

REFERENCES

The list of references to the literature here given is not intended to be exhaustive or complete. Only more recent papers, which have received particular consideration in the discussion, are included.

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THE AMERICAN ASSOCIATION FOR THE
 ADVANCEMENT OF SCIENCE
 SECTION D—MECHANICAL SCIENCE AND
 ENGINEERING

THE meetings of the section were held in the lecture rooms on the third floor of the chemical laboratory of the Johns Hopkins University. In the absence of President G. F. Swain, the vice-president of Section D, Professor Mansfield Merri- man, was chosen to preside over the meetings of the section.

Professor C. A. Waldo was elected a member of the council.

Professor C. M. Woodward was elected a member of the sectional committee.

Professor Mansfield Merriman was elected a member of the general committee.

Mr. J. F. Hayford was elected vice-president for the ensuing year.

The program consisted of eight papers read by their authors, five papers read by the secretary in the absence of the authors and three papers read by title in the absence of the authors.

The vice-presidential address which was to have been given by Professor O. H. Landreth on the subject "Governmental Control of Public Waters" was omitted on account of the unavoidable and unexpected absence of Professor Landreth. The address will be published in full in a later number of *SCIENCE*.

Mr. B. R. Green, of the Library of Congress, Washington, D. C., in speaking on the subject "Library Book Stacks without Daylight," said in substance that daylight is extremely variable, uncertain and expensive to secure in the construction of a library book stack. At best it is injurious to the books. At least it is almost useless. Stacks must be used much at night, requiring artificial illumination. The modern electric light solves the difficulty, and, at small expense, enables the stack to be built and enclosed anywhere and be perfectly illuminated at any and every desired point within it at any time of day or night. During the discussion the writer pointed out the great economy of space which can be effected where dependence is not placed upon daylight, and cited dimensions and other data from additions to the stack space recently made in the Library of Congress.

"The Testing of Transformer Steel" was presented by Mr. M. G. Lloyd, of the Bureau of Standards, Washington, D. C. In his paper he described a new apparatus for determining the constants of transformer steel, which apparatus is a modification of the Epstein apparatus, and presented tabulated and charted results obtained with the new apparatus from ordinary steels and from the special alloy steels now being used for transformer cores.

Mr. J. H. Hayford in demonstrating that "It is not Necessary to Place Geodetic Arcs in Various Latitudes" said, in effect, that the idea seems to prevail that, in order to determine the flattening of the earth from geodetic measurements it is necessary to make the measurements in various latitudes. The basis for this idea is that the flattening must be determined by measuring radii

of curvature of the spheroid which differ considerably from each other, and that arcs of the meridian in high latitudes, near the poles, have relatively long radii of curvature and those near the equator relatively short radii. But the attention should not be confined to arcs of the meridian. Since the introduction of the telegraphic method of determining longitudes, arcs of the parallel are as important as arcs of the meridian.

The flattening may be determined by measuring the difference of the radii of curvature of two arcs in any latitude, one an arc of the meridian and the other an arc of the parallel. The measurement of the latter determines the radius of curvature of the spheroid in the prime vertical plane, which, in all parts of the United States, is much longer than the radius of curvature in the meridian. The prime vertical radius is longer in latitude 49° than the meridian radius in latitude 67° . By utilizing measurements of both arcs of meridians and arcs of parallels made within the United States as great a difference of radii can be secured as from arcs of the meridian alone, scattered from latitude 26° in southern Florida to latitude 67° in northern Alaska, and three fourths as great a difference as can be secured from arcs of the meridian scattered from the equator to the poles.

These and other considerations indicate that progress is to be made in determining the flattening of the earth from geodetic measures, by securing large continuous areas of triangulation well supplied with astronomic observations, these areas to be in the most convenient localities, rather than by securing measurements of arcs of the meridian scattered through a large range in latitude.

Mr. J. Burkitt Webb, of Hoboken, N. J., discussed the subject of "House Warming." The following is an abstract of his remarks:

Direct and indirect heating, or heating by radiation and convection were compared and the former held most natural and preferable; the poisonous nature of the air of the ordinary hot-air furnace was exposed and compared with the wholesome effect of a fireplace, and hot water or steam heat discussed as a mean between the two.

The relative advantages of steam and hot water and the methods of installing these systems; the position, shape and color of radiators; the methods of generating and distributing the steam or hot water, and the method of regulation were discussed.

Professor C. N. Ricker, of Urbana, Ill., in a paper entitled "A Study of Plain Metal Base and

Bearing Plates," which was illustrated by twenty-five or thirty lantern slides, presented a summary of a bulletin soon to be issued by the Engineering Experiment Station of the University of Illinois.

The author deduced the proper theory of resistance of base plates, formulas for the safe thickness of plates of rectangular and tapered cross-sections of cast iron, and recommended the substitution and use of the straight line formula in place of the theoretical formula of very tedious application, the construction and use of a series of graphical tables for rapidly and accurately determining the dimensions and thickness of base plates employed in practical construction.

Professor A. H. Blanchard, Providence, R. I., who is assistant engineer for the State Board of Public Roads of Rhode Island, presented "An Analysis of Highway Traffic in Rhode Island."

The conclusions drawn by the writer for the roads examined are:

1. The amount of motor-car traffic which will cause disintegration is much less than is generally supposed.

2. In the case of two roads subjected to practically the same amount of motor-car traffic, the rate of disintegration will depend upon the location of the road, other conditions being equal.

3. The rate of disintegration of an ordinary macadam surface will vary almost directly as the percentage of motor-car traffic.

4. The popular belief that trap rock is the ideal road material for the surface of all macadam roads independent of the nature of the traffic to which they are subjected is a fallacy. In the case of roads subjected to horse-drawn vehicle traffic consisting of pleasure and light commercial traffic, or subjected to motor-car traffic, either exclusively or in combination with light horse-drawn vehicle traffic, the trap rock surface is exceedingly expensive to maintain. This is due to the fact that very little dust is furnished by abrasion on account of the hardness of the broken stone and hence, the binder being absent, the surface ravels under horse-drawn vehicle traffic or is disintegrated by motor-car traffic.

5. Bituminous macadam roads require a sealed surface when the highway traffic consists of a combination of heavy motor-car traffic and heavy horse-drawn vehicle traffic, while the sealed surface is not a requisite when the road is subjected to only heavy motor-car traffic. The sealed surface is considered necessary for the first class as insurance against the disintegration of the surface due to the liability of the loosening of the exposed stone by blows from the hoofs of horses

and the rapid enlargement of any break in the surface by motor-car traffic.

"Recent Progress in Aeronautics," by Major G. A. Squier, U.S.A., has already appeared in SCIENCE (February 19, 1909). The lecture was very completely illustrated with lantern slides and set forth the present state of the art in a pleasing and impressive manner.

In this connection, it should be noted that the association has decided to foster this growing branch of applied science. The council will refer all papers on engineering and aeronautics to Section D, whose officers will cooperate with their authors for adequate presentation and publication.

In the paper on "State Engineering Experiment Stations," by Professor G. W. Bissell, East Lansing, Mich., the writer reviewed and compared some of the provisions of the Hale and the McKinley experiment station bills, of which the latter is now before Congress and presented the principal arguments for such a measure.

The following papers were read by the secretary in the absence of the authors:

New Methods of Back-water Computations: Professor B. F. GROAT, Minneapolis, Minn.

Variation of Pressure on the Side of a Track Spike: Professor H. S. JACOBY, Ithaca, N. Y.

Note on Specially Designed Corliss Engine for Experimental Work: Professor A. M. GREENE, Jr., Troy, N. Y.

The Specific Speed of Hydraulic Turbines: Professor L. P. MOODY, Troy, N. Y.

On the "Degree" of Railroad Curves: Professor W. G. RAYMOND, Iowa City, Iowa.

The following papers were read by title:

A Problem for State Engineering Colleges: Professor A. E. HAYNES, Minneapolis, Minn.

Temperature Stresses in Reinforced Concrete Chimneys: Professor E. R. MAURER, Madison, Wis.

A New Type of Reinforced Building Construction: Professor J. J. FLATHER, Minneapolis, Minn.

All papers were interesting and valuable and evidenced care in their preparation. The program should have been published in SCIENCE in advance. The secretary will see that this is done for the next meeting.

G. W. BISSELL,
Secretary

SOCIETIES AND ACADEMIES

THE NEBRASKA ACADEMY OF SCIENCES

The nineteenth annual meeting of the Nebraska Academy of Sciences was held in Lincoln, Feb-