

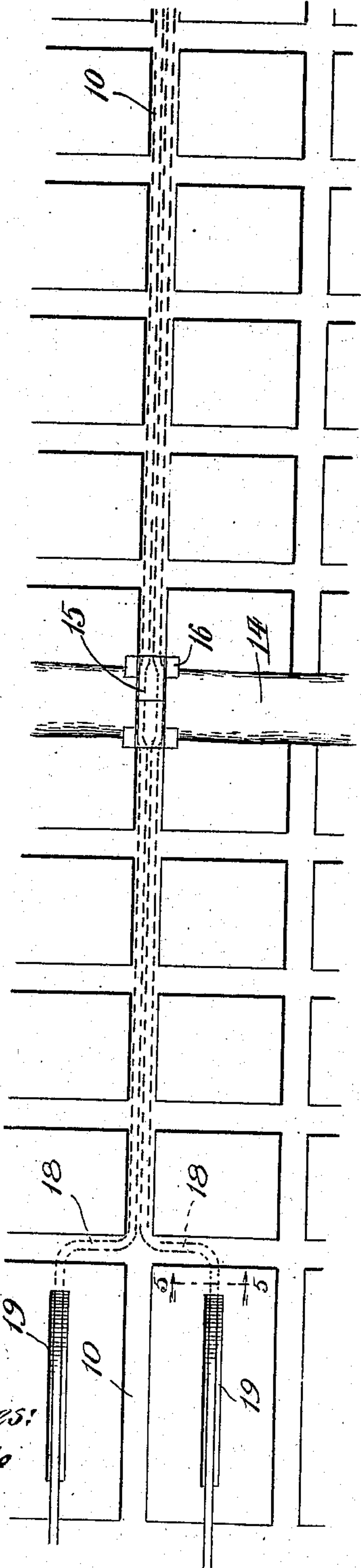
G. W. JACKSON.
TUNNEL AND SUBWAY.
APPLICATION FILED JULY 6, 1908.

899,735.

Patented Sept. 29, 1908.

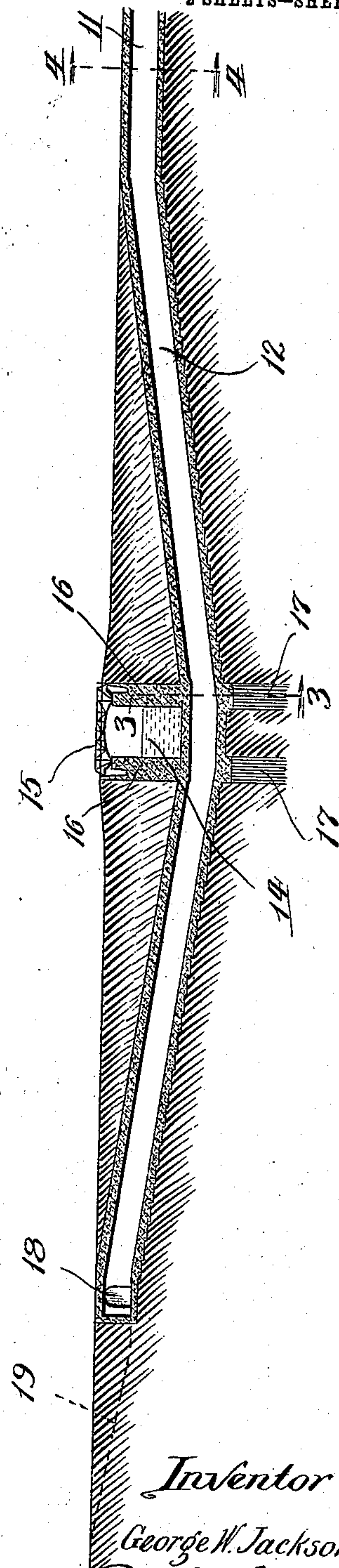
2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
J. H. Alfede
W. Hall

Fig. 2.



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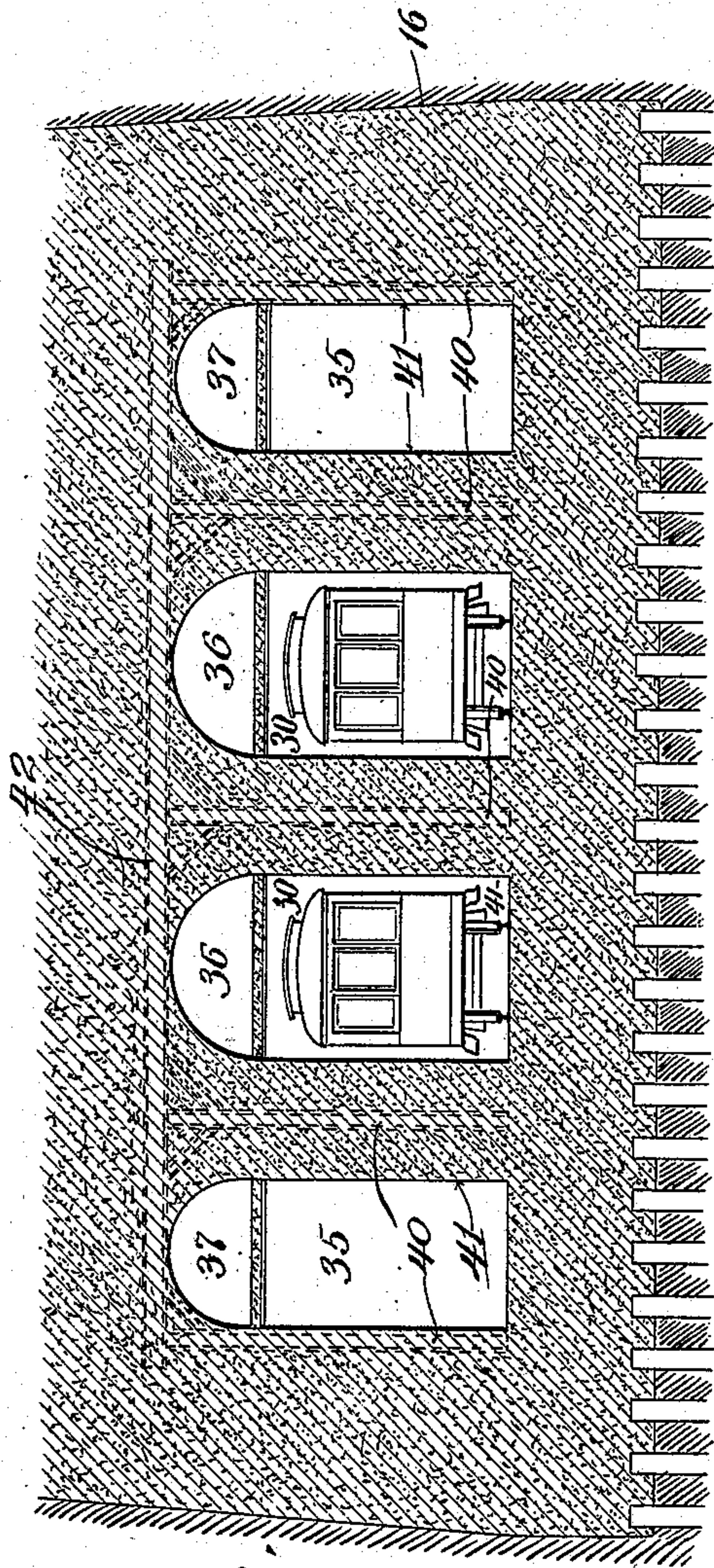


Fig. 3.

Witnesses:
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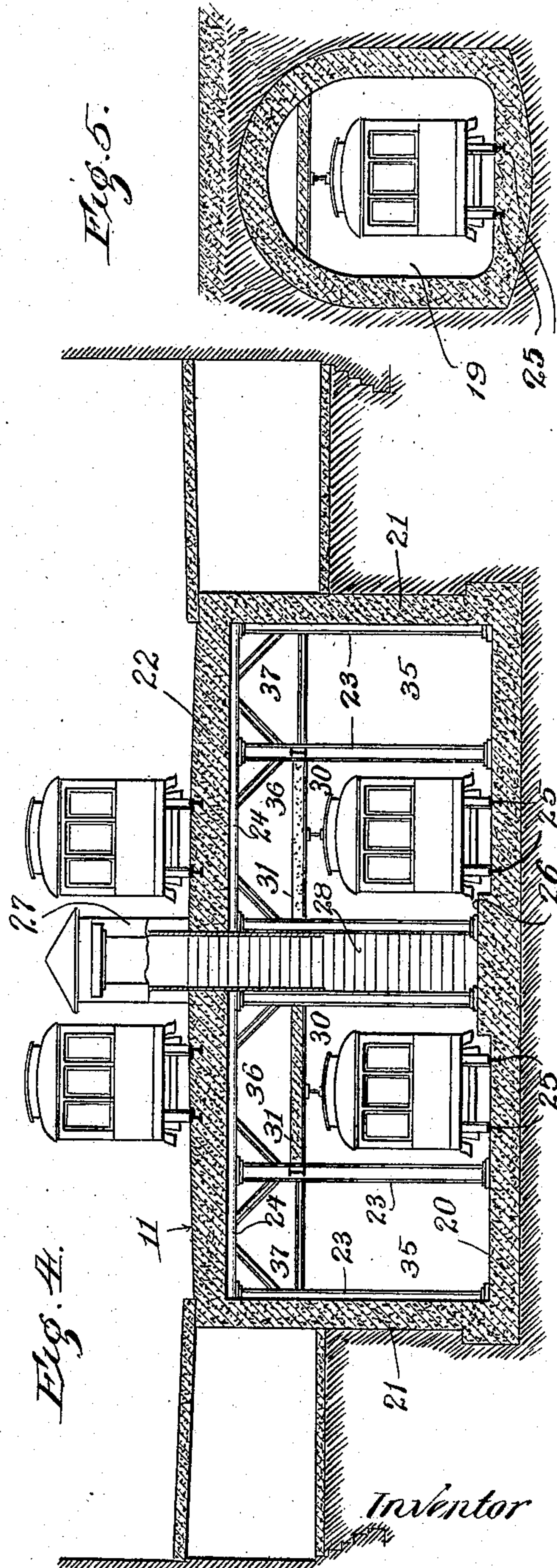


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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TUNNEL AND SUBWAY.

No. 899,735.

Specification of Letters Patent.

Patented Sept. 29, 1908.

Application filed July 6, 1908. Serial No. 442,032.

To all whom it may concern:

Be it known that I, GEORGE W. JACKSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tunnels and Subways; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to tunnels and subways constructed beneath the surface of streets for street railways, and the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims.

One of the objects of the invention is to arrange and construct a tunnel beneath a waterway, which connects traction lines on the opposite sides of the waterway, by a method which avoids the necessity of laterally diverting the line of the railway in the tunnel from the line of the street or roadway in or on which the traction lines are located at the sides of the waterway, and also avoids the necessity of purchasing adjoining valuable property through which to extend or in which to build the diverted tunnel.

Another object of the invention is to so construct and arrange approaches to a tunnel or subway which lead from the street grade to the lower tunnel or subway level as to avoid the closing of the street, beneath which the tunnel or subway extends, at the point where the tunnel or subway rises to the street grade.

In accordance with the first object of my invention I propose, when building a tunnel beneath a waterway which is spanned by a bridge that connects the roadway at the two sides of the waterway beneath which the tunnel is built, to extend the bore of the tunnel through the masonry foundation piers of the bridge and to make the walls of the tunnel and the bridge pier parts of an integral structure. When the tunnel is to be constructed beneath an existing bridge provisions will be made for supporting the superstructure of the bridge while the bridge piers are being changed or remodeled to carry the bore of the tunnel therethrough, and the said piers will be reinforced by inserted metal beams and columns at the sides and top of the tunnel bore or passage-ways

therein to preserve the original strength or integrity of the piers and to provide solid, strong and durable walls for the tunnel. If the bridge piers and tunnel be built concurrently, the piers will be fashioned in the first instance to form therein the tunnel walls. This method of constructing and arranging a tunnel with respect to the piers of a bridge above the tunnel avoids the objection and expense of diverting the traction lines, and also avoids the expense of purchasing and maintaining properties at the sides of the bridge or roadway through which the diverted tunnel extends. In instances where the congested condition of large cities warrant and require the construction of such tunnels, a condition of high priced property adjoining the tunnel almost invariably prevails, and the expense of purchasing and maintaining such property or paying large rents for easements thereon is to be avoided if possible. By carrying the bore of the tunnel through the masonry foundation piers of a bridge and constructing the piers and walls of the tunnel as integral parts of a single structure I am able to avoid the objections noted.

In accordance with the second object of the invention I propose to terminate the double track tunnel or subway below the street grade and connect said tunnel or subway by lateral branches with approaches which rise to the street grade at the side or sides of the axis of the tunnel or subway bore, or the street beneath which the tunnel or subway is built. This method of separately bringing the railway tracks to the street grade at the side or sides of the tunnel or subway bore avoids the closing or partial closing of the street beneath which the tunnel is located, which occurs when the full width of the tunnel or subway is brought to the street grade. The said tunnel or subway approaches may usually, where local conditions permit, be brought to the street grade beneath property at the side of the street in line with the tunnel or subway proper. Such method is of special advantage if said tunnel or subway constitutes part of a subway system leading from a central or congested portion of a large city to the outer, less densely populated vicinities where property is relatively inexpensive. The subways of such systems which are built beneath the streets of a city may be of substantially the width of the streets, and in the

event that such tunnel or subway is brought directly to the street grade as a single bore it would result in entirely closing the street for the uses of the public at the street grade.

5 When the local conditions are such that the tunnel or subway is brought to the street grade in a part of the city where property is comparatively inexpensive it will be financially practical to purchase rights of way for

10 the approaches in blocks at the side or sides of the street in line with the tunnel or subway, and the practicability of this method will be further enhanced by reason of the fact that buildings for commercial and other

15 uses may be built upon such property over the approaches.

I have herein shown my improvements as applied to a tunnel extending beneath a waterway and which constitutes the continuation of a subway built beneath the streets of a city. It will be understood, however, that certain of the improvements herein claimed may be applied to a tunnel which constitutes a connection between surface

20 lines on opposite sides of a waterway.

As shown in the drawings:—Figure 1 is a diagrammatic plan or plat illustrating a main roadway or street and intersecting roadways or streets, showing a tunnel beneath the

30 main roadway or street, and a bridge spanning a waterway which intersects said street or roadway. Fig. 2 is a sectional view of the tunnel, indicating an approach at one end thereof and a subway at its other end, and illustrating the manner of carrying the

35 bore of the tunnel through a bridge pier or foundation. Fig. 3 is an enlarged vertical section, taken on line 3—3 of Fig. 2. Fig. 4 is a vertical section, taken on line 4—4 of

40 Fig. 2. Fig. 5 is a vertical section of one of the approach branches of the tunnel.

In said drawings, 10 designates a roadway or street beneath which a double track subway 11 is constructed, and 12 designates a

45 tunnel connected with said subway. 14 designates the waterway, as a river, which intersects said roadway or street 10 and beneath which said tunnel extends. 15 designates a bridge spanning said waterway, and

50 16, 16 designate concrete piers which support the said bridge, said piers being supported on a piling foundation 17 driven into the earth beneath said piers. Said bridge, as herein shown, is of the bascule type and

55 requires masonry piers of large dimensions and great strength to support the same.

18, 18 designate the branches leading laterally from the end of the tunnel which approaches the street grade, and 19, 19 designate the tunnel approaches which extend from the levels of the branches to the street

60 grade. As herein shown, said branches 18, 18 extend oppositely from the end of the tunnel and the tunnel approaches 19 are located on the property at opposite sides of

the street 10 and between the same and adjacent parallel streets.

The general character or type of the subway shown, and which is connected with the tunnel described, is illustrated in Fig. 4, and is of the type described in my concurrent application for U. S. Letters Patent filed on the 6th day of July, 1908, Serial Number 442,033. It comprises a bottom wall or floor

70 20, side walls 21, 21 and a roof 22 which is supported on a plurality of posts 23, 23 and horizontal girders or beams 24, 24. The two tracks 25 of said subway are located near the center of the subway and separated by a walk or platform 26, access to and egress

75 from which is had from an entrance 27, located in the center of the street, and a flight of stairs 28. The said car tracks are arranged on each side of the platform in sections 30, 30 which are provided with sub-roofs or horizontal partitions 31, 31 which prevent the leakage of water to the track or car sections. The subway is provided at the sides of said car sections with the aisles or passages 35, 35 which are designed to receive electric wires, pipes and the like of various public and semi-public utilities. The spaces 36 above the sub-roof or horizontal partition 31, as well as the spaces 37 above the passages 35, may also carry such wires,

80 85 90 95

pipes and like appliances of public and semi-public utilities, either parallel with the subway or transversely across the subway at intersecting streets.

The tunnel may and usually will be arranged in cross-section to correspond with the arrangement of the subway described. The same general line of division of the tunnel will also be continued through the bridge or pier foundation, as indicated in Fig. 3, with the exception that the walls between the car spaces or passages 30 and side spaces or passages 35 will be solid or continuous. If the tunnel be constructed after the piers have been built, the bridge superstructure will be supported by any suitable or practical means while the pier is being reconstructed to provide the passages of the tunnel, thus not interfering with the usual use of the bridge. Said pier and the walls of the tunnel are strengthened by vertical posts 40, 40 in the partition and side walls 41, 41 of the tunnel, and horizontal beams or girders 42 in the roof of the tunnel are connected with said posts by braces in the manner here-

100 105 110 115 120 125

In Fig. 5 is indicated a cross section of one of the tunnel approaches at or near the level of the lateral branch connecting it

130

with the main part of the tunnel. The said lateral branches and tunnel approaches are arranged to accommodate but a single track 25, as herein shown, and inasmuch as said tunnel approaches are diverted from the main line of the street, no lateral passages will be required at the sides of the trackway to carry corporation or municipal utility appliances as in the main body of the subway or tunnel.

I claim as my invention:—

1. In combination, a bridge spanning a waterway, its foundation piers, and a tunnel extending beneath said waterway, the bore of which extends through the foundation of the bridge, the walls of the tunnel and the bridge piers comprising an integral structure.

2. In combination, a bridge spanning a waterway and connecting a roadway or street on the two sides of the waterway, its masonry foundation piers, and a tunnel beneath the roadway and extending transversely beneath the waterway, the bore of which extends through the foundation piers, the walls of said tunnel and foundation piers comprising an integral structure.

3. In combination, a bridge spanning a waterway, its foundation piers, and a tunnel extending beneath said waterway, and the bore of which extends through the piers of the bridge, the walls of the tunnel and bridge piers comprising an integral struc-

ture, and metal posts and girders embedded in the masonry piers to reinforce the same and the walls of the tunnel. 35

4. In combination, a roadway or street and a tunnel or subway beneath the same, said tunnel or subway terminating in two separate lateral branches, and inclined approaches connected with said branches and located at the side of the axis of the bore of the tunnel or subway. 40

5. In combination, a roadway or street, a tunnel or subway beneath the same, separate lateral branches extending in opposite directions from the tunnel or subway and inclined approaches at the sides of the axis of the bore of the tunnel or subway connected with the ends of said branches. 45 50

6. In combination, a roadway or street, a tunnel or subway beneath the same, separate lateral branches extending from the tunnel or subway, and inclined approaches connected with said branches and extending through the block between said street or roadway and adjacent streets or roadways. 55

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 21st day of May A. D. 1908. 60

GEORGE W. JACKSON.

Witnesses:

M. W. CLUXTON,
J. C. MOORE.