Brick Making, from a Trade to an Art.

The great size and height of modern buildings in our large cities has compelled more attention than ever to fire-proof construction. Twenty years ago, iron was the preferred material, taken presumably for its fire-resisting quality. But conflagrations like those of Chicago and Boston demonstrated that iron was the worst possible material. Then followed a general use of stone. Brick was not preferred from its then lack of artistic appearance and want of capacity for effect and expression. Stone, however, proved unreliable as a fire-resisting material, and some of them, in fact all except the sandstones, were found to easily disintegrate with the heat of a common, not to say a great, conflagration.

But brick making has developed from a common mechanical occupation into an art. Forms have altered from the stiff 4x8 formula, to suit artistic situations in fronts, pilasters and cornices, and finally the crowning development is reached in the rapid and cheap production of the most elegant art forms and expressions in terra cotta, until now clay workers produce the best material for the most pretentious or elaborate structures, while retaining and in fact increasing the well known fire-resisting qualities.

Only one thing is yet desired in order to render fire-proof conditions absolute, and that is a fire-proof mortar. The brick itself is practically indestructible by any heat in a conflagration. The mortar will crumble, with its lime base, and weaken the wall. A mortar has recently been invented by a German chemist that answers perfectly, it is said, but its great cost precludes its use, except, perhaps, for some particular purpose, as fire-proof vault construction, where expense is no object. There is not a single field for invention that would reward the one better who can discover a mortar that would be both fire-proof and sufficiently cheap to be available.

But, however, brick and terra cotta are being generally preferred, and never has there been such general preference shown for these materials as is foreshadowed for the coming season. Safety and durability are beginning to usurp all other conditions in the erection of large buildings—a usurpation that has been rendered permanent to brick and terra cotta by their becoming thoroughly artistic.—*The Clay Worker.*

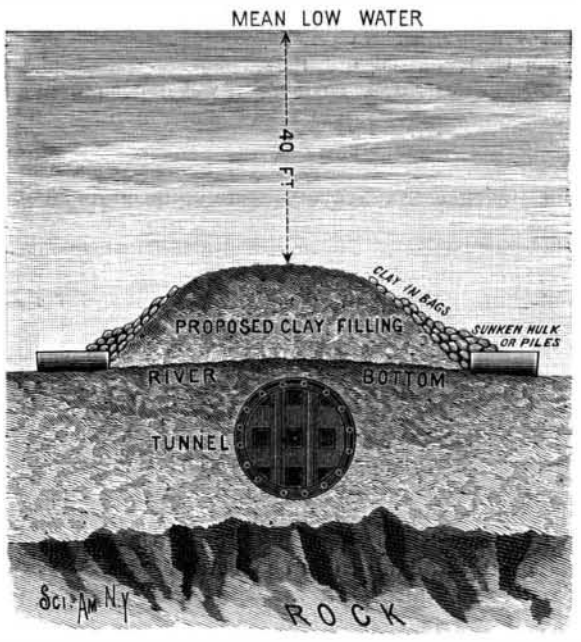
Government Note Paper.

Anybody who wishes can go into the big Crane & Co.'s factory at Dalton, Mass., and see the workmen place the blue silk on the machine that makes the paper for all the United States notes. The silk comes in spools, and is made by Belding, of Northampton. It is sold here in Bangor. There is no more secret about it than there is about the water flowing over the dam above the toll bridge. The real secret is in the composition of the paper. The silk thread idea is secured by patent, to be sure, but the making of the paper, the compound of the ingredients, is safe in the head of J. Murray Crane, who received the art from his father, who made bonds for Salmon P. Chase, Lincoln's Secretary of the Treasury, away back in war times. The pure linen pulp is in a big room, looking for all the world like any linen pulp. Then comes J. Murray Crane with a gripsack. He and the "grip" enter the room together, and it is presumed that he locks the door, for the door is locked on the inside, and the "grip" does not look able to do it. They are closeted a half an hour. When they come out the pulp goes to the paper machine, and Mr. Crane and the grip go home. But the pulp is changed by that visit, and nobody has been able to penetrate the Crane secret. The company gets about fifty times as much for that paper as for other linen paper made in the same mill.—*Bangor News.*

A STICK of California redwood is being prepared in Detroit for the World's Fair. Its dimensions are given as 16 feet wide, 13 feet long and 5 inches thick.

PROGRESS OF THE NORTH RIVER TUNNEL.

The progress of work upon the North River tunnel has brought the main heading to a critical point. The rock upon the New York shore has been almost reached and the problem of getting over or through it



SECTION OF RE-ENFORCING FILLING OVER THE TOP OF THE TUNNEL.

now presents itself. The original plan would have carried the tunnel right through the crown of the rock, necessitating blasting, with its attendant dangers and risk. The present contractors propose to attack the matter differently. Starting well back from the shore, at about the 3,800 foot mark, measuring from the west or New Jersey end of the tunnel, they propose to increase the up grade to two per cent and to approach the eastern terminus on an even slope. This will carry the line over the summit of the rock, as shown in the upper cut.

In doing this the bottom of the river is nearly reached, but five feet of silt and clay lying above the arch or top of the tunnel at one place. This introduces an element of danger. The air pressure system as applied to sustaining a vertical heading introduces an element of unstable equilibrium that can only be counteracted by a large overlying depth of solid material. If the tunnel had but five feet of wet silt or sand over it, there would be great danger of a disastrous and perhaps fatal collapse. Just above the tunnel there is a deep channel, giving a very characteristic section to the river at this point. The sudden deepening is the cause of the trouble. The method of dealing with the problem that is proposed is the following.

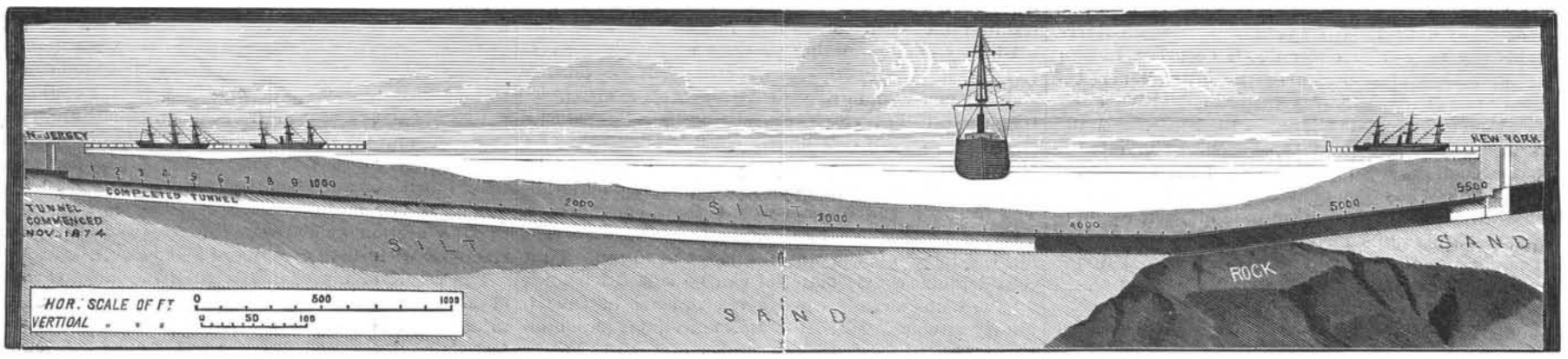
Good clay properly prepared is to be dumped into the channel at slack water, immediately above the line of tunnel. This will be continued until the depth of earth over the line of the top of the tunnel is increased to at least twenty feet. The depth of water at the critical places is from sixty to sixty-four feet. The filling to be introduced in no case is to reduce this depth to less than thirty-one feet six inches at low tide: 15,000 to 20,000 cubic yards it is thought will suffice.

To secure the mass from washing away, it may be put in bags wholly or in part and riprap and even piling, if necessary, may be used at the sides. The general section of the re-enforcing mass is shown in one of the cuts.

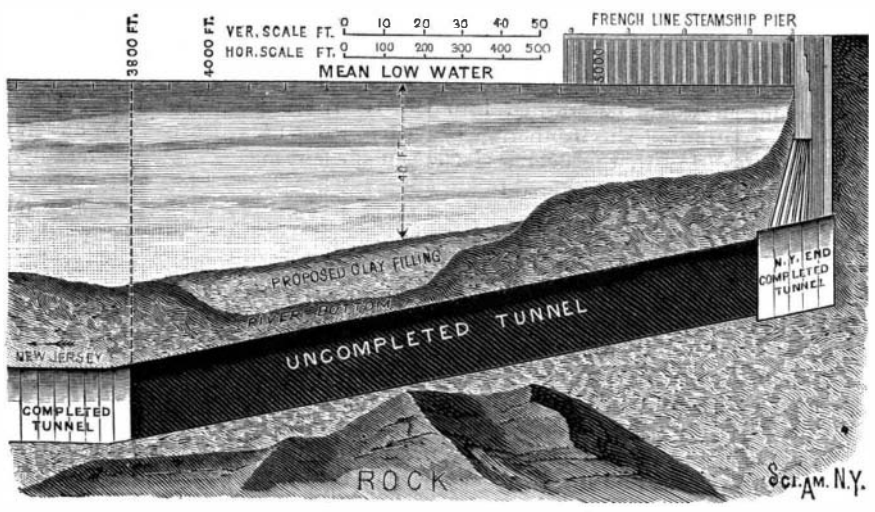
Upon completion of the work the filling will be useless and the clay is to be dredged out and the river bed left in its original condition. Any injury done to neighboring piers from scouring is to be paid for by the tunnel company.

The approval of the acting Secretary of War has been received, based upon the recommendation of a board of engineers consisting of Cols. Henry L. Abbott, C. B. Comstock, and G. L. Gillespie. Adequate safeguards in the way of supervision by the war department, and consent of the supervisor of the harbor of New York, with a bond of $200,000, have been arranged for in the permit.

From an engineering standpoint the proposed operation is of considerable interest. The weak point in the compressed air system of tunneling, which has been the sustaining a vertical heading, has been met, to a great extent, by the shield. This, by subdividing and protecting the exposed vertical area, has made the work safer. The adding to the overlying layer of earth operates in the same direction and appears quite adequate to overcome the weakness of the bottom. The sectional view of the river and tunnel is also of interest, as showing how far the work has progressed. It will be seen that but little remains to be done to complete the connecting link between the New York and New Jersey shores.



THE NORTH RIVER TUNNEL—SECTION SHOWING THE PROGRESS OF WORK.



THE EASTERN GRADE—SURMOUNTING THE ROCK.

A Volatile Compound of Iron.

On this subject a paper was lately read before the Chemical Society, London, by Mond, Langer, and Quincke.

Pursuing the researches which led some little time ago to the startling discovery that nickel formed with carbon monoxide the volatile compound $N(CO)_4$, these investigators have obtained a similar body containing iron. Its preparation is difficult, and the yield scanty. The method adopted consisted in reducing ferrous oxalate in a stream of hydrogen at a temperature of 400° C., and passing carbon monoxide over the product heated to about 80° C. Like the nickel compound, the new body is volatile, and is decomposed on heating, depositing a mirror of metallic iron. The supposition that (as but little of the substance can be obtained even from large quantities of iron) the formation of the mirror may be due to the presence of a trace of nickel in the original iron salt is negatived by the fact of the deposited metal giving the reactions of iron, and thereby allowing its identity to be definitely established.

It can be readily understood that as only extremely small quantities of the new substance could be obtained, its satisfactory analysis was difficult; but the authors' numbers point to its being of composition similar to that of the nickel compound and consider it to be represented by the formula $Fe(CO)_4$.

The bearing of the existence and properties of the new substance upon the cementation process for converting iron into steel was discussed.

It appears unlikely that the substance $Fe(CO)_4$ is an agent in this conversion, inasmuch as it is decomposed at 150° C., but it may well be that the transference of carbon, that undoubtedly takes place, is due to the activity of some similar body.