Plotting the monthly numbers, it will be seen that there are plain indications that the maximum has passed, though it is thought by some that it is still to come. H. A. H.

FIFTEENTH ANNUAL CONVENTION OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS. — I.

THE members of the society began to assemble in Chicago as early as Thursday, June 14, to visit the exposition of railway appliances, and to take part in the excursions planned for their benefit by the Engineers' club of the north-west.

By Monday morning, June 18, the number of those intending to take the special train for St. Paul, generously tendered by the officers of the Chicago, Milwaukee, and St. Paul railway, had swelled to three hundred. The train of eight cars, well filled, left Chicago at 7.30 A.M., arriving at St. Paul at 10 P.M. But few stops were made on the way, the principal one being at the crossing of the Wisconsin River, for the object of inspecting the railway bridge, and taking a better view of the fine scenery at that point. Quite an accession to the party came on board at Milwaukee.

Upon reaching St. Paul, an engine of the St. Paul, Minneapolis, and Manitoba railroad was attached; and the train was drawn over that line, through Minneapolis, to Lake Minnetonka, — a beautiful sheet of water some thirty miles long, where, at Hotel Lafayette, thirty-three miles from St. Paul, the members of the society and their invited guests were to be quartered during the convention.

The two cities of Minneapolis and St. Paul, only a few miles apart, and each containing over eighty thousand inhabitants, were rivals for the opportunity of entertaining the society; and to prevent any ill-feeling, as well as to avoid crowding any of the city hotels, already taxed to accommodate their own patrons, this summer hotel, just opened for the season, only built one year, newly enlarged and furnished, and capable of providing for the comfort of five hundred or six hundred guests, was chosen for headquarters. With the exception that some valuable time was lost in going to and returning from the place of holding the daily sessions, this selection is to be commended; for the location was extremely pleasant, and the air fresh and cool. Those who did not desire to go to the meetings each day could find rest and enjoyment at this agreeable summer resort. A special train was at the service of the convention each day throughout the entire week. A large accession to the number of members present was made as the week progressed, so that the attendance was larger than at any previous convention.

On Tuesday morning the engineers took the special train for St. Paul, and thence went to the state capitol, where the first meeting was called to order in Representatives' hall. After formal announcements of programme and arrangements, the usual addresses of welcome were made.

The first paper read was by the late Major F. U. Farquhar, U.S. eng., on the building of the dike for the preservation of the Falls of St. Anthony.

The falls, which furnish the water-power for the mills of Minneapolis, were first described. A stratum of upper magnesian limestone, eleven feet thick at the lower edge, is underlaid by an extremely soft sandrock, which is rapidly worn away; and the limestone is thus undermined and broken off. The recession of the falls was rapid; and, as the limestone outcrops with a thin edge twelve hundred feet above the present brink of the falls, their final reduction to rapids would occur, if not prevented. Citizens dug a tunnel for a tail-race in the sandrock, and the river broke in at the upper end. The immediate destruction of the falls was imminent; and attempts to check the rush of water, which rapidly enlarged the tunnel and repeatedly broke through in different places, proved ineffectual. The citizens, after building cofferdams at various weak points, discouraged by failures at times of high water, obtained an appropriation from the U. S. government, on the ground that the wearing-away of the falls would injure navigation above. A plan was finally proposed by Major Farquhar, of excavating a tunnel across the entire river, through the sandrock, from the limestone overhead to the sound rock below, some forty feet, and filling it solidly with concrete. This work was carried out under his direction, and was fully explained in the paper, and illustrated by drawings. The dike is eighteen hundred and seventy-five feet long, and has successfully shut off the water which worked its way through the soft sandstone. The detailed statement and cost can be found in the Report of chief of engineers, U.S.A., for 1879. The action of the water has been injudiciously concentrated upon a limited space of some three hundred feet by the erection of wing-dams by the mill-owners.

In the discussion on this paper at the time of its reading, and in remarks made the next morning by the engineer officer now in charge

of the falls, the other works of preservation — the timber apron, the rolling dams above, and the crib which had been placed below, the falls — were described and commented upon.

Dr. C. E. Emery read a short paper, and submitted a table, showing the cost of steam engines and boilers complete, and the cost of operating the same for three hundred and nine days in the year, including repairs and renewals, and giving, upon the data assumed, the total cost per horse-power maintained continuously. He pointed out why small engines were comparatively more expensive to maintain than were large ones. The discussion of this paper was postponed until the next day.

The convention re-assembled at the state capitol on Wednesday morning. The discussion of Messrs. Farquhar and Emery's papers was first in order. The question was asked whether the amount expended in the preservation of St. Anthony's Falls would not have sufficed to establish and maintain an equivalent plant of steam-engines. Dr. Emery thought not.

Prof. T. Eggleston followed with a paper on 'An accident to steam-pipes arising from the use of blast-furnace wool.' He attributed a corrosion and subsequent explosion of steam-pipes at Columbia college to the setting-free of sulphur from the wool by the action of extremely diluted solutions of organic acids and the rapid corrosion of the pipe by the sulphuric acid, sustaining his position by reports of analyses and tests.

He was strongly opposed by Dr. Emery, who claimed that the corrosion was due to leakage and moisture, with alternate wetting and drying of the pipes, and that blast-furnace wool was entirely innocuous.

Mr. John Lawler of Prairie du Chien described the construction of the two pontoon draws in the railway-bridge across the Mississippi at that place. Each pontoon is four hundred and eight feet long, six feet deep, thirty-six feet wide on bottom, and forty-one feet wide on top. The interior details, the regulation of height of track, the means for fastening and for manoeuvring the draws, were described at length; and the cost was stated as one-sixth of the estimated cost of the usual iron swing-bridge. The bridge was built in 1874, and has been in continued use ever since. This bridge was seen from the train on the trip from Chicago.

The last paper at this session, by G. Lindenthal of Pittsburgh, Penn., was upon the rebuilding of the Monongahela bridge at that place, from his design and under his direction. The first portion of his paper entered minutely into details of the new structure, and was illustrated by tracings. The latter portion was occupied with a discussion of the old suspension-bridge, built in 1846 by John A. Roebling, the condition of the same before removal, the tests of the material removed, and the effect of the excessive overloading to which it had been exposed for years by the increasing and heavy traffic over the bridge.

After a brief discussion, the convention then adjourned; a portion of the members repairing at once to Lake Minnetonka, and the remainder going to Minneapolis, where visits were made to the Washburn flouring-mill and to the bridges.

(To be continued.)

KINETIC CONSIDERATIONS AS TO THE NATURE OF THE ATOMIC MOTIONS WHICH PROBABLY ORIGINATE RADIATIONS.[1] — I.

THE assumption that the mean kinetic energy of translation of the molecules of a gas is the measure of its temperature is one whose beautiful agreement with experiment has led to its acceptance as a necessary part of the kinetic theory of gases, and it has often led to the thoughtless conclusion that this translatory motion is also the mechanical source of the disturbances in the ether which originate radiations. But there are many difficulties in the way of accepting this view. One of the first, and perhaps the least, is the difficulty of conceiving how such a motion of translation, which is essentially longitudinal, can originate a lateral vibration, such as light and radiant heat must be.

A greater difficulty appears to be found in the extremely moderate mean velocity of translation which the molecules of a gas are found to have. Molecular velocities, which are of the same order of magnitude as that of sound or of a rifle-ball, seem hardly fitted to cause the necessary compressions or disturbances in a medium in which the rate of propagation is so immense; or, to state it in another way, if molecules, in describing their paths, originate radiations, then the motion of a rifle-ball ought also to do so, or, indeed, any much more moderate motion, such as that of a vehicle or animal.

A still further difficulty is, that there is another part of the kinetic theory which appears to be so related to this that both cannot

[1] Presented in abstract to the Section of chemistry and physics of the Ohio mechanics' institute, April 26, 1883.