GOODRIDGE'S PLAN FOR THE ERECTION OF BARTHOLDI'S STATUE.

The question of the most desirable plan for the erection of the Bartholdi Statue of Liberty in New York Harbor is one of considerable interest to engineers, and those who are in the habit of working on engineering structures. In size the

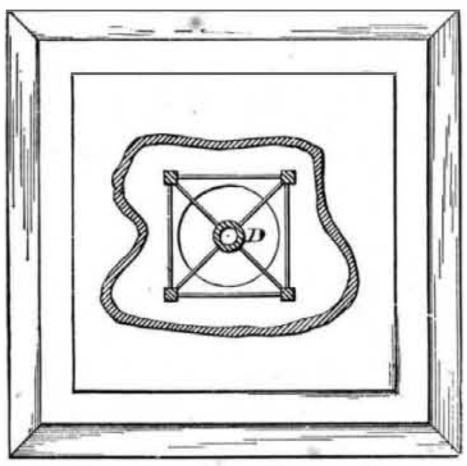


Fig. 3.—PLAN OF BRACING AND TUBE.

statue and its pedestal are beyond precedent, and as the statue is not only to be erected but maintained in position, its enormous height together with its light weight render the problem somewhat difficult. The statue is formed of rolled copper riveted together. It measures 150 feet in height, and weighs less than eighty-six tons, and is to be placed upon a pedestal about 148 feet in height. This construction renders it assailable by the strong winds that sweep our bay.

One of the plans proposed for this work, and one which

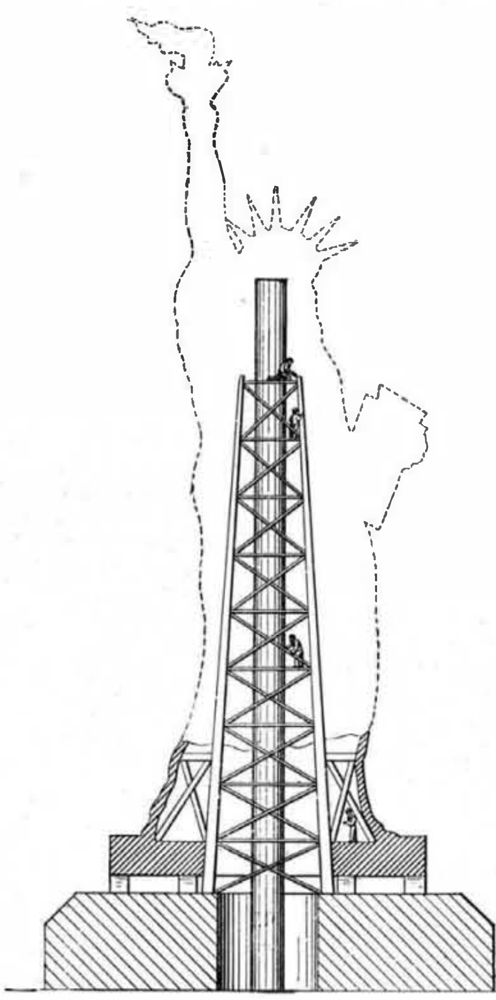


Fig. 2.—INTERIOR BRACING AND FRAME.

has been made the subject of an application for a patent by John C. Goodridge, Jr, of this city, is illustrated by our engravings and may be thus briefly described.

The foundations having been built, a series of piers are built upon it. These piers are incorporated into the structure as the work progresses, and on them the base of the statue is placed, and the statue is assembled. As the several parts of the statue are put together by devices which it is not necessary for us now to describe. It is lined with concrete or similar materials of fine

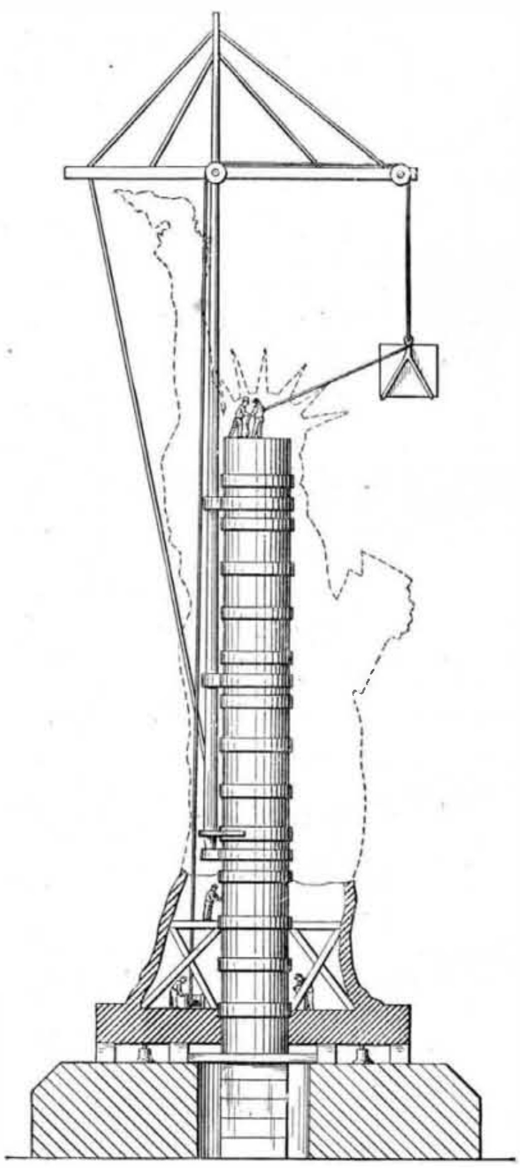


Fig. 1.—MODE OF SETTING UP THE STATUE, CRANE, INTERIOR TUBE, AND BRACING.

quality, making it heavy at the base, and decreasing in thickness as it goes up. The intention of this is to give the statue greater weight and increase its strength and stability.

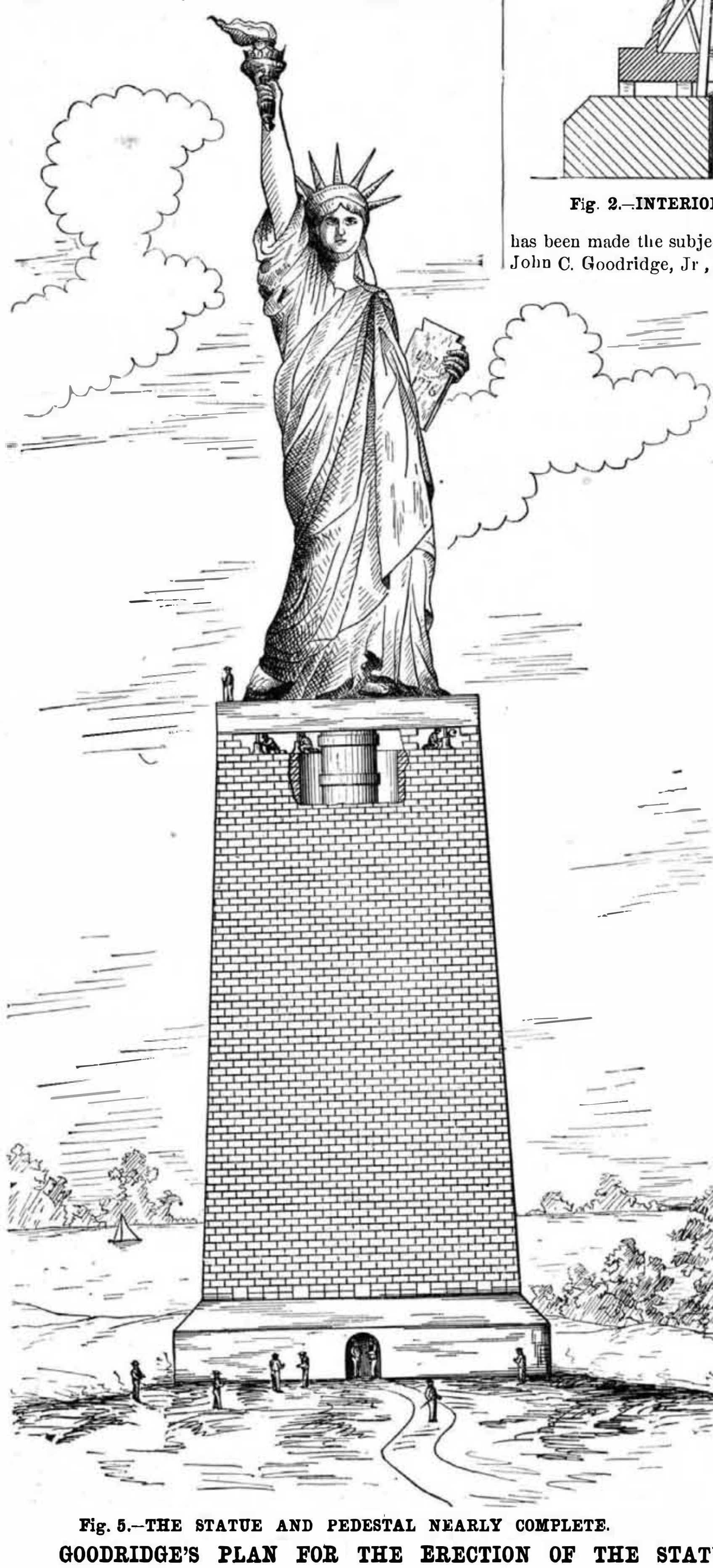


Fig. 5.—THE STATUE AND PEDESTAL NEARLY COMPLETE.

Fig. 4.—THE STATUE SET UP COMPLETE AND READY FOR ELEVATION.

GOODRIDGE'S PLAN FOR THE ERECTION OF THE STATUE OF LIBERTY AND ITS PEDESTAL IN NEW YORK HARBOR.

When the statue is completed, a series of jacks (or mechanism of a similar character) are placed upon the foundation between the piers upon which the statue now rests. By working these jacks the statue is lifted bodily high enough for a course of masonry to be built upon the piers; the spaces between the piers are then filled as high as the statue has been lifted, the jacks replaced, and the process continued until the statue reaches the required height.

If desirable the erection of the statue, and the building of the foundation, may be proceeded with simultaneously.

In addition to this, if desirable, a number of tubes are carried through the well hole or other apertures left in the masonry, so that large jacks remaining stationary on the foundation can be made to lift the statue, the tubes to be increased in length at the bottom as the work progresses.

Iron rods, passing up through the masonry and through the pedestal, are so arranged as to gauge the height to which the statue shall be raised at each lift, and to keep it permanently fastened to the pedestal. These tubes or columns are attached, and form a part of the interior bracing of the statue.

When the statue has reached its proper height, these columns can be cut off from the bottom, leaving them suspended from the base of the statue and its interior bracing, thereby adding to its weight and lowering its center of gravity.

In the engraving Fig. 4 shows the statue assembled on its foundation ready to be lifted. Fig. 5 shows the statue during the process of erection. Fig. 1, Fig. 2, and Fig. 3 will give an idea of the details of this plan to any one familiar with this class of work. The engravings are intended to give simply an idea of the construction and not the architectural design.

The statue will be safe at all times during the progress of work, and may be left without danger during the seasons in which it is not practicable to carry on such work. There is another advantage, and one which is of importance to the public generally—that is, the statue by this method can be put up as soon as the foundation is prepared, and by the same men who are now putting it together.

The difficulty of putting the statue together, some time hence, by those not familiar with its construction, is apparent. As the money is to be collected by subscription, some time may elapse before it is all received; and by other methods of erecting the statue it could not be put in position until the pedestal is completed, while by this method the statue can be erected at once with the funds now available, and commence its mission of lighting the world, or at least that portion of it visible from Bedloe's Island.

DE LABASTIDE'S POCKET MITRAILLEUSE.

The "pocket mitrailleuse" constructed by Mr. De Labastide, of Nice, is a weapon which, though of small size, carries many cartridges; for the dimensions of an apparatus carrying 12 cartridges and of 7 millimeters caliber need not exceed 6 centimeters in width, 10 in length, and 2½ in thickness. The weapon partakes of the form of a small bound book, and occupies no more space than a cigarette case. The absence of a butt and other projecting parts, which are so much in the way in ordinary pocket weapons, renders this terrible apparatus essentially portable, as well as convenient to handle.

The annexed figures represent a six-shooter type which has served in experiments; but, as the number of cartridges carried in no wise modifies the system, the figures will answer to allow of a description being understood. Fig. 1 gives a general view of the mitrailleuse, which is a sort of oblong case, open at the top and bottom, of slight depth, and into which slide like a drawer the ten barrels (Fig. 2) that are hidden in Fig. 1 by a morocco cover. To one of the extremities of this case there is affixed a piece of wood forming a pommel. Above is seen the hammer. At the lower part of the other extremity there is a circular aperture, and, at the upper part, a projecting channel through which the balls pass freely. The piece interposed between these two parts is the trigger.

To use the weapon, it is held in the hand with the wooden part resting in the palm, while the middle finger is passed through the circular aperture. In this position the apparatus is held very firmly and the forefinger is left free to manipulate the trigger. The hammer, PP (Fig. 3), which occupies the whole length of the apparatus, slides in a groove on one side of the case, and its striking part is bent at right angles and forms a head which carries two points (Fig. 6). It is pulled into the position shown by the dotted lines, PP′, by a large spring, G R (Fig. 3). In this position the points will have traversed two holes in the breech, and one of them will have struck the center of a cartridge, while the other will have entered a small hollow, *c*, between two of the barrels (Fig. 7). The barrels (same figure) are arranged quincuncially, so that, after each ascent brought about by the motion of the hammer, they will present themselves successively before the points in the order numbered in the figure, and that when the point to the right falls on a cartridge to the right, the point to the left will drop into the hollow opposite it. The opposite effect is produced when the point to the left strikes the cartridge to the left. A series of small pins, the same in number as the barrels, is arranged on each side of the latter, and serves as a rack for raising them bodily to a distance equivalent to the distance apart of two of the pins, at each recoil of the hammer.

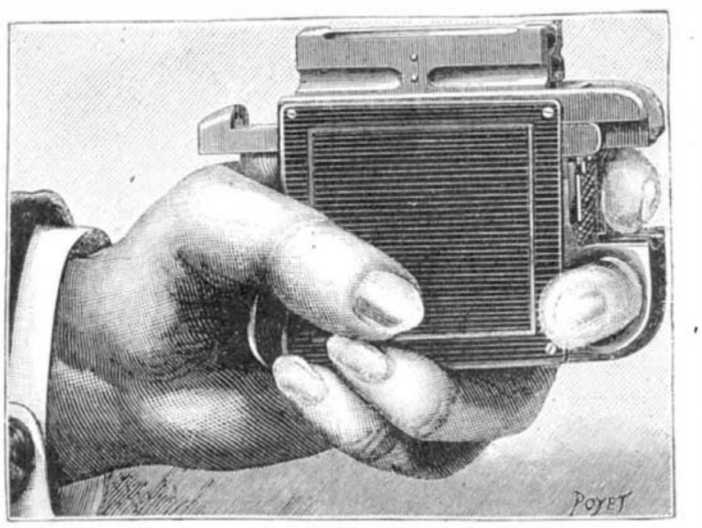
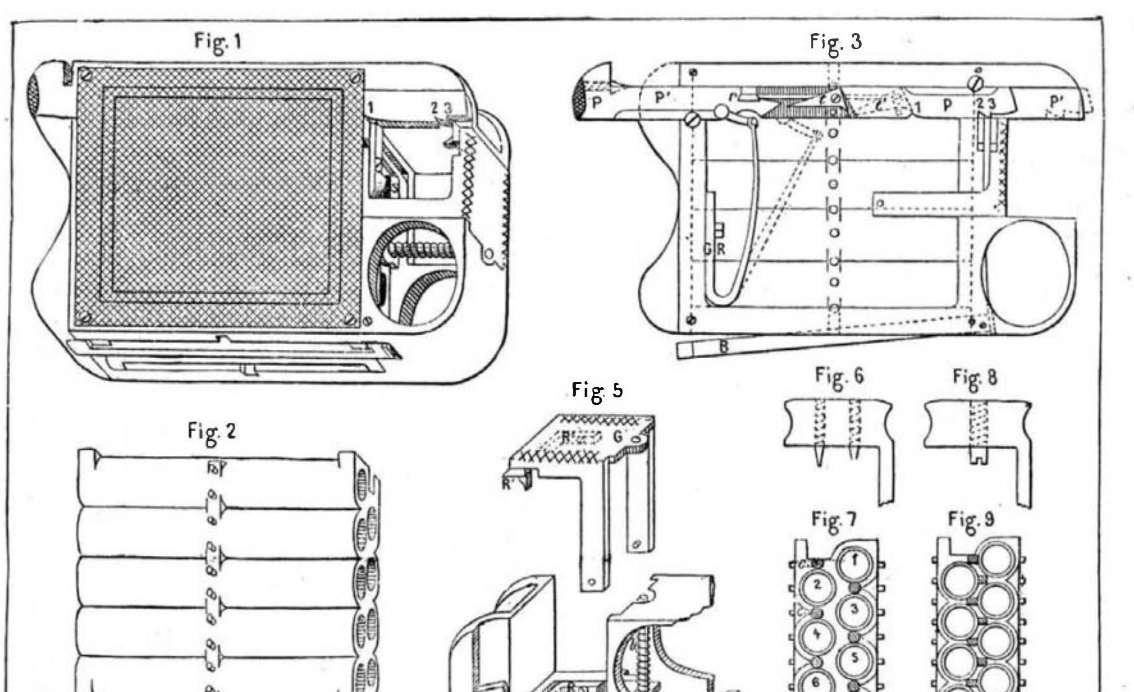


Fig. 10.—MANNER OF USING THE POCKET MITRAILLEUSE.

In the center of the hammer rod there is a notch (Fig. 3), in which is placed a triangular piece, *t*, which is movable around the screw which holds it, and which a small spring, *r*, tends to keep in the position shown by the dotted line, *t′*. On examining the figure it will be readily seen that, when the hammer is drawn back, this little piece, by passing under one of the pins of the rack, will cause the system of barrels to rise until the pin has lifted the small spring, *r*, which latter will at once fall back behind it so as to prevent the barrels from dropping again. In this position the hammer will be enabled to return to its first position without moving the combination of barrels, these being held, as they are, by the pin remaining over the little spring.

The mechanical part of the hammer just described faces the interior of the case, and is shown externally in the figure only, so that it may be more readily understood. The combination of barrels is provided with two racks, and operates just as well with one as with the other. If, after firing only a few shots, it be desired to put the weapon in the pocket, the barrels are withdrawn the rest of the way from their sheath by a backward and forward motion of the hammer, and are then reversed and put back into the case, so that the cartridges that were at the bottom are now at the top.



Figs. 1 to 9.—DE LABASTIDE'S POCKET MITRAILLEUSE.

A spring, R (Fig. 4), abuts against the hammer rod, and when this latter is pushed back, introduces itself into the first notch, 1, which is the safety catch (Fig. 1), and afterward fastens the central notch, 2, which is the catch of the weapon (Fig. 4). Under these two circumstances the hammer will be held very firmly, although the spring, G R, tends the while to pull it back.

To the trigger, G (Fig. 5), there is fixed another spring, R′, very nearly like the former, but provided with a tail piece whose point, when the trigger is pushed in, passes between the spring, R, and a projection under the trigger guard, and abuts against the latter, until the two springs, R R′, leave their catch (Fig. 3). Then the large spring acts with all its power, and percussion is effected. The firing having taken place, a spiral spring, *b*, draws back the trigger as seen in Fig. 1. If the trigger acts directly upon the hammer, its spring catches in the last notch, 3, carries it along, and, reaching the end of its travel, frees itself therefrom, as has just been said.

In the lower part of the apparatus there is a rod, B (Fig. 3), which is designed for disengaging the barrels.

If it be desired to use rim fire cartridges instead of central fire ones, a hammer which is made in a single piece must be employed. In such a case it will be possible to place the barrels much nearer each other, since there will be no longer any need of leaving vacant spaces between them to receive the points.

As may be seen, this weapon operates like the most improved revolvers. It may be fired either by drawing back the hammer by means of its head, or by pressing with the forefinger on the trigger.—*La Nature.*

Underground and Submarine Wires.

Our London contemporary *Nature* has an article on the above subject in which it says wires are almost invariably carried underground through towns. Copper wire insulated with gutta-percha, incased in iron pipes, is the material used. There are 12,000 miles of underground wire in the United Kingdom. There is a great outcry for more underground work in England, owing to the destruction to open lines by gales and snowstorms; but underground telegraphs, wire for wire, cost at present about four times as much as overground lines, and their capacity for the conveyance of messages is only one-fourth; so that overground are, commercially, sixteen times better than underground wires. To lay the whole of the Post Office system undergound would mean an expenditure of about £20,000,000. Hence there is no desire to put wires under ground except in towns. Besides, snowstorms are few and far between, and their effects are much exaggerated. Of the numerous materials and compounds that have been used for insulating purposes, gutta-percha remains the oldest and the best for underground purposes. It, like all other materials used for telegraphy, has been improved vastly through the searching power that the current gives the engineer.

The past ten years have seen the globe covered with a network of cables. Submarine telegraphs have become a solid property. They are laid with facility and recovered with certainty, even in the deepest oceans. Thanks to such expeditions as that of H. M. S. Challenger, the floor of the ocean is becoming more familiar than the surface of many continents. There at present 80,000 miles of cable at work, and £30,000,000 have been embarked in their establishment. A fleet of twenty nine ships is employed in laying, watching, and repairing the cables. The Atlantic is spanned by nine cables in working order. The type of cable used has been but very little varied from that first made and laid between Dover and Calais; but the character of the materials, the quality of the copper and the gutta-percha, the breaking strain of the homogeneous iron wire, which has reached ninety tons to the square inch, and the machinery for laying have received such great advances that the last cable laid across the Atlantic, by the Telegraph Construction and Maintenance Company, was done in twelve days without a hitch or stoppage.

THE *Journal de Pharmacie* says that a mucilage composed as follows will unite wood, porcelain, or glass: eight and a half ounces of gum arabic in strong solution, twenty grains of solution of alumina dissolved in two-thirds of an ounce of water.