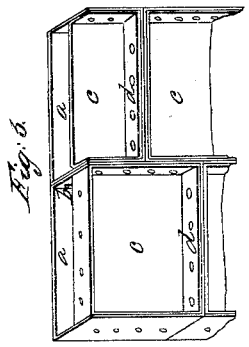
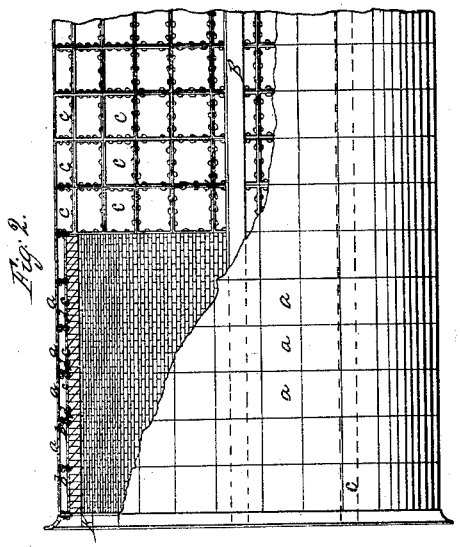
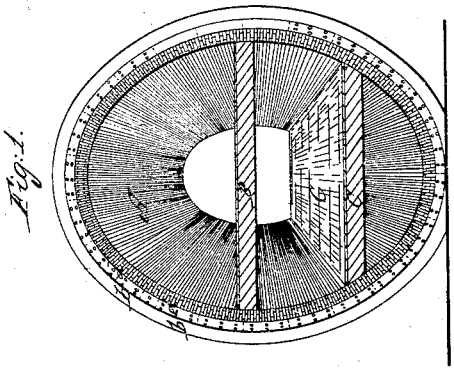
S. J. Seely.

Tunnel.

No. 46,527. Patented Dec. 20, 1864.







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UNITED STATES PATENT OFFICE.

SAMUEL J. SEELY, OF NEW YORK, N. Y.

IMPROVEMENT IN TUNNELS.

Specification forming part of Letters Patent No. **45,527**, dated December 20, 1864.

To all whom it may concern:

Be it known that I, SAMUEL J. SEELY, of New York, in the county and State of New York, have invented a new and useful Improvement in Tunnels; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, of which—

Figure 1 is an end view of the tunnel. Fig. 2 is a side view, partly in section; and Fig. 3 shows a detached portion of the iron wall.

My invention consists in constructing the surrounding inclosure of a tunnel of iron sections with angular edges, which are lined with similar sections, with space allowed between them for cement, all of the fastenings being within the structure, and the whole serving as a sustaining-wall in itself, or as a shield to an interior lining wall of masonry.

In constructing a tunnel under a river according to my improved method, I make perpendicular excavations at the ends of the proposed structure of the size and to the depth required, which will be lined with masonry and provided with elevators and stairways communicating with the tunnel. Simultaneously with the work of excavating for the tunnel the work of supplying the iron sections progresses, first placing at the end in its position the iron frame K, to which the first series are fastened, the metal plates or sections being previously prepared in the form shown at Figs. 2 and 3. These, with the method of attaching them, I will now proceed to explain. And first, the outer sections, *a a a*, &c., have their sides bent to an angle adapted to the radius of the interior. Their edges are also bent inward to the angle of ninety degrees, and thus present the form of a box, the sides of which are from six to twelve inches in depth, according to the thickness it is intended to make the wall. These are riveted at their angles of intersection by lines of rivets, *b b b*, before the sections constituting the lining are added. The inner sections, *c c c*, are formed similar to the other, but their sides have less depth or are more shallow. Their inner edges placed even with the edges of the other, there will be a space between them of sufficient thickness for a body of cement or concrete. These are riveted through the united angles *d d d*, consisting of four thicknesses. By the union of the several parts in this manner ribs are formed which extend around the arched inclosure and along its length which are stayed at their sides by the surface portion of the sections, which must be torn asunder before the ribs will yield laterally. This combination I regard as new and of much importance. By this means I am able to obtain a great degree of strength with comparative lightness of material, and which is still further strengthened by the addition of cement or concrete under pressure through openings provided for the purpose in the spaces before mentioned, which are afterward hermetically closed. This likewise effectually excludes water or dampness from the interior. A wall of iron and cement thus constructed may in itself be sufficient in many cases without an interior lining of masonry; but in order that the greatest degree of strength and durability may be obtained in the structure, I prefer to construct a wall of bricks and cement within the other, of suitable thickness to give to the whole permanence and solidity. I thus make use of the iron inclosure as a shield to the masonry, for which it is especially adapted and possesses many and important advantages over any form of shield before used. The work of supplying the iron sections will keep pace with the excavation. At no time need the earth be exposed a space greater than the size of one or two of them. This will prevent the earth from caving and water from inundating the work, and when finished (by freedom from water or damp) a wall can be built within that will remain permanently dry. It is important to notice that no rivets or bolts pass through from without to be fastened at the inside. A chief object in giving angles to the sides of the iron sections, as before explained, is that convenient access can be had by the workmen to all of these fastenings from within. The rivets pass through these angles from side to side, and thus the necessity of excavating beyond the exterior of the sections to give room for passing through from without the necessary fastenings is avoided, and the earth need not be disturbed beyond their exterior surfaces. Each of them, therefore, can be made to take direct and firm bearing against the earth when put in its place, giving essential security to the work as it progresses. Cast or malleable iron may in some cases be used with

advantage. The iron will be coated with substances adapted to prevent oxidation.

A is the tunnel. It is shown in an oval or elliptical form, but I do not propose to confine myself to that form. Within the tunnel I make provision for two roadways, one above the other, each with a double track. B is the upper and C is the lower roadway. The latter is for vehicles of various kinds, and the former is designed to receive rails and be used by cars as a railroad, with platforms for foot-passengers. These are constructed by beams and planks of such material and size as may be best suited for the purpose, and the whole is lighted and ventilated.

A means of descent into and ascent from the tunnel is provided at each end of the same.

Either stationary or other power may be used for moving the cars through the tunnel, as shall be deemed most suitable.

Where tunnels are constructed under the streets of cities in accordance with this plan, the superincumbent earth or roadway can remain undisturbed by reason of the fact that the work of construction is within the area of its own diameter. A structure of the kind will give a desirable location for water and gas pipes, together with sewers, access to which can at all times be had for repairs, &c.

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

A wall of concrete inclosed between iron plates with flanged edges, the flanges upon the outer plates serving as ties to prevent their sides from spreading apart by their connection with the other, and the inner serving as stays to the flanges of the other part and to confine the concrete in its place, substantiallay as described.

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Witnesses:

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