(No Model.)

F. N. BLANC.

SUBWAY STRUCTURE FOR CITY STREETS.

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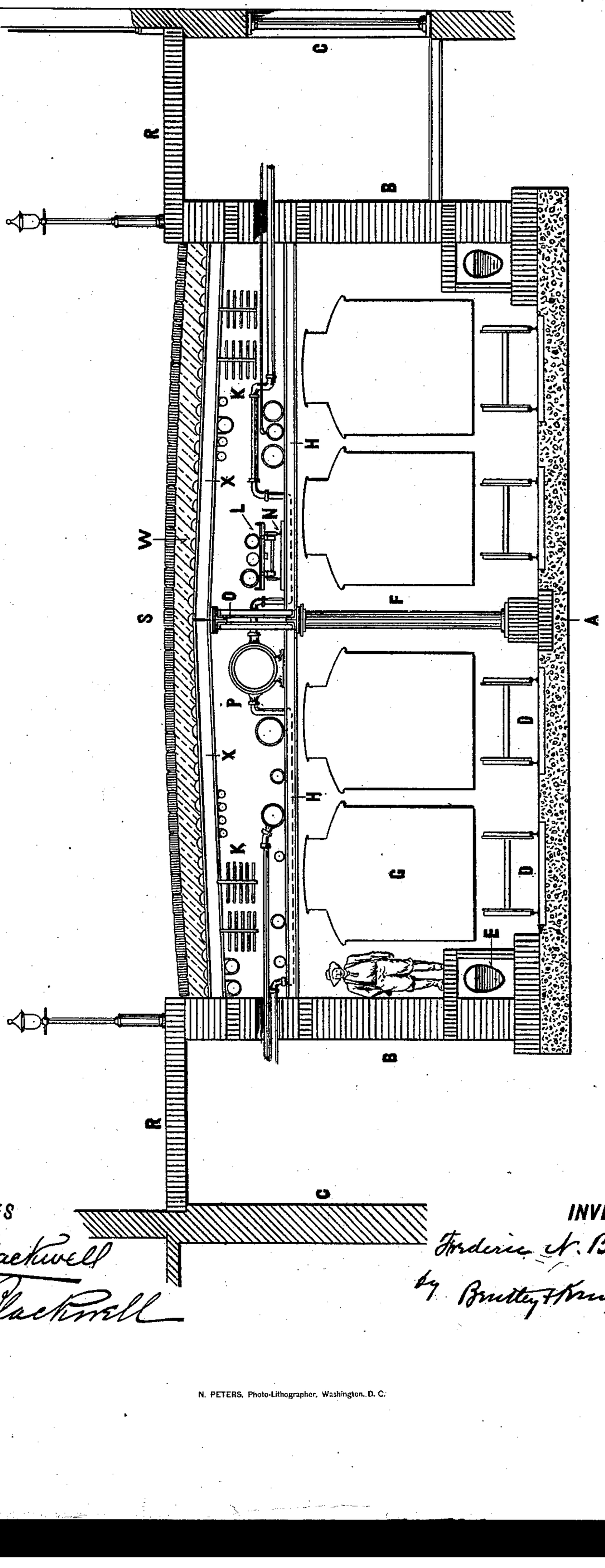

WITNESSES

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SUBWAY STRUCTURE FOR CITY STREETS.

SPECIFICATION forming part of Letters Patent No. 358,331, dated February 22, 1887.

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To all whom it may concern:

Be it known that I, FREDERIC N. BLANC, a citizen of France, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Subway Structures for City Streets, of which the following is a specification, reference being made to the accompanying drawings.

My invention relates to those subways designed to accommodate one or more railway-tracks for the transportation of passengers, and also to receive all the pipes, sewers, tubes, and wires usually placed in the streets of a city.

In structures of this kind it is often essential to the accommodation of the traffic and the financial success of the undertaking that there should be four tracks—two for way and two for express trains. Since such streets are usually comparatively narrow and lined with large and heavy buildings, it is exceedingly difficult to secure the necessary lateral space for the four tracks and at the same time not to come too close to the foundations of the buildings, while the existence of an intricate aggregation of pipes of all kinds still further complicates the difficulty. It has been proposed in such a situation to construct a series of tunnels with very thin walls and galleries on either side of them for pipes and wires. It has also been proposed to build the pipe-gallery below the road-bed of the railway. Both of these plans, however, necessitate the entire removal of all pipes and wires as at present laid and great inconvenience to consumers while the change is being effected. A change of level is also necessitated in the pipes, either throughout their entire length or at intervals where stations are located, which is liable to seriously impair or render useless existing systems. The former plan, moreover, renders necessary a division of all pipe systems, so that there shall be a line for each side of the street, and the latter plan weakens materially the foundation of the structure.

My invention consists of a structure of stone, iron, or suitable material built below the street level and upholding the ordinary paved surface, and divided horizontally into two parts, the lower one being provided with any desired number of railway-tracks adapted for ordinary passenger traffic and the upper one at the ordinary pipe-level, and of depth and capacity only such as shall adapt it for the reception of distribution-pipes of all kinds—such as gas, water, pneumatic, or steam pipes, and for electric wires—the design being to avoid too great depth of tunnel. This arrangement of lower railway-tracks and upper pipe gallery, besides being very simple and effecting an enormous saving in cost of construction, has the following distinct advantages which are not attained by any other systems, although the subject has long been carefully considered by the most skillful engineers: First, the entire width of the street is available for railway-tracks, so that the structure can be wholly within the vault-line and no danger to the house-foundations will result from the excavation; second, all existing pipes are left in their original positions, being supported by the transverse beams or partition between the pipe-gallery and railway as the work of construction proceeds; third, both old and new pipes can be readily connected with either side of the street; fourth, pipes and wires crossing the street can remain at their present level and not have to be diverted below the structure; fifth, there is no interruption of gas, water, or other service during construction; sixth, the sewer will always be kept at the required depth; seventh, room for track walkers and inspectors may be left beside the railway; eighth, at stations, switches, and at intersecting roads there will be no interference with the pipes; ninth, the pipe-gallery will be entirely independent of the railway-tracks, and will be readily accessible for all purposes; tenth, a solid unitary foundation for the whole structure will be maintained and will support directly the heavy weight of the trains.

In the accompanying drawings, S is the paved surface of the street.

A is a solid unbroken foundation extending from side to side of the street.

B B are the vault-walls of the adjacent buildings, which form also the side walls of my structure.

C C are the building-walls.

F is one of a series of columns midway between B B, supporting the girder O, from the top of which extend transverse beams X X, carrying roof W. The large tunnel or chamber thus formed is horizontally divided into two parts by transverse beams H H, extend-

ing from the lower chord of girder O to side walls, B B. Beams H H are at a sufficient height above the foundation A to permit the passage beneath them of railway-cars G, and a space is left above them sufficient only to form a pipe-gallery accommodating the necessary pipes, wires, &c., and permitting the passage of workmen. In the lower space there are four tracks, D, two being for express and and two for way trains. There will also be, by means of my arrangement, sufficient space to permit of the sewer being laid on the track-level on one or both sides of the tracks, as shown at E. This sewer may be covered over, so as to form a walk upon which track inspectors and repairers may be safe from passing trains. The sewers will also be at a constant desired depth.

In the pipe-gallery, above beams H H, are placed pipes P of all descriptions and electric wires K of all kinds. Since this gallery extends across the whole width of the structure, the same system of pipes can supply both sides of the street.

A floor sufficient for the accommodation of workmen and to protect the railway from any drippings or odors will be laid on the beams H H, and also a small railway-track, N, on which a truck, L, carrying pipes, tools, &c., may be run.

The stations will be on the railway-level and extend back transversely to the structure into intersecting streets or other unoccupied spaces. The pipe-gallery will thus never come into interference with the station, and at intersecting streets the crossing pipes will enter transverse openings into the pipe-gallery of the structure.

With branching structures the pipe-galleries will be correspondingly branched, and in both cases will be above the railway-tracks, so that there need be no deviation of pipes around the structure, as is necessary with side pipe-galleries.

I am aware that it has been proposed to construct two tunnels under a street, one above the other, and each adapted for ordinary city railway-traffic. In my invention, however, the upper compartment of the tunnel, which I term a "pipe-gallery," is in no case intended or adapted for traffic. It is of a depth no greater than is necessary for the accommodation of the pipes and wires, and is adapted definitely and exclusively for the reception of the large accumulation of water, gas, steam, pneumatic, and electric distribution systems which are now to be found in every important street.

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

1. A subway structure for city streets, supporting above it the paved roadway of the street and divided horizontally into two parts, the lower part being provided with one or more railway-tracks for passenger service, and the upper part placed immediately below the street-surface and constituting a pipe-gallery for the reception of pipes, wires, and similar distributing systems.

2. A subway structure for city streets, adapted to occupy the entire space between the vault-walls of the houses and support the paved roadway of the street, and provided with a pipe-gallery in its upper part on the ordinary pipe-level of the street, the said gallery extending substantially from one vault-wall to the other, so as to permit a single distributing-pipe to supply both sides of the street.

3. The combination of foundation A, side walls, B, intermediate support, F, the railway-tracks, roof W, supported on F, and paved externally to form the roadway of the street, and beams H, dividing the structure horizontally into two parts, the lower one adapted for the passage of cars G, and the upper one containing pipes P, substantially as described.

4. A subway structure for city streets, supporting the paved roadway of the street, provided with a pipe-gallery in its upper part at the ordinary pipe-level of the street, and with two or more railway-tracks in its lower part below the pipe-gallery, and having one or more sewers or sewer-pipes in the said lower part beside the railway-tracks.

5. A subway structure for city streets, provided with a pipe-gallery on the ordinary pipe-level of the street and accessible from both sides of the street, and provided with transverse openings leading into said gallery at intersecting streets for receiving the pipes from said streets.

6. A subway structure for city-streets, adapted for the reception of one or more railways for passenger-traffic, provided with stations beside the railway-tracks extending transversely to the structure, and with a pipe-gallery above the level of tracks and stations.

7. The combination, with a subway structure for city streets, substantially as described, of a branching structure on the same level, branching railway-tracks extending into the structures, respectively, and a branching pipe-gallery above the tracks for the reception of the pipes and wires pertaining to the street.

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Witnesses:
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