeting of the Board, October 4, 1943

The meeting was called to order by President Kammer with the following members present: Cappel, Gosa, Kerr, Leake, Nairne, Steinmayer and Mayer. The minutes of the last meeting were read and approved.

The motion introduced at the September meeting of the Society by Mr. J. H. O'Neill in regard to the reinstatement of service men dropped for delinquency of dues was discussed. A motion was passed by the Board instructing the President to advise the membership that the Board would take appropriate action on Mr. O'Neill's motion as soon as sufficient data were secured for taking the necessary steps.

The following Nominating Committee was selected by the Board and appointed by President Kammer: C. C. Cappel, Chairman, J. M. Todd, Ole K. Olsen.

The resignation of Mr. Harry D. Scott, Puerto Cabezas, Nicaragua, was accepted with regret and with the invitation to rejoin the Society at some future date.

A committee composed of W. S. Leake, Chairman, J. P. Kemper, C. M. Kerr, was appointed to prepare the obituary on the death of Mr. L. P. Elberson, Life Member of Crowley, Louisiana.

President Kammer read a letter received from Lieutenant Katherine Luna, USNR, requesting that a letter regarding recruiting for the WAVES be read at the next meeting of the Society. It was decided that this letter be read at the October meeting.

It was announced that all members on the September ballot had been elected by vote of the membership.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Society, October 11, 1943

The meeting was called to order by President Kammer with approximately 50 members and guests present. The minutes of the last meeting were read and approved.

President Kammer reported that the Board of Direction had passed a motion to take appropriate action on the motion proposed by Mr. O'Neill at the last meeting of the Society as soon as sufficient data were secured for taking the necessary steps.

President Kammer introduced Mr. Harold Miehler who spoke briefly on the coming United Community and War Chest Drive.

The Secretary read a letter from Lieutenant Antoinette R. Bracher, USNR, requesting the assistance of members of the Society in securing recruits for the WAVES.

The report of the Employment Committee was also read by the Secretary.

President Kammer announced the new members of the Society elected on the September ballot. Mr. L. J. Cucullu announced that a meeting of the Chairmen and Vice-Chairmen of the sub-committees for the Annual Meeting would be held on October 12.

President Kammer introduced the speaker of the evening, Mr. Walter Parker, Directing Economist, Interior Bureau of Economics, who spoke on "The Economic Future of New Orleans." Mr. Parker answered a number of questions from the floor and was given a rising vote of thanks for his interesting and informative talk.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Board, November 3, 1943

The meeting was called to order by President Kammer with the following members present: Gosa, Kerr, Kuhn, Nairne, Steinmayer, and Mayer. The minutes of the last meeting were read and accepted.

It was announced that the back dues of Colonel E. S. Bres had been paid and that he has now been reinstated to membership in the Society.

The Secretary presented statistics regarding the relative current delinquency of dues for members in the armed services as compared to civilian members of the Society. These statistics showed that there is a smaller percentage of delinquency among service members than among civilian members. The Board voted to reaffirm its former action in that provisions regarding members in the armed services remain unchanged. A statement of the facts concerned was prepared for presentation to the membership at the next meeting of the Society.

Several letters regarding the activities toward the establishment of a Lake Charles Section were read by the Secretary. Mr. Kerr reported on the progress of the Post War Reconstruction Committee of which he is chairman. President Kammer reported that Chairman C. P. Knost of the New Orleans Section, A.I.E.E., had discussed with him the question of forming an Engineers Club in New Orleans—the membership of this club to be made up of the members of the various local engineering groups. Mr. Kuhn as chairman of the House Committee was requested to contact officers of the local engineering groups and discuss this matter with them.

There being no further business, the meeting adjourned.

J. K. MAYER,
Secretary-Treasurer.

Report of the Board of Direction Regarding Dues for Members in the Armed Services

At a meeting of the Board held October 4, 1943, the motion introduced by Mr. J. H. O'Neill at the September meeting of the Society with regard to reinstatement of service men, was discussed, and at the October meeting of the Society it was reported to the membership that the Board would take appropriate action as soon as sufficient data were secured to take the necessary steps.

Your Board having reviewed the findings of the Secretary now feels called upon to recommend to the membership that the present provisions regarding members in the Armed Services remain unchanged.

It is the belief of the Board that a review of the present provisions, together with a statement as to the result of their application, will demonstrate to the membership that neither their alteration nor that of the Constitution and By-laws of the Society is necessary.

The By-laws of he Society definitely state that a member who is delinquent in his dues for one year shall be dropped. He may, however, automatically reinstate himself at any time by the payment of back dues for one year.

In recognition of the fact that the payment of regular dues might impose a hardship upon those members in the Armed Services, the Board took the following action shortly after the advent of our country into the war:

Dues for Members in the Armed Services

Resident members serving as Commissioned Officers	$5.00
Non-resident members serving as Commissioned Officers	3.00
Resident junior members serving as Commissioned Officers	2.50
Non-resident junior members serving as Commissioned Officers	1.50
All members serving as Enlisted men	1.00

Your Board does not believe that these provisions impose a hardship upon any member.

Furthermore their application has been uniformly successful as evidenced by the following statistics:

Members now in the Armed Services	94	
Service members now delinquent for any portion of 1943 dues	12	(12.8%)
Civilian members subject to dues (Exclusive of Life members, etc.)	447	
Civilian members now delinquent for any portion of 1943 dues	80	(17.9%)
Civilian members dropped in 1943 for delinquency of dues	35	
Service members dropped in 1943 for delinquency of dues	12	

Of these 12 service men, 7 were delinquent in dues prior to their entry into the service and efforts to contact 2 of the remaining 5 have been unsuccessful.

These figures indicate that under the present system the members in the Armed Services are paying their dues more promptly than the civilian members; also that of the 12 service men dropped in 1943 only 3 were either unable to carry the dues at the reduced rate or lost interest in the Society after entering the service.

Any of the members dropped for delinquency may reinstate themselves by the payment of one year's back dues. This will not affect their eventual qualification for Life Membership, since its only requirement is the payment of dues for 30 years. Continuous membership in the Society is not required.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Joint Meeting of the Society with New Orleans Section, A.I.Ch.E., November 8, 1943

The meeting was called to order by President Kammer with approximately 85 members and guests present. The minutes of the last meeting were read and accepted. President Kammer read a statement prepared by the Board of Direction in regard to the dues paid by members in the armed services and recommending that the present provisions remain unchanged.

President Kammer announced that a Nominating Committee composed of Messrs. C. G. Cappell, Chairman; Ole K. Olsen; J. M. Todd had been appointed and would consider nominations for a period of ten days following the meeting. Report of Mr. E. L. Fithian, chairman of the Finance Committee, was read by the Secretary; also, a letter from Mr. H. A. Benson, Civilian Defense Coordinator and a Commander, inviting the membership to attend a coming lecture to be held on the affect of bombs on buildings.

President Kammer turned the meeting over to Mr. E. A. Gastrock, chairman of the New Orleans Section, A.I.Ch.E., who introduced several distinguished guests. It was moved that the business of the Section be dispensed with. Mr. Gastrock introduced Mr. Herman F. Willkie, member of the Board of Directors and Vice-President in Charge of Production, Seagram Distillers, Inc., Louisville, Kentucky, who spoke briefly on the Seagram organization with particular regard to the educational and research policies. Mr. Willkie then introduced Mr. J. R. Stuetz, Director of Technical Information, Seagram Distillers, who presented an illustrated paper on, "A review of the Engineering Developments in Grain Distilleries." Mr. Willkie then introduced Dr. Paul Kolachov, Technical Council, Seagram Distillers, who spoke briefly on the efforts to increase the yield and starch content of agricultural products used in the production of industrial alcohol. Mr. Gastrock moved that the Societies express their appreciation to the speakers by a rising vote of thanks. The meeting was turned back to President Kammer and adjourned to the usual refreshments.

J. K. MAYER,
Secretary-Treasurer.

Minutes of the Meeting of the Baton Rouge Section, Louisiana Engineering Society, October 14, 1943

The meeting was called to order by Mr. Pillet, President, with thirty-four members in attendance and the following officers: F. F. Pillet, President; H. L. Lehman, 1st Vice President; Hamilton Johnson, 2nd Vice President; P. J. Guelfi, Secretary-Treasurer.

The reading of the minutes was dismissed with. The president then read a letter of resignation from Mr. Dubus, secretary-treasurer, occasioned by his transfer to Lafayette, La. The president then read a letter of reply to Mr. Dubus in commendation of his work. He then announced the appointment of Mr. P. J. Guelfi as secretary-treasurer for the remainder of the year.

Mr. Pillet then called for any unfinished business that should be brought before the meeting and as there was none, he asked for a report of the Special Committee headed by Mr. N. E. Lant. In his report Mr. Lant stated that his Committee composed of Dean LaSalle, Professor Germano and himself, had studied the procedure for the election of officers and recommended that Page 3, Article III, Section I of our existing constitution and by-laws which read as follows:

> "Nominations for the election of officers of the Section shall be by formal ballot, and shall be limited in each case to the two receiving the largest number of votes. Election shall be by ballot."

to be revised to read as follows:

> "The Executive Committee shall select and the President shall appoint, not later than the third regular meeting of the year, three members of the Section to act as a Nominating Committee. The notices for the annual meeting in December shall advise the membership of the personnel of this committee and that suggestions for nominations well be received up to one day before the December meeting of the Section. The Nominating Committee shall report its nominations in writing at the December meeting, which nominations together with any additional nominations ordered to be included by vote at the December meeting shall be submitted to the membership for ballot. One ballot will be used for all officers and each member of the Section in attendance shall vote for one candidate so nominated for each office. Candidates receiving the greatest number of votes for each office shall be declared elected."

The question was put to a vote and was adopted. The president then appointed a Nominating Committee consisting of Mr. Lant, Mr. Tennant and Mr. Pegues.*

The president announced that the annual meeting would be held some time in the first or second week of December and urged that all committees proceed with the necessary work so that it could be completed well in advance of the date of the meeting.

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* Because the time was evidently to be short, the Executive Committee had previously met and selected the Nominating Committee in anticipation of the passage of the revised election procedure.

Mr. Pillet then introduced Mr. Roy H. Odom of the Louisiana State Department of Public Works. Mr. Odom made an interesting talk cover the development of mapping in Louisiana from its earliest times when a necessary part of the surveyor's equipment was a rifle to the present day advancement of map making aerial photography. The talk was well illustrated with many examples of the map maker's art on display including some very old maps. The speaker brought out the tremendous amount of work involved an map making and the importance of mapping in today's businesses and the future progress in Louisiana.

The meeting adjourned at 9:00 p. m. after which refreshments were served.

P. J. GUELFI,
Secretary-Treasurer.

Minutes of the Meeting of the Baton Rouge Section, Louisiana Engineering Society, December 13, 1943

The fifth annual meeting of the Baton Rouge Section of the Louisiana Engineering Society was called to order at 7:30 p. m. by President Pillet with forty-two members, twenty-five guests and the following officers present: F. F. Pillet, President; H. L. Lehman, 1st Vice President; Hamilton Johnson, 2nd Vice President; and P. J. Guelfi, Secretary-Treasurer.

Guest were introduced and then Mr. Pillet reported on the membership of the Baton Rouge Section, stating that at the beginning of the year we had ninety members, whereas the present membership is 101. The minutes of the previous meeting were read and by resolution adopted as read.

Mr. Lehman then took the floor and moved that it be made a general practice each year to present the outgoing president with a gift from the Section in appreciation of his services. This motion was passed unanimously. Acting with the approval of a majority of the Board of Directors, Mr. Lehman then introduced the four past presidents in the order in which they served and presented each with a gift. To bring this practice up to date, Mr. Pillet, as the retiring president for 1943, was then presented with his gift.

Mr. Pillet then called for a report from Mr. Lant, chairman of the Committee on Nominations, who reported on the action taken in which the following were nominated for office for the year 1944.

Mr. H. L. Lehman.....President
Mr. Hamilton Johnson.....1st Vice President
Mr. Joseph T. O'Brien.....2nd Vice President
Mr. P. J. Guelfi.....Secretary-Treasurer

There being no further nominations from the floor, Mr. Whipple motioned that we vote on the members as nominated by the committee. Mr. Pillet called for a ballot and the ticket was unanimously elected.

There being no further business before the house, Mr. Pillet introduced the principal speaker of the evening, one of our own members, Mr. H. W. Waterfall, who gave an excellent talk on "Industrial India and China". In closing Mr. Waterfall asked for questions and those with the answers proved very interesting. Motion was made and seconded that we give a rising vote of appreciation to Mr. Waterfall and adjourn. Meeting adjourned at 9:30 p. m.

P. J. GUELFI,
Secretary-Treasurer.