(No Model.) 2 Sheets—Sheet 1.

D. H. FOREMAN.

RAILROAD SWITCH.

No. 302,719. Patented July 29, 1884.

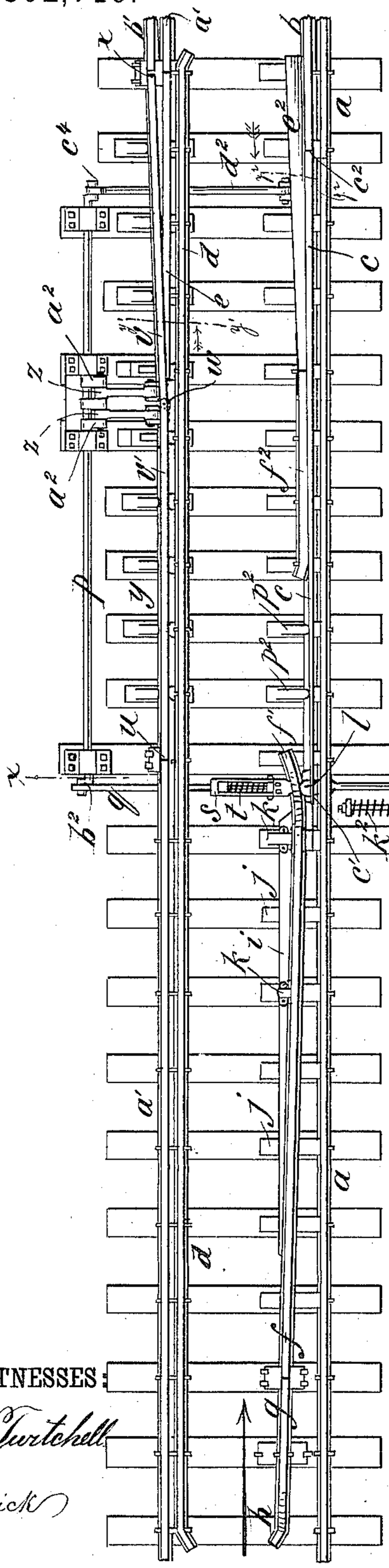


Fig. 1.

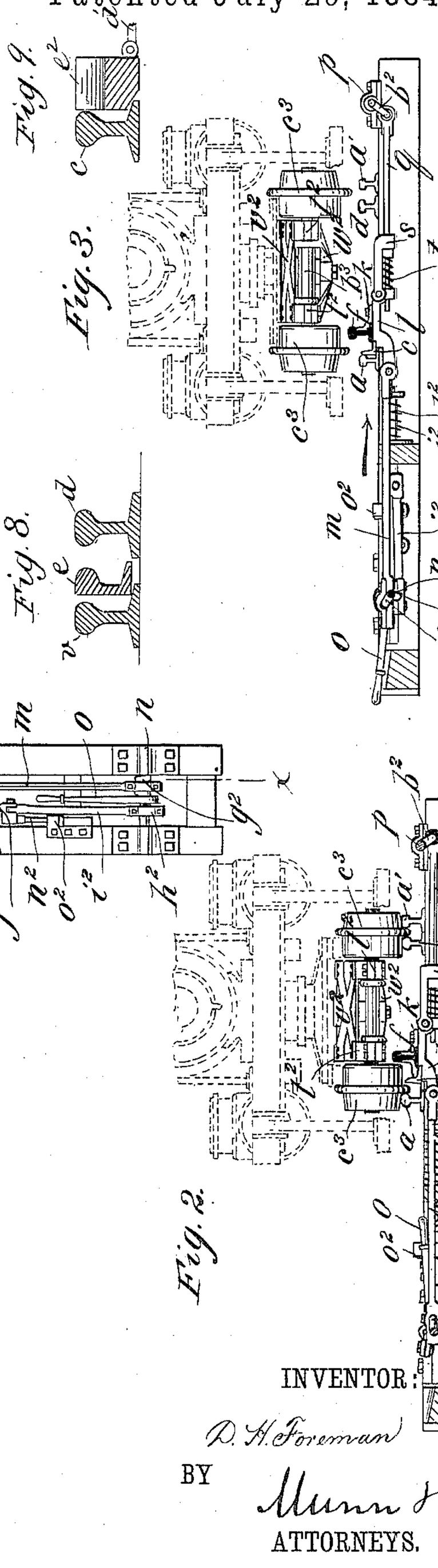


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 8.

WITNESSES:

Donn Twitchell

C. Sedgwick

INVENTOR:

D. H. Foreman

BY

Munn & Co

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

D. H. FOREMAN.

RAILROAD SWITCH.

No. 302,719. Patented July 29, 1884.

Fig. 4.

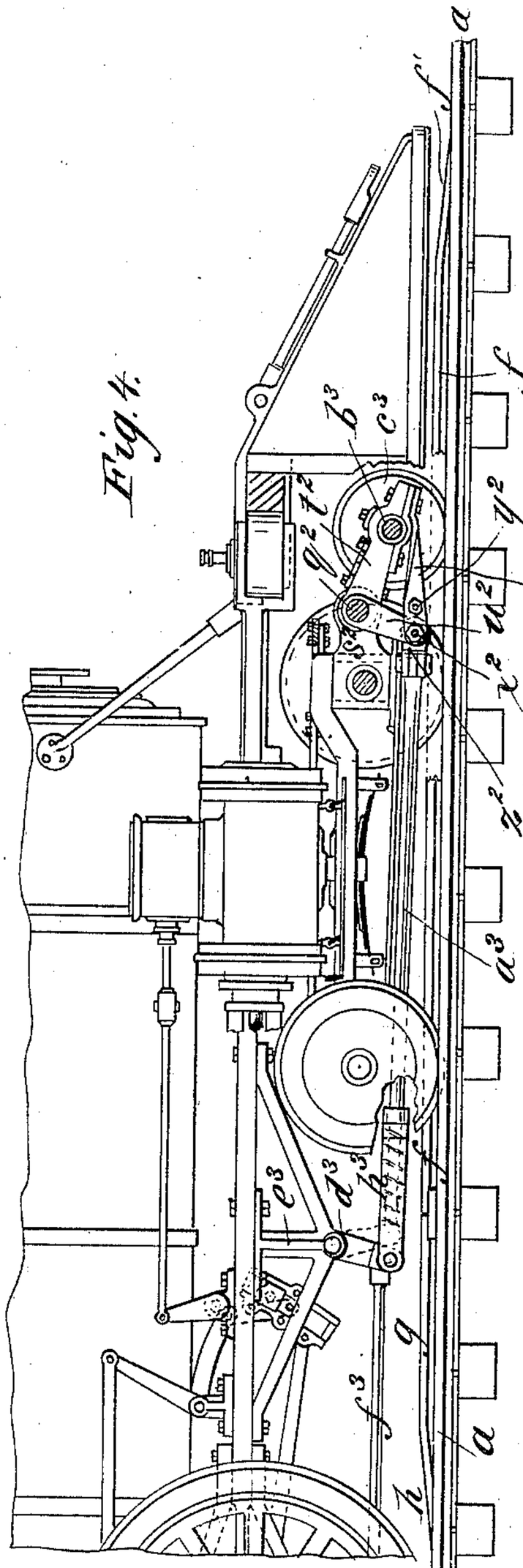


Fig. 10

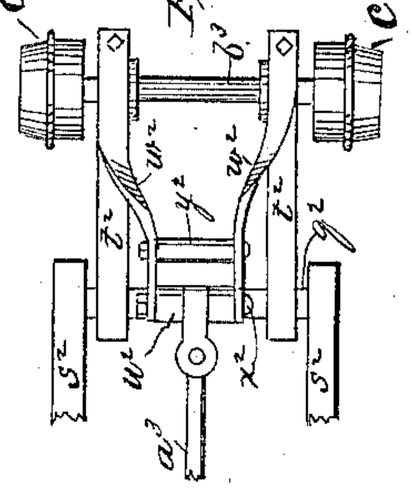


Fig. 5.

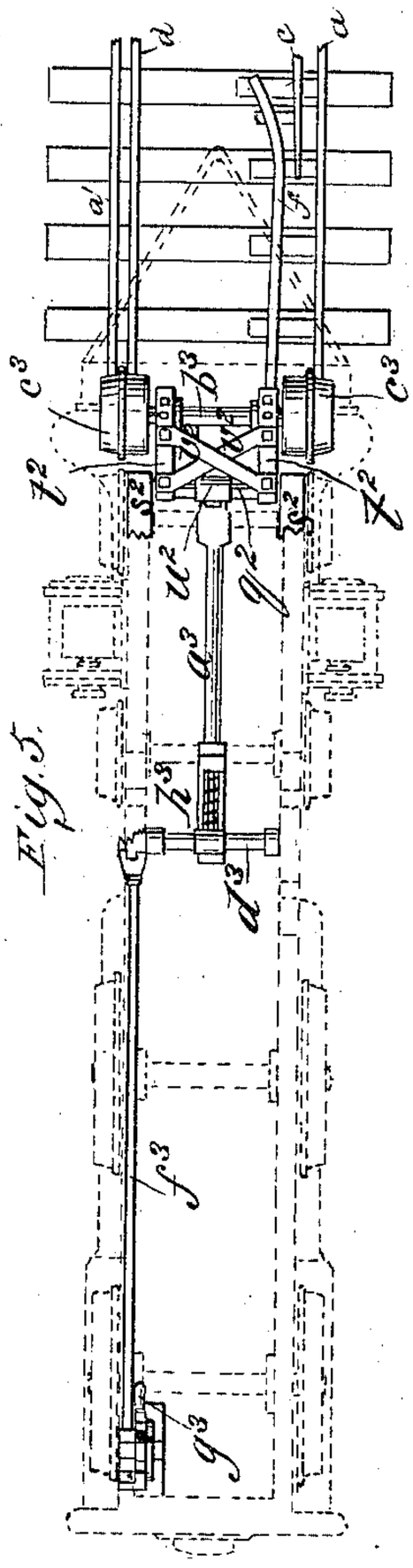


Fig. 6.

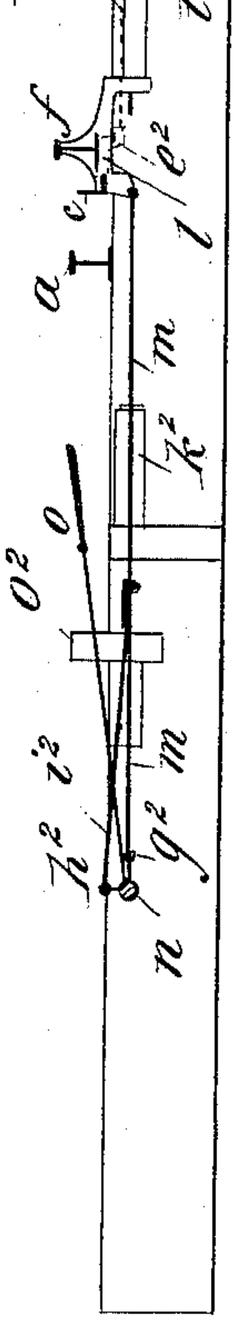
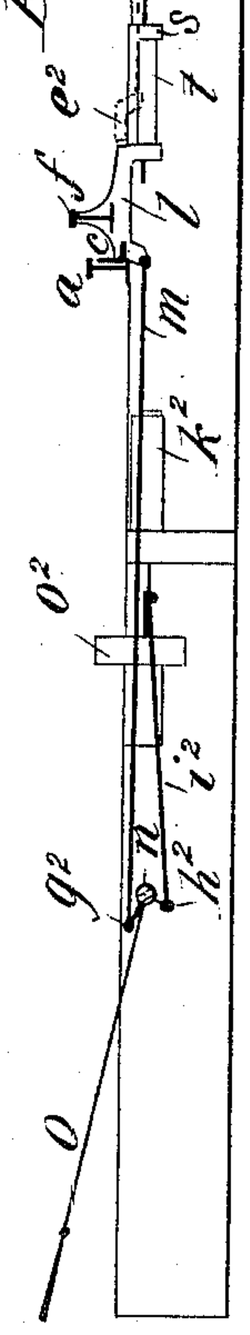


Fig. 7.



WITNESSES:

Donn Twitchell.

C. Sedgwick

INVENTOR:

D. H. Foreman

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

DAVID HARPER FOREMAN, OF LANCASTER, PENNSYLVANIA.

RAILROAD-SWITCH.

SPECIFICATION forming part of Letters Patent No. 302,719, dated July 29, 1884.

Application filed July 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, DAVID HARPER FOREMAN, of Lancaster, in the county of Lancaster and State of Pennsylvania, have invented certain new and useful Improvements in Railroad-Switches, of which the following is a full, clear, and exact description.

The objects of my invention are, first, to insure to through trains upon the main line positive security against accidents arising from misplaced switches, regardless of the position of the switches or of the direction in which they are passed by said through trains upon the main line; second, to insure a positive preventive for what are termed "facing-point accidents"—that is, in the event of the engineer of said through train failing to see a signal or otherwise receive information of the misplacement of a facing-point, to effectually prevent this train being accidentally thrown upon the siding by said misplacement; third, to enable the through train to operate and properly set and securely lock the switch for the main line when set for the siding, whichever way the train may be passing the switch; fourth, to enable a car or train to be safely carried onto the main line when accidentally shunted from the siding and the switch is set for the main line; and, fifth, to enable the train to be safely switched from the main line to the siding, for which objects I have contrived and arranged mechanism as hereinafter fully described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of my improved self-locking safety-switch and positive safety facing-point appliance set for the main line. Fig. 2 is a cross-section of the same set for the main line, also a front elevation of the controlling appliance upon the locomotive for the switch, which is also set for the main line. The section is taken on the line *x x* of Fig. 1. Fig. 3 is a cross-section of the same set for the siding, also a front elevation of the controlling appliance upon the locomotive for the switch in the position for being switched from the main line onto the siding, the section being taken upon the same line. Fig. 4 is a side elevation of the track, showing the elevation of the safety-rail above the track. It also shows a longitudinal section of a portion of the controlling appliance upon the locomotive, set for the main line. Fig. 5 is a plan view of portions of a locomotive in dotted lines, with the switch-controlling appliance thereon in full lines. Fig. 6 is a diagram showing more clearly the positions when the switch is set for the main line. Fig. 7 is also a diagram showing the positions when the switch is set for the siding. Fig. 8 is a section on line $y' y'$ of Fig. 1. Fig. 9 is a section on line $y^2 y^2$, Fig. 1; and Fig. 10 is an inverted plan of the switch-controlling appliance.

Referring to the drawings, *a* and *a'* represent the rails of the main track; *b b'*, the rails of the siding.

c is a movable point-rail adapted to be moved to and from the main-track rail *a* at the point *c'*, and secured to the end of fixed siding-rail *b* at the heel c^2.

d is a fixed guide-rail secured to the ties the entire length of the switch.

e is a fixed frog-point. *f* is the elevated safety-rail. Its movable end *f'* is curved or sloped down to the level of the rails of the main track. The fixed end is secured at the end of a fixed elevated guide-rail, *g*, which is also inclined at *h* to a level with the rails of the main track for security against interference from the cow-catcher of the locomotive passing in either direction. The rail *f* is riveted through its base to a broad base-plate, *i*, which rests and shifts on elevated base-plates *j*, suitably fixed on the ties, said base-plate *i* being to strengthen rail *f* laterally. They are also connected by brackets *k*, for greater strength of the rail *f*. The movable point-rail *c* and the elevated safety-rail *f* are positively connected together at a fixed distance apart by the yoke *l*, and move simultaneously when the point-rail *c* is moved to or from the main rail *a*. The rail *f* is adapted to move longitudinally in the yoke *l* for expansion and contraction. The yoke *l* is connected by a switch-rod, *m*, with the cranked shaft *n* of the switch-lever *o* at one side of the track, for shifting the switch thereby, and said yoke is connected to crank-shaft *p* at the other side of the track by connecting-rod *q*, housing-frame *s*, and compensating-spring *t*.

Between siding-rail *b'* and the joint *u*, with

rail a' opposite the movable end of point-rail c, there are a couple of frog-rails, v v', jointed together at w, turning on joints u and x, and sliding on the base-plates y. These frog-rails v v' are connected by rods z to cranks a^2 of the shaft p, which cranks are set nearly opposite to crank b^2, by which rod q is coupled to shaft p. The frog-rail v has lengthwise motion in the chair at x, where it joins siding-rail b'. The fixed frog-point e is sufficiently elevated and overhung to allow the base-flange of frog-rail v to swing under it, when shifted up to said frog-point, to allow them to come close together at the base, as shown in Fig. 8. The shaft p is prolonged beyond the rods z, connecting it with the frog-rails v v', and it has another crank, c^4, set directly opposite to crank b^2, and connected by rod d^2 with a movable inclined elevating-rail, e^2. This rail has one end fixed at the end of a fixed supporting guide-rail, f^2, and swings thereon transversely to and from the point-rail c when operated by shaft p. The rod d^2, connecting it with the crank c^4, is bent suitably to pass under the rails between it and said crank.

The cranked shaft n, to which the switch-rod m is connected by crank g^2, has another crank, h^2, set at a right angle to and in advance of crank g^2, and connected by rods i^2 and j^2 with a maintaining-spring, k^2, braced against a fixed bracket, l^2. The sliding rod j^2 has a rod, n^2, which works in a spring-lock, o^2, that is designed to lock said rod n^2 self-actingly when the switch is set for the main line. The switch being set in the position shown in Figs. 1 and 2, a train passing in the direction of the arrow, Fig. 1, will pass over the main track a a'. It will be seen that in this case the point-rail c, being locked in its position by the switch-rod m, and banking bed-plates p^2, and fixed rail f^2, against which it then rests, will be very securely held in its position away from the rail of the main track, and forms a fixed guide-rail to passing wheels upon said main track, and this security is increased by the jointed frog-rails v v' being unyieldingly closed up against the base of the fixed frog-point e.

By reference to Fig. 6 it will be seen that the cranks of connecting-rods z are brought to a position slightly below the dead-center, when the switch is set for the main line, thereby securely bracing the movable frog-rails v v' against any outward force by the wheels of the train. It will be seen that by this arrangement I overcome the objectionable feature of an open frog-point, and, since all the parts are rigidly and positively secured, I obtain, virtually, an unbroken main line. The fixed frog-point e is planed or trimmed off on its head at the outer edge sufficiently to allow the passage of a wheel-flange when the base of the frog-rail v is closed up to it, as shown in Fig. 8. When the switch is set for the main line, the inclined elevating-rail e^2 is forced against the heel of point-rail c by the rod d^2, so that should a car be accidentally shunted from the siding b b', with the switch in this position, the wheel upon rail b will be carried up the incline e^2. The opposite wheel upon rail b' coming in contact with frog-rail v, will force the wheel upon elevated rail e^2 obliquely across the heel of point-rail c, safely onto the main line at the point of convergence of frog-rail v. By this arrangement I overcome the necessity of having the point-rail c elastically supported to secure the safety action, and can lock it rigidly, as before stated. I also obviate the objectionable feature of having the wheel pass over the entire length of the point-rail c and spring it aside—an action more or less destructive to the thin point of the same. Should a car approach in the direction of the arrow, Fig. 1, that is to be switched onto the siding, the locking-bar n^2 having been released by the use of a key, the switchman can throw the lever o over into the positions shown in Figs. 3 and 7. Since the lever o, switch-crank g^2, and the maintaining-spring operating crank h^2 are all solidly connected upon and form part of the rock-shaft n, it follows that they all rotate simultaneously at fixed degrees of angularity in relation one to the other. It will therefore be seen that when the switch-crank g^2 is moved about one-half the throw of the switch the maintaining spring-crank h^2 will have reached the maximum point of compression upon the maintaining-spring k^2. As the throw of the point c is continued, crank h^2 begins the return-stroke, having passed the dead-center, the maintaining-spring then exerting its force on the crank g^2. By this arrangement of the cranks, when the throw of the point is completed, crank h^2 will have gained such a degree of angular leverage over crank g^2 that the expansive power of the maintaining-spring k^2 exerted upon the former will be sufficient to secure the switch in position for the legitimate uses of the siding. When the point-rail c is moved over against the main rail a by lever o, as above stated, the shaft p, operated by connecting-rod q, forces the cranks a^2 of connecting-rods z into the position represented in Fig. 7, drawing the movable frog-rails v v' away from the fixed frog e into a position parallel with the point-rail c. Simultaneously with this movement of the point-rail c and frog-rails v v' the elevating-rail e^2 is moved away from the heel of point-rail c by the connecting-rod d^2 and shaft p, as shown by the dotted lines in Fig. 7. This gives a smooth, level, unbroken open line for the legitimate use of the siding. Should the car be of slightly broader gage than the distance between the point-rail c and the frog-rails v v' where they are joined, the wheels will force them apart, and by the connections with yoke l compress compensating spring t, and bear the point-rail c with increased force against the main rail a. With this point-rail c and elevated safety-rail f coupled together and connected to the crank-shaft n, and provided with a maintaining-spring, as above described, I have contrived

operating devices upon the locomotive, which, together with said rails and connecting devices and spring, constitute what I call my "positive safety-rail appliance," the said locomotive attachment being as follows: q^2 is a shaft having bearings in the extensions s^2 of the boxes of the fore axle of the pilot-truck. t^2 represents arms forged solid to said shaft, and u^2 is a vertical lever, also forged solid to said shaft midway from the ends. v^2 are bracing-irons bolted to arms t^2 diagonally, and adapted to strengthen the same against lateral strain. w^2 are other bracing-irons bolted to the under side of the axle-boxes on the ends of the arms t^2, and at the other end secured to a joint-bolt, x^2, upon the end of lever u^2. y^2 is a collar (see Fig. 10) bolted between bracing-irons w^2 immediately in front of lever u^2, adapted to prevent any binding or lateral strain from said braces upon said bolt x^2.

z^2 is the angle-iron of a universal joint bolted into lever u^2, and bracing-irons w^2 at one end and to connecting-rod a^3 at the other end.

l^3 is an axle boxed into said arms t^2, and carrying a pair of centrally-flanged wheels, c^3, the flange and outside tread of said wheels being of the usual form, the inside tread being cylindrical, and of a diameter equal to the largest diameter of the coned outside tread. The breadth of the inside tread is equal to the space between point-rail c and elevated safety-rail f and the throw of the point. Said wheels c^3 are adapted to be lowered or raised to or from the rails of the main track by the lever u^2, connecting-rod a^3, crank-shaft d^3, journaled into the suspended brackets e^3, connecting-rod f^3, and the lever g^3 in the cab of the locomotive. A strong compensating-spring, h^3, and housing for the same is placed upon connecting-rod a^3 at the end next to the shaft d^3, adapted to insure the wheels c^3 being brought down firmly upon the rails of the main track when set in normal position, and to compensate for the slight variations from the vibration of the locomotive when running, and the independent motion of the truck in adjusting itself to the track.

The positive operation and securing of the wheels c^3 in either position is insured by the use, in connection with lever g^3, of a spring-latch and notched sector in the cab of the locomotive. By this arrangement it will be seen that the action of the wheels c^3 for either of the purposes set forth is not affected by any vibration or rocking of the locomotive when running.

By reference to Fig. 2 it will be seen that when the switch is set for the main line, and the appliance upon the locomotive is in the normal position, Figs. 2 and 4, that the one does not in any way interfere with the other when the locomotive passes the switch in either direction upon the main line. Therefore, when the engineer starts upon his "run," immediately upon gaining the main line he secures the appliance upon his locomotive in the position shown in Figs. 2 and 4. Suppose the safety-rail to have been accidentally left set for the siding, ordinarily, should he fail from any cause to see the misplacement his train will be thrown upon the siding; but in this arrangement it will be seen by reference to Figs. 3 and 7 that when the switch is set for the siding the elevated safety-rail f is moved toward the main rail a a distance equal to the throw of the point c'. Wheel c^3, in passing between fixed main rail a and movable elevated rail f, will force said rail f into the position shown in Figs. 1 and 2. With crank g^2 in the position shown in Figs. 3 and 7, (set for the siding,) when wheel c^3 forces rail f and the point-rail c away from the main rail a in the direction of the arrow, Fig. 3, crank h^2 will be brought to the line of dead center, compressing maintaining-spring k^2. As the force is continued, crank h^2 passes the line of the fulcrum-point, where spring k^2 by its expansive power aids in completing the throw of point-rail c away from the main rail a, setting the switch for the main line. When in this position it is securely locked by the spring-lock o^2. The sudden action upon rail f by the wheel c^3 from a train running rapidly is received with a cushioned effect upon spring t. The wheels c^3 are firmly braced against the lateral resistance of the rail f by the flange of one against main rail a and the other against guard-rail d, thus preventing any strain or twist upon the locomotive in the act of throwing the misplaced switch. Should a car approach the switch in the opposite direction upon the main line, when the switch is set for the siding, the flange of the wheel in passing between the main rail a and point-rail c, from heel to point, will force the point-rail c aside and set the switch securely for the main line, as before stated. Since the point-rail c and the movable frog-rails v v' move simultaneously, it follows that the wheels of the car will have passed over frog-point e onto the frog-rails v v' before they are closed up against frog-point e. The weight of the passing wheel upon rail v' will immovably retain it in the open position. The opposite wheel in forcing point-rail c from main rail a will compress compensating spring t, throw and lock point-rail c, as before stated. The wheel upon frog-rail v' having passed onto the main rail a', compensating spring t will force the cranks of connecting-rods z down into positions shown in Fig. 6, closing the frog-rails v v' up against frog-point e, as before stated.

From the above it will seen that when the appliance is set in normal position upon the locomotive of a through train upon the main line said locomotive will operate misplaced rails upon either side of the main line for the positive maintenance of the same regardless of any lack of action on the part of the engineer. Should a locomotive running upon the main line, with the appliance in normal position, Figs. 2 and 4, approach the switch in the direction of the arrow, Fig. 1, to take the sid-

ing, the switch having been set for the same, the engineer moves the lever g^3 so as to force the wheels c^3 into a position above the plane of the elevated safety-rail f. The locomotive will then pass over point-rail c, and be safely switched onto the siding.

It will be seen that this appliance upon the locomotive, when in normal position, offers no interference to the points of an interlocked plant, or to junction-points under the positive control of a tower-operator, since to points so controlled the elevated safety-rail is not attached.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The elevated safety-rail f and the point-rail c, positively connected to the switch-rod m at a fixed distance apart, in combination with movable frog-rails v v', also connecting to the switch-rod, and with a fixed frog-point, e, substantially as described

2. The movable inclined elevating-rail e^2, in combination with the point-rail c, fixed frog-point e, and the movable frog-rails v v', said rail e^2 being connected, substantially as set forth, with the switch-rod m, substantially as described.

3. The switch-rod m, connected to crank g^2 of rock-shaft n, having crank h^2 at a right angle to crank g^2, and connected with a maintaining-spring, k^2, substantially as described.

4. The switch-rod m, connected to crank g^2 of rock-shaft n, having crank h^2 at a right angle to crank g^2, and connected to a maintaining-spring, k^2, and a locking-bar, n^2, substantially as described.

5. The movable frog-rails v v', connected to cranks of shaft p, and said shaft connected to switch-rod m by crank b^2, rod q, compensating-spring t, and housing s, said rod m having the movable elevated safety-rail f and the point-rail c connected to it, substantially as described.

6. The inclined elevating-rail e^2, connected by rod d^2, crank c^4, shaft p, crank b^2, rod q, compensating-spring t, housing s, and rod m, said switch-rod m having the elevated movable safety-rail f and the point-rail c connected to it, substantially as described.

7. The combination of the fixed guard-rail f^2 with the inclined elevating-rail e^2 and the point-rail c, substantially as described.

8. The combination of the centrally-flanged wheels c^3 and means, substantially as set forth, for lowering and raising them, located on the locomotive, with the elevated movable safety-rail f and the point-rail c of the switch, said rails f and c being positively connected to the switch-rod m at a fixed distance apart, and said switch-rod being connected to crank g^2 of the rock-shaft n, having a crank, h^2, at a right angle to crank g^2, and connected to a maintaining-spring, k^2, substantially as described.

9. The combination of the centrally-flanged wheels c^3 and means, substantially as set forth, for lowering and raising them, located on the locomotive, with the elevated movable safety-rail f and the point-rail c of the switch, said rails f and c being positively connected to the switch-rod m at a fixed distance apart, and said rod being connected with movable frog-rails v v', and also connected with a maintaining-spring k^2, as described.

10. The combination of the centrally-flanged wheels c^3 and means, substantially as set forth, for lowering and raising them, located on the locomotive, with the elevated movable safety-rail f, point-rail c, and the frog-rails v v' of the switch, said facing-point rail f and point-rail c being positively connected to the switch-rod m at a fixed distance apart, and the crank-shaft p, for working the frog-rails, being connected to the switch-rod m by the compensating-spring t and housing s, substantially as described.

11. The centrally-flanged wheels c^3, mounted on the axle b^3, arranged in bearings of the arms t^2 of a shaft, q^2, arranged in extension-arms s^2 of the truck-axle boxes, and said arms t^2 and shaft q^2 stayed by diagonal braces v^2 and w^2, substantially as described.

12. The arm u^2 of the rocking frame supporting the centrally-flanged wheels c^3, connected with the working lever-gear by a rod, a^3, having a compensating-spring h^3, substantially as described.

DAVID HARPER FOREMAN.

Witnesses:

E. F. BOWMAN,

W. B. MUSSET.