

(No Model.)

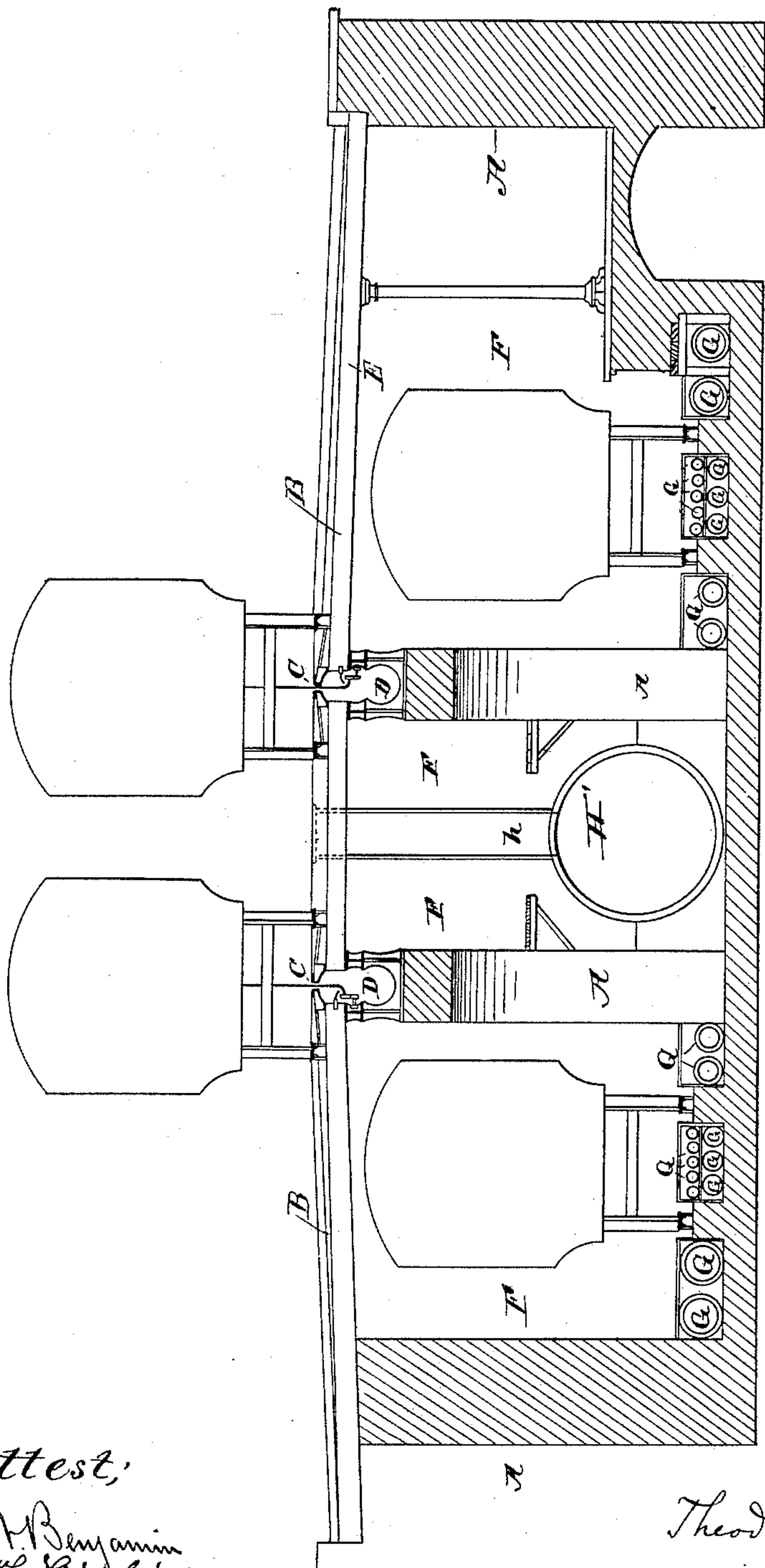
3 Sheets—Sheet 1.

T. G. GRIBBLE.

STREET RAILWAY TUNNEL AND METHOD OF CONSTRUCTING THE SAME.

No. 468,282.

Patented Feb. 2, 1892.



*Fig. 1.*

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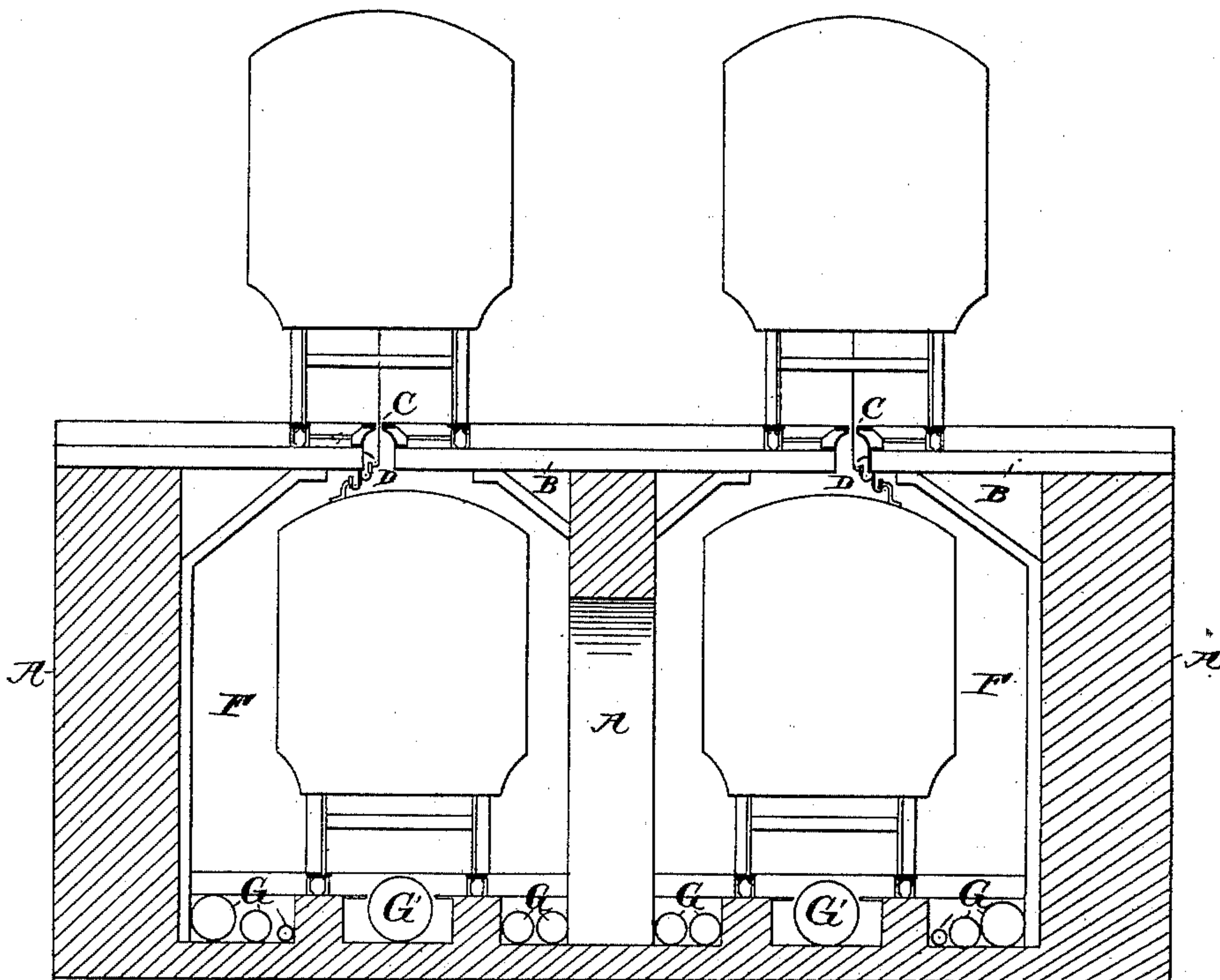


Fig. 2.

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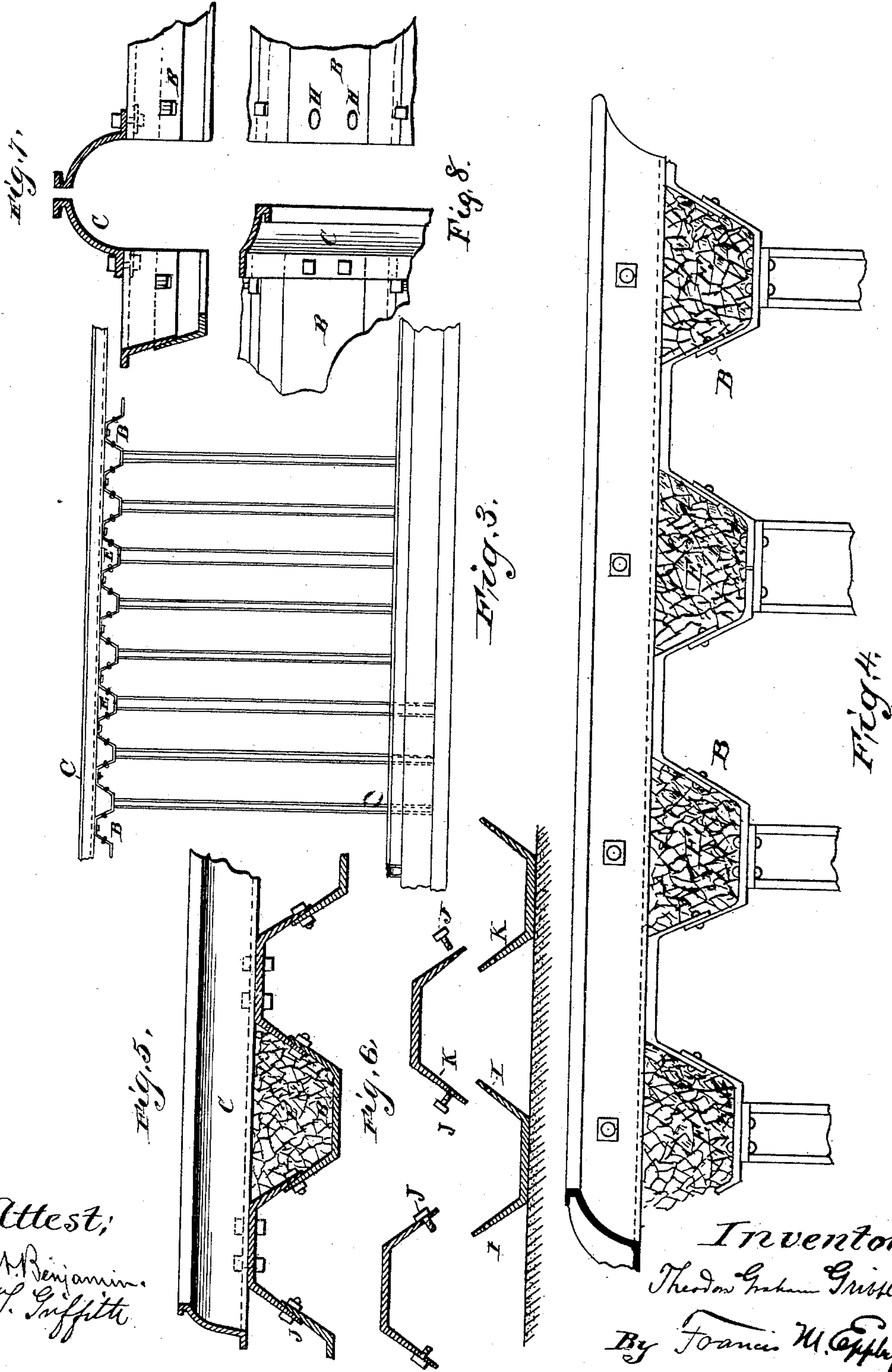
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# UNITED STATES PATENT OFFICE.

THEODORE GRAHAM GRIBBLE, OF YONKERS, NEW YORK.

STREET-RAILWAY TUNNEL AND METHOD OF CONSTRUCTING THE SAME.

SPECIFICATION forming part of Letters Patent No. 468,282, dated February 2, 1892.

Application filed January 22, 1891. Serial No. 378,677. (No model.)

*To all whom it may concern:*

Be it known that I, THEODORE GRAHAM GRIBBLE, a subject of the Queen of Great Britain, residing in the city of Yonkers, State of New York, have invented a new and useful Improvement in Constructing Street-Railway Tunnels or Underground Conduits; and I do hereby declare the following to be a full, clear, and concise description of the construction and operation of my invention, so as to enable any person skilled in the art to make and use the same, reference being had to the annexed drawings, making a part of this specification.

My invention is fully illustrated in the accompanying drawings, in which—

Figure 1 is a cross-section showing the cable-slots over the central walls. Fig. 2 is a cross-section with slots between the side walls. Fig. 3 is a detail view in the vertical plane of the slot. Fig. 4 is an enlarged view of the troughs, their supports, and one of the slot-rails. Fig. 5 is a detail of the troughs and one slot-rail. Fig. 6 shows the sections forming the troughs. Figs. 7 and 8 are details of the slot-rails and troughs and the means for fastening them together.

The same letters indicate corresponding parts in all the figures.

In Fig. 1, A A are the side walls; B, the roof-floor, of corrugated or trough iron. C C are the slot-rails. D D are the conduits. E is the trough of the flooring. F is the central portion of the excavation. G G are pipe-mains.

H H, Fig. 8, are the attachments of the slot-rails with oval bolt-holes, and H', Fig. 1, shows a sewer.

The object of my invention is to construct a street-railway tunnel or underground conduit in such a manner as to interfere as little as possible with the street traffic, and also to utilize the roof of such structure as a support for the slot-rails of a surface cable or other railway.

Instead of the ordinary arches of masonry or systems of girders with flooring-plates, which all require considerable depth of excavation, I use corrugated roof-floor troughing of iron or steel, which, from its construction hereinafter described, may be laid down

and connected together on the surface of the ground either in single troughs or combined, and which requires little or no more excavation than the removal of the pavement. This corrugated floor has the following advantages: It acts temporarily as a floor and affords sufficient bearing-surface upon the soil to render it self-supporting during the process of constructing the side walls underneath. It also acts permanently as a bridge, after the earth between the walls is removed, possessing sufficient strength to support all the loads of the street traffic without any assistance from cross-girders. It also affords a ready means of supporting pipes by means of suspension-rods in a manner and with a facility impossible by the usual means of construction. The peculiarity of its form renders it possible to attach a slot-rail to its extremity, and thus leave a permanent slot for the purpose of mechanically operating the cars of a surface-railway without the use of yokes.

The flooring is composed of channel-irons having flared and tapered sides K, and they resemble a form of metallic cross-ties used in European and Indian railways. They are laid alternately, web downward and upward, and are attached together by bolts or rivets J, so as to form a continuous flooring.

The method of construction is as follows: I first remove the pavement from that portion of the street which is to receive the flooring to a depth sufficient to receive the same—viz., from six to twelve inches. If it is necessary to perform the operation while the street traffic is in motion along the street, I remove from three to five feet of the paving at such a time during the night when the street surface is free from the business traffic. I remove just as much pavement as I am able to replace with my flooring and new pavement the same night. Having thus excavated I lay down the lower portion of the flooring, web downward, upon the ground, spacing the lower sections the proper distance apart to receive the upper portions. I then lay upon them the upper portions and insert the screw-bolts J J without tightening them up. I thus avoid the necessity of getting under the floor to bolt it together. The screw-bolts J J hold the flooring secure until after the internal exca-



vation is removed, when nuts are screwed on from underneath to complete the attachment. When the flooring is thus laid, I fill the spaces E, formed by the connected flooring, with concrete or analogous material to a depth sufficient to leave a smooth and level surface, upon which I lay the pavement. I then drive headings under the floor in the space the side walls are intended to occupy, beginning at a point midway the length of such walls or any section thereof. I then build up the walls, beginning at the ends and working back to the commencement. I then complete the excavation by removal of the inclosed earth. Access to the headings for the purpose of removing the material is obtained from shafts in the street when the work is proceeding, or, if preferable, from shafts in the side streets connected by adits with headings. To fix the slot-rails in place I attach them temporarily with screw-bolts to the ends of the channel-irons constituting the corrugated floor when laying it. The ends of the bolts pass through oval bolt-holes H H, Fig. 3, in the flooring, and the nuts are attached after the earth is removed. The oval form of the hole permits a slight lateral adjustment of the slot-rail to compensate for any displacement which may have occurred during the excavation.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The herein-described method of constructing subways or tunnels, which consists, first, in laying upon the surface of the ground under which the tunnel is to run a floor or roof having itself sufficient strength and bearing-surface upon the soil to permit side walls or supports to be built from underneath without temporary underpinning; second, building up supporting-walls from underneath such roof or sides thereof, and, third, excavating the soil under the roof and between the supports, so as to form the finished tunnel, substantially as specified.

2. A roof for tunnels or subterranean structures, adapted, also, to support cable or other conduit-railway structures, said roof consisting of a series of metallic plates with flared and tapered sides bolted or otherwise connected together, so as to form troughs adapted to be filled with concrete or analogous material, and a slot-rail secured to and supported by the margin formed by the ends of said plates, substantially as specified.

THEODORE GRAHAM GRIBBLE.

Witnesses:

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G. P. EVANS.