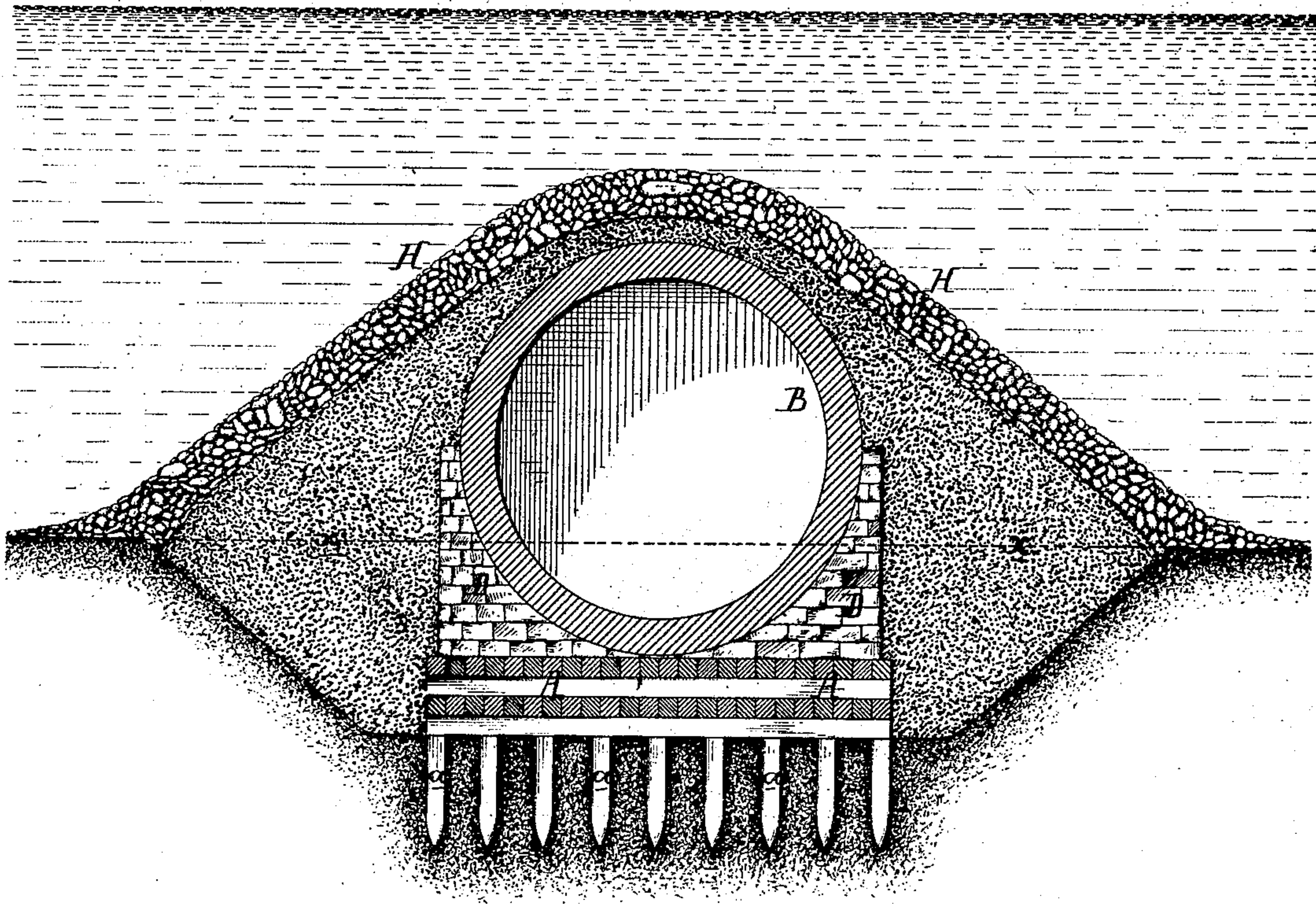


J. C. TRAUTWINE.
SUB-AQUEOUS TUNNEL.

No. 181,498.

Patented Aug. 22, 1876.



Witnesses
Richard G. Gardiner.
Harry Smith

John C. Trautwine
by his Attorneys
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UNITED STATES PATENT OFFICE.

JOHN C. TRAUTWINE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN SUBAQUEOUS TUNNELS.

Specification forming part of Letters Patent No. **181,498**, dated August 22, 1876; application filed August 4, 1876.

To all whom it may concern:

Be it known that I, JOHN C. TRAUTWINE, of Philadelphia, Pennsylvania, have invented an Improvement in Making Subaqueous Tunnels, of which the following is a specification:

My invention relates to the economical construction of subaqueous tunnels for railroads or common roads; and my improvement consists in constructing the tunnel above water and upon a strong wooden platform, which shall serve as the base of the tunnel after the latter has been sunk and placed in its final position in the water.

The accompanying drawing represents a section of my improved tunnel.

A is a substantial platform, composed of layers of beams properly framed together, and B is a tunnel proper, which, as shown in the drawing, is in the form of a hollow cylinder, but which may be varied in shape, as circumstances may suggest, the tunnel being combined with suitable masonry D, or other supporting appliances, and the whole being built on the platform A.

There are many instances in which a tunnel may be permitted to project above the bed of a river—as, for instance, when the river is not adapted to navigable purposes, or where the water is so deep that the projecting tunnel will not interfere with navigation.

In the present instance, the greater portion of the tunnel is represented as projecting above the bed *x x* of the river, is covered with earth-work, and protected by a layer, H, of rip-rap.

The bed of the river may be dredged for the reception of the tunnel, and piles *a* may be driven for a foundation, when the nature of the soil requires their use.

In some cases the tunnel with its base may project entirely above the bed of the river, and in others it may be so arranged that the upper portion of the tunnel is level, or thereabouts, with the bed of the river.

In ordinary tunnels there is always a depth of soil of twenty feet, or thereabout, between the lowest portion of the bed of the river and the top of the tunnel, so that the approaches to the tunnel must necessarily be long and expensive.

By arranging the tunnel so that the top is level with the bed of the river the approaches must necessarily be shortened, and still further shortened when a portion or the whole of the tunnel projects above the bed of the river.

The platform A may assist in floating the tunnel to its place by means of scows, pontoons, or other appliances; or the platform may be used as the floor of a temporary caisson around the tunnel, thus forming a vessel in which the tunnel may be floated to its place prior to being sunk. Or the floating platform may be placed above the spot which it is finally to occupy, and the tunnel may then be built upon it in the open air, and be allowed to sink by degrees as the building goes on. The gradual sinking may be effected by lowering-screws, or by converting the platform into a caisson or box by the addition of sides and ends. In other cases the tunnel may be built on its permanent platform on land, and launched into its final position by wheels, rollers, or slides.

According to circumstances the tunnel may at first be constructed either in one length only, or in sections, to be placed under water separately. In the latter case the ends of such sections may be temporarily closed by bulk-heads, which may be removed after the junctions of said sections have been completed by drivers, or by the aid of coffer-dams or otherwise.

The foundation upon which the tunnel is finally to rest must be prepared for it before the tunnel is sunk into its place, and may (according to circumstances) be either at or above or below the natural bottom of the water. This foundation may be prepared by any of the methods usually adopted for bridge-piers or other subaqueous structures.

Tunnels constructed in this manner will avoid the hazardous and costly excavation, and other processes involved in working below the bed of the water, and inasmuch as they need not be placed at as great depths as the ordinary process demands, their length and that of their approaches may usually be much reduced thereby, reducing also their cost.

I claim as my invention—

The mode herein described of making sub-aqueous tunnels—that is to say, the building of the tunnel above water on a platform, and the sinking of both, so that the said platform shall form the permanent base of the tunnel, all substantially as herein set forth.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

JOHN C. TRAUTWINE.

Witnesses:

HARRY HOWSON, Jr.,

HARRY SMITH.