(No Model.) 2 Sheets—Sheet 1.

J. CHRISTIANSEN.

RAILWAY SWITCH.

No. 558,600. Patented Apr. 21, 1896

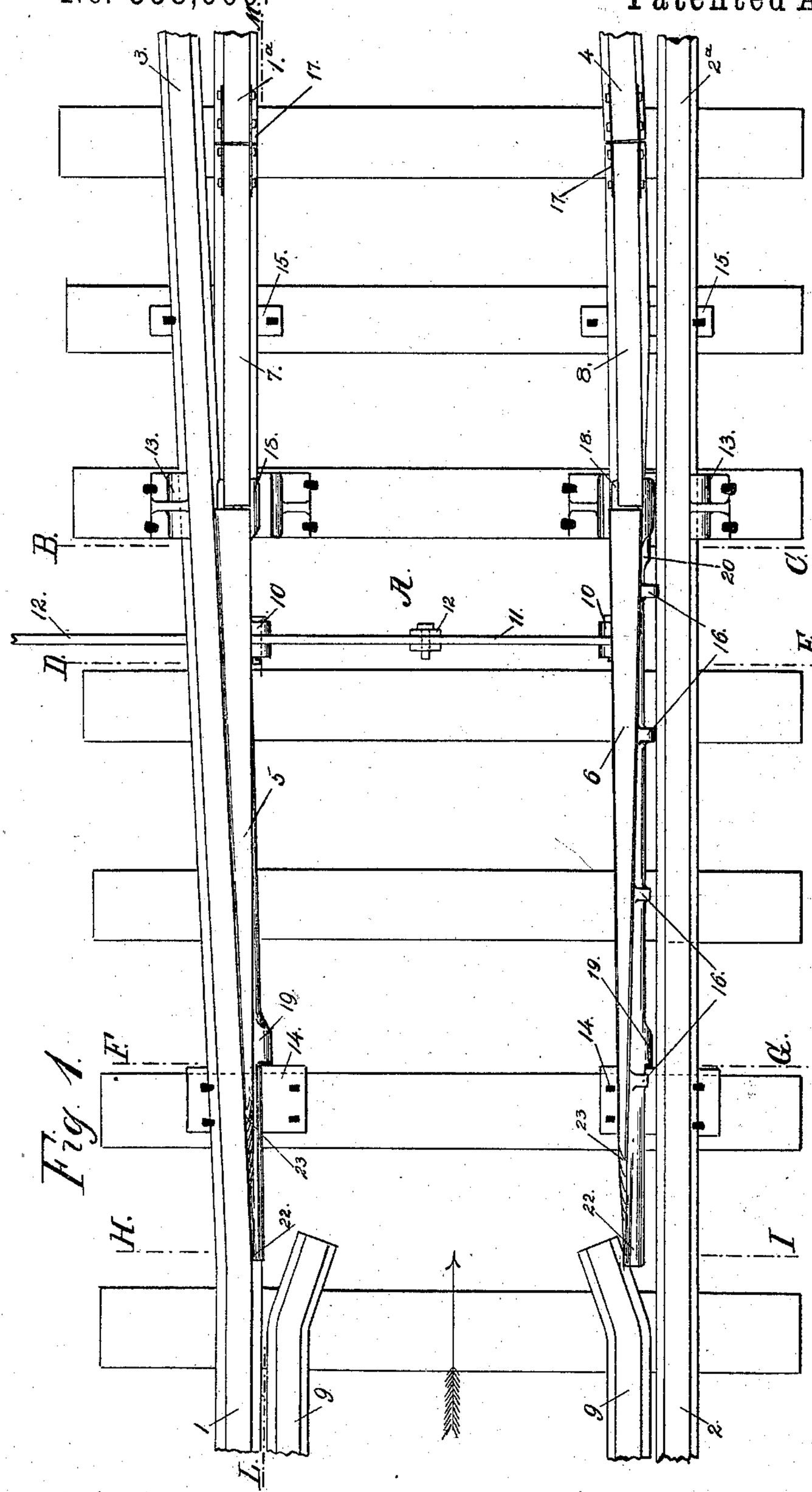

Fig. 1.

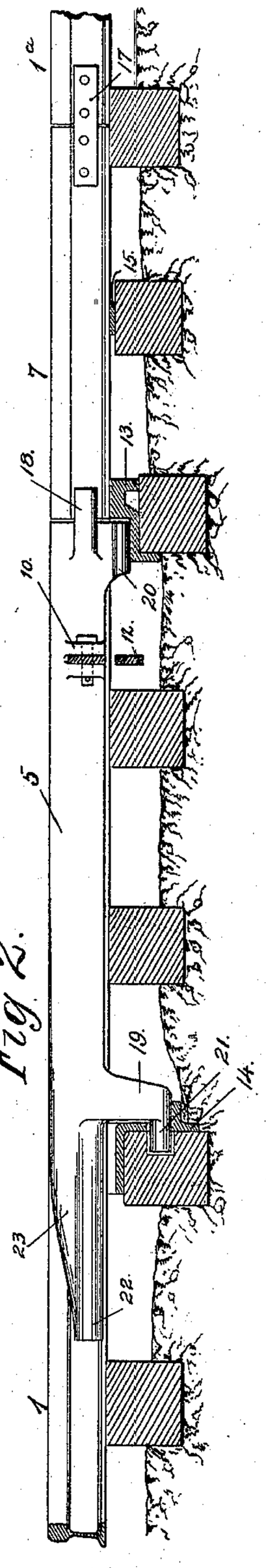

Fig. 2.

Witnesses
Jennie Stelle.
W. H. Howiss.

Inventor.
John Christiansen.

(No Model.) 2 Sheets—Sheet 2.

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Fig 3.

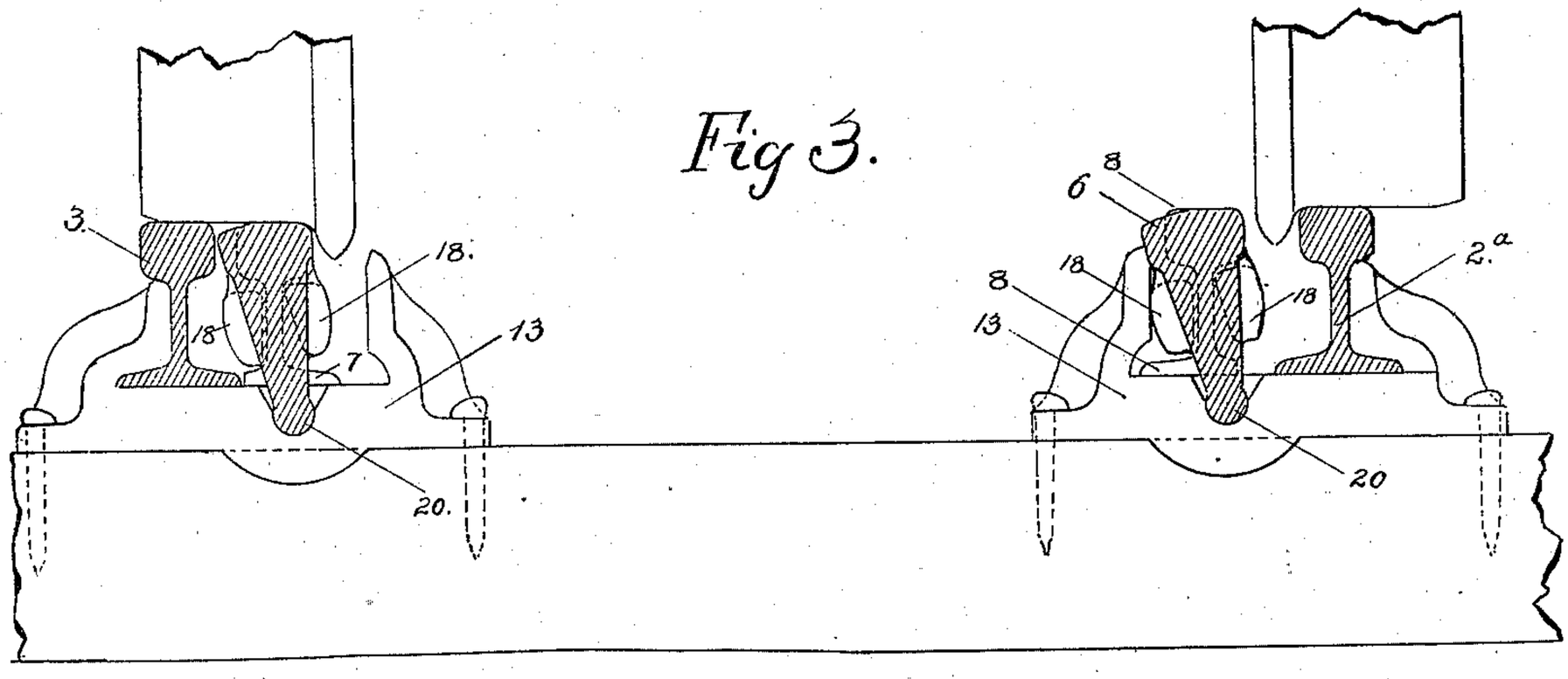


Fig 4.

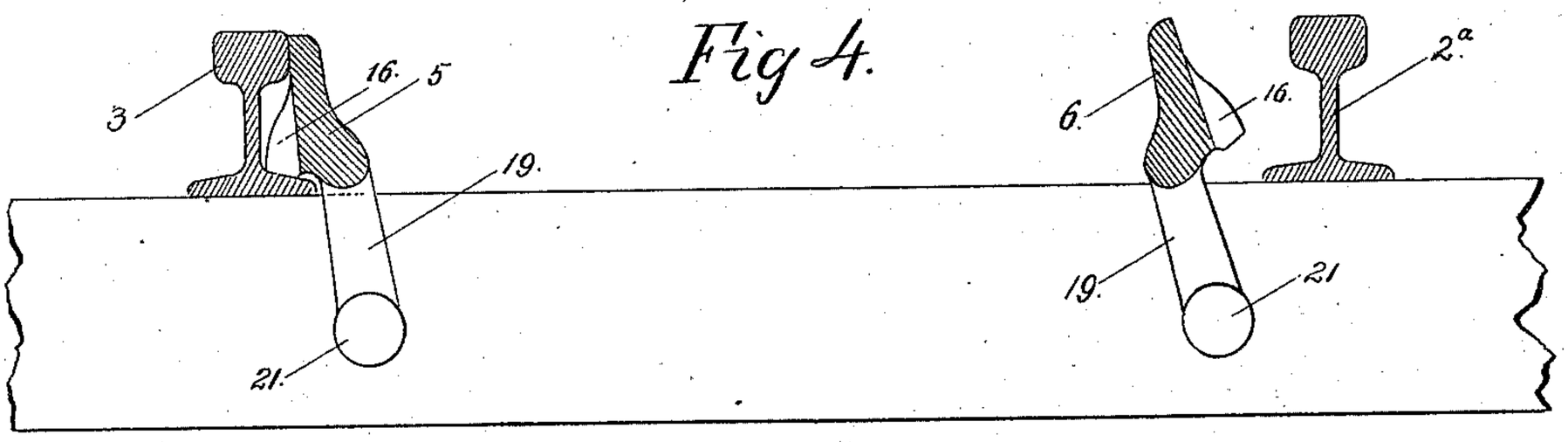


Fig 5.

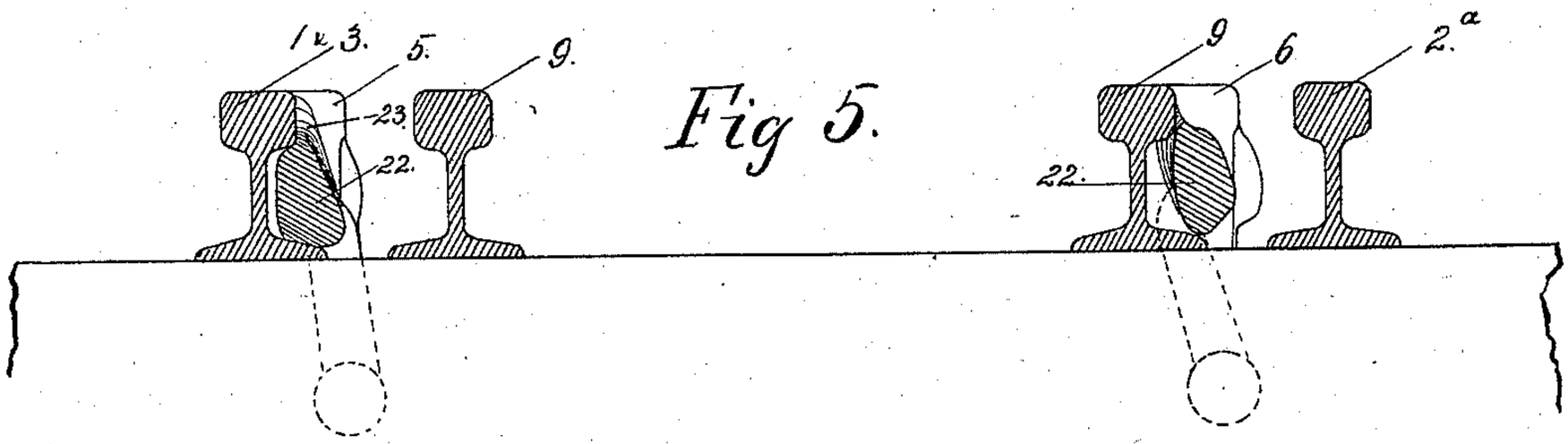
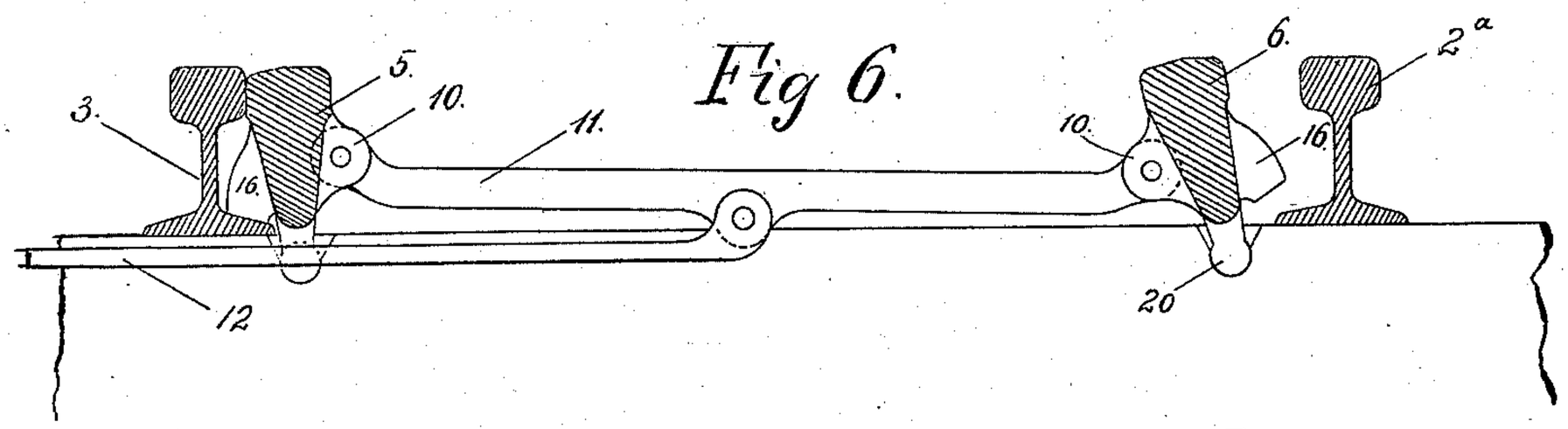


Fig 6.



Witnesses.
Jenne Nellis
W. H. Komiss

Inventor.
John Christiansen.

UNITED STATES PATENT OFFICE.

JOHN CHRISTIANSEN, OF HARTFORD, CONNECTICUT, ASSIGNOR OF ONE-HALF TO WILLIAM A. LORENZ, OF SAME PLACE, AND HENRY T. BRÜCK, OF MOUNT SAVAGE, MARYLAND.

RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 558,600, dated April 21, 1896.

Application filed August 13, 1895. Serial No. 559,113. (No model.)

To all whom it may concern:

Be it known that I, JOHN CHRISTIANSEN, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Railway-Switches, of which the following is a full, clear, and exact specification.

My invention relates to improvements in railway-switches, the object being to simplify the present almost universally used "split switch" and to greatly lessen the number of parts of which it is composed, also to give greater strength and stability to the switch-rails, and consequently to make the switch safer and more durable, also to reduce the power required to operate it, and to gain material advantages in its automatic action and operation, as hereinafter more fully described.

In the drawings accompanying and forming part of this specification, Figure 1 is a plan view of a junction of two lines of rails, showing my improved switch in connection therewith, set to the right-hand line of rails. Fig. 2 is a longitudinal sectional elevation on line L M of Fig. 1. Fig. 3 is a transverse section on line B C. Fig. 4 is a transverse section on line F G. Fig. 5 is a transverse section on line H I. Fig. 6 is a transverse section on line D E.

Similar letters and numerals refer to similar parts throughout the several views.

A in Fig. 1 represents the switch as a whole, located in the railway-track, of which 1 and 1^a and 2 and 2^a designate the main-track rails, the side-track rails being designated by numerals 3 and 4. The switch-rails or movable rails are composed of two parts on each side of the track—namely, 5 and 7 on the left and 6 and 8 on the right side. The pointed or wedge-shaped rails 5 and 6, which I will call the "primary" switch-rails, are capable of an oscillatory motion. The rails 7 and 8 are termed "secondary" switch-rails, and are simply ordinary short pieces of railway-rails connected to the track-rails 1^a and 4 by means of fish-plates or splices, or in any other suitable manner, so as to allow of a laterally-swinging motion of the secondary rails from these loosely-jointed connections with the fixed rails 1^a and 4 as centers.

The manner in which the engagement of the secondary or sliding rails with the primary or oscillating rails is effected, so as to comply with the conditions required, which are that the rails shall be strongly and firmly yet loosely jointed, and shall form a proper alinement with each other and with the track-rails at their extreme position, is clearly shown in Figs. 1, 2, and 3, and consists in a fork-shaped extension at the ends of the rails 5 and 6, which has the peculiar shape designated by 18 in Fig. 3, and which engages the webs of rails 7 and 8 in such a manner as to allow of a perfectly free oscillating motion of the primary switch-rails 5 and 6 within their prescribed limits, and to provide for the requisite swinging motion of the secondary switch-rails, so as to place them in proper and true alinement with the primary rails at each extremity of their motion.

The primary switch-rails are each provided near their point or forward end with a downward extending heavy arm 19, (see Figs. 2 and 4,) said arm carrying a trunnion 21, which is journaled in a chair 14, supported on and spiked firmly to the tie. At their rear ends they are also each provided with a trunnion 20, which has its bearing and support in the rail-chair 13. It will be noticed that the distance from the top of the rail to the centers of these trunnions differs considerably, being much greater in the forward trunnion 21 than the rear one 20. The object of this difference is to impart a larger movement or throw to the point 22 of the primary switch-rail, so as to give a wide throat for the entrance of the wheel-flanges.

The lugs or ears 10 on the sides of the primary rails (shown in Figs. 1, 2, and 6) serve for the attachment of the bar 11 by means of pins or bolts, and to this bar, at any convenient place within its length, is coupled the switch-rod 12, leading to a switch-stand of the kind now ordinarily in use. Thus both the primary switch-rails 5 and 6 are operated simultaneously, the movement of the switch-

stand lever oscillating both switch-rails on their respective trunnions, and causing either one or the other to engage with the fixed main or side track rail at will.

By reference to Fig. 1 it will be seen that the points of the primary switch-rails are moved a long distance for a given angle of oscillation, compared with the movement of the forked end of those rails, which, with the same amount of angular motion, moves those ends and the ends of the secondary rails which are engaged by them but slightly. This difference in lateral movement of the two ends of the primary rail is due to the difference in the vertical position of the two trunnions with relation to the upper surface or tread of the rail, and is adapted to place the primary switch-rails and their attached secondary rails so as to give a wide throat for the entrance of the wheel-flanges, as above stated, and also to make the change in direction a gradual one.

The primary switch-rails are provided at their outer sides with lugs 16, which, when the primary rail is lying against the main rail, like the rail 5 in Figs. 1 and 6, are shaped so as to fit down upon the foot or bottom flange of the main rail, so as to form a rigid vertical support for the primary switch-rail. Thus whatever load or strain may come on that switch-rail is effectually transferred to the fixed track-rail, and does not particularly affect the arm 19 and trunnion 21, which otherwise might be the part of the switch-rail most liable to break. It will also be observed by reference to Figs. 1 and 6 that the head of the switch-rail 5, which is therein shown to be in service, is fitted throughout its length to the head of the fixed track-rail 3, and is thereby firmly supported in a lateral direction against the shock and strain due to passing trains. The additional width of the head of the switch-rail at its junction with the secondary rail, necessitated by this construction, is provided for by the excess of motion imparted to the primary switch-rail because of its oscillation upon the trunnion 20, as compared with the motion of the secondary rail, due to its lateral swinging motion.

In Fig. 1 it will be observed that the right-hand edges of the primary rails 5 and 6 coincide with the corresponding edges of the secondary rails 7 and 8, those being the edges along which the flanges must pass as the switch is therein set. When the switch is thrown to the opposite side, the oscillation of the primary switch-rails will bring their left-hand edges into line with the corresponding edges of the secondary rails, the difference in movement between the adjacent ends of the primary and secondary rails being sufficient to compensate for the greater width of the primary rails at their junction with the secondary rails.

The construction of the foremost end or point of the primary switch-rails (see Fig. 1, 2, and 5) is made exceedingly strong. As the rails decrease in width on top toward their forward end or point, they are bellied out at the bottom, as shown in Fig. 4, but still nearer the point, and, as shown in Fig. 5, metal is added also on the side next to the fixed track-rail, extending in under the head of that rail, and the form of the point 22 is made such as to nearly fill the space between the head and the flange of the fixed rail, resting firmly upon that flange, and the gradual rise and upward slope of the thin wedge-shaped pin 23, with its gradual increase in size and width, makes the point of the primary switch-rail remarkably strong and safe.

The primary switch-rails are preferably made of cast-steel, which permits the molding of the point and other parts in the manner described, and I thus obtain conditions which it is impossible to arrive at by planing an ordinary track-rail wedge-shaped, as is the practice in the split switches at present largely in use.

The lugs to which the rod 11 is attached by pins or bolts, and by means of which the switch is operated, are shown located near the rear end of the primary switch-rails. They may be placed in the middle, or even nearer the point, if thought desirable, but their particular location makes practically no difference in the perfectly safe operation of the switch-rails. I may put on two or more sets of lugs, distributed at proper distances throughout the length of the primary switch-rail, and connect them across by two or more bars, either one of which may be connected to and operated by the switch-stand, but I disclaim the necessity for so doing, claiming for this switch extreme simplicity, dispensing with all the spread-bars, bolts, and rods, which are an expensive and troublesome necessity in the present split switch.

Having described the construction of the switch and its operation, I desire to point out the leading advantage which it possesses over other switches when operated automatically—that is, when connected with an automatic switch-stand of the kinds now in use, so as to allow of a train passing safely through the switch when the latter is not properly set—for instance, a train running over the switch from the side track when it is set for the main track, as in Fig. 1. It will be seen that as soon as the wheels have passed the fixed rail 4 and get on to the movable rail 8 their flanges will impinge upon the side of the secondary switch-rail 8, gaged by the opposite fixed track-rail 3, and will swing the rail 8 on its greased sliding plate 15 and on rail-chair 13, and by means of the forked connection will throw the primary switch-rail 6 over against the fixed track-rail and into proper position for the wheels to pass over it safely, and will have done so before the wheels have quite reached the primary switch-rail, the pull or strain on the switch-stand connection being thus overcome by the flanges acting through the forked connection and thence torsionally

through the heavy body of the primary switch-rail between said forked connection and the lugs of the switch-rod attachment. As long as there is a wheel anywhere on the switch between the point of the primary switch-rail and the joint of the secondary switch-rail with the fixed track-rail, the switch will remain stationary in this position. After the wheels have all passed the points of the primary switch-rails on to the main-track rails 1 and 2 the secondary switch-rail 8 and the primary rail 6 will be free to return to the position shown in Fig. 1.

In the split switch at present in general use the switch-rod connection is at or near the point of the switch, and in a case like that above mentioned the wheels would strike the switch-rail about twelve feet back from the point and near the pivot thereof, acting upon the rails as upon a lever of the third kind. Thus a sudden and heavy strain would be thrown on the rail and on the switch-rod, which causes a destructive lateral bowing or bending of the thin wedge-shaped portion of the rail, and also causes violent lateral vibration in each wheel passing over the switch.

I am aware that the two trunnions 20 and 21, when arranged as shown in Fig. 2, with their axes parallel with the tread of the rail, and therefore out of line with each other, would not work freely if they were to be fitted tightly in their bearings, and especially if oscillated to a considerable angle; but in this class of work it is necessary that the bearings should be reasonably free, and this fact, coupled with the comparatively slight angle of oscillation necessary, enables me to use trunnions with their axes arranged parallel to the tread of the rail, as herein shown. The axes of the trunnions of each of the primary switch-rails may be made in line with each other coinciding with a line located at a suitable inclination with the level of the top surface or tread of the rail. The tendency of a rail thus arranged would be to move endwise in the direction of the inclined axis of its trunnions under the weight of passing trains, but that tendency might be met by providing the trunnions with suitable shoulders or end bearings. I prefer, however, the arrangement shown in Fig. 2, inasmuch as the axes of the trunnions are therein located at right angles to the force exerted by the weight of passing trains.

I claim as my invention—

1. In a railway-switch, in combination with a laterally-swinging rail thereof, a primary rail operatively connected with the swinging rail and adapted to oscillate upon trunnions located at different distances from the tread thereof, substantially as described.

2. In combination with a Y-junction of railway-tracks, having fixed continuous outer rails, a switch, consisting of a pair of oscillating primary rails, and of a pair of swinging secondary rails connecting the primary rails with the inner rails of the two tracks forming the junction, substantially as described.

3. In combination with the inner or adjacent track-rails of a Y-junction, a pair of secondary rails jointed at one end of each to their respective track-rails so as to allow of laterally-swinging motion therefrom, and connected at their opposite ends with primary rails adapted to rock laterally on trunnions, substantially as described.

4. In combination with the inner or adjacent track-rails of a Y-junction, a pair of secondary rails jointed at one end of each to their respective track-rails so as to allow of laterally-swinging motion therefrom, and connected at their opposite ends with primary rails adapted to rock laterally on trunnions, with means operatively connected with a switch-stand and adapted to oscillate the primary rails, substantially as described.

5. A primary switch-rail of the class specified, provided with brackets or projections, as 16, on their sides nearest the fixed track-rails, adapted to rest against and upon the flanges of its fixed track-rail when it is in service, having its point reinforced with an enlarged portion adapted to lie between the top and bottom flanges of the adjacent track-rail, with a gradual incline and increasing thickness from the enlarged part toward the top of the rail, substantially as described and for the purpose specified.

JOHN CHRISTIANSEN.

Witnesses:
JENNIE NELLIS,
W. H. HONISS.