(No Model.)

J. A. COLE.

SUBMERGED TUNNEL INLET.

No. 300,576. Patented June 17, 1884.

Fig 1

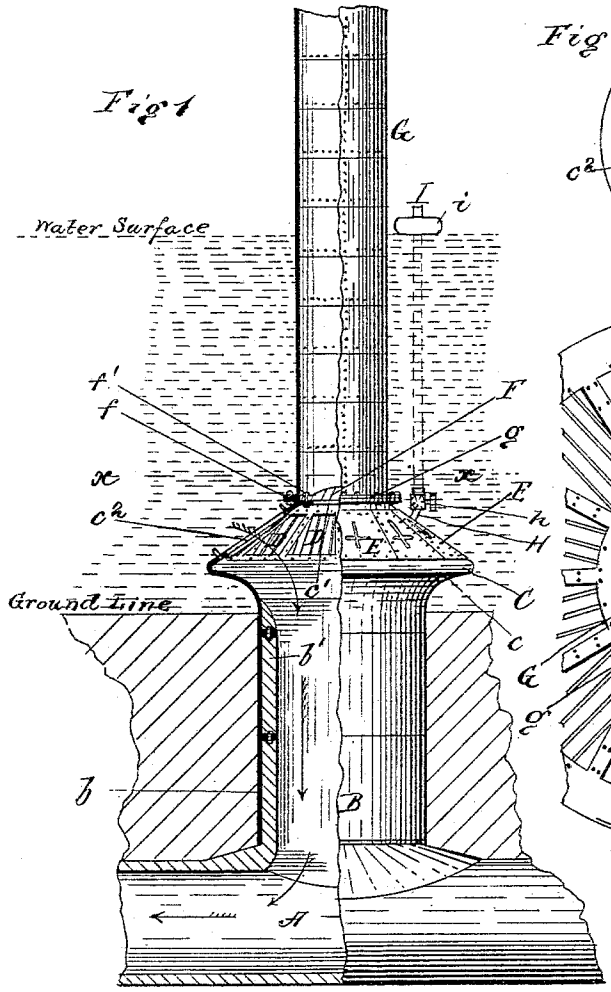
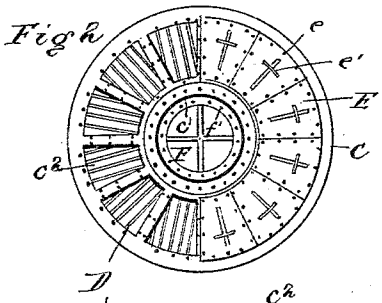


Fig 2



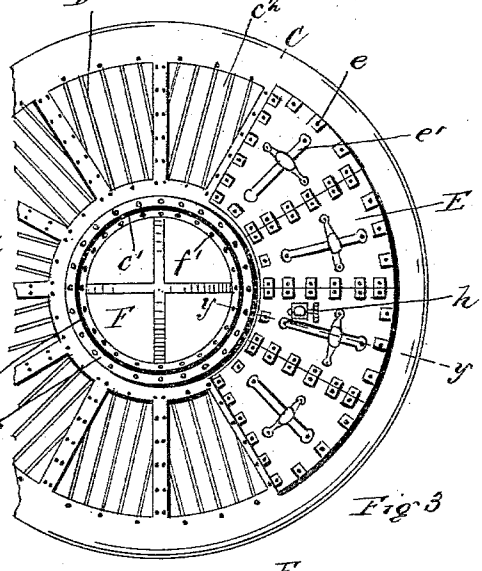
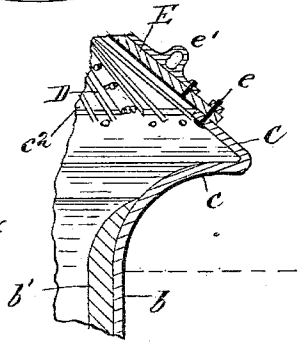


Fig 3

Fig 4



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UNITED STATES PATENT OFFICE.

JOHN A. COLE, OF HYDE PARK, ILLINOIS.

SUBMERGED TUNNEL-INLET.

SPECIFICATION forming part of Letters Patent No. 300,576, dated June 17, 1884.

Application filed March 24, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. COLE, a citizen of the United States, residing at Hyde Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Submerged Tunnel-Inlets, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents an elevation of a part of the tunnel with my improved inlet applied, the structure being partly in section; Fig. 2, a plan section taken on the line *x x*, Fig. 1; Fig. 3, a similar view, on an enlarged scale, with a portion of the cap broken away; and Fig. 4, a detail section of the same, taken on the line *y y*, Fig. 3, and on the same enlarged scale.

My present invention relates to inlets for water-tunnels, which are intended to be submerged or placed near the bottom of the body of water from which the tunnel leads.

The invention consists, mainly, in various improvements in the construction of the cap which surmounts the upright inlet-pipe, whereby the accumulation of sand is obviated, and the cap is readily closed until the tunnel is completed and ready for operation, when it is also opened with facility for the admission of water.

I will proceed to describe in detail the construction and operation of devices by which I have carried out my invention in practical form in one way, and will then point out definitely in the claims the special improvements which I believe to be new and wish to protect by Letters Patent.

In the drawings I have represented the ground-line or bottom of the body of water, and also the surface of the water, by suitable lines marked to distinguish them, respectively. The main tunnel A is some distance below the ground-line, as shown in Fig. 1 of the drawings. It may be of any ordinary construction, and my present improvement does not relate particularly to it. At the proper point an upright or inlet cylinder, B, rises until it is above the ground-line. This inlet-cylinder is preferably formed of large cast-metal rings *b*, which are sunk successively in the water-bed, in a manner well known, which I need not stop to describe here, until the main tunnel is reached, with which connection is then made in any suitable way, and preferably the interior is bricked up with a lining, *b'*, the ring-sections being fastened together by their respective end flanges, which is an ordinary device in structures of this kind. The cap C of this inlet-cylinder extends a little way above the ground-line with the same dimensions, and is then enlarged or flared, so as to present the appearance of quite a wide flange, *c*, projecting beyond the body of the cylinder a little way above the ground-line. Above this enlargement or flange the cap is gradually drawn in, so as to make it practically cone-shaped, as shown in the drawings, until finally the central opening, *c'*, is considerably smaller than the inlet-cylinder. This conical top of the cap is a skeleton frame, consisting of a central ring at the extreme top and bars running thence to the outer circumference or flange. It will thus be seen that all round the conical side of the cap there will be irregular-shaped openings c^2, through which, as well as through the central opening, water may be admitted to the inlet-cylinder. These openings are grated, being provided with bars D, arranged in any suitable way to prevent the entrance of refuse of any kind which would tend to fill up and clog the tunnel. The bars are bolted, or in any other convenient way fastened to the cap; or, if desired, they may be cast with the cap-piece.

In order to close the cap, I provide plates E of suitable size and shape to completely cover the openings in the conical side of the cap-piece, and to project beyond them somewhat on all sides, as shown in Figs. 2 and 3 of the drawings. These plates are securely fastened to the cap-piece by bolts *e*, passing through the edges of the plates and the parts of the cap-frame directly underneath and around the openings, as shown in Figs. 3 and 4 of the drawings. If desired, the plates may be provided with a loop or handle, *e'*, for convenience in removing them. A suitable circular plate, F, is also provided to close the central opening of the cap-piece, around which is an inside seat, *f*, on which this plate rests,

and to which it is fastened by bolts *f'*. It will thus be seen that the cap-piece may be entirely closed and kept so, even when submerged until the tunnel is ready for use. In constructing the inlet of the tunnel, the sections for the inlet-cylinder are fastened together, and the cap also placed in position and secured to the upper section-ring. The cap-piece is closed, except its central opening, and to its top is applied a pipe or cylinder, G, of sufficient length to extend above the water-surface, and built up section after section, as the inlet-cylinder is sunk in the water-bed, in a way that is well understood at the present time. The lower section of this pipe or cylinder is provided with a suitable flange, *g*, by which it is bolted to a corresponding flange on the head of the cap-piece, as shown in Fig. 1 of the drawings. It will be understood, of course, that this cylinder G operates as a coffer-dam while the structure is being built and completed. After the inlet-cylinder is sunk to the tunnel, the brick lining is built in, and preferably is extended part way up the cap-piece, so as to reach, if not extend a little above, the ground-line. When this is done, the central plate, F, is applied to close the upper or central opening in the cap, and then the pipe or cylinder G is removed, the bolts which fasten it to the cap-piece being removed by divers. When the tunnel is completed, and it is desired to let in water, these several plates E and F which close the cap-piece are readily removed by divers, when of course water is admitted from all sides through the cap-piece to the tunnel. The flanging or projecting outward of the cap-piece a little distance above the ground-line serves to prevent the accumulation of sand and other material, which would finally cover the inlet, for the water against the cap-piece underneath the flange will carry out and away the sand and other material, keeping the inlet-cap entirely free and unobstructed. This submerged inlet-cap, it will be understood, is some distance below the surface of the water, so that it is out of reach of accident from anything floating at or near the surface of the water; and it is obvious that the water taken near the bottom will ordinarily be less liable to contain impurities than that near the surface.

It will be evident to those familiar with structures of this kind that in operation it will be necessary to provide for the admission of air to the inlet when closed, under certain circumstances, and also to allow the air to escape therefrom under certain circumstances. For instance, when it is desired to pump out the tunnel, it is obvious that the submerged inlet must first be closed, but then air should be admitted thereto to effect the pumping; and, again, when it is desired to let water into the empty tunnel, there should be means provided for the escape of the air, or the inflow of the water will be prevented. To provide for the admission and exhaustion of air to and from the inlet when closed a short pipe, H, is attached to one of the closing-plates, which may be either one of the side plates or the central plate, as desired, or it may be attached to a fixed part of the cap. In the drawings I have shown this pipe on one of the closing-plates. It is provided with a stop-cock or valve, *h*, and when it is desired to make an air-passage from the interior of the inlet to the atmosphere above the water-body a tube, I, preferably flexible, is connected to this pipe, being supported at its upper end above the surface of the water by a float, *i*, or any other suitable means. A diver connects the lower end of this tube with the pipe H, opens the stop-cock, and obviously communication is at once established between the interior of the inlet and the atmosphere above the water.

I do not wish to be understood as limiting myself to details of construction as described above and shown in the drawings, for it is obvious that these may be changed in many particulars without modifying the main feature of my invention, and especially the particular construction of the upper or top portion of the cap-piece may be changed in many ways.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A submerged inlet-cap for tunnels, provided with a flange or enlarged projection extending out beyond the main body of the inlet and arranged a little above the ground-line of the water-bed, substantially as and for the purposes set forth.

2. The submerged inlet-cap C, of cylindrical form, and provided with a flange, *c*, projecting out beyond the body of the cap and arranged a little above the ground-line, in combination with the main tunnel A and the inlet-cylinder B, composed of the sections *b*, substantially as and for the purposes set forth.

3. A submerged inlet-cap, C, provided with a flange, *c*, extending outward from the main body a little way above the ground-line and having a conical top provided with side openings, c^2, and a central opening, *c'*, substantially as and for the purposes set forth.

4. The submerged inlet-cap C, provided with a conical top having side openings, c^2, in combination with detachable covering-plates E, for closing the side openings, substantially as and for the purposes set forth.

5. The submerged inlet-cap C, having a conical top provided with a central opening, *c'*, and side openings, c^2, in combination with the side closing-plates, E, and central closing-plate, F, substantially as and for the purposes set forth.

6. The submerged inlet-cap C, provided with a central opening, *c'*, and side openings, c^2, in combination with the closing-plates E and F and the removable pipe or cylinder G, substantially as and for the purposes set forth.

7. A submerged inlet for tunnels, in combination with a detachable air-tube, whereby communication may be made between the interior of the inlet and the atmosphere above the water-body when the inlet is closed, substantially as and for the purposes set forth.

8. The tunnel A, in combination with the inlet-cylinder B, inlet-cap C, air-pipe H, attached to one of the closing-plates and provided with a stop-cock, and the air-tube I, substantially as and for the purposes set forth.

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