

(No Model.)

2 Sheets—Sheet 1.

E. STRUB.

RACK RAIL FOR MOUNTAIN RAILWAYS.

No. 600,324.

Patented Mar. 8, 1898.

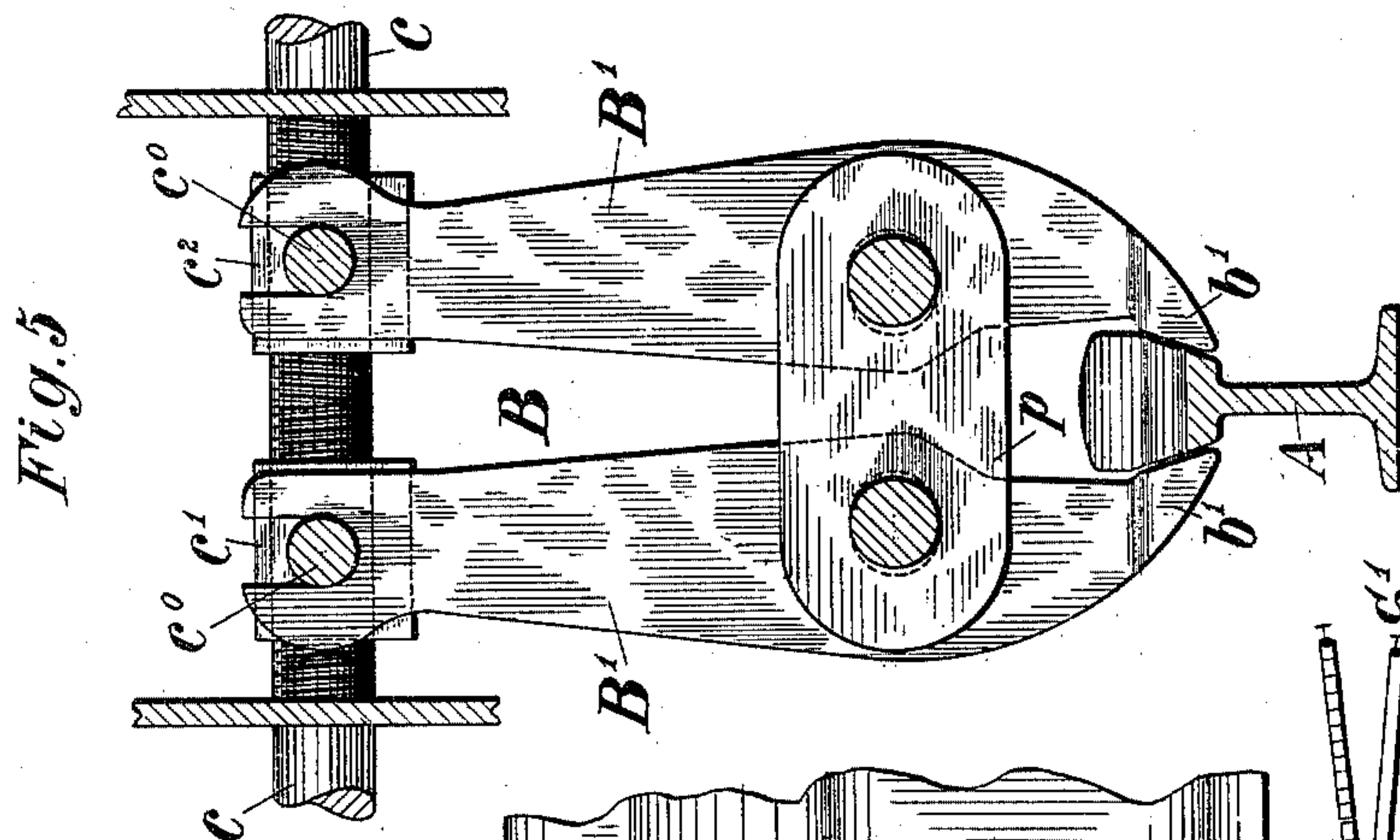


Fig. 5

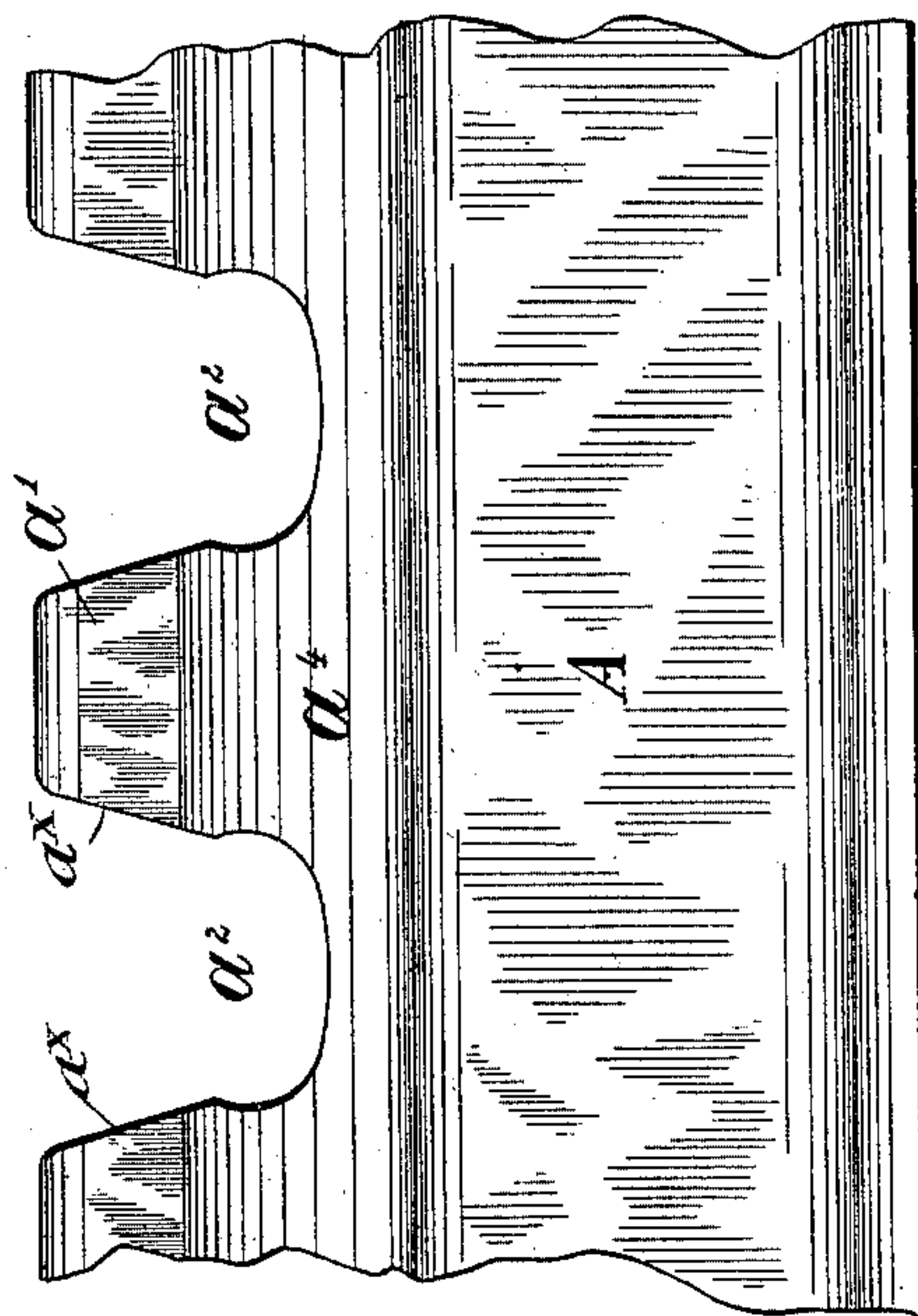


Fig. 2

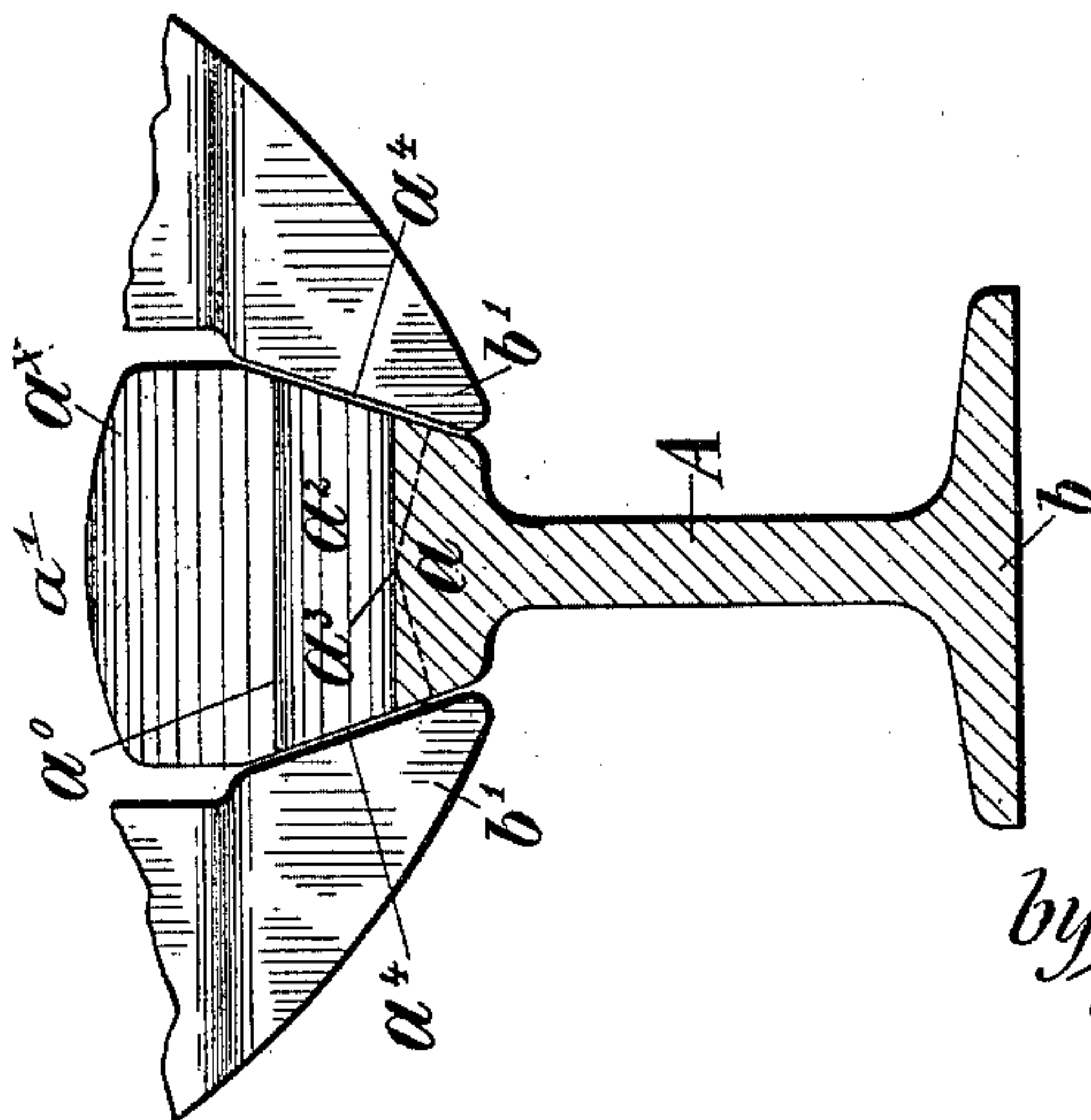


Fig. 1

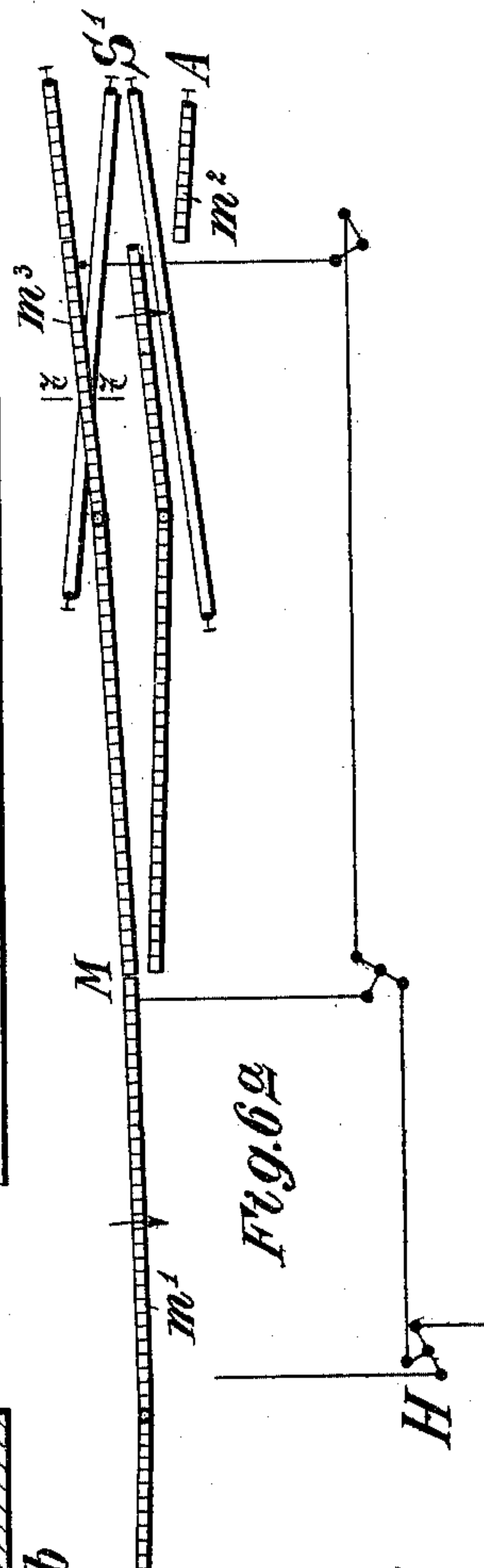


Fig. 62H

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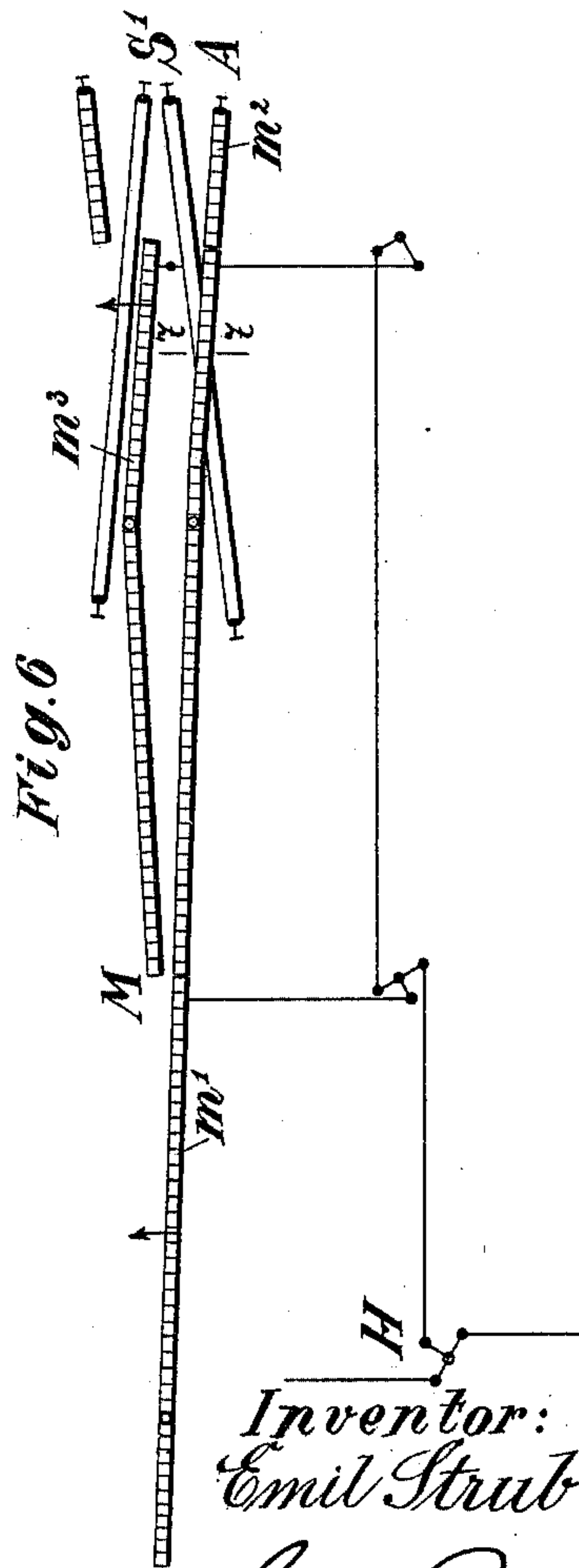
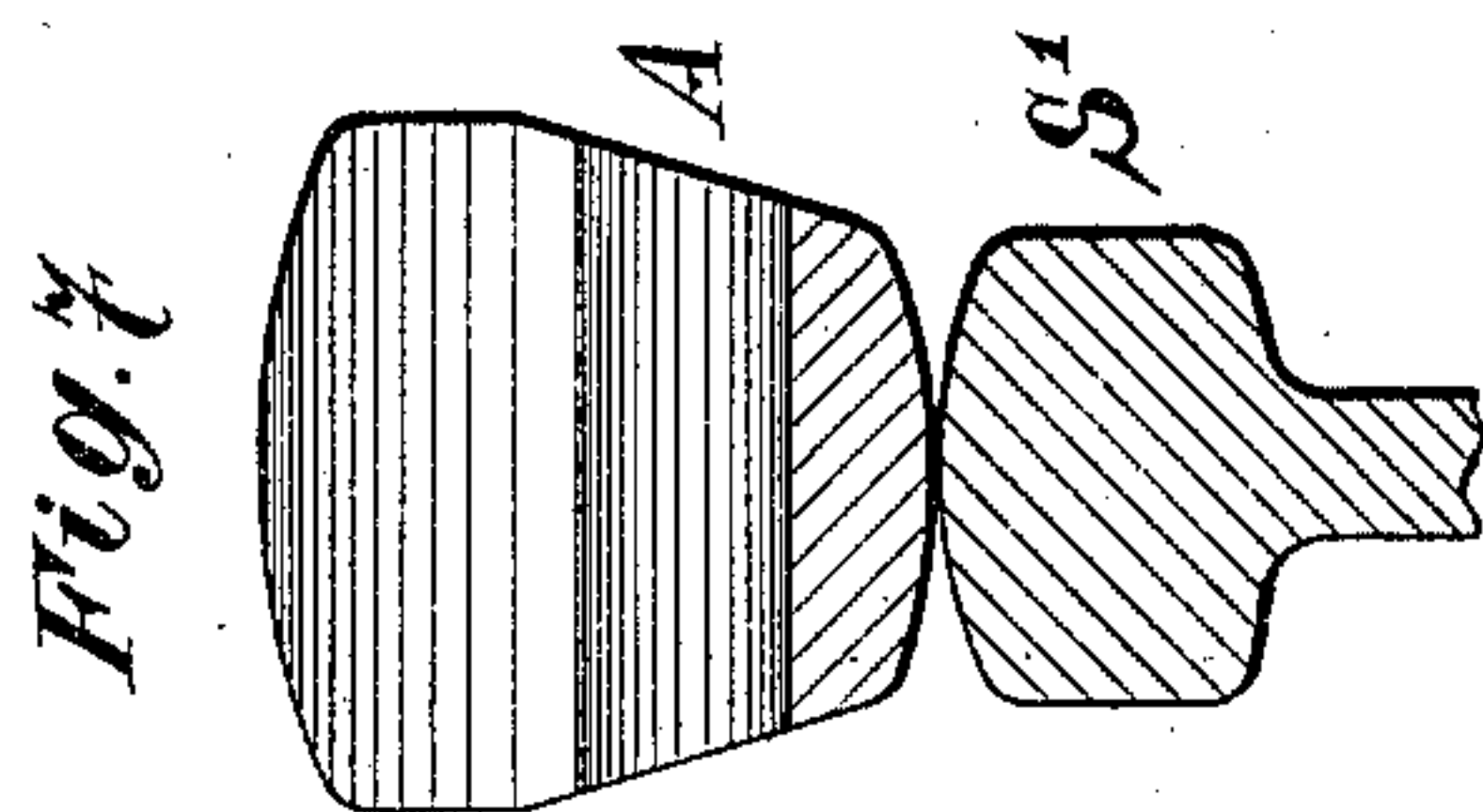
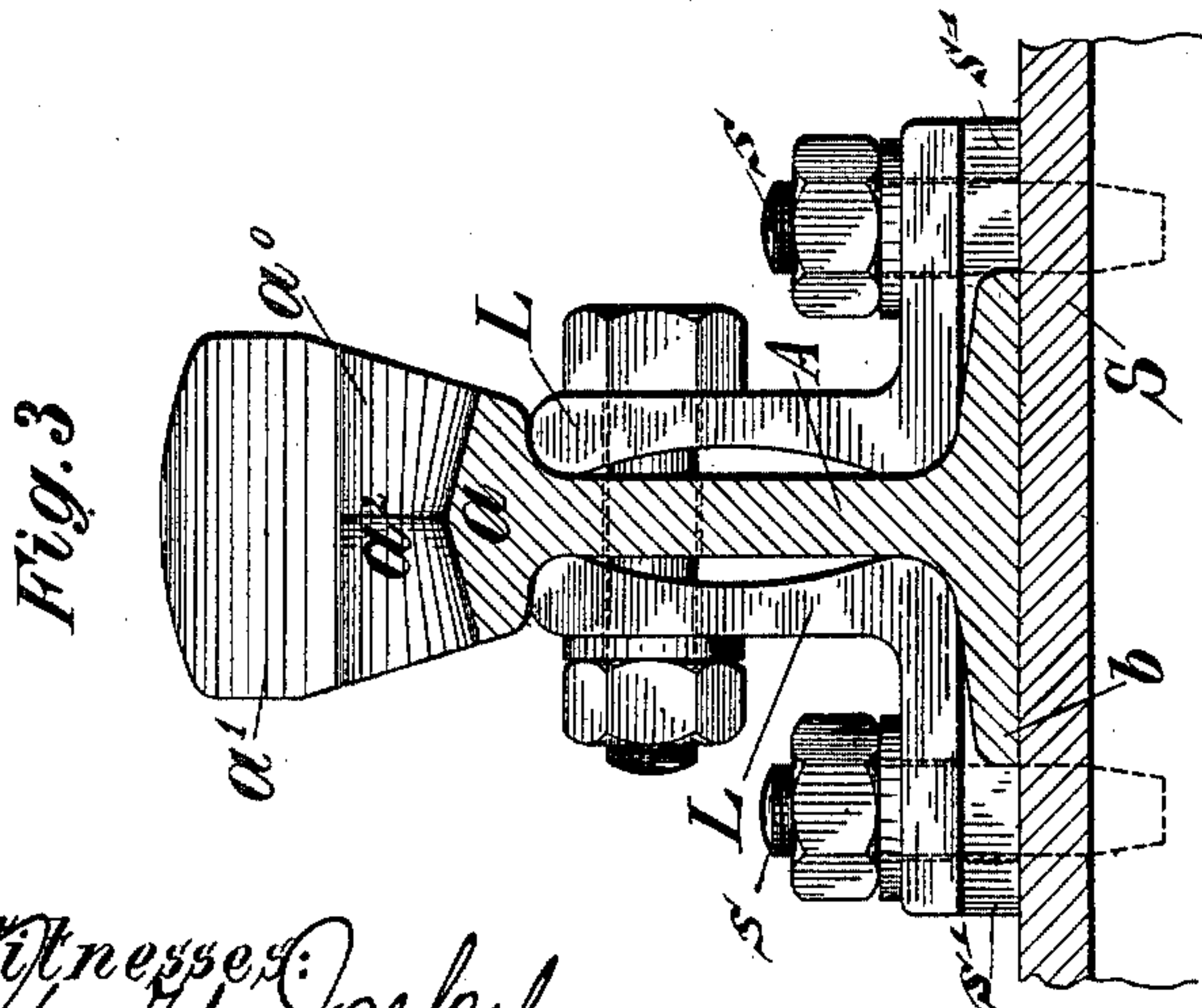
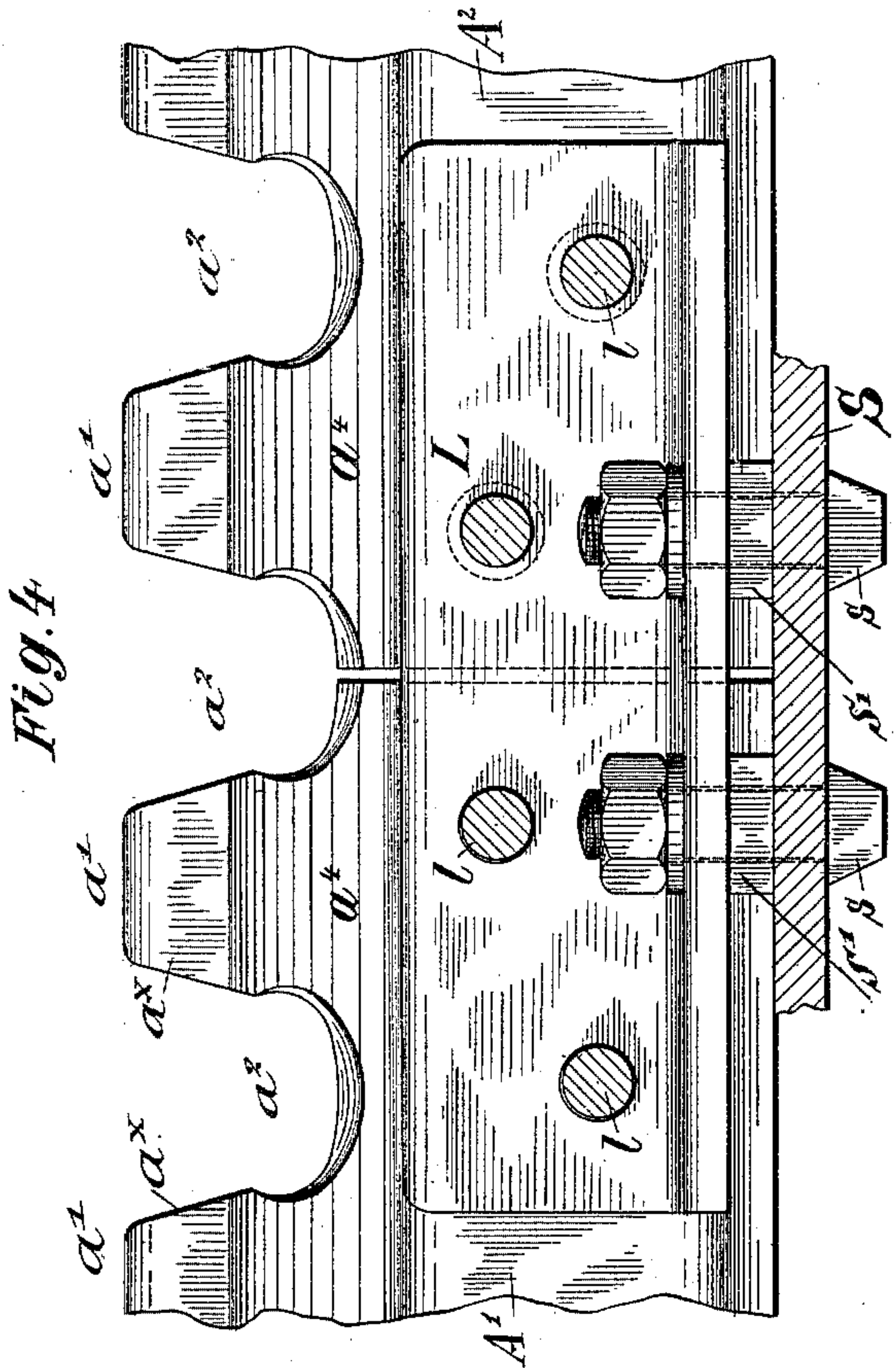
(No Model.)

2 Sheets—Sheet 2.

E. STRUB.
RACK RAIL FOR MOUNTAIN RAILWAYS.

No. 600,324.

Patented Mar. 8, 1898.



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UNITED STATES PATENT OFFICE.

EMIL STRUB, OF ZURICH, SWITZERLAND, ASSIGNOR TO THE GESELLSCHAFT DER L. VON ROLL'SCHEN EISENWERKE IN SOLOTHURN, OF SWITZERLAND.

RACK-RAIL FOR MOUNTAIN-RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 600,324, dated March 8, 1898.

Application filed January 21, 1897. Serial No. 620,029. (No model.)

To all whom it may concern:

Be it known that I, EMIL STRUB, a citizen of the Republic of Switzerland, residing at Zurich, in the Republic of Switzerland, have
5 invented certain new and useful Improvements in Rack-Rails for Mountain-Railways, of which the following is a specification.

This invention relates to a rack-rail for inclined planes or mountain-railways; and the
10 object of the invention is to facilitate the manufacture and cheapen the construction of the rack-rails as compared to those heretofore in use and also to provide a greater degree of safety in this class of inventions
15 than heretofore, together with a higher degree of efficiency by way of durability.

The invention consists of a rack-rail having a toothed head, the teeth of said head being flat at the sides of their upper portions,
20 so as to be parallel with the longitudinal axis of the rail, while the lower portions of the teeth are provided with inclined sides which diverge from the point of connection with the head of the rail upwardly to the parallel flat
25 side portions of the teeth, while the recesses or notches between the teeth are enlarged at their lower portions, said teeth being beveled in the usual manner adjacent to the recesses or notches.

The invention further consists of fish-plates of L shape in cross-section, said fish-plates being bolted at their vertical flanges to the abutting end portions of the rails and being bolted at their horizontal flanges to the ties
35 in the road-bed, between which horizontal flanges and the ties washers or filling-pieces are inserted, and through which latter the connecting-bolts pass; and the invention further consists of a safety device carried by the
40 car-body, said device consisting of a pair of levers having jaws the inner faces of which are inclined correspondingly with the sides of the rail, while said jaws are connected together by a suitable link or cross-head and
45 are actuated in any suitable manner by means of a right-and-left screw, which passes through the correspondingly-threaded nuts carried by the upper end of the levers; and the invention consists of other features of construction
50 and combinations of parts to be hereinafter fully described and then claimed.

In the accompanying drawings, Figure 1 represents a vertical transverse section of my improved rack-rail for mountain-railways with the jaws of the safety-levers broken off
55 and in connection therewith and applied to the inclined sides of the teeth. Fig. 2 is a side elevation of my improved rack-rail. Fig. 3 is a transverse section of a modified form of rack-rail, showing the fish-plates in
60 connection therewith by which the adjacent ends of two rails are secured together. Fig. 4 is a side elevation of Fig. 3. Fig. 5 is a side elevation of the safety device, showing the rack-rail in transverse section. Figs. 6
65 and 6^a are plan views of the switch construction used in connection with my improved rack-rail, respectively showing the normal and shifted position of the switch-tongues. Fig. 7 is an enlarged transverse section on
70 lines 7 7, Fig. 6.

Similar letters of reference indicate corresponding parts.

My improved rack-rail A is made with the web and base in the general form of an ordinary railway-rail, while the head *a* of the
75 same corresponds with the head of the ordinary railway-rail, excepting that it is toothed and is provided with a peculiar conformation. The object in so forming the rail is for the
80 purpose of facilitating the rolling and to permit the laying of the same in the same manner as the ordinary rails are laid.

a' are the teeth, which are arranged equidistantly apart and are separated by recesses
85 or notches *a*², that are arranged transversely of the longitudinal axis of the rail.

The rail can be best manufactured by suitable rolls and by dies, saws, or otherwise, by which the recesses *a*² in the head are produced.
90 In this way the head of the rail forms to some extent the rack-bar proper, inasmuch as the same is toothed. For the sake of simplicity the teeth *a'* of the rail-head are provided at their upper ends with straight sides parallel
95 with the longitudinal plane of the rail, while the recesses *a*² between the teeth are formed by means of the adjacent beveled walls *a*^x of the upper portions of the teeth, which converge toward ovaly-enlarged portions of the
100 recesses between the bases of the teeth, where by the recesses are enlarged at their inner

portions, as shown clearly in Figs. 2 and 4. The oval enlargements of the inner portions of the recesses a^2 are made for the purpose of obtaining a more reliable intermeshing of the teeth, inasmuch as the undercuts formed in the teeth by the ends of the oval enlargements provide sufficient spaces into which obstructions—such as snow, ice, dirt, &c.—may be forced by the teeth intermeshing with the teeth of the rail.

As shown in Figs. 3 and 4 and also in dotted lines in Fig. 1, the bottoms of the recesses may be inclined downwardly and outwardly from the median longitudinal plane a^3 of the rail. This construction is specially adapted to those railways in which ice is liable to form an obstruction on the rails, inasmuch as the lateral outward displacement or forcing of the ice is reliably accomplished by the teeth of the driving gear-wheel.

The sides of the head a of the rail and of the teeth are inclined outwardly and upwardly at a^4 from the base of the head to the lower ends of the flat or straight faces of the teeth, so that the sides of the head and of the lower portions of the teeth diverge upwardly from the base of the head. The inclined faces a^4 terminate at points above the edges a^0 of the oval enlargements.

By making the head of the rail of less width at its lower part than at its upper part—in other words, gradually increasing the size of the head as well as the width of the teeth upwardly—a safety device is permitted to be used conjointly with the rail, said safety device being carried by the car. By the provision of this safety device not only the vertical displacement of the car from the rails is prevented, but also a lateral displacement or detachment of the driving gear-wheel from the rack-rail is prevented, while by the direct application of the jaws of the safety device to the head of the rack-rail a brake action is obtained, so that the safety device may be used as a brake not only during the ordinary normal running of the car, but it may be also used as an emergency-brake, for instance, in the event of the breakage of an axle—that is to say, the safety device can be connected with suitable devices on the car and be actuated in such a manner that a normal brake action, as well as an automatic brake action, in case of an accident is produced. This safety device is shown fully in Fig. 5 and partially in Fig. 1, and consists of levers B' , which are fulcrumed to a link or plate p and are pivotally connected at their upper ends with screw-nuts $c' c^2$, which are provided with pivot-pins c^0 , that are received in recesses in the upper ends of the levers, said screw-nuts being oppositely screw-threaded and being mounted upon and actuated by a correspondingly right and left threaded screw-spindle c , which is mounted in any suitable manner upon the car-body. By the provision of the right and left threads on the screw-spindle the turning of the spindle is enabled to cause

the upper ends of the levers to approach or recede from each other, while the lower ends of the levers, or those portions b' which form the jaws, are correspondingly actuated, so as to be moved from the inclined side faces a^4 of the head of the rail or toward the same for gripping the rail. Rotary motion is imparted to the spindle either by means of a suitable worm-wheel transmission operated by hand, or the spindle is connected with a self-acting device by means of which the automatic application of the jaws to the rail is produced.

In Figs. 3 and 4 fish-plates L , which are L-shaped in cross-section, are shown, the vertical flange of said fish-plates being applied to the abutting ends of two rails and secured thereto by connecting-bolts l , while the horizontal flanges of the same are connected to the cross-ties S by means of connecting-bolts s , which horizontal flanges are separated from the cross-ties by means of washers or filling-pieces s' interposed between the said flanges and the cross-ties.

In Figs. 6 and 6^a a switch M is shown, which is so constructed that the safety device located on the car can be readily passed from the stationary rails to the switch-rails. In my improved switch three shiftable rack-tongues m' , m^2 , and m^3 are arranged, which tongues are operated or set simultaneously by means of a suitable lever system H , which is connected with each of the tongues. The switch is shown in two positions in said Figs. 6 and 6^a—that is to say, so that the car can pass along the main track or from the main track onto the side track—the relative arrangement and location of the switch-tongues $m' m^2 m^3$ being readily understood and the direction of their shifting motion being indicated by arrows in said figures. A clear idea of the construction and relative arrangement of the main-track rails and the switch-tongues is gained from Fig. 7, in which it will be seen that the switch-tongue A' is of the same construction and conformation as the heads of the rack-rails, said switch-tongues crossing the main-track rail S' in oblique direction. In this manner the toothed switch-tongue is supported at a greater elevation than the track-rails, as in all railways of this kind the rack-rails are higher than the track-rails. By cutting off the lower part of the switch-tongue at the point where it crosses the track-rail it is permitted to bridge the track-rail and thereby permit the driving gear-wheel to cross the ordinary rails.

A ready passing from the main track onto the switch-track could not be accomplished with the same facility in the construction heretofore in use as in the present invention.

The advantages of my improved rack-rail, therefore, are, first, that it can be manufactured with greater facility and with a greater degree of cheapness as compared with the rack-rails heretofore in use; second, that the laying of the rail is facilitated, whereby the

expense of the construction of such tracks is considerably reduced; third, that a high degree of safety is obtained, as the rack-rail permits the use of a safety device; fourth, that there is obtained a considerably greater degree of durability, together with comparatively less weight.

The employment of the safety device permits this system to be applied to increased grades as compared to those rack-rail systems in which there is a vertical intermeshing of the teeth. The rack-rails can also be readily bent for curves in either direction and can be connected at the rail-joints in the same manner as ordinary track-rails, and as they are connected to the ties in a simple manner no special devices for laying the rails other than those required for laying ordinary rails are required. The same rail is used for the switches and crossing, excepting that the web and the base are removed, so that thereby the entire system is simplified and adapted to requirements.

Having thus described my invention, what I claim is—

1. A rack-rail, having the base and web of an ordinary railway-rail and provided with a toothed head, the head and teeth having inclined flat sides diverging from the lower portion of each side of the head, substantially as set forth.

2. A rack-rail, having the base and web of an ordinary railway-rail, and provided with a toothed head, the teeth of the rail being separated by recesses, the lower portions of which are enlarged or offset in the direction of the length of the rail, substantially as set forth.

3. A rack-rail, having the base and web of an ordinary railway-rail, and provided with a toothed head having inclined opposite sides diverging from the bottom of the head up-

wardly, the teeth of said head being separated by recesses, the lower portions of which are radially enlarged in the direction of the length of the rail, substantially as set forth.

4. A rack-rail provided with teeth which are widest transversely of the rail and are separated by recesses extending transversely of the rail, said recesses being radially enlarged at their lower ends in the direction of the length of the rail, substantially as set forth.

5. A rack-rail, the teeth of which are provided with inclined flat sides diverging upwardly from the lower part of the head of the rail, substantially as set forth.

6. The combination, with a rack-rail, having a toothed head provided with inclined upwardly-diverging sides, the teeth of said head forming the upper part thereof, while the recesses between the teeth extend across the entire width of the head, so that they open at both sides of the head, of a safety device provided with jaws with inclined inner faces, the inclination of said faces corresponding with the inclination of the sides of the toothed head, and means for actuating the safety device for applying or releasing the jaws from the rail, substantially as set forth.

7. The combination, with the main track, of a rack-rail provided with a pivoted rack-rail switch-tongue, said switch-tongue being recessed at its under side where it crosses one of the rails of the main track, substantially as set forth.

In testimony whereof I hereunto sign my name, in the presence of two subscribing witnesses, this 11th day of December, 1896.

EMIL STRUB.

Witnesses:

H. LOCKART,
MORITZ VIETH.