THE HUDSON RIVER TUNNEL AT NEW YORK.

We have heretofore made reference to the commencement of the great work of tunneling the Hudson river, for the purpose of establishing direct railway connection between the city of New York and the many great railways that now have their termini at Jersey City, upon the opposite bank of the stream. The gigantic traffic of all these railways at present depends upon ferry boats, the maintenance of which is expensive, while they are subject to frequent interruption. In winter, especially, when fogs and ice obstruct navigation, the ferry passage often involves the public in disastrous risks and inconveniences.

The project of tunneling the Hudson river at this point has been often proposed. Its importance as a promoter of the prosperity of New York city can hardly be overestimated. Every additional link in the chain of communications by which access to this metropolis is improved, rendered quicker, cheaper, or better, is a positive and permanent gain for the city. Every added facility for ingress and egress helps to swell its business, helps to increase both its resident and floating population, helps to build it up as the chief mart of commerce and finance of the New World. So obvious are the public benefits that must result from the building of great works like this that it seems hardly credible that it could have any real opponents. It is a serious fact, however, that there are individuals and corporations who are laboring against it. But we are confident they will not prevail. The work has been actually commenced, the means, it is alleged, are provided, and we believe the day is close at hand when railway cars will run under our Hudson with the same frequency and regularity as they now run under the Thames, at London.

This work of tunneling the Hudson is being carried on under the auspicies of the Hudson Tunnel Company. Capital, $10,000,000. Incorporated under the General Laws of the States of New York and New Jersey. The President of the corporation is DeWitt C. Haskin; Vice-President, George G. French; secretary, L. C. Fowler, ; Consulting Engineer, William H. Paine.

Fig. 1 is a plan sketch of New York and vicinity, showing the general position of the new Tunnel. The other engravings are taken from the Company's drawings and works.

Fig. 2 is a cross section of the Hudson river, showing the Tunnel works in profile, the depths of soundings, borings, grades, and distances. The upper figures show the latter in hundreds of feet from the bulkhead lines. The intermediate figures indicate the depth of the water in feet. The lower figures give the depth of borings in feet. The extreme grade of the Tunnel is two in a hundred feet, descending from Jersey City, then, ascending on the New York side, three in a hundred for 1,500 feet, then two in a hundred to the New York end.

The greatest depth of water is a little over sixty feet. The borings show that the soil through which the Tunnel will pass is for the most part a tenacious silt, underlaid by hard sand. Near New York shore, a small extent of rock is encountered, and some gravel. The tenacious character of the soil is considered favorable for tunnel construction, and no serious difficulty of any kind is anticipated by the Company.

Fig. 3 shows a cross sectional elevation of the vertical shaft on the Jersey city side, lately begun, together with a portion of the intended horizontal Tunnel as it will appear when extended under the river.

Fig. 4 is a cross section of the Tunnel at the air lock.

Fig. 5, cross section of complete Tunnel and railway tracks.

The Tunnel walls, C', will be constructed of the best hard brick and cement, three feet in thickness; circular in form, twenty-six feet in width and twenty-four feet in hight, painted white in the inside, and lighted with gas; with a double track railway, with heavy steel rails, upon stone ballast five feet from the bottom. D, bottom drain.

The entrance to the tunnel on the Jersey side of the river is to be from Jersey avenue, on Fifteenth street; the work is to extend thence to Hudson street and the river, about 3,400 feet; thence under the river, curving five degrees northward, to the New York bulkhead line, at or near the foot of Morton street, about 5,400 feet; thence curving slightly southward in New York, about 3,000 feet, to a point to be selected by commissioners.

The entire length of the tunnel and approaches will be about 12,000 feet (with the depot tracks to be added thereto), being about one mile under the river, and nearly three fourths of a mile upon each side.

The track will be of steel, ballasted with broken stone to five feet from the bottom of the tunnel, where can be located gas pipes, pneumatic tubes, and water pipes, if needed. Telegraph wires can be placed upon either side.

For the purpose of expedition, it is proposed to work, from each side of the river at the same time, as many men as can be successfully employed in excavating and laying brick, changing them each eight hours. Thus by constant work, doing three days' labor every twenty-four hours—by which it is believed the work can be advanced five feet from each end every day—the whole work can very easily be completed within two years. The Hudson Tunnel Railroad Company will then be able to convey passengers, without change of cars, from the South and West, as well as from Newark, Elizabeth, Paterson, and all local points, arriving at Jersey City, and within six minutes thereafter to Broadway, New York, where the Company hopes to make connection with the Broadway Underground Railway, which is to run north and south.

The company say that more than four hundred trains of cars could be passed through the tunnel each twenty-four hours. Freight trains would have transit at night. Market trains in the early morning. All drawn by powerful engines, made especially for this purpose, to be run by signals—without bells or whistles—consuming their own steam and smoke, or run with compressed air.

All connecting railroads are to have an equal right to have their passengers and freight transported through the Tunnel upon the same equitable terms.

The construction of the Hudson Tunnel to a point near Broadway will soon involve the construction of another Tunnel under the East River to Brooklyn, from near the same point; then a perfect system of rapid transit railroads, running East, West, North, and South, would be in operation. This, the Company believes, is in the near future, and their report adds:

"Rapid transit should not be considered as useful in only one direction, but is equally useful to run East, West, South, and North—will be as well for New York, if extended to Brooklyn and Jersey, as to run into Westchester County. All will be benefited by the general prosperity of the main city itself. All are feeders to it. Thus all will derive their proportion of the benefits that their position entitles them to. This Tunnel the company justly regards as but the precursor to rapid transit in all directions, soon to follow

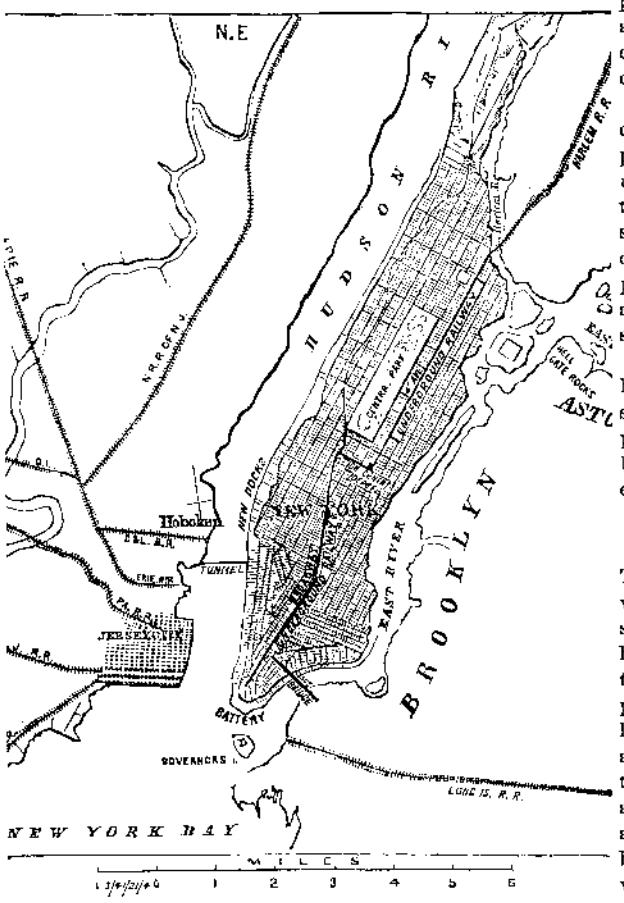

Fig. 1.—THE HUDSON RIVER TUNNEL AT NEW YORK. PLAN OF THE CITY AND VICINITY, SHOWING THE LOCATION OF THE TUNNEL.

The Tunnel was commenced in November last, after extensive borings, for a year previous, in the bottom of the Hudson river, down to the depth to be occupied by the tunnel. A circular working shaft, C, thirty feet in diameter and to be sixty-five feet in depth, was then commenced one hundred feet inland from the water, on Fifteenth street in Jersey City. After it had been sunk twenty feet, with perfected brick walls four feet in thickness, the further prosecution of the work was enjoined at the suit of the Delaware, Lackawanna, and Western Railroad Company. The litigation occasioned thereby, it is hoped, will be terminated soon, and the necessary legislation secured, when the work proposed will be resumed and forwarded as rapidly as possible."

The company further say "that the great expense of an undertaking of this magnitude has hitherto prevented its construction. The Hudson Tunnel Railroad Company, however, by the aid of compressed air, as applied in the patent therefor, obtained by its president, Mr. Haskin, in connection with other important appliances, will be able to complete this work at much less expense than any similar work has ever been constructed. It is believed that its present capital of ten million dollars will be abundant for that purpose. In its plan of construction no expensive coffer dam, caissons, or Brunel shields will be needed."

"The use of compressed air introduced into the face of the Tunnel, with sufficient pressure to hold in place, or keep back and prevent the interruption of silt, clay or water, will," it is believed by the company, "overcome the difficulties usually experienced in constructing tunnels, and also enable it by this agency, to remove the water and waste earth to the surface, through pipes, without the aid of hoisting apparatus."

The intended method of operating will be understood by reference to Fig. 3.

A is the foundation ring on which the masonry of the vertical shaft is built and allowed to settle as fast as the earth below the ring is excavated. At E, is an air lock, composed of an iron cylinder, with hinged doors at each end for access of men and materials. The cylinder is of small dimensions and rests upon a bed of earth and a wall, F, which, with a canvas curtain, G, and other packing, makes a sealed partition and forms a tight air chamber heading in front of the lock. A small railway track will convey bricks and materials to the heading. Air pipe, I, conducts compressed air from the surface to the heading. This air pressure is expected to assist in keeping out water and upholding the roof of earth during excavation in front of the masonry, also to supply air for the workmen, who will work in considerable numbers on platforms, K, as shown in our engraving.

The air pressure will also carry back up to the surface, through pipe, H, and discharge at L, into scows at the dock, all sand, mud, or water that may accumulate in the heading during the course of the excavation (H, Fig. 3).

We shall watch the progress of the work with great interest, giving our readers from time to time such incidents in connection therewith as may be desirable. We heartily wish success to the enterprise, and trust that it may be brought to the speedy completion that the company anticipates.

Backing for Photo Transparencies.

The *British Journal of Photography* says: To plain and rather thick collodion add some finely sifted carbonate of lead (white lead), in the proportion of a teaspoonful to four ounces of the collodion. Incorporate well together by trituration or shaking, then add a few drops of castor oil and as much Canadian balsam as would fill the half of a walnut shell. Filter through muslin, if necessary. This emulsion when poured upon glass will give a very fine and even opal surface; and glass thus prepared will, for the purpose under consideration, answer just as well as the finest and most expensive opal glass, whether flashed or pot metal.

Another opal mixture consists simply of a mixture of collodion and negative varnish. Although very pure and transparent when in the bottle, no sooner has a film been formed upon a cold plate of glass and allowed to become dry than the transparence gives way to a pure translucent white, presenting a very beautiful appearance. The mixture by means of which we made our finest specimens was composed in the proportion of an ounce of ordinary collodion to two drams of a retouching varnish, which we had made of sandarac dissolved in alcohol.

Let those of our readers who desire to examine and exhibit their transparencies under the most favorable circumstances at once remove the ground glass from them, supplying its place with a plain piece of glass rendered opaline by one or other of the methods described, and they will have every reason to be satisfied.

The Oxy-Sulphur Light.

We had a small sheet iron retort of the usual conical form. The delivery tube of this we loosely plugged to act as a safety valve, if necessary, and in the lid we drilled a hole and screwed four inches of quarter inch brass tube. Through a hole in the side of this was inserted a piece of much smaller tube, closed by hammering the end, and having the closing pierced by a fine hole. By this arrangement we had the larger tube in communication with the interior of the retort and in the center of that tube, and rising a little higher than the level of its mouth, a smaller tube coming out at the side and long enough to enable a rubber tube to be attached—an arrangement, in fact, very much like the ordinary form of blow-through oxyhydrogen burner. A quantity of sulphur was placed in the retort, and sufficient heat applied to raise the temperature to about 725° Fah. the point at which it vaporises. The end of the smaller tube was attached to the oxygen bag—one containing four cubic feet—and a fourteen pound weight applied, which was found amply sufficient. When the vapor of sulphur made its appearance, the oxygen was turned on, and the result was a steady flame of about two inches in length, and of such intensity that, although we had not an opportunity then of trying it, we are sure a small statuette could have been photographed by it in a few seconds.

The product of combustion—sulphurous acid—may easily be got rid of if there be in the room a suitable chimney; but even without that, there is no difficulty in rendering it so harmless that the operation may be carried on in a drawing room.

Beet Cider.

M. Plouard, a lawyer of Andelys, France, has invented a new cider, said to be very cheap and of excellent flavor—the peculiarity of which is that a large proportion of sugar beets is mixed with the apples before pressing; 80 lbs. of beets are mixed with 700 quarts of apples, or about 11 lbs. to 100 quarts. The beets and apples are pressed together, then saturated with water, left quiet in a cellar for twenty-four hours, and pressed anew. This is repeated seven times. The inventor says he makes 100 quarts of cider for 80 cents, which seems rather questionable.

The Latest Novelty in Paper.

Inasmuch as paper has been made available for the manufacture of almost every variety of furniture and articles of dress, it is passing strange that paper coffins should have been left till this late day unthought of. The undertaker is certainly not an enterprising party. Trunk makers have long been credited with using all the unsalable printed books; but at the present rate of production, were every traveler supplied with a van load of these troublesome *impedimenta* to traveling, such a stock would remain that all the bookshelves in the world would not contain a tithe of them. To further reduce the stock, a manufacturer out West proposes to supply every journeyer, to that bourne whence no traveler returns, with a last trunk made of *papier maché*, waterproofed with asphaltum.

M. SCHRETZ states that borax enfeebles the spontaneous movements of all living vegetable tissues and kills microscopic animalculæ. In this country, the use of borax as a preservative of weed has been patented.