THE HUDSON RIVER TUNNEL.

In our paper for September 18 we gave an engraving showing in section the construction of the new diving bell, or caisson, employed by the Tunnel Company to recover the bodies of the lost workmen and repair the damages occasioned by the crushing in of the tunnel entrance. In connection with the same figure, we now present another engraving, Fig. 1, showing the caisson in position and fairly at work, it having been successfully sunk nearly to the depth of the tunnel arches.

The accident, by which the entrance portion of the tunnel at Fifteenth street, Jersey City, caved in, took place on the 21st of July last. Twenty men who were at work in the structure lost their lives. The company attempted to recover the bodies by sinking a coffer dam, but the expedient failed, and resort was had to a diving bell or caisson, which machine is here illustrated. It consists of a great box of timber and iron, closed and made air tight, except at the bottom, which is open. Rising from the center of the box is an iron air flue, through which the men and materials are passed, and compressed air is introduced. The interior working chamber is of cylindrical form in its ceiling, is 41½ feet long, 25 feet wide, and 18 feet high. The roof of the chamber is composed of strong timbers, heavily braced and filled in solidly with cement, which is carried up to a level, forming a deck on which the necessary sinking load is placed. The ends and sides of the caisson are built of planking, held in place by strong timber cross braces and iron tie rods, running from end to end and from side to side, through the air chamber, as shown in our engravings. This is believed to be the largest air chamber or caisson of the kind ever produced. The men work in an atmosphere of compressed air, which, at the date of writing, was 11 lb. per square inch, but which pressure will be increased the deeper the caisson sinks.

The method of sinking is as follows: The men dig away, little by little, the earth at the outer edges, or shoes, of the caisson; at the same time weights are piled upon the flat upper deck on the exterior of the machine to overcome the interior air pressure and cause the machine to descend. In this case railroad iron is used as the weights. The pressure of air within the caisson prevents the rise of water through the ground where the men are at work, so that the floor of the working chamber is comparatively dry. The compressed air to a certain extent escapes at the edges of the chamber and bubbles up through the earth and superincumbent water. The earth that is excavated by the workmen is thrown into a box and mixed with water, and when made into the proper consistency, it is carried up out of the air chamber to the surface of the ground by means of a pipe, through which it is driven by the force of the compressed atmosphere that exists within the chamber. The caisson is kept in vertical position by means of suspension rods, that extend from the outer edges of the caisson to strong timbers at the surface of the ground, the upper extremities of the rods being provided with screw nuts, which are turned to permit the descent or adjustment of the caisson. The upper end of the central air tube is provided with a lateral extension, shown in Fig. 1, called the air lock, where the men go in and out. The air lock has strong doors at each end; one door is opened and the other closed, when the men go in or out, and thus the escape of air is prevented.

In Fig. 1, the place where most of the unfortunate workmen were buried, is indicated by the crushed iron plates that formed the original roof of the tunnel entrance. In both figures the two tunnels shown represent the mouths of the portions of the twin tunnels already built, which tunnels will form the main lines of the railway under the Hudson River. When the caisson is fully sunk home it will occupy the position shown by the dotted lines. A single broad arched tunnel will then be built within the caisson, as indicated in Fig 2, to inclose the mouths of the twin tunnels; and the single tunnel will extend thence on a proper grade to the surface of the ground in Jersey City.

At the time of this writing the working success of the new caisson had been apparently demonstrated, contrary to the predictions of outside engineers, who prophesied that it was too weak in construction and must inevitably collapse when subjected to the pressures involved in its descent. No sign of weakness has, however, appeared, and the machine has gone down nearly to its final resting place. Some of the bodies of the lost workmen have been recovered. The first to be taken out was that of the brave Peter Woodland, the assistant-engineer.

BENZINE is said to be more effective than anything else for exterminating moths, roaches, etc.

THE LANDING OF THE OBELISK.

The transfer of the obelisk from Clifton, Staten Island, to the staging prepared for its reception at the foot of West Ninety-sixth street, has been delayed owing to the prevalence of strong northerly winds.

The method adopted for removing the monolith from the hull of the Dessoug was substantially the same as the one employed in loading it. The Dessoug, carrying the obelisk, was drawn out of the water in the cradle of Lawler's marine railway at Clifton. Then her bow was opened and the obelisk was run out upon a staging resting on two rows of piles driven for the purpose.

The reloading of the obelisk upon the pontoons to be used in floating it across the harbor will be accomplished as follows: The water will be pumped out of the pontoons which have been floated under the obelisk and sunk. In rising the pontoons will lift the stone from its temporary resting place, and a couple of tugs will tow the much-traveled monolith one stage further toward its final destination.

From the landing the obelisk will be hauled to the Park on a sort of portable tramway by means of a movable steam engine. The stone will roll upon cannon balls placed in the grooved tracks of the tramway.

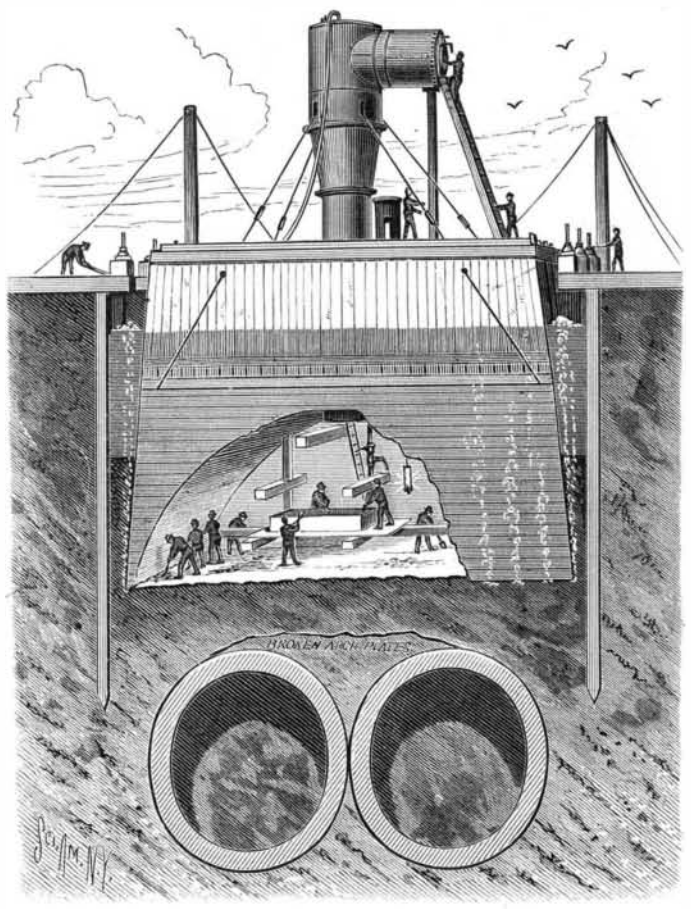

Fig. 1.—THE NEW CAISSON.—HUDSON RIVER TUNNEL.

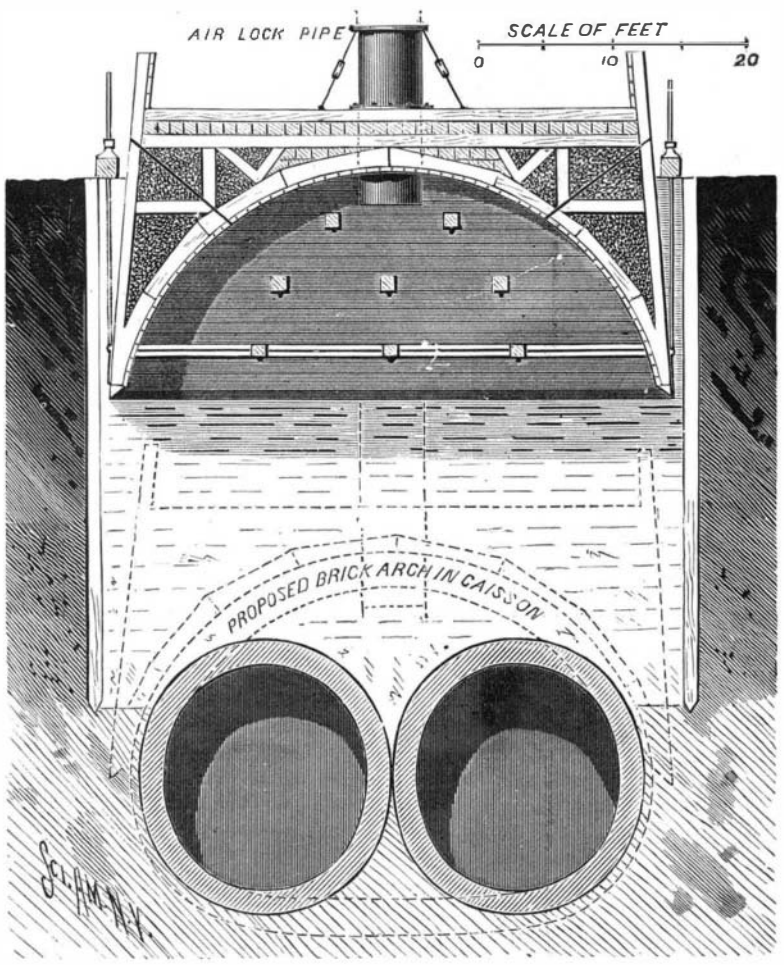

Fig. 2.—THE NEW CAISSON.—HUDSON RIVER TUNNEL.

The International Roadmasters' Association.

The second annual convention of the International Roadmasters' Association met in Chicago, September 8. The subjects of reports and discussions embraced track frogs and switches, the comparative action of frost on different material composing roadbeds, heaving, and the utility of tile and deep ditching; ballast and its preparation; track-laying; best forms of spikes, joints, nut-locks, rails, rolling stock, etc.; elevation of curves; and the relative merits of different kinds of ties.

The committee on track frogs found that the frog that gave the best results was the steel-rail spring frog always open for main track, for the reason that it was the safest for trains running at a high rate of speed, it gives no jar to rolling stock, is the least injurious to wheels and springs, its durability is greater than any open or rigid frog, costs less to keep in repair, and costs no more than any other steel-rail frog per foot. The committee also found that the steel-rail rigid frog, with wrought or rolled iron filling between point and wing rails, gave the best results in large yards where switch engines were constantly working.

The discussion of roadbed materials resulted in the decision that with proper drainage a good roadbed may be made of gravel, locomotive cinders, slag, or broken stone, either material to be used according to the cost at which it could be obtained in the particular section where it might be required.

The committee on railway curves and their elevation recommended the following:

1. That the limit of elevation of all curves should be five inches.
2. Changes of elevation on all old roads should be made by raising the outer or lower rail, as the case may require.
3. That the proportion of elevation at the tangent point to maximum elevation should be one-half.
4. That the rate of elevation on all curves, with speed at thirty-five miles per hour, should be three-quarters of an inch to a degree.
5. That in approaching a curve the rate in change of grade to get the necessary elevation of tangent point should be 1 inch to 100 feet.

The third recommendation was, after discussion, amended to make the proportion of elevation three fourths. The committee on switches, after expressing their personal favor for the Wharton and split switches as the most safe and economical, resolved to recommend no particular form of switch. The best switch would be one that came the nearest to an unbroken or continuous rail on main line and sidings.

A number of prominent roadmasters discussed at some length the proper size and weight of rails, but no decision was arrived at. The association will meet next year in Cincinnati, the second Wednesday in September.

Industrial America Abroad.

The *Tribune* recently announced the shipment of brush and broom making machines to the Holy Land by a Schenectady firm. They were for the American colonists at the foot of Mount Carmel. A short time ago the cable announced that an American mowing machine had taken first prize in a trial on the fields of Bulgaria. Simultaneously from Australia came the announcement that an American watch had been awarded the highest premium at the fair in Melbourne. Europe and the East does its weighing on American-made scales. A correspondent in Paris gave lately an account of the introduction of American elevators in hotels there. American hotel palace cars have been introduced in England in spite of English prejudice, and will soon overcome the opposition to their introduction in France which the parsimony of French corporations maintains. Our breadstuffs are sold in every market of the hemisphere; and special fleets of steamers convey live American beef to English markets. Every variety of canned goods finds favor there.

These are only a few of the facts which might be named in illustration of the recent material development of America abroad. The growth of our industries has not been confined to home; marvelous as it has been in the last decade or two, it has been equally surprising in the older countries. A few years ago American pork and cotton were about the only staple productions which Europe largely bought of us; now there is a large trade in nearly every article of food grown or machinery invented in America.

The Largest Lathe.

The St. Chamond Steel Works, France, boasts of having the largest lathe in the world. It was manufactured by Sir Joseph Whitworth & Co., of Manchester, England, and has just been set up in France for turning 100-ton guns.