

(No Model.)

2 Sheets—Sheet 1.

J. A. YOUNG.  
MEANS FOR VENTILATING TUNNELS.

No. 462,025.

Patented Oct. 27, 1891.

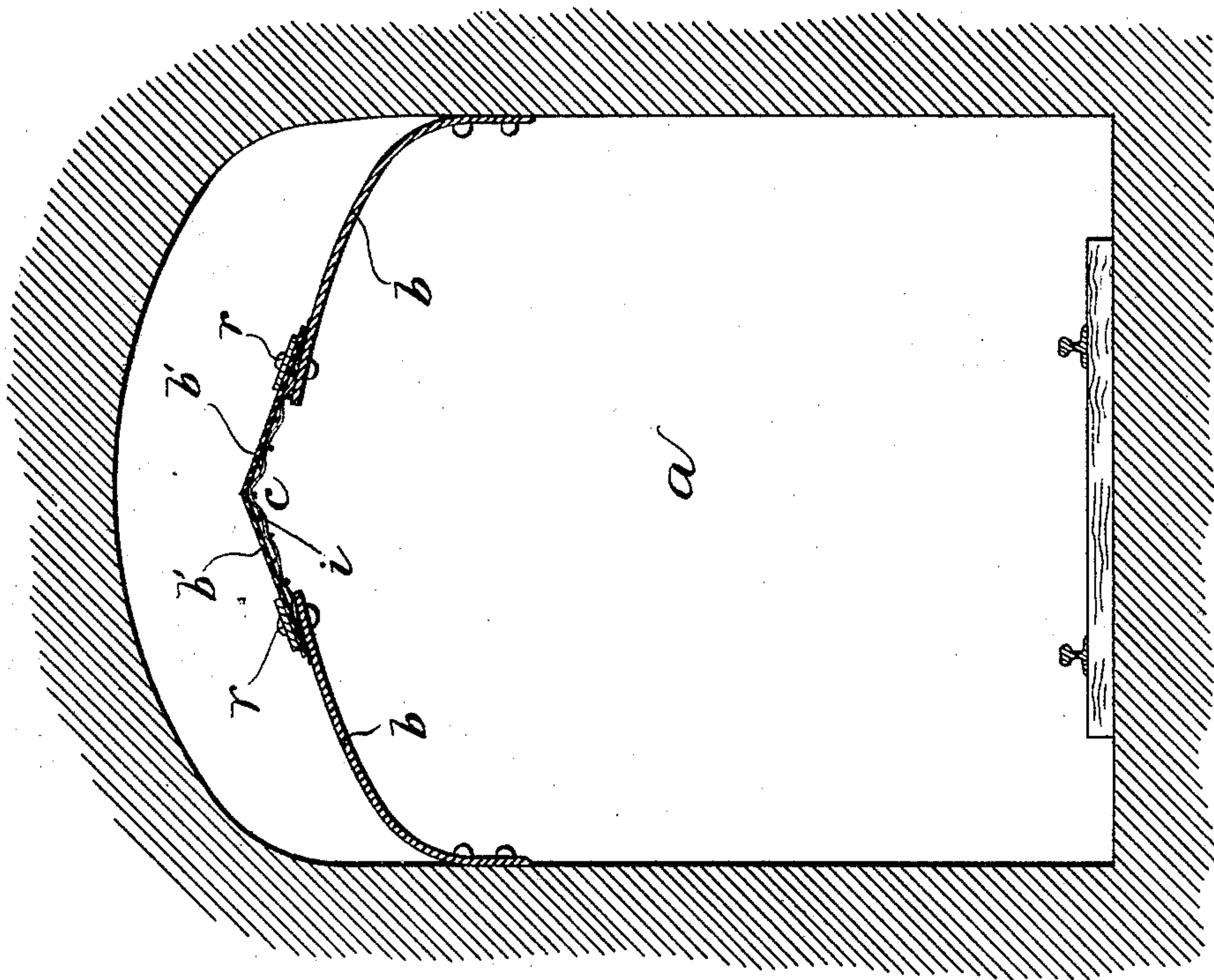


FIG. 2.

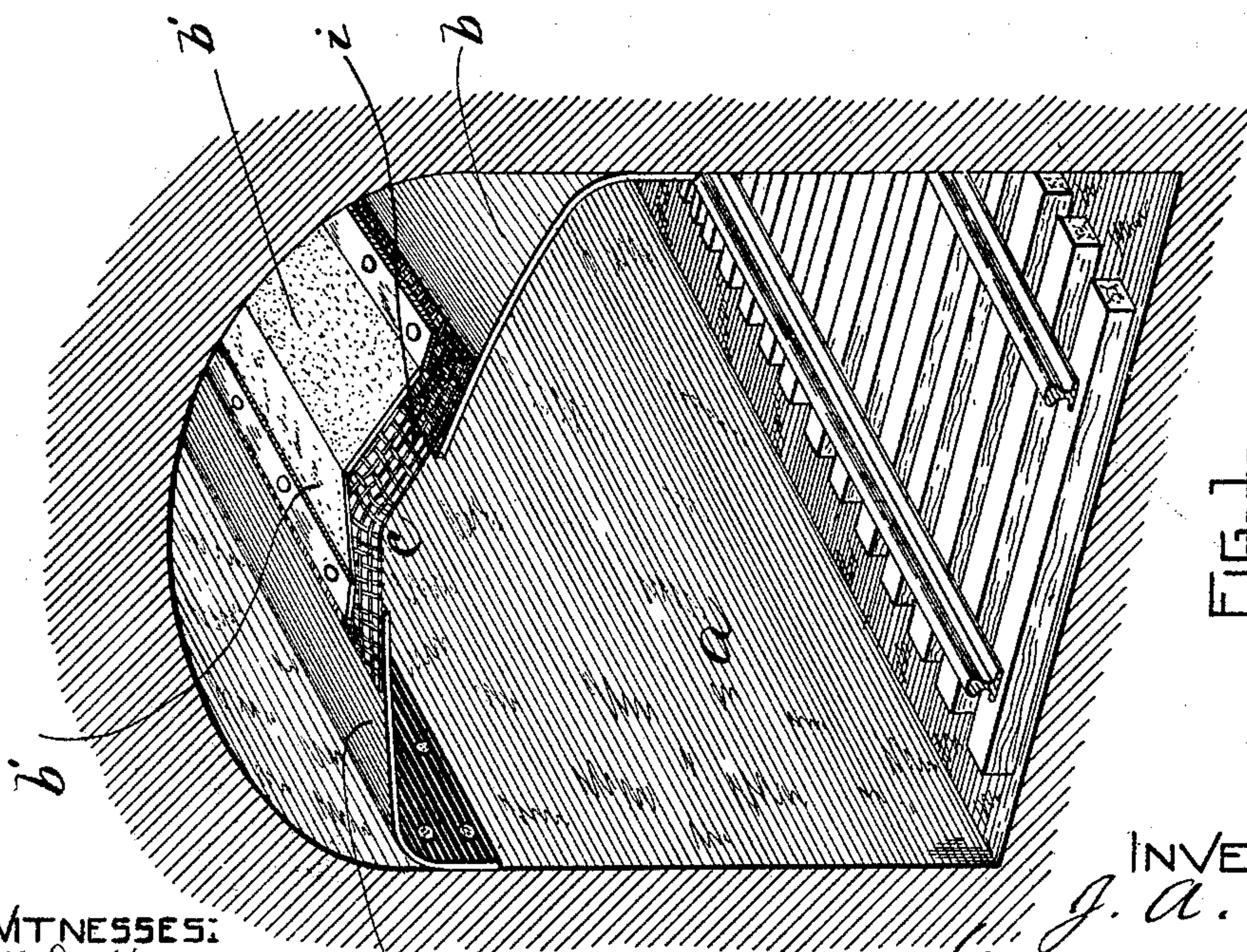


FIG. 1.

WITNESSES:

A. D. Harrison.  
L. C. Brown

INVENTOR:

J. A. Young  
by Wm. Brown Howes  
att'y



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2 Sheets—Sheet 2.

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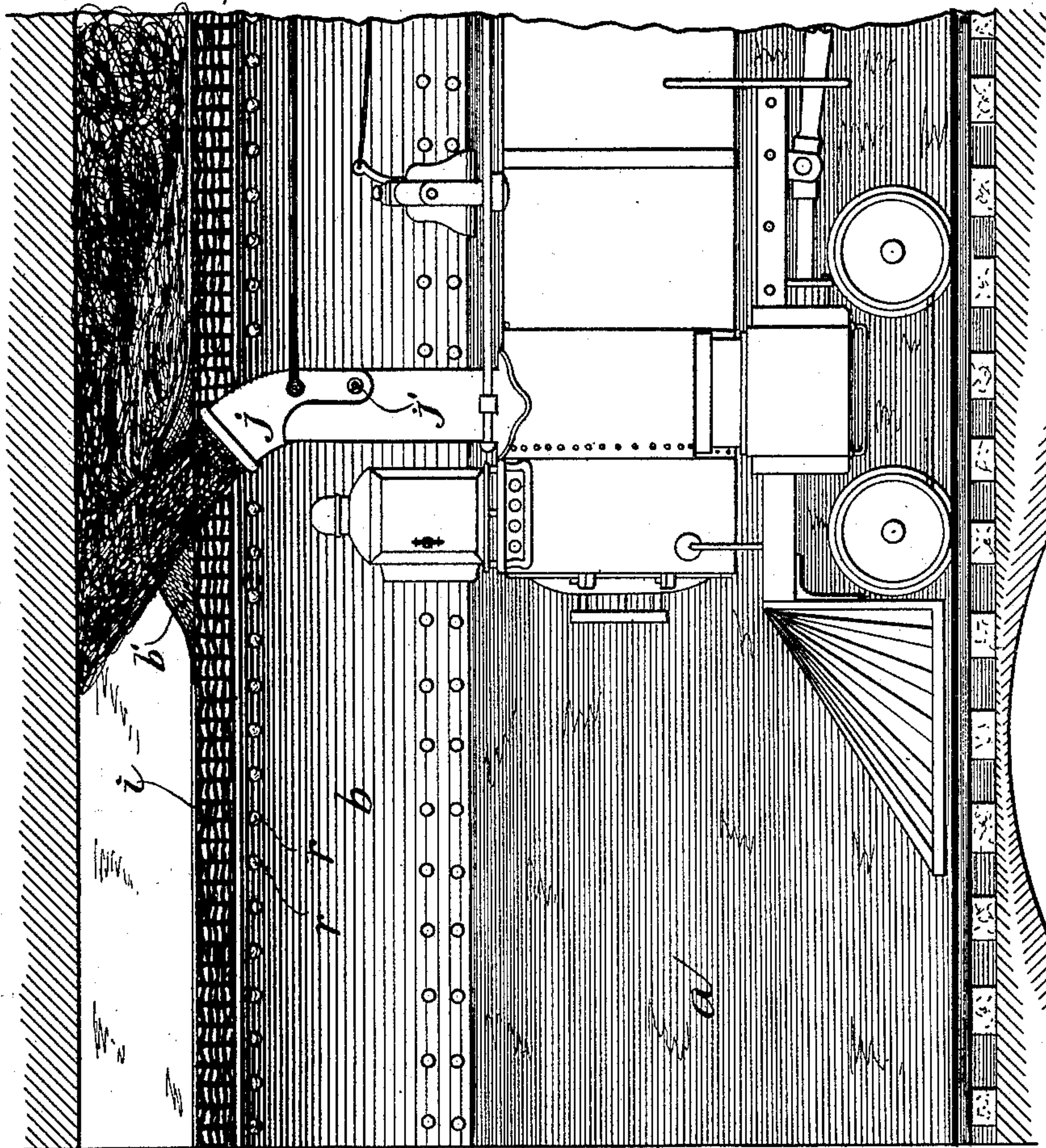


FIG. 4.

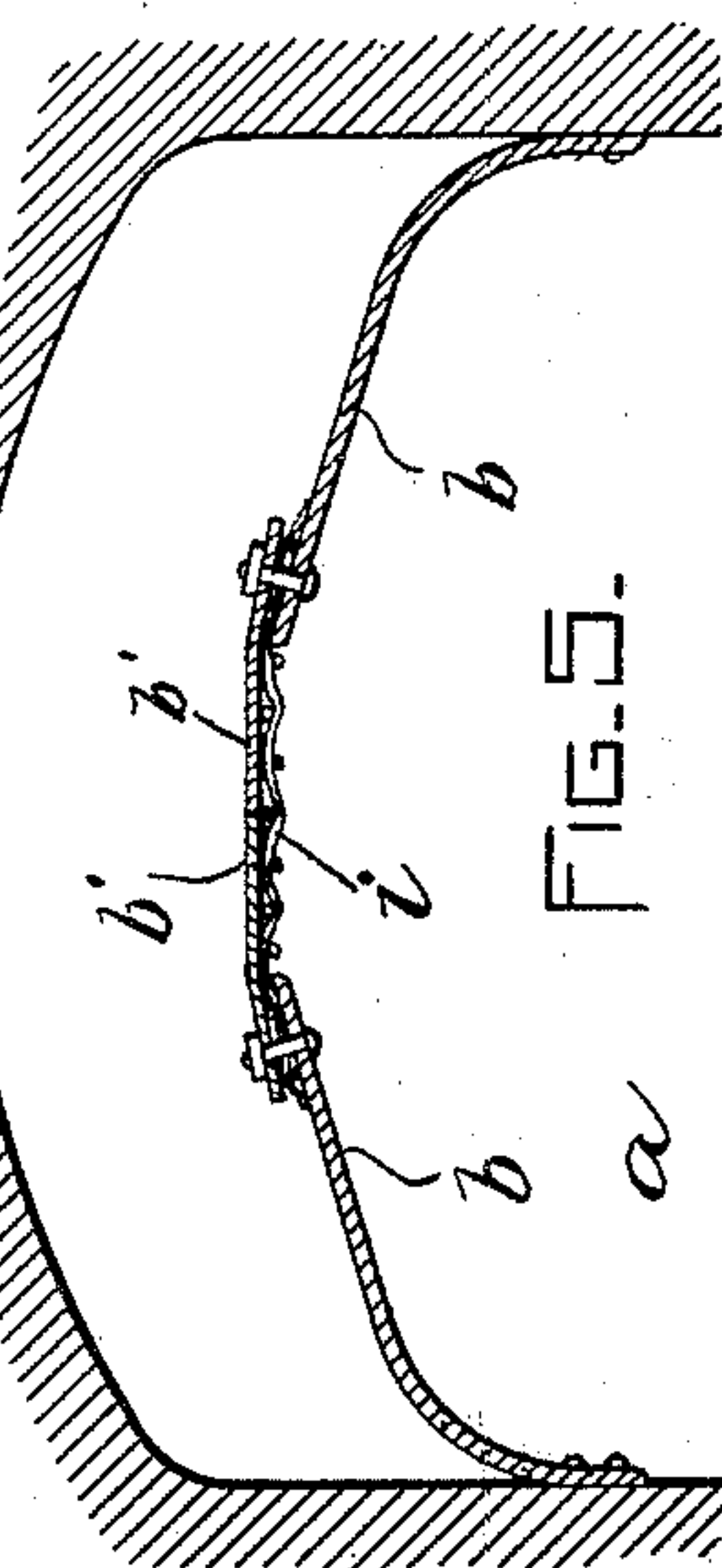


FIG. 5.

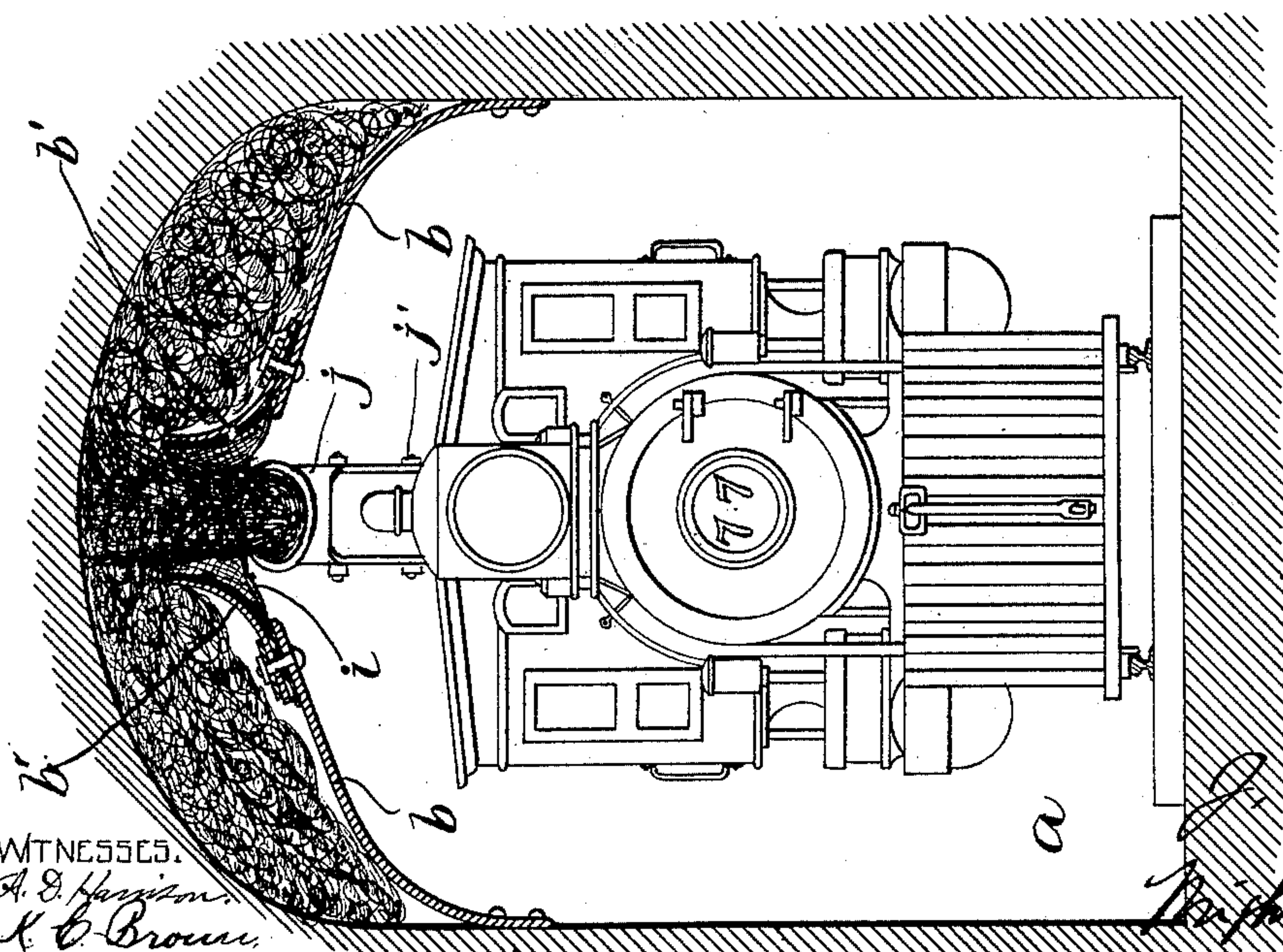


FIG. 6.

WITNESSES.  
A. S. Harrison.  
H. C. Brown.

INVENTOR:

J. A. Young  
By *Wm. Brown*  
Att'y.



# UNITED STATES PATENT OFFICE.

JAMES A. YOUNG, OF SOMERVILLE, ASSIGNOR OF ONE-HALF TO CHARLES F. BROWN, OF READING, MASSACHUSETTS.

## MEANS FOR VENTILATING TUNNELS.

SPECIFICATION forming part of Letters Patent No. 462,025, dated October 27, 1891.

Application filed July 1, 1891. Serial No. 398,159. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES A. YOUNG, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain  
5 new and useful Improvements in Means for Ventilating Tunnels, of which the following is a specification.

This invention has for its object to provide means for ventilating tunnels containing  
10 railway-tracks and removing therefrom the smoke and gases discharged from locomotives passing through the tunnel,

The invention includes a partition extending lengthwise of the tunnel across the same  
15 and dividing the tunnel into a lower and an upper compartment, the partition being of sufficient height to permit the trains to pass under it through the lower compartment. Said partition has at its central portion a longitudinal way or slot guarded by one or more  
20 (preferably two) flexible diaphragms or valves, which normally stand in position to bridge over the slot and maintain the continuity of the partition, but are adapted to yield to upward pressure and separate, thus allowing  
25 smoke, gases, and cinders forced upwardly by the exhaust from a locomotive to pass through the slot or way into the upper compartment, the said diaphragms or valves opening to receive the smoke, &c., only at a point  
30 in close proximity to the smoke-stack of the locomotive and closing automatically behind the smoke-stack.

The invention also includes a foraminous  
35 support or bridge extending across the slot or way in the partition and formed to support the valves or diaphragms when they are at rest or closed, and thus prevent them from sagging or dropping into the slot or way without preventing the free upward passage of  
40 smoke, gases, &c., through said slot or way into the upper chamber.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents  
45 a perspective sectional view of a railway-tunnel provided with my improvements. Fig. 2 represents a transverse section of the same, the valves over the slot or way in the partition being closed. Fig. 3 represents a section  
50 similar to Fig. 2, showing the valves raised

or opened by the exhaust from the smoke-stack of a passing locomotive. Fig. 4 represents a section on line 4 4 of Fig. 3.

The same letters of reference indicate the same parts in all the figures. 55

In the drawings, *a* represents the tunnel, which is shown in transverse section in Figs. 1 and 2. The partition is composed of two rigid sections *b b*, which are preferably composed of metal plates suitably secured to the  
60 walls of the tunnel, and two flexible sections constituting the valves or diaphragms *b' b'*. The rigid sections are separated from each other by an opening or way *c*, extending continuously through the tunnel. The movable  
65 sections are arranged to normally bridge over said way and constitute with the fixed sections a practically continuous partition. Each of the movable sections is a sheet or strip of suitable flexible material, which should be fire-  
70 proof. I consider the ordinary asbestos cloth or fabric of commerce a suitable material for said movable sections, and in practice prefer to make each section as a continuous strip of asbestos cloth, which may be made up of  
75 sections of suitable length secured together, and each section may be composed of one or more thicknesses or plies and re-enforced, if desired, by wire-cloth. The outer edges of the movable sections are suitably attached to  
80 the fixed sections, as by bolts or rivets *r r*, as shown in Fig. 4, and each section is inclined, so that their free outer edges meet over the center of the opening or way between the fixed sections, said free edges being retained  
85 in contact with each other by gravitation, and they may be weighted, if desired, as by chains secured to the free edges.

To prevent the sections or valves *b' b'* from sagging downwardly in the way or opening *c*,  
90 I secure to the rigid sections *b b* a bridge *i* of any suitable foraminous construction which will support the sections or valves *b'* in the position shown in Figs. 1 and 2 without obstructing the upward passage of smoke,  
95 &c., through the way or opening *c*. I prefer to make said bridge of wire-cloth of suitably coarse mesh, although, if preferred, transverse bars arranged at suitable distances apart may be substituted for the wire-cloth, or any other  
100



construction may be adopted that will answer the desired purpose—viz., to support the movable sections or valves *b'* in their closed position when there is no pressure below them to raise or open them and to permit the free upward passage of smoke and gases when the valves are opened. When a locomotive is passing through the tunnel, the pressure of the exhaust from the smoke-stack causes the movable sections to yield, as shown in Fig. 3, an opening being thus formed for the passage of the smoke and gases upwardly through the way or opening *c*, said opening changing its position with the movement of the locomotive—that is to say, the movable sections or valves *b'* open immediately in front of the smoke-stack and close behind the same in a manner that will be readily understood.

It will be seen from the foregoing that substantially all the smoke, gases, &c., ejected from the smoke-stack will pass upwardly through the way or opening *c* and will be prevented from falling or returning into the main portion of the tunnel by the automatically-closing sections or valves *b'*. The smoke and gases thus accumulated in the upper section of the tunnel may be removed in any suitable way, as by exhaust-fans arranged at suitable intervals along the tunnel. I prefer, however, to utilize the force of the exhaust to induce or create a current in the upper chamber of the tunnel, which will carry the smoke and gases toward one end of the tunnel. To this end I provide each smoke-stack with a movable hood or cowl *j*, which is pivotally connected to the smoke-stack at *j'* and is adapted to deflect the blast either forward or backward from the mouth of the stack and give the blast an inclined direction, as indicated in Fig. 4. I prefer to arrange the cowl so that it will direct the blast forward, the blast being in all cases directed upwardly.

It will be seen that by giving the blast an inclined direction, as described, I cause each blast to give an impulse in one direction to the smoke and gases accumulated in the upper chamber of the tunnel, so that a current is created which tends to carry the smoke and gases toward one end of the tunnel, each smoke-stack contributing its quota toward the formation of such current, the different smoke-stacks acting somewhat on the principle of the steam cone or nozzle of an injector, inducing a movement of the air and gases in the upper chamber of the tunnel.

I am aware that it has been proposed to partially subdivide a tunnel, so as to form an upper chamber above the main portion of the tunnel, communicating with the main portion through a longitudinal slot or way arranged over the center of the track, so that the smoke and gases carried upwardly by the exhaust from the locomotive will pass into

the upper section, from which it has been proposed to remove the smoke and gases by means of exhaust-fans. I am not aware, however, that any one has employed, suggested, or described a longitudinal valve covering said way or opening and adapted to be raised or opened by the pressure of the exhaust and to automatically close after the pressure has subsided. This feature and the means for giving an inclined direction to the blast from the smoke-stack, I believe to be new with me.

I do not limit myself to the employment of two movable sections or valves, as a measurably-successful result might be produced by the employment of a single section *b'*. Hence I do not limit myself in this respect. The sections or valves *b'* may also be made in independent sections instead of in continuous strips, like so many trap-doors of flexible material, and arranged end to end. I regard it as essential, however, that the valves or movable sections be of such construction and material as that their opening and closing movement will be comparatively noiseless and not attended by injurious percussive blows or jars.

I claim—

1. The combination, with a railway-tunnel, of a compartment or passage in the upper part thereof for the reception of smoke and gases from a locomotive, said compartment or passage having a longitudinal way or slot, a flexible covering for said way or slot, and means for preventing the falling of said covering through the said slot, substantially as described.

2. In a railway-tunnel, a partition composed of suitable fixed sections separated by a longitudinal way or opening, one or more flexible sections forming a valve arranged to normally cover said opening, and a foraminous support extending across said opening to prevent the downward displacement of the valve, as set forth.

3. A railway-tunnel having a partition composed of suitable fixed sections separated by a longitudinal way or passage, movable sections composed of strips of flexible material, each connected at its outer edge to one of the fixed sections, its opposite edge being free to rise and fall, and a foraminous support extended across said opening to prevent the downward displacement of said movable sections, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 20th day of June, A. D. 1891.

JAMES A. YOUNG.

Witnesses:

C. F. BROWN,  
EWING W. HAMLEN.