

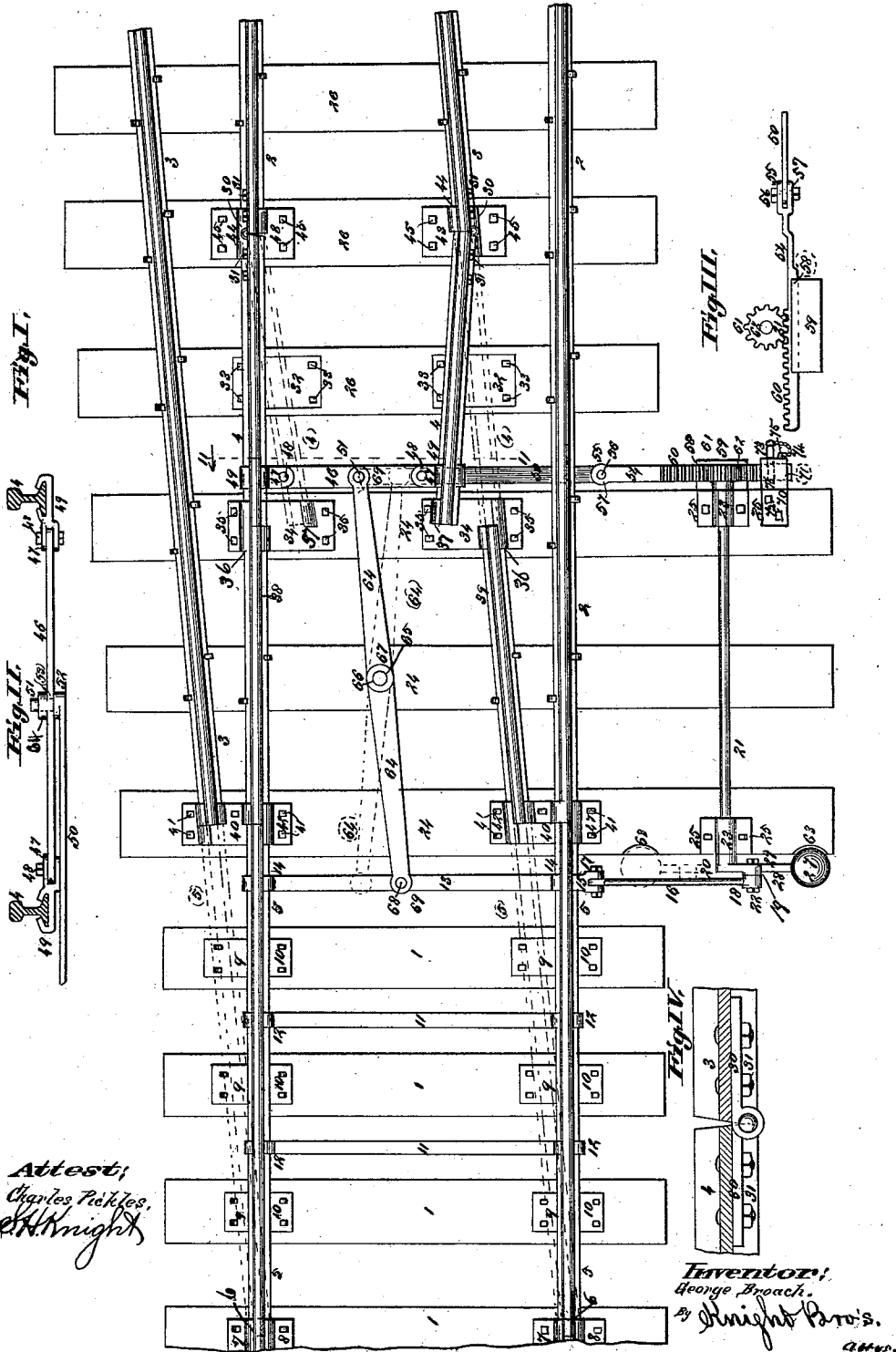
(No Model.)

G. BROACH.

AUTOMATIC LOCK GEARED RAILWAY SWITCH.

No. 466,295.

Patented Dec. 29, 1891.



UNITED STATES PATENT OFFICE.

GEORGE BROACH, OF EAST ST. LOUIS, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE ACME RAILWAY SWITCH COMPANY, OF SAME PLACE.

AUTOMATIC LOCK-GEARED RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 466,295, dated December 29, 1891.

Application filed December 10, 1890. Serial No. 374,243. (No model.)

To all whom it may concern:

Be it known that I, GEORGE BROACH, of East St. Louis, in the county of St. Clair and State of Illinois, have invented a certain new and useful Improvement in Automatic Lock-Geared Railway-Switches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to devices for the automatic throw of switch-rails, with equalizing connections between the two throws; and the invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a plan view of my automatic switch, showing the main track and siding and the automatic devices for throwing the switch into line by the passing train, either from the main track or siding, and also shows the combined equalizing and coupling bar. Fig. II is a section taken on line II II, Fig. I, and shows the action of the operating-bar in throwing the switch. Fig. III is an enlarged detail of the same bar and of the rack and pinion that works it; and Fig. IV is an enlarged horizontal section of the hinge-strap, and shows the hinged connection of the heels of the short switch-rails to the stationary rails of both the main and siding tracks, with which they connect.

Referring to the drawings, in which similar figures of reference indicate like parts in all the views, 1 represents the cross-ties; 2, the rails of the main track; 3, the rails of the side track, and 4 the short twin switch-rails that are alternately and automatically thrown into line, according as the train is coming from the main track on the one hand or the siding on the other, in either case coming into line with the main track ahead.

5 represents the long twin switch-rails, whose normal position is on line with the main track. (See Fig. I.) The said long switch-rails at their stationary ends butt against the corresponding stationary track-rails and are seated in the slot-bed 6 of the rail-chairs 7, which are secured by spikes 8. The flanges of the chair allow sufficient movement of the switching ends of the rails to and fro to

connect relatively with either the siding or main track. When the switch is thrown, the rails slide on the anti-wear plates 9, that are secured to the cross-ties 1 by spikes 10. The said switch-rails are connected by tie-rods 11, whose ends are provided with clutches 12, that grasp the foot-flanges of the rails. The switching tie-rod 13, near the adjustable ends of said switch-rails, is secured to the rails by clutches 14, that grasp their foot-flanges, as do those of the other tie-rods. This switching tie-rod is provided with bifurcated arms 15, that form an extension outside the track, and within the perforate bearings in said arms and the corresponding bearing of the connecting switch-rod 16 the pivot screw-bolt 17 is seated. The perforate drive-head 18 at the other end of said rod, in correspondence with the crank-head 19 of the crank 20, which is integral with and governs the switch-shaft 21, is pivotally connected by the screw-bolt or wrist-pin 22.

The switch-shaft has its bearings within the journal-boxes 23, which are secured to the long cross-ties 24 (that carry the drive system of the switches) by spikes or bolts 25. 26 are the cross-ties of intermediate length that underlie both the main track and siding.

The crank-arm 20 of the switch-shaft 21 is weighted with the ball 27, that is carried by the lever 28, which lever is an extension of the crank-arm, with which it is integral, and has a knuckle connection or offset at 29 from the same. The side of this ball, after either its forward or back throw, is seated in one of the curved recesses 63 in the adjacent cross-tie.

The short switch-rails 4 are relatively secured, one of them to one of the rails 2 of the main track and the other to one of the siding-rails 3, by the hinges 30, which are secured to the co-operative rails by screw-bolts 31, and said switch-rails slide on the wear-plates 32, that are secured to the cross-tie that underlies the middle of said switch-rails, by spikes 33, also on the combined wear and junction chair-plates 34, which are spiked to the long cross-tie beneath them by the spikes 35. These latter plates carry (cast integral therewith) the three-quarter-section chairs 36

and quarter-section chairs 37, that respectively hold said switch-rails at both limits of their throws, and the short junction-rail 38 of the main track and the divergent junction-rail 39 of the siding.

40 are like combined wear and chair plates, which are secured to the long cross-tie beneath them by spikes 41, and which carry (cast integral therewith) the three-quarter-section chairs 42, on which are tight-seated said short junction-rails, and the outside main and siding rails, and on which play to and fro, as they are thrown, the long switch-rails and are seated at the limit of their throws in their chairs.

43 are chair-plates that carry (cast integral therewith) the section-chairs 44, that hold, respectively, one each of the stationary main-track and siding rails, and the hinged end of the short switch-rails, and which plates are secured to the cross-ties that underlie them by the spikes 45.

46 represents the sectional switching tie-rod that ties the adjustable ends of the short switch-rails 4. The said tie-rod is pivotally connected to clips 47 by screw-bolts 48. The clips are integral with and carry the rail-clips 49.

50 represents the drive-rod that governs the short switches, with the tie-rod of which it connects by the vertical pivot 51, which surmounts its disk-head terminal 52. (See Fig. II.) The said pivot ascends through a perforation 53 in the tie-rod.

54 represents a rack-bar that seats the corresponding terminal of the drive-rod between its bifurcated arms 55, (see Fig. III,) and is pivotally connected therewith by the bolt 56, which is seated in the perforate bearings 57 in both said corresponding parts. The rack-bar works within the channel-groove 58 in the bed-block 59, and is surmounted by rack-teeth or cogs 60, which engage with and are engaged by the cogs 61 of the pinion-wheel 62, which is carried on the adjacent end of the switch-shaft 21.

64 represents a compound equalizing-bar, which has central pivot-bearings at 65 in both the bar and in the middle long cross-tie. A king or master bolt 66 is seated in said bearing, its head resting on the washer 67. 68 is a pivot-bolt that is seated in one of the bearings 69 in the ends of said equalizing-bar and in the switching tie-rod 13. The other end bearing 69 of said equalizing-bar is seated and held on the aforesaid vertical pivot 51, which pierces and surmounts the tie-rod 46, that couples the short switch-rails 4. It will be seen that the said equalizing-bar enforces the co-operative action (at the end of which it is located of the switch system) of all the switches to and from the main track and siding if at any time the co-operative switch-shaft 21, its pinion-rack or connections should be crippled, so that still the automatic action of the train as it leaves the siding and switch system and of the manumotive action of the ball-lever as

the train approaches said system is still operative, as by diverse means the equalizing-bar 64 and the switching-shaft 21 perform the same functions in the simultaneous throw of the switches. The equalizing-bar in its co-operative drive of the whole switch system is an equalizer of the strain on the co-operative pivot-bearings, so that the rack and strain, being divided up, are not so severe on any one point. It is also seen that as the switching tie-rod 46, that governs the short switches that communicate both with the main track and siding, is of sectional construction, connecting by clips to the chairs that seat said switch-rails, therefore, should the connection with the drive-rack and the switch-shaft 21 at any time be crippled, then by disconnecting the pivot-bolt of the clip on the crippled side and spiking the switch-rail on line with its connecting-track the switch-rail on said crippled side is again operative while awaiting the necessary repairs. So, also, should both sides be crippled, by removing both pivot-pins from their relative clips, and in that case also the connecting-pin at that end of the equalizing-bar, both switch-rails being then spiked to their connecting-lines, the track is kept open and does not have to wait on repairs.

70 represents a bracket-bearer that carries the out terminal end of the rack-bar 54 within the boxing 71, and said bracket-bearer is secured to the adjacent long cross-tie by screw-bolts 72. When it is desired to lock the switches from being thrown either automatically or otherwise, the stop-pin 73, which is held captive by the chain 74 to the staple 75, that projects from said bracket, is inserted in its perforate seat 76 in the bracket 70 and the rack-bar 54, thus preventing the switch from being thrown. This feature is of importance when a train has been side-tracked, and consequently the siding is pre-engaged, or when from any other cause it is not desired that the siding shall be used. It is also a hinderance to the wanton throwing of the switches by passing boys or unauthorized persons. At the same time it will be understood that in the usual condition of the road and other contingent circumstances the stop-pin will not be used, as the most important features in the invention are the provision of an automatic switching system in which the trains passing from either the main track or siding to the main track ahead throw the switches to lead in line with said track.

I have shown and described one end only of the siding switch system. It is understood that at the other terminal of the side track the switch system shown in the drawings and described above is duplicated.

In operation, when a train approaches the switch-siding system, if the switches are in their normal position (on line straight through for the main track) the ball of the weighted switch-lever, which rests in its curved recessed seat, so as to hold the switch-lever below its center bearing, thus prevents all dan-

ger by the vibration of the train on the track of the lever being thrown, and thus side-tracking the train. If, on the other hand, it is required to side-track the train, the ball-lever is thrown by hand, which is the only part of the operation that is not automatic, and it is preferred that this initial act in side-tracking a train should always be manumotive, so that a train should never take the siding except by a special act at the time of a responsible official. For the same reason, also, immediately after a train switches from the siding to the main track the switch-lever should be reversed to keep the main line always open, except while side-tracking. Should, however, this precaution be accidentally or fortuitously omitted, unless another train occupies the side track, my automatic switches, by the action of the train itself, will be thrown into line with the main track at the far end of the siding, so as to return the train to the main track. It will be seen that when a train is leaving the switch-siding system, whether the train is approaching from the main track or the siding, whichever way the switches point (as left by the previous train) the flanges of the locomotive-wheels will automatically set the switches if not on line to run the train on the main line ahead. For instance, in Fig. 1 the switches have been thrown in line for approaching trains on the main track, because the last incoming train from that direction has passed over the main track; but a freight has probably been side-tracked to allow the express or other passenger train to pass and, the track being clear, is now ready to pull out. Now it will be seen that all the wheels on the off side of the locomotive and all but the front wheel on the near side are firmly seated on and their flanges against stationary rails when the front near wheel contacts with the short switch-rail, on which it is about to travel, and its flange presses against the side thereof and throws the switch, bringing its stub end in line with the short junction-rail, sliding the connecting switch-rod and rack-bar, the rack of which drives the pinion and its switching-shaft, thereby throwing the ball-crank lever 28, which in its turn by its connecting switch-rods in line with said junction-rail and with the off siding-rail and the automatic double switch-throw has been effected before the second wheel has touched the switch-rail. In the meantime the compound equalizing-bar 64, swinging on its pivot-bearing on the middle long cross-tie 24 and pivotally connected to the tie-rods of both throws, equalizes the strain and thereby co-operatively overcomes any undue or severe friction of individual parts, (on which in such devices the strain is frequently too much concentrated.) It also couples the two throws and still further enforces their simultaneous movement; also, should the ball-crank and pinion-rack movement at any time be crippled in the interim before there is time to repair, the equalizing-bar, being also a coupling-

bar, will effect the simultaneous automatic throw until repairs can be effected, although not with the same ease as with the pinion-rack and ball-crank combination.

Another especially important feature in the invention is that not only does the train throw its own switches, but it also locks its throw. Each and every succeeding wheel on the passing train re-enforces the lock of the thrown switch, whose throw the first wheel effected, and thus makes it impossible by any accident to rethrow the switch, for by the clamp action of the wheels and the double-joint action through the equalizing-bar and co-operative switching-shaft it has an enforced coadjutory agreement, and consequently the switch never can be thrown automatically, manumotively, or accidentally under the train. A fruitful source of loss from accidents of this class is thus avoided; also, ill-disposed individuals cannot abuse the switch while a train is passing, as has frequently been done to derail the train. The crank-ball of the switch-lever after each throw falls into one of its recessed seats 63, so as to pass its center bearings and not be rethrown on too slight a provocation.

My invention is also applicable in conjunction with split switches, and in which latter case it is preferred to elongate the lock-switch system, in which case duplex equalizers may be used by placing said equalizers longitudinally to each other with pivotal connection, so as to act as does the single equalizer, as shown and described, only over a longer stretch to adapt it to the split-switch system. It is also evident that my lock-switch is well adapted for cross-junction duplex switch systems, for when the switch on one line is thrown and in possession of the train running on said line the cross-train cannot throw its switch, for the switch system is locked by the train that has already switched and has the right of way. Therefore even in said extreme case a cross-track collision would be prevented.

I claim as my invention—

1. In a railway-switch, the combination, with the main and the siding rails, the switch-rails 5, and the junction-rails 38 39, of the short switch-rails hinged to the rails on which they swing, the sectional switching tie-rod 46, rail-clips in which said short switch-rails are seated, detachably secured to the sections of said rod 46, the rod 13, connecting the long switch-rails, the pivoted equalizing-bar having its ends connected to said rod 13 and to said sectional rod 46, the crank-shaft 21, the rod 50, detachably secured to rod 46 and having rack-and-pinion connection with said shaft, and a bar connecting said shaft with the rod 13, substantially as and for the purposes set forth.

2. In a railway-switch, the combination, with the main and the siding rails and the junction-rails 38 39, of the short and long twin switch-rails, the wear-plates under said

switch-rails, the junction chair-plates, the quarter and three-quarter section rail-chairs cast integral with said plates and adapted to seat the switch-rails at both limits of their throw, the switch sectional tie-rod 46, the combined switching chairs and clips detachably connected with said tie-rod, the switch tie-rod 13, and the compound pivotal equalizing-bar 64, connected to the rod 13 and the sectional rod 46, substantially as and for the purpose set forth.

3. In a railway-switch, the short switch-rails 4, the long switch-rails 5, the sectional switch tie-rod 46 and its combined attachment-clips and switch-rail chairs, the tie-rod 13, the pivotal switching-bar or drive-rod 50, the rack-bar 54, the connecting switch-rod 16, the switch crank-shaft 21, the pinion said shaft carries adapted to engage in the rack

of the bar 54, which, in conjunction with said switch crank-shaft, is adapted to operate and make co-operative the corresponding switches under the automatic action of the advancing train, and the stop-pin 73 for staying the throw of the switch when it is required to be inoperative, substantially as and for the purpose set forth.

4. In a railway-switch, the drive-rod 50, the pivot-bolt 51, the bracket-bearing 70, the rack-bar 54, the bifurcated arm 55, the pivot-bolt 56, and the bed-block provided with the channel-groove guideway 59, in which said rack-bar is mounted, substantially as and for the purpose set forth.

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Witnesses:

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SAML. KNIGHT.