

O. VANDENBURGH.

Ventilating Underground or Subsurface Railways.

No. 136,563.

Patented March 4, 1873.

Fig. 1.

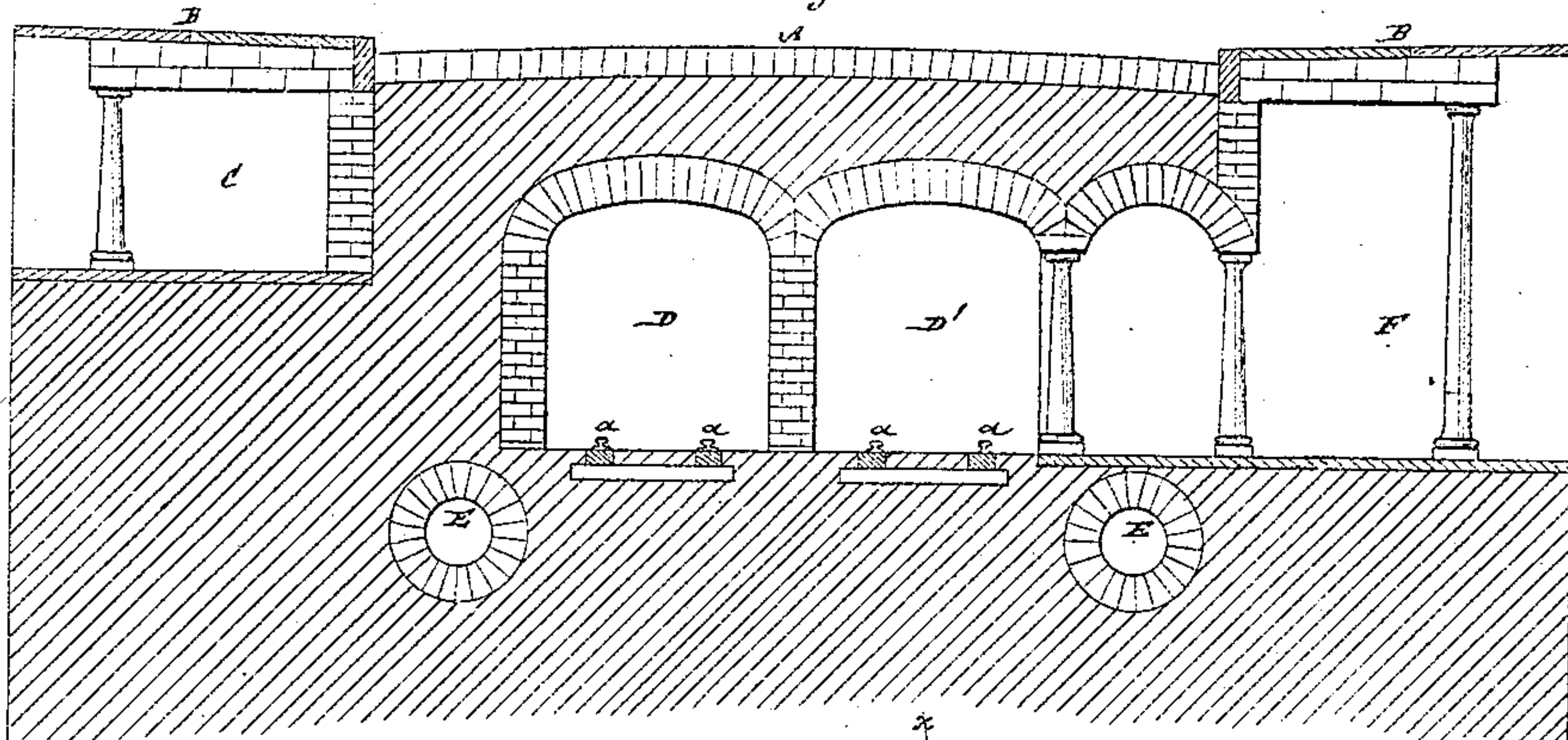


Fig. 2.

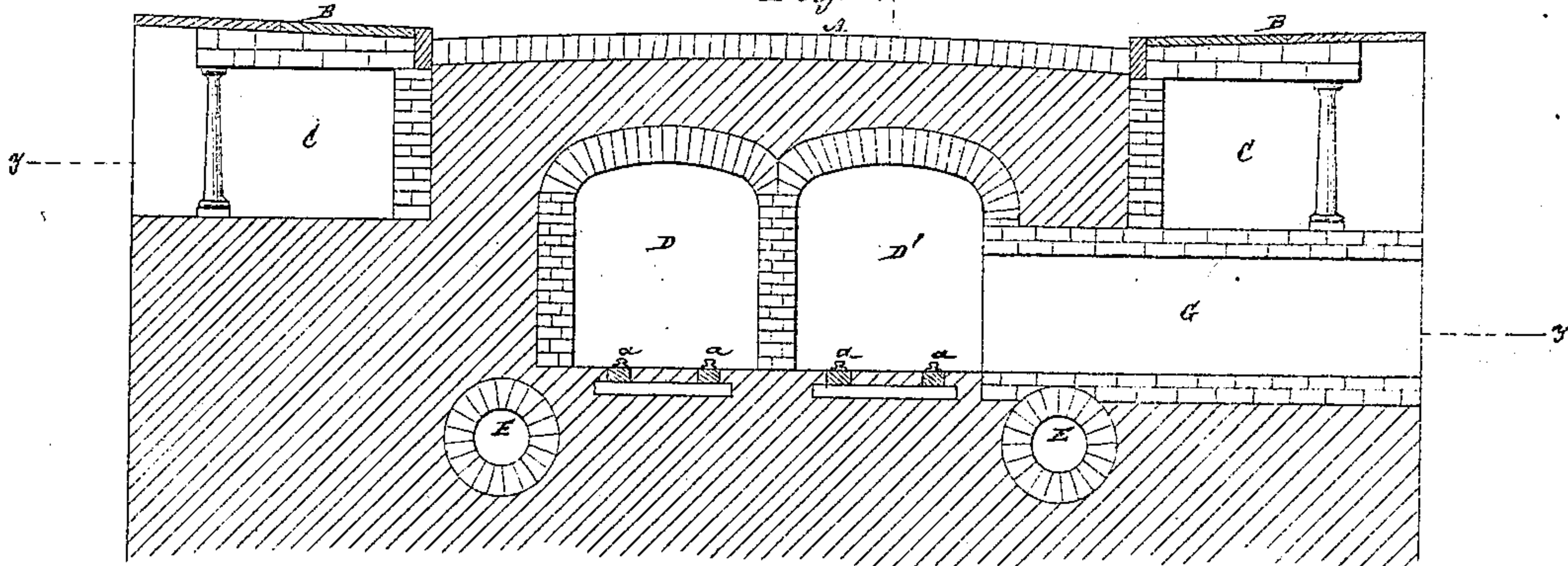
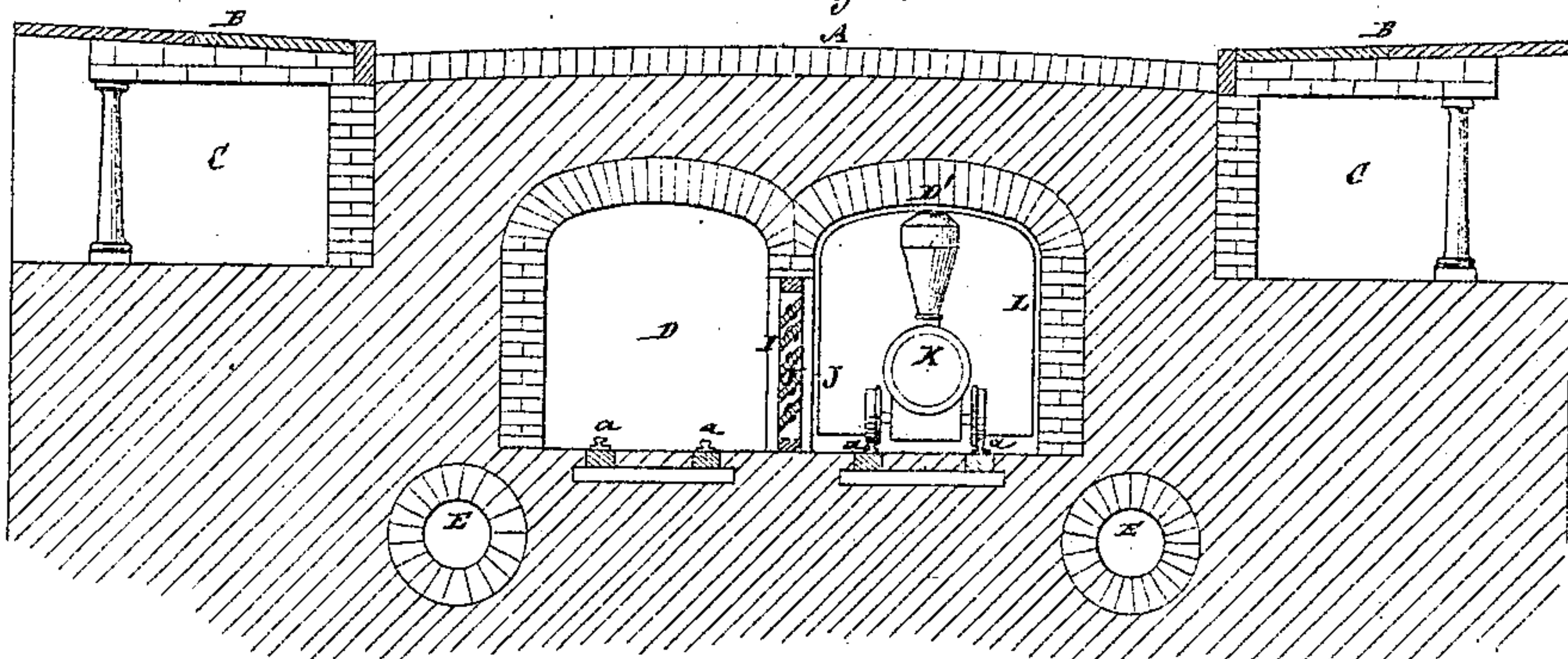


Fig. 3.



Witnesses:

Henry T. Brown  
Fred Hamme

Inventor:

O. Vandenburg



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Fig. 4.

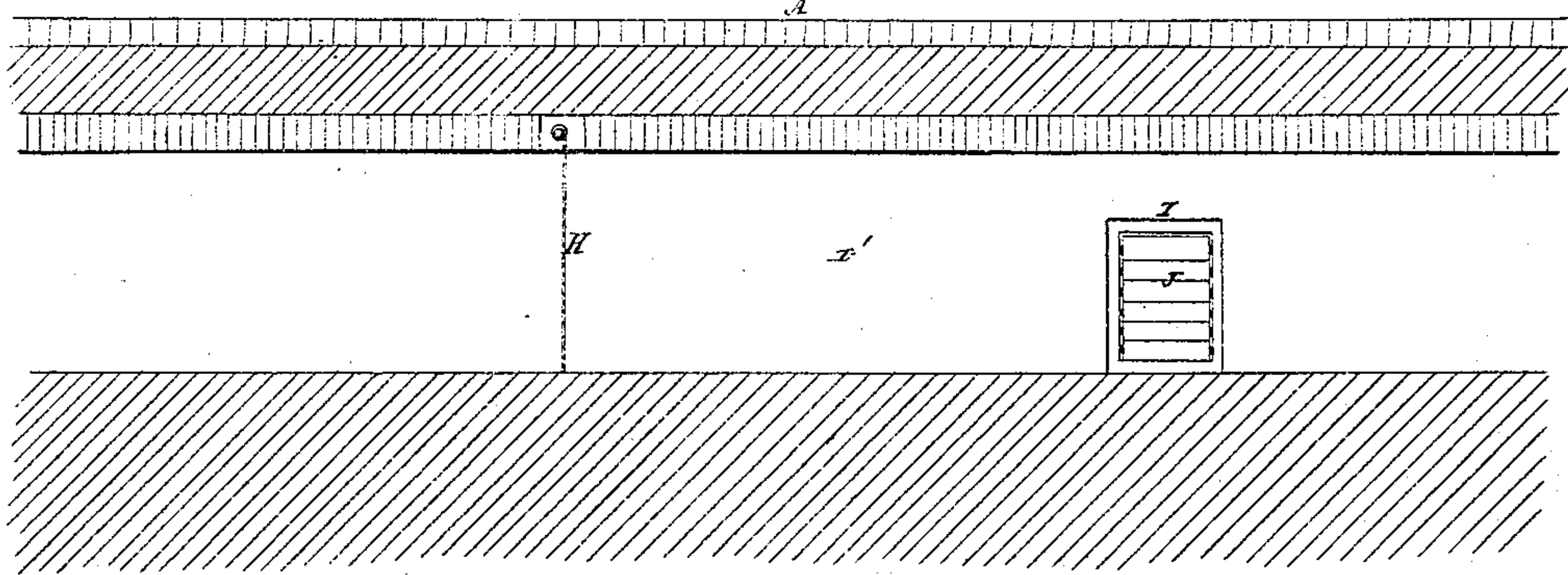
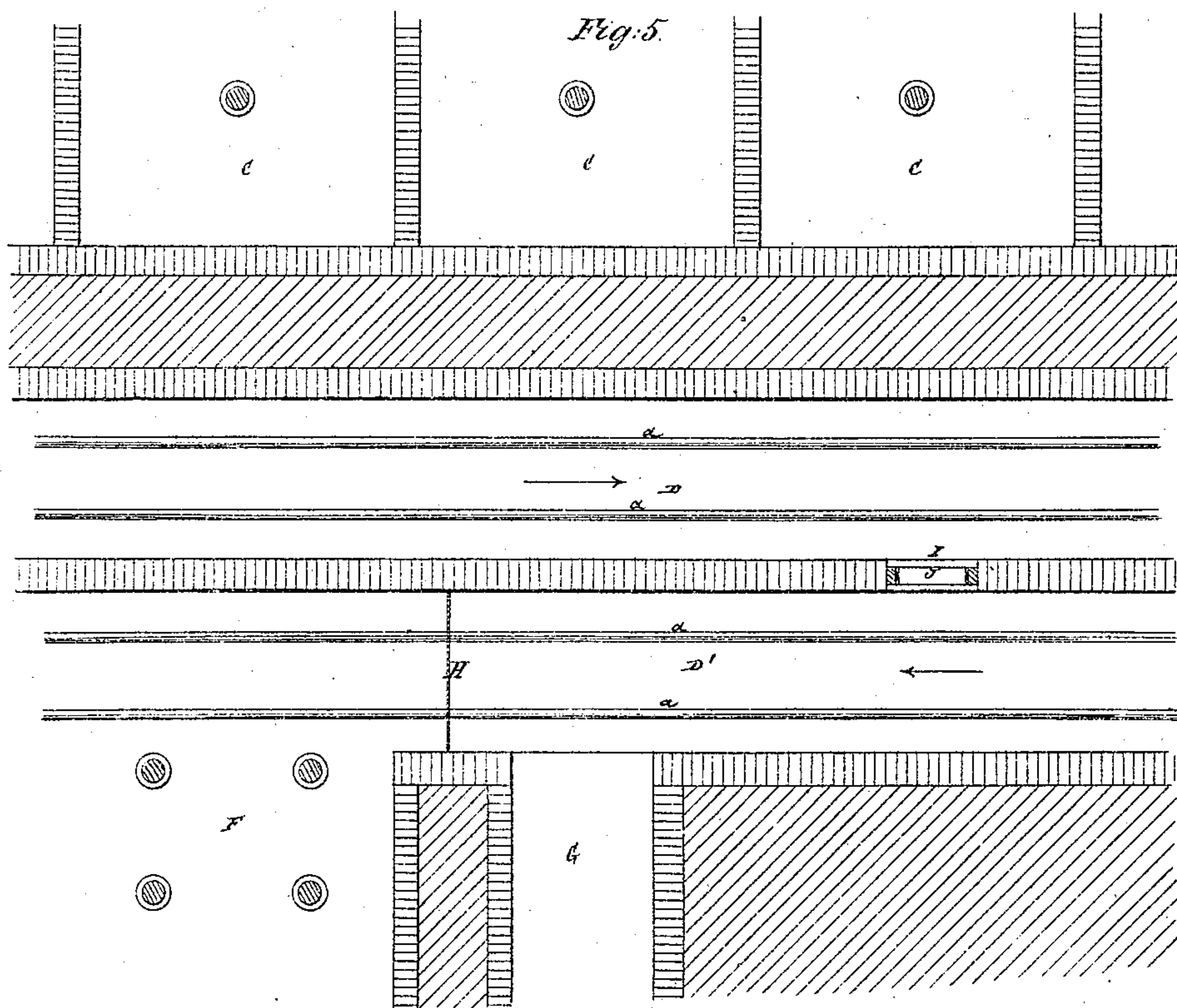


Fig. 5.



Witnesses:

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Fred Harris

Inventor.

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# UNITED STATES PATENT OFFICE.

ORIGEN VANDENBURGH, OF NEW YORK, N. Y.

IMPROVEMENT IN VENTILATING UNDER-GROUND AND SUBSURFACE RAILWAYS.

Specification forming part of Letters Patent No. 136,563, dated March 4, 1873.

*To all whom it may concern:*

Be it known that I, ORIGEN VANDENBURGH, of the city, county, and State of New York, have invented certain Improvements in Under-Ground or Subsurface Railways, of which the following is a specification:

This invention has reference to under-ground or subsurface railways under the streets of cities, having locomotives for the moving agents, and a leading object of this invention is to effect a more thorough and perfect ventilation of such roads. To attain this end without objectionable upward openings into the street under which the railway runs, and yet to provide for two or more tracks or lines of rail for the accommodation of traffic in reverse directions, as well as to secure additional safety, I construct a double-track under-ground or subsurface railway, with a separate and distinct tunnel or subway for each track or line of rail, each tunnel or subway being no larger in its transverse sectional area than is necessary for the free movement of the locomotive and train, by the transit of which the air is expelled before them from the tunnel or subway, through suitably-located lateral passages, while fresh air is caused to enter behind them by reason of the vacuum there produced by such transit, and the necessary changing of the air to secure perfect ventilation is obtained by the running of the trains.

Said railway is arranged to run in line with or parallel to the streets below or under which it lies, and the lateral passages for the egress of the air in front of the trains may connect with shafts of suitable height, located at a proper distance from the street under which the railway runs, such shafts having a tendency to an upward draft, produced in them by natural or artificial means.

These lateral passages for the expulsion of the air should be located near the stations, at points which the train has to pass before arrival at the station, thus avoiding or reducing draft through the station. This advantage, which also includes the exclusion of much smoke and gases from the station, is augmented by a curtain arranged between the station and each lateral escape-passage, said curtain opening or being removable to allow the train to pass into the station.

To provide for the expulsion of as much as practicable or desirable of the volume of air in front of the locomotive and train, and its replacement by fresh air, the locomotive, tender, or any one or more of the cars of a train, may be provided with a surrounding and projecting disk, the edges of which conform, or nearly so, to the transverse sectional form of the tunnel or subway, and which approximately fills the vacant spaces between the locomotive, tender, or car and the subway.

To provide for the regulation of the supply of fresh air, so that it may not be excessive in cases of extremes of temperature, the two or more separate subways, arranged side by side, are provided with lateral or connecting openings, furnished with shutters or registers, through which a portion of the air expelled from or entering either subway may be caused to pass into or be received from the adjacent subway.

In the accompanying drawing which forms a part of this specification, Figure 1 represents a transverse vertical section of a double subway under the line of a street, taken through one of the stations. Fig. 2 is a transverse vertical section of the same through one of the lateral outlet-passages provided for the expulsion of the air. Fig. 3 is a transverse vertical section of the same through one of the lateral openings, and its shutter or ventilator provided between the two subways. Fig. 4 is a vertical longitudinal section at the line *xx* in Fig. 2, through one of the subways; and Fig. 5, an irregular horizontal section through both of the subways at the line *yy*.

Similar letters of reference indicate corresponding parts throughout the drawing.

A represents a street roadway, and B B its raised sidewalks. C C are vaults under the sidewalks belonging to the buildings on the street. D D' represent two separate subways or tunnels, arranged one alongside the other, and under the roadway A of the street, in a line with the latter. Each of these subways has laid within it a separate track or line of rail, *a a*, one track or line being for the travel in one direction, and the other for travel in an opposite direction. These tunnels or subways are made of only just sufficient transverse area and of suitable form for the free transit of the locomotive and train. E E are drains for



draining the subways. F is a station for the track or lines of rail in the subway D'. The stations for the two lines may be opposite each other, or at any suitable distances apart. G is one of the lateral passages from the subway D' for the expulsion of the air from the latter. This passage is located near the station F at a point which the train has to pass before arrival at said station, so that most of the air in front of the train and smoke and gases emitted by the locomotive may be expelled through said passage G by the transit of the locomotive and train, instead of through the station F. Said passage G may be connected at a suitable distance from the street with a shaft either having a natural or artificial draft to aid in inducing the escape of the air through such passage. Further provision is also made for thus turning the expelled currents through special passages or ventilating escape-ducts, instead of through the stations, by means of curtains specially arranged for the purpose, and which divide each subway into a series of sections, as it were. Thus H is such a curtain across the subway D' in the vicinity of the station F, and between it and the air-escape passage G. This curtain may be of any suitable construction that will provide, when opened or removed, for the passage of the train. It may be either slatted or solid and operate as a door, or be a single rolling sheet. Such curtain is only designed to be opened as a train approaches it, and it is closed again after the train has passed through. It may thus be opened and closed by an attendant in waiting or automatically by the train. I is a lateral opening forming a communication between the two subways and fitted with a register-like shutter, J, which may be opened and closed by a rod, wire, or chain from the nearest station, or from any point more or less distant from the said opening. This shuttered opening between the subways provides for the regulation of the supply of fresh air that it may not be excessive in case of extremes of temperature, the opening I, with its shutter J, admitting of a regulated portion of air expelled from or entering either subway being caused to pass

into or to be received from the adjacent subway. K is a locomotive, and L the disk surrounding it and conforming to the transverse sectional shape of the subway and approximately filling the space surrounding the locomotive within the subway, for the purpose of aiding in the expulsion of the air in front of the train. This disk may be of thin wood or of sheet-iron, and the best place to arrange it will be somewhere between the smoke-pipe and the driver's cab. It may be arranged, however, about the tender or around one of the cars of the train.

As the train moves forward in either subway the air in front of it is pushed forward in a body and expelled from the subway at one of the lateral openings G, while, by the vacuum produced behind the train, fresh air is caused to enter the subway by the nearest opening behind, and hence the air is constantly being changed by the running of the train.

Among the other advantages which result from the provision of a separate and distinct subway for each track are greater economy of construction and the obtaining of a higher elevation of rail in a subway of given height; likewise greater safety than when both tracks are in one subway.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination, with the lateral ventilating ducts or passages G and stations in a double-track under-ground railway, having a separate subway for each track, of curtains H, arranged in relation with the ducts and stations substantially as herein described, for the purpose set forth.

2. The openings I between the subways, provided with shutters or registers J, essentially as and for the purpose herein described.

3. In combination with the subway of a locomotive line or lines of railway, the disk L, surrounding the locomotive, tender, or car, substantially as and for the purpose herein specified.

Witnesses: O. VANDENBURGH.  
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