under a sloping roof, with no protection in the shape of air space, and but very inadequate means of ventilation. The result of this, when combined with the rays of the summer sun, was the production of a temperature and an atmosphere that was trying in the extreme, and which accounts for the half-hearted interest in most of the discussions that were manifest.

The entertainments by the supply men were simply a continuation of what had gone before; there was a grand ball in honor of the American Railway Master Mechanics' Association, in which perhaps a dozen members joined, and where male partners were scarce despite the several hundred men about the hotels. There were the boating parties on the lake, the fireworks, the music, and an excursion to Dunkirk, all enjoyable, but all like what had gone before.

The convention opened with the customary prayer, followed by the president's address. Mr. Hickey dealt in a general way with the labor problem and the construction of locomotives. Referring to the expense of locomotive performance, he said: "A majority of the largest roads throughout the country show an operating expense of from 22 to 25 cents per locomotive mile run, about 50 per cent. of this amount chargeable to fuel consumed in generating power." Referring to the locomotive returns for the month of March, 1893, as published in the July issue of the American Engineer, we find 31 roads there reported. Of these 31 only eight show an expense of as much as 22 cents per mile run, or, in other words, 25 per cent. pay the lowest amount given by Mr. Hickey, and of these eight, four pay more than $5 per ton for coal. Some of the roads even drop below 15 cents per mile. We desire to call attention to this, because, while there is no doubt but that the locomotive does exhaust an immense amount of heat energy into the atmosphere, as Mr. Hickey says, we believe he has overestimated the expense, but agrees that the various modifications in the valve motion of simple engines made for the purpose of reducing the loss have given but little promise of ultimate success. The address then went on to deal with the changes that were suggested to the speaker in locomotive construction.

The committee appointed to confer with that of the American Society of Mechanical Engineers on a Standard Method of Conducting Locomotive Tests made its report. There is nothing new and no innovation embodied in it. Those of our readers who are familiar with the methods adopted on the Baltimore & Ohio Railroad and the Chicago, Milwaukee & St. Paul know exactly what this report recommends. There are the same fuel and water measurements, and the use of the indicator, calorimeter and dynamometer car. The report is valuable chiefly as a record and basis of action as recommended by two great mechanical associations, and, as such, is to be referred to and consulted, though it adds nothing to the information of men who have followed the work already done, as reported from time to time in the columns of the technical press.

The report on Compound Locomotives simply gave the result of a year's experience on several roads. That the number of compound locomotives has increased is shown by the fact that 208 new engines were added to the equipment of the country within the year; but the reports of their performances are so varying that many members feel that they know less about that particular type of engine than they did before the first one was built. One member stated that the cost of maintenance is no more than for an ordinary engine, while another announced "an increase of repairs of 50 per cent." The New York, Lake Erie & Western report a saving of 8 per cent. of coal per car mile and 15.1 per cent. engine mile; the Chicago & North-western put the latter at 7.7 per cent., while the Cincinnati, New Orleans & Texas Pacific put the two figures at 43.5 per cent. and 33.7 per cent. respectively; the Cleveland, Akron & Columbus, at 15 per cent. and 32 per cent., and the Brooklyn Elevated even up both at 24 per cent. Now, what is the jury of prospective buyers to do? How can they bring in a verdict? Really there seems no way out but to use the Scotch formula of "Not proven," and decline to say what is not proven. Frankly, we cannot presume to decide from such a jumbled mass of figures. Why should car mile saving be greater than the locomotive saving on one road and less on another? The mystery about this, as in all other things, lies simply in the fact that we do not know all the facts. When they are known, then, perhaps, the relative merits of the compound and simple engine will be settled. At the present writing it would seem that the compound will save some coal—just how much is an unknown quantity, and it is also unknown whether this saving is or is not counterbalanced by the extra expense of repairs and interest on first cost.

The chief work of the Committee on Wheel Centers and Tires is embodied in the recommendation to add centres of 70, 74, 78, 82, 86 and 90 in. in diameter to the standard centers already adopted by the Association.

The recommendations of the Committee on Boiler Attachments might be embraced in the general statement that they favored the use of flanged rather than screw fastenings; that they preferred to have check valves inside the boiler and not outside; that all cocks should be placed in locations where they are least likely to be injured or knocked off, and that the tendency to make attachments too light should be most especially guarded against. The committee announced themselves as of the opinion that water glasses were not a necessity, and the discussion of their report centered about this one heading. The convention apparently agreed with them, for it passed a resolution to the effect "That while the Master Mechanics' Association regards the water glass as a convenience and an additional precaution against low water, we do not regard it as an absolute necessity to the safe running of locomotives."

On Attachments between Engine and Tender the committee took a decided stand in favor of great strength, and particularly commended the Duluth, South Shore & Atlantic Railway practice, where the safety chains are held to the tender beam by double-ended staple bolts of 14-in. round iron, the loose ends being coupled to the under side of the engine draw casting by two pairs of pendent lugs cast on, through which (and through last link of chain) passes a 14-in. horizontal cottered bolt. The danger to the men on the footplate from the tender mounting over the same is not considered to be great, and a plain flat casting plate on the tender with a rounding one on the engine was recommended. As for the step question we are somewhat disappointed. We have repeatedly called attention to the dangerous and inconvenient form of the steps of American locomotives, and have contrasted them unfavorably with their English cousins, and when this committee was appointed we hoped that they would make some recommendations and present some plans that would serve to improve this particular detail of our locomotives, but they have really done almost nothing in this direction. The following is the full text of their report on the subject: