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(Illustrated articles are marked with an asterisk.)

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Troy meeting commenced on the 17th of August, and closed on the 24th. It was a gratifying success; the proceedings were harmonious, dignified, and vigorous; many of the papers read are valuable.

The attendance was respectable, and all parts of the country were represented. But many familiar faces were not to be seen. Death has made sad havoc among the old men. Henry is in Europe; Agassiz and Peirce were kept away by sickness. There was, however, a crowd of earnest young men, of whom we name as examples the Salem naturalists, and Cope, Pickering, Hitchcock, Young, and Storer, who are ready (and who will, perhaps, some day be able) to take their places. Of course there were clap-trap, private ax-grinding, and speeches for Buncombe, and yet probably no more than at former meetings.

The Association is indeed one of the most important of living agencies for the advancement of science in America. Its list of members comprises nearly all the American names which are distinguished in scientific literature. It brings together harmoniously the members of all our other learned bodies, and thus it represents the science of the whole continent. The Association is a national institution, and it asks for the sympathy of all the friends of progress.

It is to us a very gratifying fact that the Association is respected and honored by the people at large. At the present time there is no other annual peripatetic convention which is so much invited, prepared for, talked about, and hospitably entertained; and all this notwithstanding its proceedings are as unintelligible as Greek to most of its kind friends. No one can see this and believe that America is justly reproached with neglect or distaste for scientific pursuits. If America is behind other nations in scientific advancement it cannot be because our scientific laborers need the stimulus of sympathy and appreciation.

As an example of how kindly the Association is treated we may mention some interesting facts about the Troy meeting. The citizens of Troy contributed $10,000 to defray the expenses of the entertainment. Hotels, private houses, and public buildings were freely opened for the use of the Association, and the members were honored as if they were guests of the whole population. Elegant receptions were given at the houses of the Mayor and of other leading citizens. The Association in a body, at the invitation of the Troy local committee, went in a special train to enjoy the elegancies of Saratoga, and, at the invitation of the State Department of Education and in a steamer chartered by citizens of Albany, visited the Capital.

The Association is, then, a very respectable society, and it receives the hearty homage of the people. The people surely contribute fully their part in the cause of science. Should not their liberality and hospitality be a stimulus to still greater exertion on the part of the Association? Does the Association owe a duty to the public, and is that duty well attended to?

Because we respect the Association so highly, we desire to see it improved if possible, and it is for the same reason we see its defects. In some respects it is better than it was before the war; it is more in earnest, and it has more workers; and in other respects it has sadly changed. There are lately more trashy papers, and especially papers which are made big with padding from encyclopedias and old almanacs. Perhaps it is impracticable to prevent such papers being offered, but there surely may be some way of keeping them out of the printed transactions. The printing of some of these papers recently, has made the Association an object of ridicule all over the world. Why not try to prevent such a thing happening again. A little quackery, boring, or ax-grinding, which lasts only during a meeting, is perhaps best to be endured, but print it in the transactions and it is a disgrace for all time.

THE ST. LOUIS BRIDGE.

The bridge now in process of erection across the Mississippi at St. Louis, is one of the wonders of the age. It is to be a tubular, cast steel, arch bridge, supported by the abutments and two piers; the latter are 515 feet apart, and 497 feet each from its nearest abutment, making three spans of about 500 feet each. Its greatest span is the same as that of the Kuilenburg bridge over the Leck, an arm of the Rhine, in Holland. Thomas Telford's suspension bridge across the Menai Straits, in the northwestern part of Wales, has a span of 570 feet. The Victoria tubular iron bridge of Montreal, exceeds this greatly in length, being 6,600 feet (1¼ miles), but it rests upon 24 piers, and its spans are only 275 feet. The Suspension Bridge at Niagara spans 821 feet, and is 245 feet above the water. The East River Bridge will span 1,600 feet, at a hight midway of 130 feet.

But the novel method of the construction of this bridge in some particulars, renders it especially worthy of note. The piers are sunk in the following manner: The masonry is commenced at the surface of the water, upon an inverted elliptical-shaped caisson, 80 feet long by 40 wide—the dimensions of the pier. This is closed at the top and open at the bottom, with its lower part larger than the upper, to facilitate its passage through the sand after it reaches the bed of the river. It would be very much like building the pier upon the bottom of an inverted wash-tub, of the same size and shape as the caisson. The caisson is filled with air, like a diving bell, and the mass of masonry which constantly accumulates upon it is borne up by the confined air, and, as the caisson descends, the pressure of the water condenses the air so that the water rises considerably within it, just as when an inverted tumbler is pressed down into a vessel of water. To prevent this and give greater buoyancy to the mass, air is forced into the caisson through a vertical passage in the masonry by a powerful steam pump. The caisson with its superstructure of masonry must be sunk to the rock bed of the river, because the deposit of sand above it—which at one pier is 79 feet deep—in times of flood and freshet, is scoured away to a great depth, if not to the rock itself. When the caisson reaches the river bed, the sand within it must be removed. This is done by a current of water that is forced down, by a tube, through the masonry, into the caisson and then up again to the surface; and as it takes its upward course the sand is shoveled into it through a contrivance for the purpose, and carried to the surface in the form of muddy water by the ascending current and poured out into the river. Here it causes a bank of sand to accumulate which sometimes rises to the surface of the water.

Workmen are needed in this caisson of condensed air, below the bed of the river, to shovel the sand and do other necessary work. These pass down by means of a circular stairway in another vertical passage—there being five in all—through the center of the pier, and are admitted into the caisson through an air-lock or chamber, with an air-tight door on the upper and lower sides. Into this chamber, after the men have passed the upper door, the condensed air is gradually admitted till it is as dense in the lock as in the caisson below. They experience here very peculiar sensations, among which are, a burdensome pressure upon the whole system and especially upon the drum of the ear, and a great increase of heat in the system, because condensed air has a smaller capacity for heat than in its ordinary state. In passing out, of course, the order of proceeding and of sensation is reversed. The workmen in the caisson are exposed to considerable danger from the unusual atmospheric pressure, which sometimes amounts to two or three atmospheres. Several have died from the injuries here received. When the caisson has reached the bed rock, the rock which "dips" towards the Illinois shore, is leveled off with concrete; then the caisson and the passages in the pier are filled with concrete, and the *solid pier* rests upon a foundation of limestone rock. Two piers have been sunk in this manner and are now above the surface of the water; the last will be similarly sunk this fall.

The manner of testing the steel which will form the arches of the superstructure is also very interesting. This is done by means of a massive machine which acts by hydrostatic power. By its use the power of the steel to resist both compression and tension is accurately determined. It is a well known principle of hydrostatics, that a given pressure upon one square inch of liquid surface causes equal pressure upon *every* inch of that surface. This instrument is so constructed that the surface where the power is exerted is to the surface of the piston where the power is applied as 1 to 100; hence the exertion of one pound of power produces a compressing or tensile force of 100 pounds. Any change in the length of the steel to be tested, even to the 20,000th of an inch, it is said can be detected. This change is indicated by a mirror, which revolves as the piston moves, and which reflects light from a graduated arc, 25 feet distant, to a telescope situated in the arc. Through this the observer looks and records the continued changes of the steel by the varied pressure to which it is subjected. Every piece is tested until its limit of elasticity is reached, that is, until it has become so compressed that it will not spring back when the pressure is removed. It may be subjected to a force of 100 tuns.

A WANT IN LOCOMOTIVE ENGINEERING.

We this week saw in an English paper a controversy in regard to the speed of a train in rounding a curve, it being charged that a "driver," as our British cousins style a man who runs a locomotive, was in the habit of taking a particular train around a curve above the standard speed of forty miles an hour, for which the curves are calculated, thus endangering the safety of passengers.

This question of speed always comes up when accidents occur, and as yet no adequate means have been adopted whereby the precise speed of a locomotive engine at any given point of its running can be so recorded as to settle such questions beyond dispute.

Such an instrument would be a boon to engineers who run locomotives, and who are, in our opinion, much more often unjustly than justly blamed for undue and improper speed on the occasion of accidents.

The problem is not a difficult one to solve. We once, as a matter of personal amusement, designed an instrument on the principle of the ball governor which would do it perfectly. The balls, instead of being hung on pivoted arms, slid out on horizontal arms against scale-springs of definite power, as they revolved by motion derived from one of the truck wheels. In doing this they raised a tracing point along the side of a vertical cylinder revolving by clock-work, making a mark of given hight for a given speed, rising with increased speed, and falling as the velocity of the locomotive decreased. Vertical lines on the surface of the cylinder represented hours and five minute divisions, and the position of the pointer between these lines might easily be computed for any less time than five minutes.

The general principle of this device is simply the conversion of rotary motion into pressure, and taking a diagram of the pressure at different points of motion, as is done with the steam indicator.

Doubtless inventors might greatly simplify this device, or it may be, adopting a different principle, succeed in devising something much better.

In these days of accurate measurement in everything pertaining to the use of steam it seems a little singular that a matter of such importance, in a scientific as well as a legal point of view, should have been so long overlooked.

In legal actions arising from accidents on railways the corporations are always placed at a disadvantage before juries, the latter always being inclined to sympathize with individuals rather than with the companies, who, it is thought, can better afford to pay, than the individual can afford to fail to recover the damages he claims.

The witnesses, also, are, many of them, totally incompetent to judge of the question of speed, and are mostly liable to overrate it. The adoption of such an instrument as we have described, or some other calculated to effect the same object, would obviate all disagreements of this character, and thus prove valuable to the corporations, as well as to those who hold the responsible posts of engineers.

THE SOUTHERN DEMAND FOR MACHINERY.

We find in the columns of the Kaufman (Texas) *Star*, an article calling attention to the changed condition of the South, and the pressing need of employing machinery to make up the existing deficiency in labor. That the minds of the most enterprising of the people are fully aroused to this need is evident from the many communications we receive in relation to it, and also from the fact that a very respectable beginning in manufacturing has been already made in some of the States.

The article alluded to gives some facts relative to the section of the State—Kaufman County—in which the journal above named is published.

These facts, as significant of the great want of machinery in various parts of the South, and that immense development which may be expected from its introduction, will be of interest to our mechanical readers, especially those engaged in the manufacture of wood-working machines.

This section is, like many other Southern sections, well stocked with valuable timber. The Bois d'arc fork of the Trinity River passes through the county, and the bottom lands constitute one vast forest of bois d'arc trees, two miles wide, and fifty miles long. These trees here attain to a diameter of from two to three feet.

The journal referred to states that this timber is the most durable in the world. It says: "We will venture the assertion that no living man ever saw the symptom of decay in this remarkable timber. The running gear of a wagon that has been in constant use over twenty years, is before us as we write this article, and yet the wood works are, to all appearance, as sound as when turned out of the shop. There is an oil in the wood which fills up the pores and prevents either air or water from affecting it. No one can tell how long it will last, even when exposed to the weather. A reward might be offered in vain, for a decayed particle of this timber. It is not affected by the rays of the sun, and hence it never shrinks. A carriage wheel made of bois d'arc will run until the tire is worn out, without having to set it. But the greatest evidence of the superior quality of this wood, for wagons and carriages, may be estimated from the fact that a rough home-made bois d'arc wagon is worth about double the best Northern-made wagon."

To make by hand twenty-four spokes of this timber has been considered a fair day's work. Four wagon hubs were also considered a day's work.