

C. A. EDGE.  
Tramway.

No. 218,432.

Patented Aug. 12, 1879.

Fig. 4.

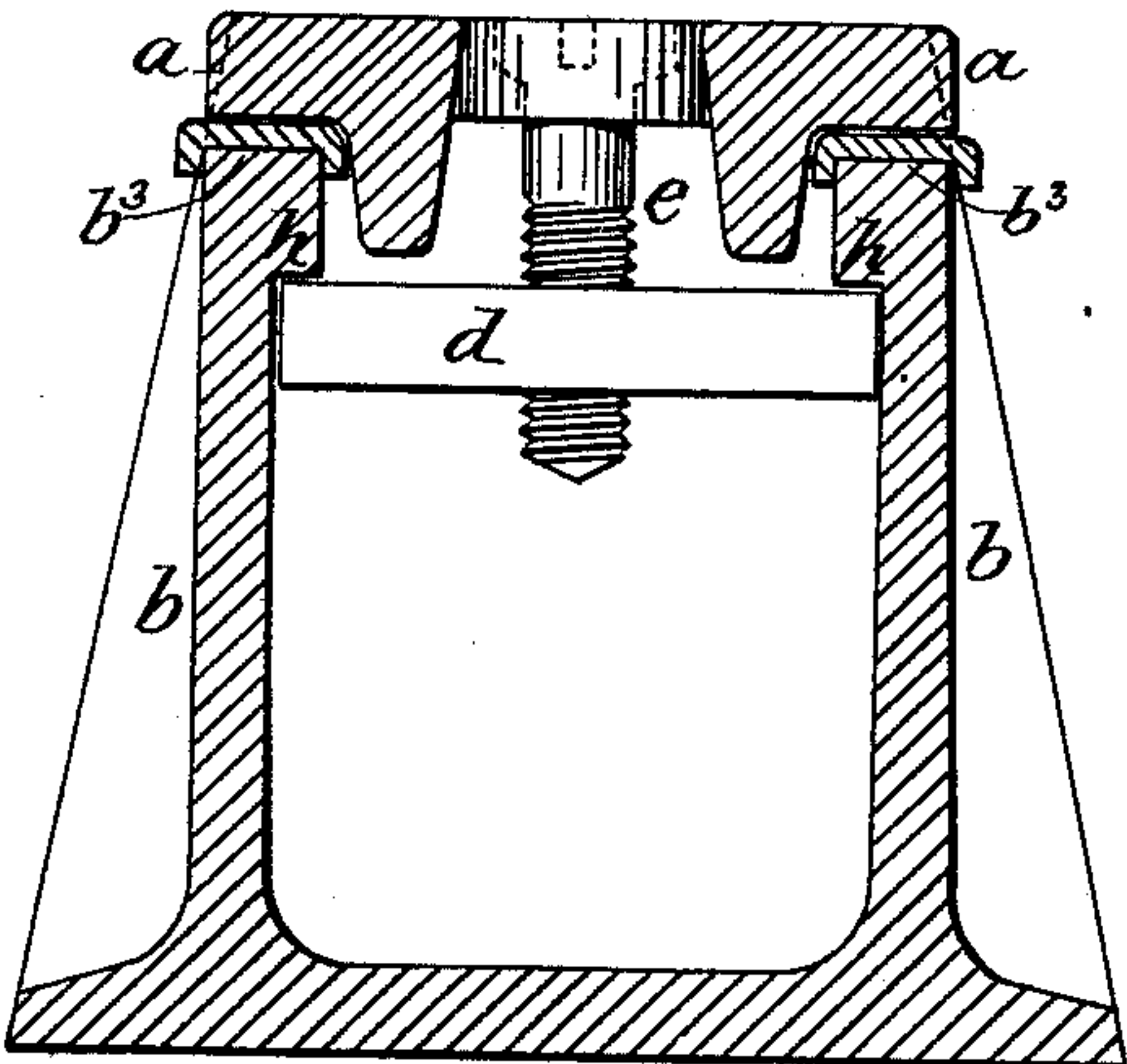


Fig. 5.

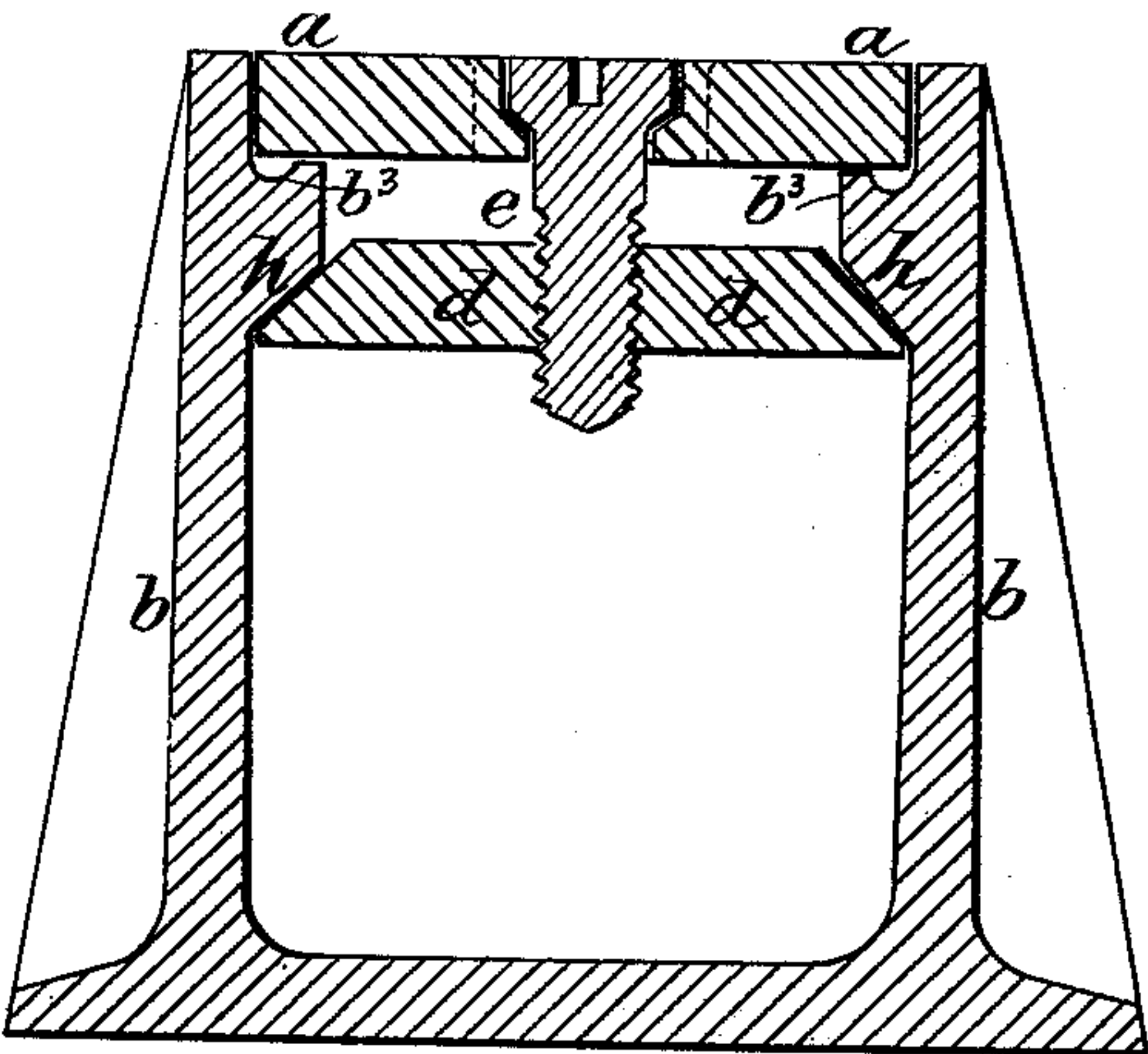


Fig. 12.

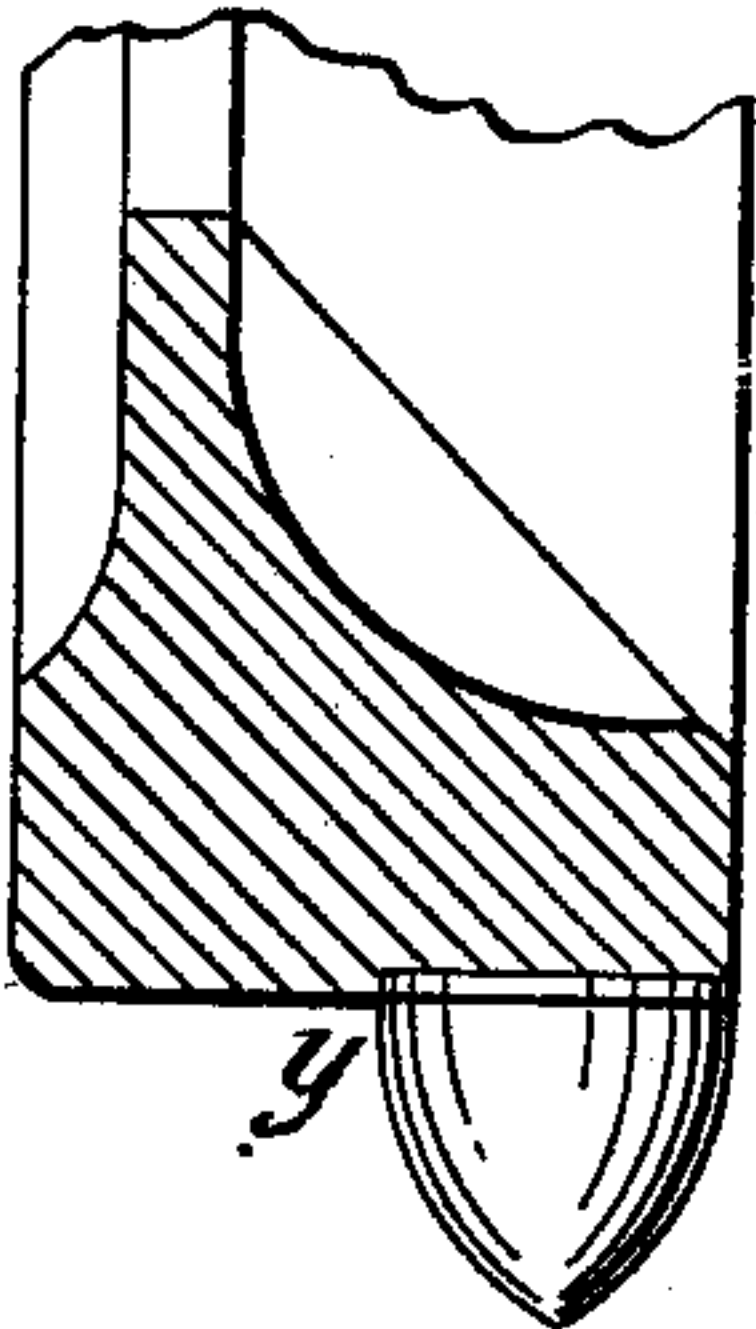


Fig. 13.

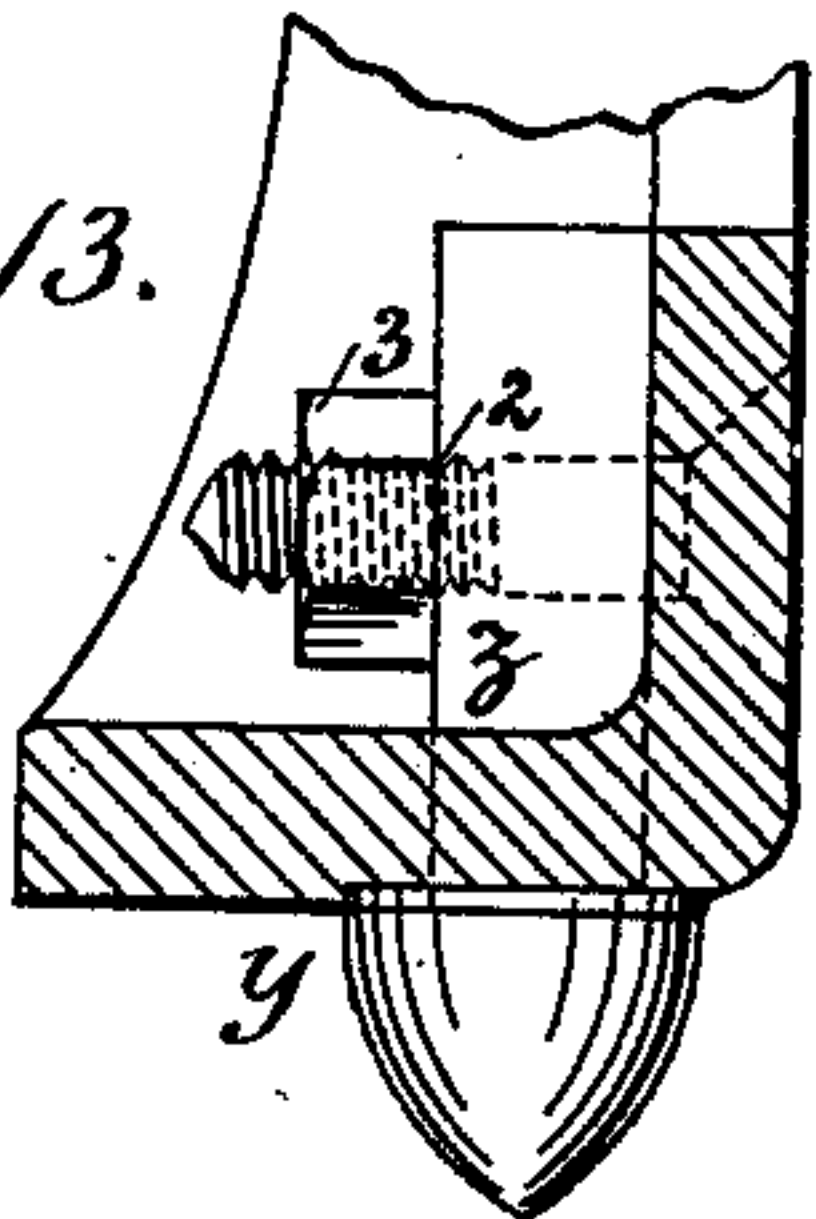


Fig. 1.

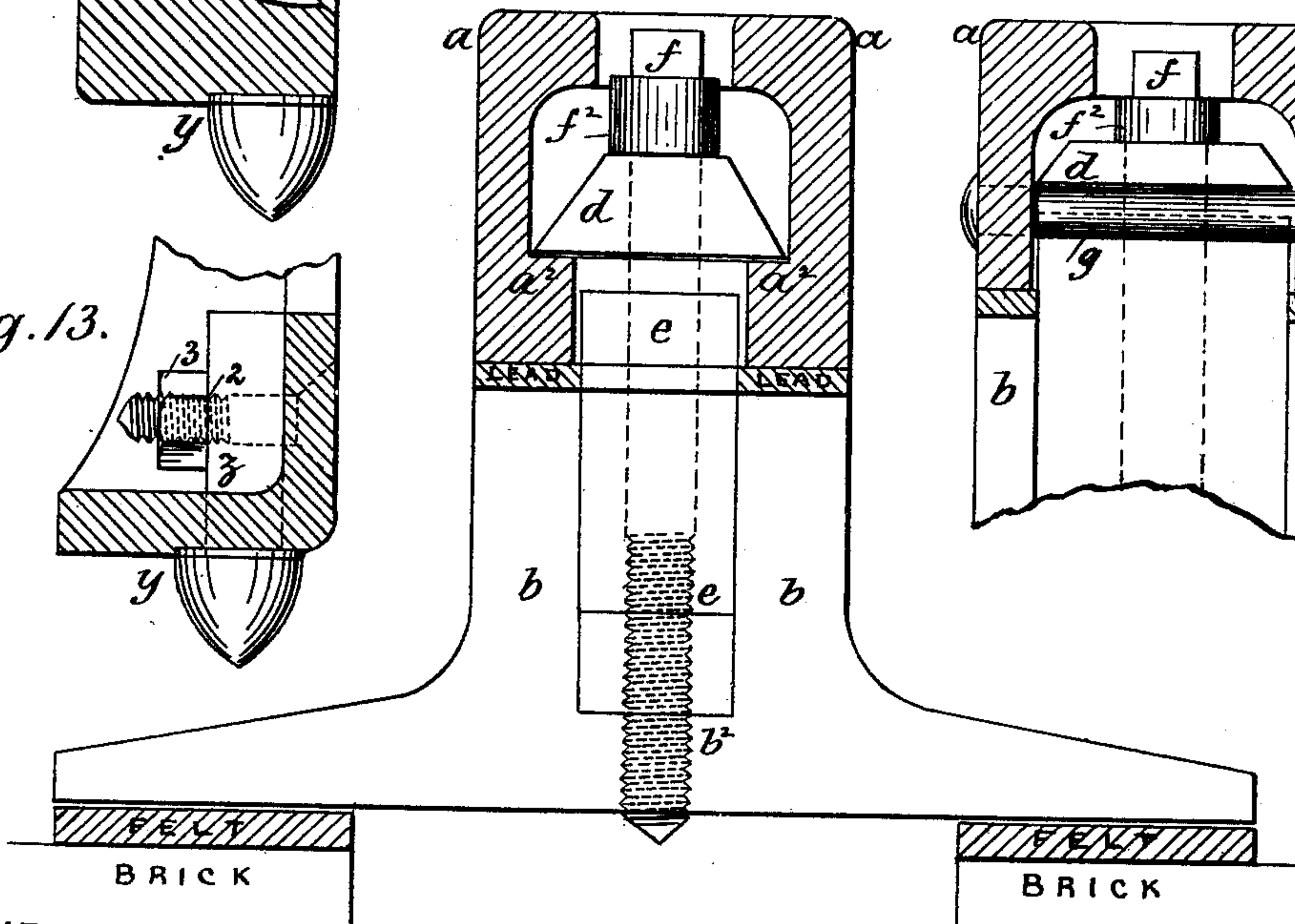
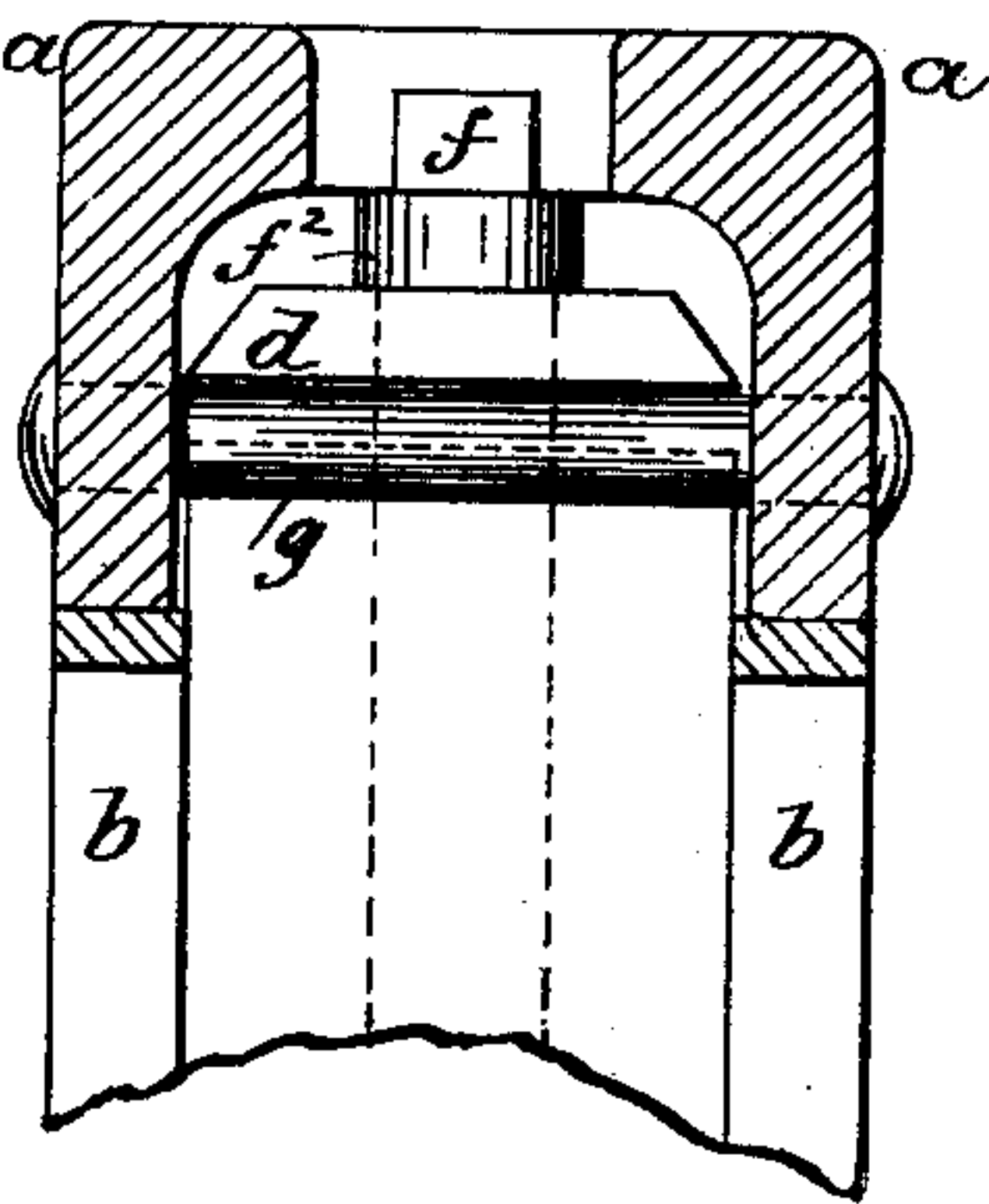


Fig. 3.



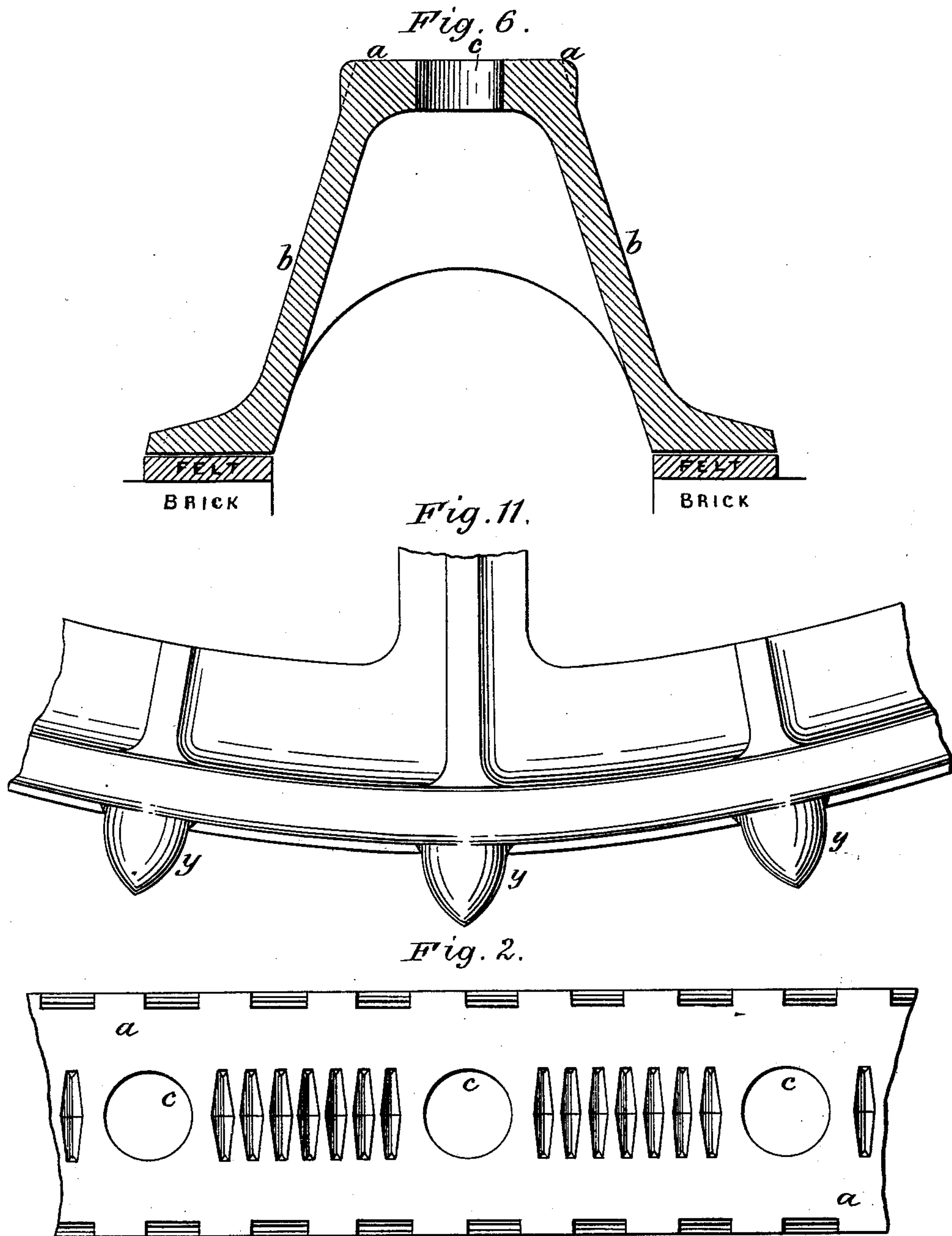
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Philip Mauro

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his attorney

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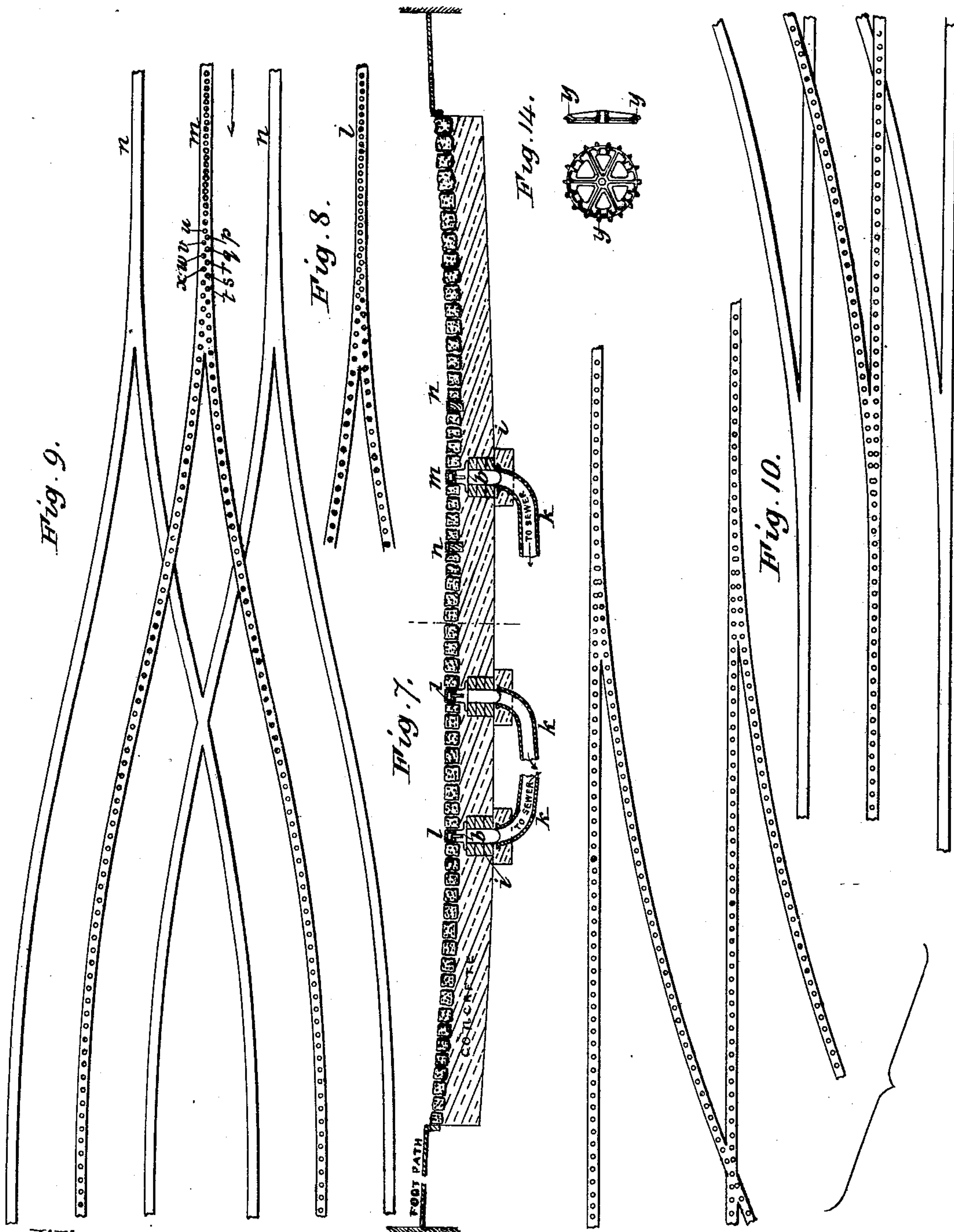
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# UNITED STATES PATENT OFFICE.

CHARLES A. EDGE, OF BIRMINGHAM, COUNTY OF WARWICK, ENGLAND.

## IMPROVEMENT IN TRAMWAYS.

Specification forming part of Letters Patent No. **218,432**, dated August 12, 1879; application filed June 11, 1879; patented in England, November 30, 1877.

*To all whom it may concern:*

Be it known that I, CHARLES ALLARTON EDGE, of Birmingham, in the county of Warwick, England, architect, have invented new and useful Improvements in Tramways, and in Carriages for Tramways, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

My invention consists of the improvements hereinafter described in tramways, by which improvements certain inconveniences attendant on tramways of the ordinary construction are remedied.

Figure 1 of the accompanying drawings represents, in cross-section, a rail and the foundation-chair on which it is supported, constructed according to my invention; and Fig. 2 represents, in plan, a portion of the rail, Fig. 1.

The rail (marked *a*) has, in cross-section, a figure somewhat resembling the letter **U** inverted. This rail is supported upon foundation-chairs *b* by the vertical sides of the said rail resting on the flanges of the said foundation-chairs and connected thereto in the manner hereinafter explained.

The foundation-chairs *b*, which are fixed at distances of about three feet apart, have broad bases, which are supported on an inverted arch or trench formed of brick-work or concrete, as hereinafter explained.

The upper face of the rail *a*, on which the wheel of the tramway-carriage travels, is perforated with a series of equidistant holes, *c c*. These holes are either circular or oval, according as the teeth on the tramway-carriage wheel, which teeth engage in the holes, are circular or oval in cross-section.

The rails *a* are fixed in the following way: The vertical sides of the rail are furnished at the bottom with internal flanges, *a<sup>2</sup> a<sup>2</sup>*, on which flanges plates of iron *d* rest at short distances apart. Screw-bolts *e*, with square heads *f*, pass downward through holes in the plates *d* and in the foundation-chairs *b*, the said screw-bolts *e* taking into screw-threaded apertures made in the foundation-chairs at *b<sup>2</sup>*. By means of a key fitting the heads *f* of the screw-bolts *e* they can be readily screwed into or withdrawn from the foundation-chairs. The cylindrical parts *f<sup>2</sup>* of the heads of the screws

bear upon the plates *d* and bind down the rails firmly to the foundation-chairs.

The kind of rail represented in Fig. 1 has the form which I prefer to give it when it is made of cast-iron.

Fig. 3 represents, in cross-section, the figure which I prefer to give to the rail when it is made of wrought-iron. In this case I fix, by riveting or otherwise, cross-bolts *g*, extending from one of the vertical sides of the rail to the other. The plates *d* rest upon the cross-bolts *g*, the said plates *d* being held down by the screw-bolts *e*, in the manner before described with reference to Fig. 1.

Figs. 4 and 5 represent, in cross-section, other modifications of rails with continuous cast-iron hollow foundation-sleepers in lieu of the chairs, at intervals, and the brick trench hereinbefore described.

The rail in the modification Fig. 4 may either be made of cast or wrought iron, and the rail in the modification Fig. 5 of wrought-iron. In Figs. 4 and 5 the rail is marked *a*, and the foundation-sleeper *b*. In these modifications the rail *a* is held down on the shoulders *b<sup>3</sup>* of the sleeper by means of the screws *e* taking into screwed holes on the cross-plates *d*. These cross-plates *d* take their bearing upward against the shoulders *h h* in the interior of the foundation-sleeper *b*.

Fig. 6 represents, in cross-section, a modification of my invention in which the rail and the foundation-sleeper are made in one piece, by the process of casting or rolling.

Fig. 7 represents, in cross-section, a street or road provided with tramways constructed according to my invention. By an examination of the said Fig. 7 it will be seen that the foundation-chairs *b* are supported upon inverted arches *i*, of brick and concrete.

I prefer to make the roadway on each side of the tramway incline from the outside toward the middle of the road, so that rain may run toward the rails and pass through the holes in the rails into the inverted arches *i i*, on which the foundation-chairs are supported. The said inverted arches *i i* are connected at convenient distances by means of the pipes or channels *k k* with the ordinary sewer, by which the rain passing into the inverted arches *i i* is carried off.



In Fig. 7 I have represented two kinds of tramways constructed according to my invention, the one consisting of a pair of iron rails, *l l*, and the other of one iron rail, *m*, situated midway between two plain iron, wood, or other rails, *n n*.

Fig. 8 represents, in plan, the tramway, with two iron rails, *l l*; and Fig. 9 represents, in plan, the tramway having one middle iron rail, *m*, and wooden or other rails *n n* on either side of it.

Figs. 8, 9, and 10 illustrate the arrangements which I adopt for points and for turn-outs for the tramway-carriages. In Fig. 10 the carriage, on arriving at the points, can be guided, at the will of the driver, either on the direct line or onto the diverging line. As the holes in the rails (in which holes the teeth of the tramway-carriage wheels enter) are in the divided rail opposite to each other, and as the two rails pass into one another, the holes gradually approach each other; then coalesce to form nearly oval holes, which gradually shorten in their longest diameter, and finally pass into circular holes. By this arrangement of the holes at the points the carriage is free either to continue on the principal rail or to be turned onto the diverging rail.

In Figs. 8 and 9 the points are made self-acting—that is, the tramway-carriage is directed by the holes in the rails so that it passes from the principal line to the branch or divergent line automatically. By an examination of Figs. 8 and 9 it will be seen that the principal rails *l m* before they divide are provided with double sets of holes—that is, holes the distance between two of which is equal to half the distance between two of the teeth of the tramway-carriage wheels. These double sets of holes, it will be seen, separate as the rail is divided into two single rows of holes, by the action of which the tramway-carriage may either be turned to the right or left. This will be understood by an examination of Fig. 9, in which figure let it be supposed that the carriage advancing in the direction of the arrow is so situated on the rail *m* that two of the teeth of its wheel are engaged in the holes *p q*. The following teeth of the wheels as the carriage advances will engage in the holes *r s t*, and the carriage will be deflected to the left of the main line; but if the carriage were so situated on the line that two of the teeth of its wheels were engaged in the holes *u v*, then as the carriage advances the following teeth of the wheels would engage in the holes *w x*, and the carriage would be deflected onto the rails at the right of the main line.

The arrangement of holes represented in Fig. 10 may be combined with the arrangement of holes represented in Figs. 8 and 9.

Fig. 11 represents, in elevation, a portion of a wheel of a tramway-carriage provided with teeth *y y*, for engaging in the holes *c c* in the rails. These teeth *y y* may either be circular or elliptical in cross-section, the holes *c c* in the rails having a corresponding figure.

Fig. 12 represents, in section, a portion of the tire of a tramway-carriage wheel, in which the tire and teeth are made by the process of casting.

Fig. 13 represents, in section, a portion of the tire of a tramway-carriage wheel made of wrought-iron. In this wheel the tooth *y* is made separate from the tire, and is connected thereto by a shank, *z*, passing through a hole in the tire, and being fixed in its place by a screw, 2, and screw-nut 3, as represented.

Fig. 14 represents, in elevation and section, a wheel for a tramway-carriage constructed for use in connection with my invention. As will be seen by an examination of the drawings, I dispense with the flanges ordinarily employed on the wheels of tramway-carriages and the corresponding grooves in the rails, the guiding of the wheels being effected by the teeth *y y* taking into the holes *c c* in the rails. These teeth not only give the wheels a firm hold upon the rails, but they clear the said holes *c c* of anything which may have accumulated in them, and the inconvenience attending the clogging of the grooves of the tramway-rails of the ordinary construction is avoided.

Having now described the nature of my invention, and the manner in which the same is to be performed, I wish it to be understood that I claim as my invention—

1. A tramway having one or more rails, with upper face perforated and fixed in position upon a level with the street, by means substantially as described.

2. The combination, with the perforated rail or rails of a tramway, of one or more trenches or inverted arches connected with the sewer, and means, substantially as described, for securing the rail or rails in position over the said trench or trenches, substantially as set forth.

3. The combination, with a perforated tramway-rail, of the foundation-chairs and bolts for attaching the rail to the chairs, substantially as described.

4. A tramway switch or frog having converging or diverging lines of perforations on the upper face thereof corresponding with the tracks which unite or separate or cross at said switch or frog, substantially as described.

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