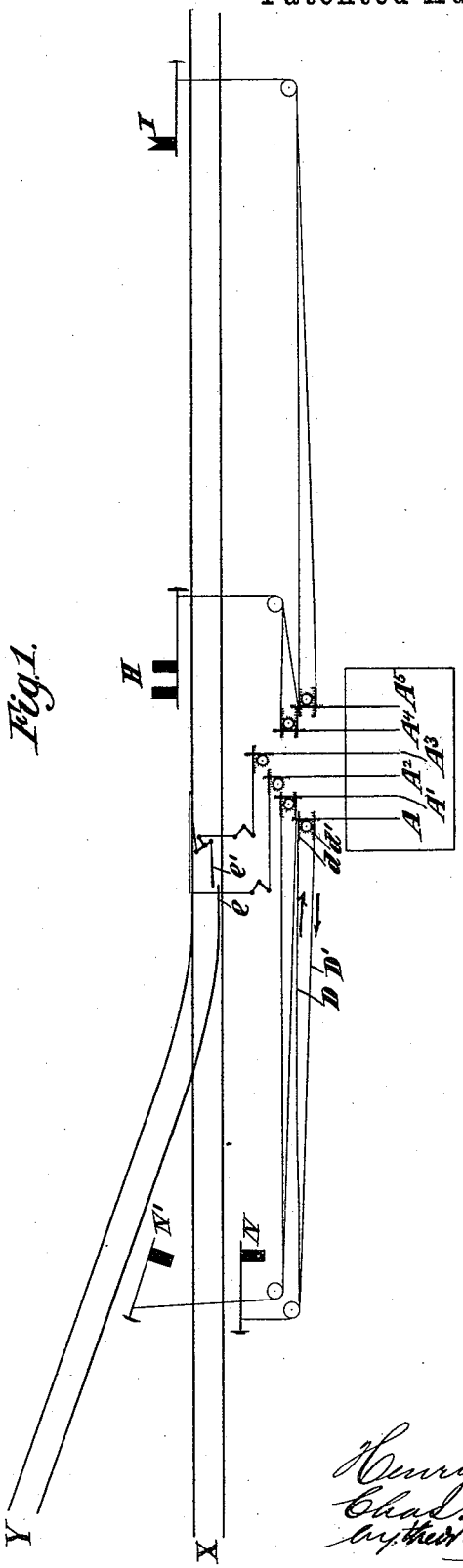
(No Model.) 2 Sheets—Sheet 1.

H. & C. R. JOHNSON.

MECHANISM FOR OPERATING RAILWAY SWITCHES AND SIGNALS.

No. 347,939. Patented Aug. 24, 1886.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

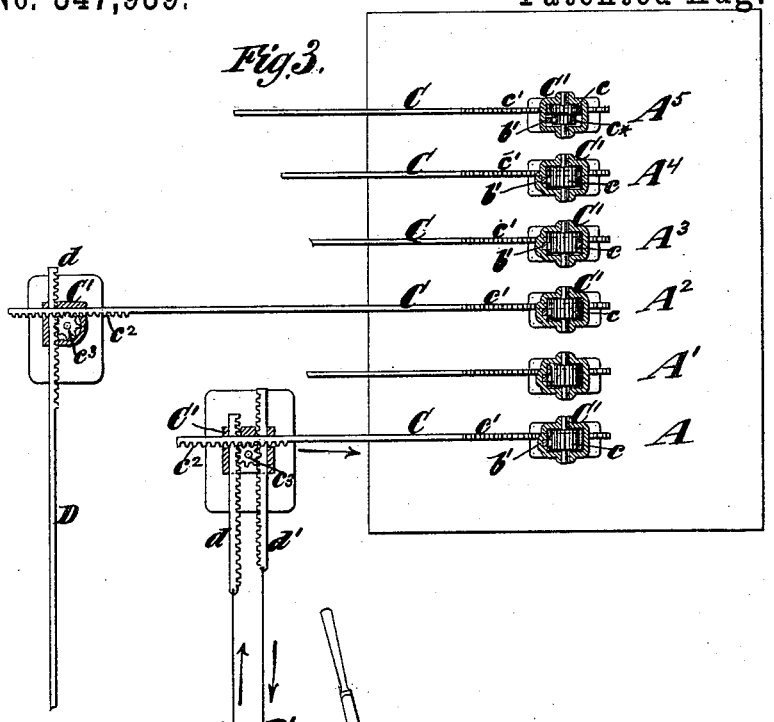
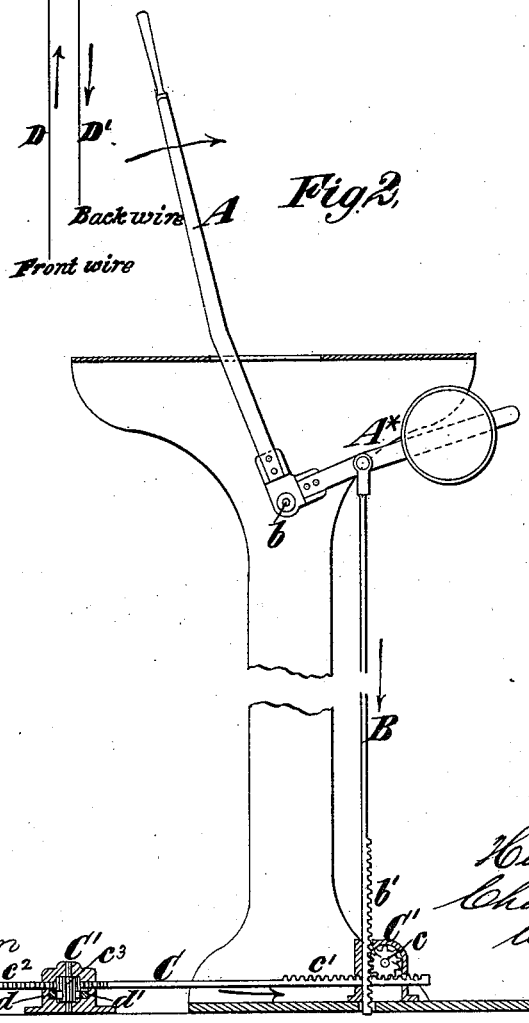


Fig 2.



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UNITED STATES PATENT OFFICE.

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MECHANISM FOR OPERATING RAILWAY SWITCHES AND SIGNALS.

SPECIFICATION forming part of Letters Patent No. 347,939, dated August 24, 1886.

Application filed May 28, 1886. Serial No. 203,511. (No model.)

To all whom it may concern:

Be it known that we, HENRY JOHNSON, of Flixton, in the county of Lancaster, England, and CHARLES R. JOHNSON, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Mechanism for Operating Railway Switches and Signals, of which the following is a specification.

In the switch, switch-lock, and signal-operating devices heretofore in use the lead-off of connections to the switches, switch-locks, and signals from the tower, where pipes or rods have been used, has been effected by means of vertically and horizontally swinging bell-crank levers, or by rock-shafts, and where wires have been used to operate by tension, by means of vertical and horizontal wheels, or by rock-shafts. Where such bell-crank levers and rock-shafts are employed for transmitting motion from one to the other of rods or wires which extend at an angle to each other, the arms of the bell-crank levers and rock-shafts and the length of the rod or wire connections must be exactly proportioned to give the various lengths of movement required in operating switches, switch-locks, and signals by a predetermined movement of the operating-lever; and the object of our invention is to provide a uniform and compact mechanism in the lead-off of switches, switch-locks, and signals, which will avoid the inconvenience arising from the use of bell-crank levers or rock-shafts, and which will obviate the necessity of making the rod or wire connections of exact predetermined lengths.

To this end our invention consists in the combination, with a lever or handle for operating a switch, switch-lock, or signal, of connections leading from said lever or handle to the switch, switch-lock, or signal, and comprising rods or wires terminating in racks and arranged at an angle relatively to each other, and a pinion with which both racks are geared, whereby a longitudinal movement of one rod or wire and rack will, through the pinion, produce a similar movement of the other rod or wire and rack.

In carrying out our invention the rod, which extends downward from the hand-lever in the tower, is provided with a rack which engages a pinion turning in a vertical plane, and through this pinion transmits motion to a horizontally-extending rod through a rack at one end thereof. This horizontally-extending rod is provided on the side and at its opposite end with a rack which engages and transmits motion to a pinion rotating in a horizontal plane, and this pinion, through a rack arranged at the desired angle relatively to the rack which drives it, transmits motion, through a rod or wire, to the switch, switch-lock, or signal to be operated. Where wires or analogous connections operating by tension to shift the switch or signal in one or other direction are employed, the front and back wires will extend from racks which engage with opposite sides of the horizontally-rotating pinion. When a considerable length of movement is required for operating the signal, motion may be transmitted through racks arranged as above described, and two concentric pinions of different sizes rotating as one, and the rack which receives motion from the hand-lever may engage with the smaller of these pinions and the rack to which motion is transmitted with the larger of the two pinions.

In the accompanying drawings, Figure 1 is a plan of a junction of two single tracks, showing home signals in both directions and one distant signal. Fig. 2 is an elevation, partly in section, of one operating-lever with a downwardly-extending rod and gearing for the horizontal lead-off; and Fig. 3 is a partly-sectional plan upon the same scale as Fig. 2, showing a vertical to horizontal lead-off from six levers and a horizontal lead-off for one rod or wire and for two wires.

Similar letters of reference designate corresponding parts in the several figures.

To enable our invention to be fully understood, we will first describe the arrangement of one lever and its leading-off connections.

A is an ordinary operating-lever, fulcrumed at *b*, and with the arm A* of which is connected the downwardly-extending rod B, through which motion is transmitted to the horizontally-extending rod C, and thence to the re-

maining connections for operating the switch, switch-lock, or signal.

c designates a pinion which is pivoted in a suitable housing or casing, C′, and with which engages a rack, *b′*, upon the lower end of the rod B. The horizontal rod C is likewise provided with a rack, *c′*, which also engages the pinion *c*. The racks *b′ c′* work through slots or suitable guideways formed in the casing or housing C′, and are thereby held in proper engagement with the pinion *c*. When the lever A is operated in one or other direction, the rod B will be moved upward or downward, and through its rack *b′*, pinion *c*, and rack *c′*, will transmit motion in one or other direction to the horizontal rod C. The horizontal rod C has at the opposite end and upon its side a similar rack, c^2, which engages a pinion, c^3, in a suitable housing or casing, C′, and with this pinion c^3 engages a single rack, *d*, when the switch, switch-lock, or signal is to be operated by a single rod or pipe, D, or two racks, *d d′*, when the switch, switch-lock, or signal is to be operated by two wires or analogous connections, D D′. Both the single connection D, with its single rack *d*, and the double connections D D′, operating by tension, and with their racks *d d′* engaging opposite sides of the pinion c^3, are shown in Fig. 3. Where wires or analogous connections D D′, operating by tension only, are employed, the wire or connection D may be the front wire and the wire or connection D′ the back wire. It will be understood that this arrangement for transmitting motion from one to the other of rods or wires which are arranged at an angle relatively to each other is very desirable, as it avoids the necessity of making the connections of absolute predetermined lengths, and it provides for transmitting any amount of movement as may be necessary for operating a switch or signal. All that is required is to make the racks which are employed of sufficient length to compensate for the variations in the length of the connections, and the racks may be engaged with the pinions at the proper points to make the length of connection absolute.

Referring now to Fig. 1, A A′ A^2 A^3 A^4 A^5 designate the positions of the several levers for operating, respectively, the home signals N N′ from X and Y, the switch *e*, the face-point lock *e′*, the home signals H, and the distant signal I. The lever which is at A^4 operates one or other of the two home signals to X Y, according to the position of the switch. To operate the signal N, for example, the lever A is pulled over in the direction of the arrow, Fig. 2, and the rods B and C and front and back wires, D D′, will all be operated in the directions indicated by their respective arrows, the front wire, D, being thereby pulled and the back wire, D′, simultaneously let out to lower the signal. In the operation of switches the stroke or length of movement required is the minimum, the length of movement required for the locking-bar and home signals may be the same or different, and the maximum length of movement is required for operating the distant signal. This maximum for operating the distant signal may be obtained from a lever having substantially the same movement as the companion levers which are employed in operating the switch-lock and home signal, and such movement may be increased by the employment of two pinions, *c c**, of unequal diameters, arranged concentric with each other and connected so as to turn as one pinion, such a construction being shown in Fig. 3. The rack *b′* of the downwardly-extending rod B will engage with the pinion *c**, of smaller diameter, and the rack *c′* of the horizontal rod C will engage with the pinion *c*, of larger diameter. The difference in the diameters of the pinions *c c** may be varied to suit the length of movement required for operating the distant signal I.

It will be seen that we may vary the stroke or movement of the respective racks, either by varying the point of connection *s* of the rod B with the arm A* of the lever A in relation to the fulcrum *b*, or by using pinions having two diameters, as just described, and as shown at A^5 in Fig. 3.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with a lever or handle for operating a switch, switch-lock, or signal, of connections leading from said lever or handle to the switch, switch-lock, or signal, and comprising rods or wires terminating in racks and arranged at an angle relatively to each other, and a pinion with which both racks are geared, whereby a longitudinal movement of one rod or wire and rack will, through the pinion, produce a similar movement of the other rod or wire and rack, substantially as herein described.

2. The combination, with a lever for operating a switch, switch-lock, or signal, of connections leading therefrom, and comprising a rod leading downward from the lever, and a rod leading laterally, a pinion arranged at the juncture of the rods and rotating in a vertical plane, and racks forming continuations of the rods and gearing with the pinion, substantially as and for the purpose herein described.

3. The combination, with a lever for operating a switch, switch-lock, or signal, of connections leading from the lever to the switch, switch-lock, or signal, and comprising rods or wires extending laterally at angles to each other, and provided with racks arranged to work one above the other, and a pinion with which said racks are geared and through which motion is transmitted from one to the other of them, substantially as and for the purpose herein described.

4. The combination, with a lever for operating a switch, switch-lock, or signal, of connections leading from the lever to the switch, switch-lock, or signal, and comprising a rack,

a pinion with which it engages, and two other racks arranged at an angle relatively to the first and engaging opposite sides of the pinion, and rods or wires extending from the last-named racks and operating by tension to shift the switch, switch-lock, or signal in one or other direction, as the pinion is turned in one or other direction, substantially as and for the purpose herein described.

5. The combination, with a lever for operating a switch, switch-lock, or signal, of connections leading from the lever to the switch, switch-lock, or signal, and comprising rods or wires extending from two racks arranged at angles relatively to each other, and pinions of different sizes rigidly connected side by side and with which the racks respectively engage, substantially as and for the purpose herein described.

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