(No Model.) 3 Sheets—Sheet 1.

M. C. OSTER.

RAILWAY SIGNAL.

No. 606,075. Patented June 21, 1898.

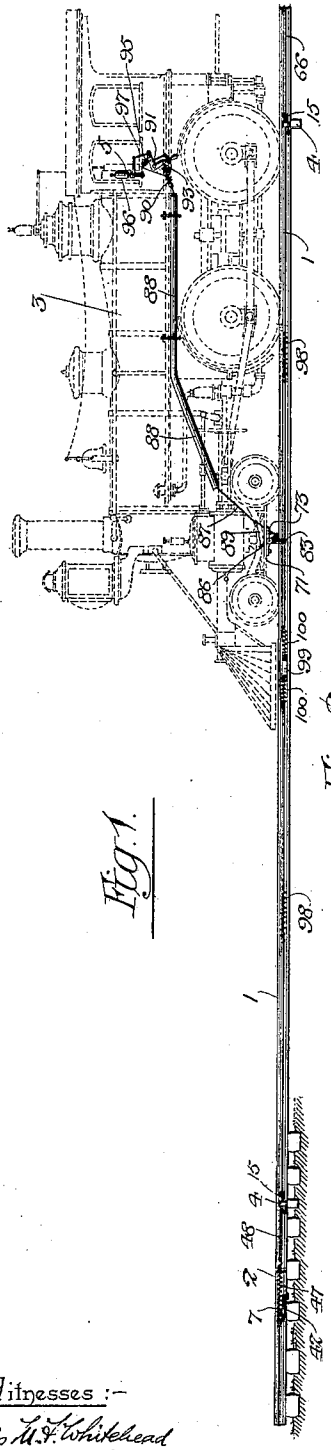


Fig. 1.

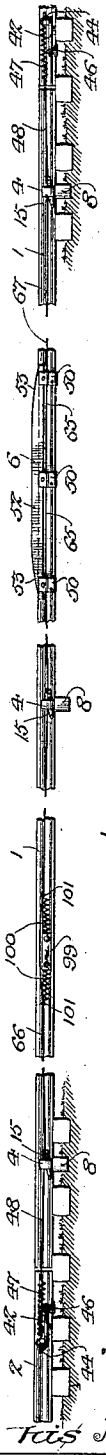


Fig. 2.

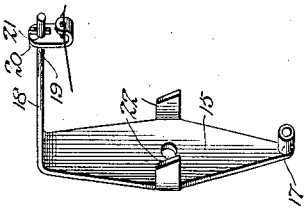


Fig. 3.

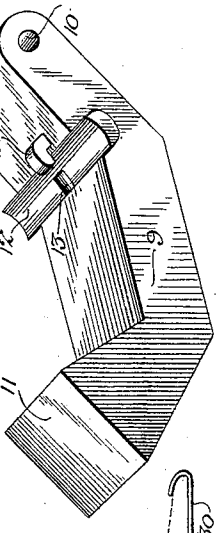


Fig. 4.

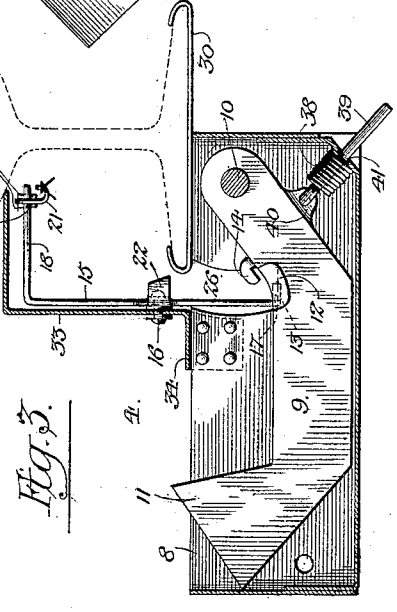


Fig. 5.

Witnesses:—
Louis M. F. Whitehead
H. J. Benchoff

Mathew C. Oster Inventor;—
By his Attorneys,
C. A. Snow & Co.

(No Model.) 3 Sheets—Sheet 2.

M. C. OSTER.

RAILWAY SIGNAL.

No. 606,075. Patented June 21, 1898.

Fig. 8.

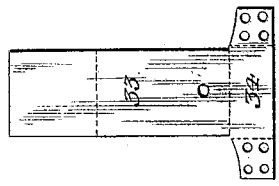


Fig. 7.

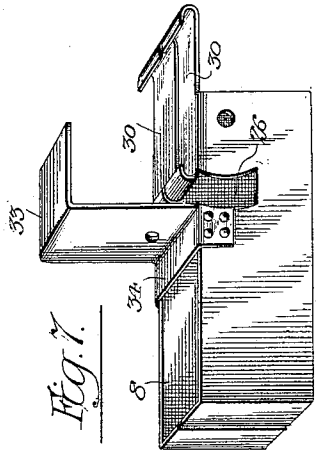


Fig. 10.

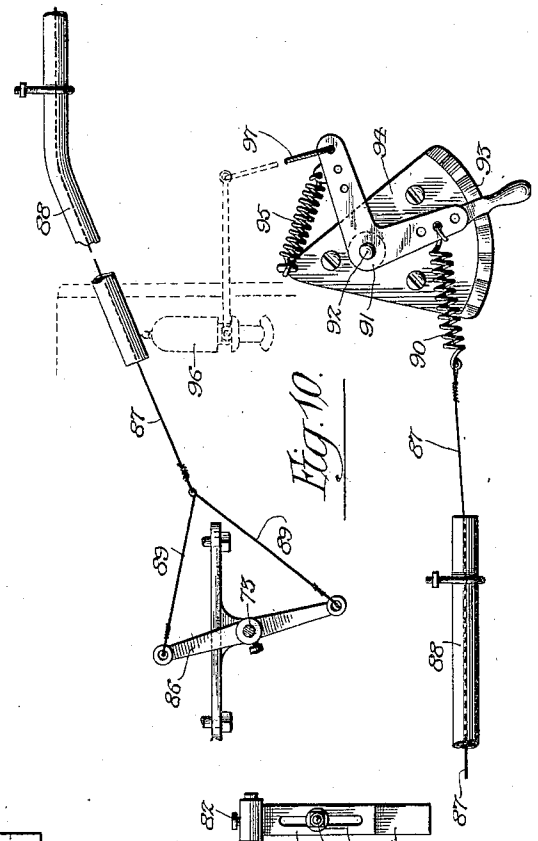


Fig. 6.

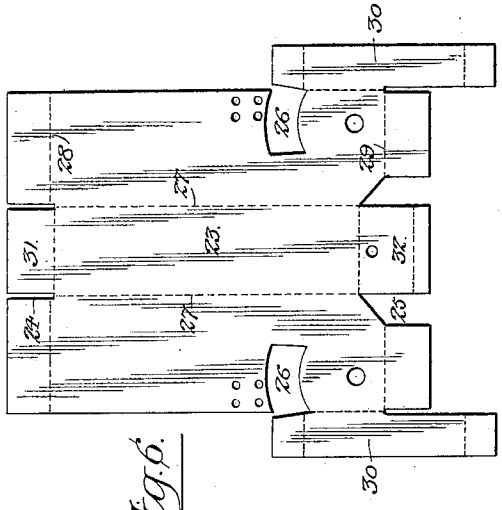
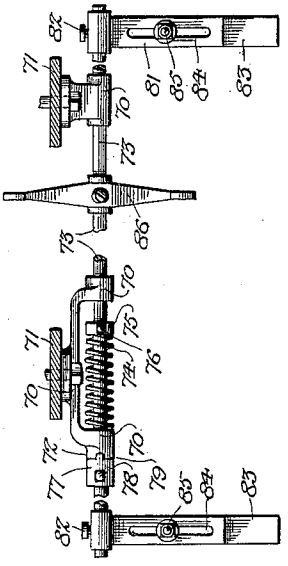


Fig. 9.



Witnesses:—
Louis M. F. Whitehead
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(No Model.) 3 Sheets—Sheet 3.

M. C. OSTER.

RAILWAY SIGNAL.

No. 606,075. Patented June 21, 1898.

Fig. 12a.

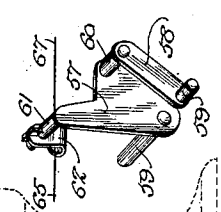


Fig. 12.

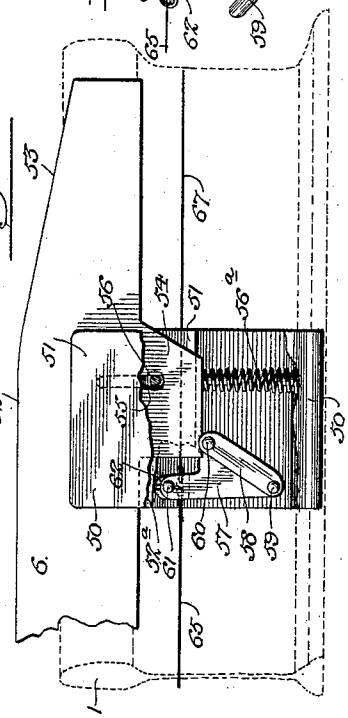


Fig. 11.

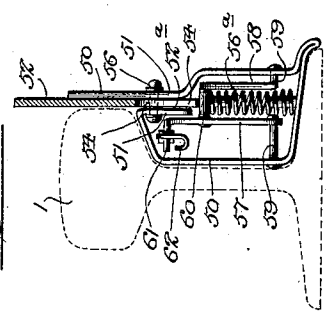


Fig. 15.

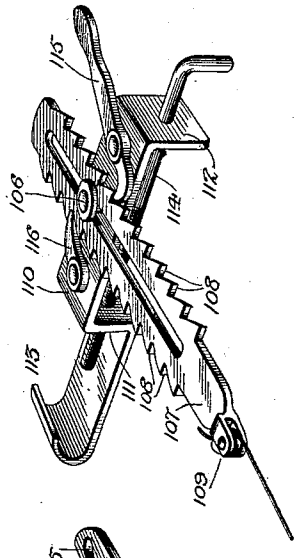


Fig. 14.

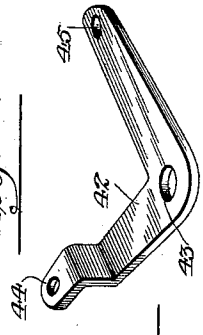


Fig. 16.

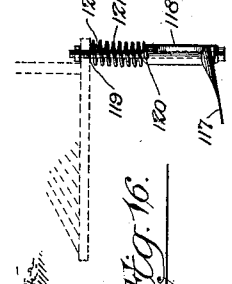
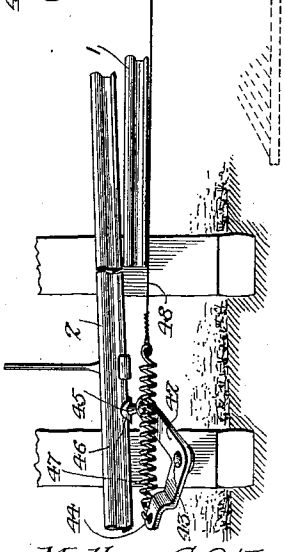


Fig. 13.



Witnesses:—

Louis M. F. Whitehead

H. J. Bernhard

Mathew C. Oster. Inventor:—

By Fair & Allorneys.

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

MATHEW C. OSTER, OF WAHPETON, NORTH DAKOTA.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 606,075, dated June 21, 1898.

Application filed March 16, 1898. Serial No. 674,050. (No model.)

To all whom it may concern:

Be it known that I, MATHEW C. OSTER, a citizen of the United States, residing at Wahpeton, in the county of Richland and State of North Dakota, have invented a new and useful Railway-Signal, of which the following is a specification.

My invention relates to improvements in automatic signals for use on ordinary railway-tracks; and one object that I have in view is to provide means for automatically indicating to an engineer in the cab the fact that a switch is opened at the railway-crossing, such warning signal being given in time to notify the engineer to enable the stoppage of a train to be effected before it arrives at an open switch.

A further object of the invention is to provide an automatic mechanism by which trains on a single track approaching each other may be caused to give signals automatically to notify engineers in time to stop the trains and prevent collisions.

A further object of the invention is to provide simple devices which may be readily applied to an ordinary railway-track and locomotive and which are automatic, efficient, and reliable in service.

With these ends in view my invention, broadly stated, consists in the combination, with a signal-operating mechanism, of a wheel-operated track mechanism to throw the signal-operating mechanism into position for giving a signal to a passing train or the engine thereof and a switch-operated track mechanism that also sets the signal-operating mechanism, whereby either track mechanism may set the signal-operating mechanism to warn an engineer of an approaching train or of an open switch.

My invention further consists in the novel construction of the signal mechanism *per se*, a signal-operating mechanism, a wheel-operated track mechanism, and a peculiar switch-operated track mechanism.

The invention further consists in the novel construction and arrangement of parts and in the combination of elements, as will be hereinafter more fully described and claimed.

To enable others to understand my invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side elevation of parts of a railway-track with a locomotive thereon and with my signal mechanism applied to said track and locomotive. Fig. 2 is an elevation of a track, indicating the application of the signal-operating devices, a wheel-operated setting device, and a switch-operated setting mechanism. Fig. 3 is an enlarged sectional view through a part of the signal-operating mechanism applied in proper relation to one of the rails of a track. Fig. 4 is a detail perspective view of the trip-lever forming a part of the signal-operating mechanism. Fig. 5 is a detail perspective view of a controlling-lever which normally depresses the trip-lever out of the path of a tappet-arm on a locomotive and which serves to hold the trip-lever in its raised position. Figs. 6, 7, and 8 are views of the casing for the signal-operating mechanism. Fig. 9 is an elevation of part of the signal mechanism which is to be applied to the cow-catcher stays or to the front wheel-truck of an ordinary locomotive. Fig. 10 is a sectional elevation of another part of the signal mechanism. Fig. 11 is a cross-sectional view through a track-rail and a part of the wheel-operated track mechanism employed to set the signal-operated mechanism by a passing train. Fig. 12 is a side elevation, the parts broken away, of the wheel-operated track mechanism shown by Fig. 11. Fig. 13 is a detail view of part of a track and switch, illustrating the switch-operated setting mechanism which is operatively connected with the signal-operating mechanism Fig. 14 is a detail perspective view of parts of the switch-operated setting mechanism. Fig. 15 is a detail perspective of a stretching and applying mechanism by which the connecting wires or cables may be applied to a track. Fig. 16 is a device for clearing snow from the path of the crank-arm on the locomotive.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

To enable others skilled in the art to understand my invention, I have illustrated a section of a track at 1, an ordinary switch at 2,

and a portion of a locomotive at 3; but it will be understood that all such mechanisms are ordinary in the art.

My improvement contemplates the provision of a number of signal-operating devices 4, which are placed at suitable intervals along the track 1, a signal mechanism 5, carried by the locomotive and adapted to be actuated by the signal-operating mechanism 4 in the event of the switch 2 being opened or of a train approaching another train on the same track, a wheel-operated track mechanism 6, connected with said signal-operating mechanism 4 and adapted to adjust the latter in the path of the signal mechanism 5, and switch-operated track mechanism 7, which is also operatively connected with the signal-operating mechanism 4 and with the movable switch-rails 2. The detailed construction of each mechanism 4, 5, 6, and 7 will be hereinafter fully set forth, and I will now proceed to describe the signal-operating device 4 in detail.

I employ a metallic shell or case 8, which is applied to the track-rail and serves to sustain all of the working parts of the signal-operating mechanism 4. This case 8 is of proper size to contain within itself a trip-lever 9, one end of which is provided with a transverse opening to receive a pivotal pin or bolt 10, on which the lever is loosely hung and which is suitably attached to the side walls of said case 8. The other end of the lever is free or unconfined, so that said lever may be extended or projected through the upper side of the case to lie in the path of a tappet-arm carried by a passing locomotive, and said free end of the lever is bent at an angle and formed with the inclined faces shown by Figs. 3 and 4 to provide a tapered heel 11 on the unconfined end of said lever. At a point between its pivot 10 and the heel 11 the trip-lever is provided with a cross-bar 12, which is suitably secured on the upper side of said lever and is of sufficient length to extend beyond the side edges of the lever, said cross-bar being provided at or near its middle with a recess 13. The lever is furthermore provided at a point adjacent to the cross-bar 12 thereon with a hook 14, which extends upwardly from the lever for a suitable distance and is adapted to be engaged by one or the other of a pair of holding-lugs, which are provided on a controlling-lever 15. This controlling-lever is arranged in a substantially upright position above the trip-lever 9, and it is fulcrumed at a point intermediate of its length on the case 8 or a part thereof, the fulcrum of the upright controlling-lever lying in a horizontal plane at right angles to the pivot 10 of the trip-lever and said fulcrum being indicated at 16. The lower end of the upright controlling-lever projects into the case 8, and said end of the lever 15 carries a roller 17, which is loosely journaled thereon, said roller being adapted to travel against the cross-bar 12 of the trip-lever and to fit in the recess or notch 13 thereof when the trip-lever is depressed to its full limit within the case 8 and the controlling-lever 15 assumes its upright position at right angles to the trip-lever. The trip-lever is normally pressed upward, so as to project its heel 11 beyond the case 8, when the controlling-lever is disengaged therefrom by means of a spring 38, which is coiled around a guide-rod 39, one end of which rod is attached to a lug 40 on the lower side of the trip-lever adjacent to its pivot 10. This rod 39 is free to travel in a slot 41 of the case 8 at one angle or corner thereof, (see Fig. 3,) and the spring 38 is seated against the lug 40 at one end, while its other end has traveling contact with the case 8, thus enabling the pressure-spring to remain in operative relation to the trip-lever when the latter is in either its raised or lowered positions.

The controlling-lever 15 is operatively connected, in the manner hereinafter described, with the wheel-operated track mechanism and the switch-operated setting mechanism, so that said controlling-lever is held normally in an upright position and with its roller 17 in engagement with the notched cross-bar 12 of the trip-lever. This engagement of the controlling-lever with the trip-lever tends to hold the trip-lever in its depressed position within the case 8, and thus the trip-lever is out of the path of the tappet-arm on a locomotive; but when the controlling-lever is thrown off its center or out of its upright position the roller 17 thereof is withdrawn from engagement with the notched cross-bar 12, thus permitting the spring 38 to elevate the trip-lever and project its heel 11 beyond and above the case 8 to cause it to lie in the path of the tappet-arm on a locomotive.

The upper end of the controlling-lever 15 is provided with an angular arm 18, arranged to project inwardly toward the vertical web of a track-rail and to lie below the head of said rail, and the extremity of this arm 18 is reduced and rounded to form a pintle 19, transversely perforated to receive the keys 20, that loosely confine the clip 21 against accidental displacement on said pintle 19, the clip 21 being loosely fitted on said pintle of the arm 18. This clip is shown on the arm in Fig. 5 of the drawings, and, as represented, it consists merely of a plate bent upon itself to form a lip alongside of the body thereof, to which lip may be attached a wire or cable to operate the arm or lever 15, that controls the trip-lever 9. The controlling-lever 15 is furthermore provided with the holding-lugs 22, which are rigid with said lever 15 and disposed on opposite sides of the fulcrum 16 thereof. When the lever 15 is turned out of its vertical position by a pull on the wire or cable attached to the clip 21 and its roller 17 is free from the notched cross-bar 12, one of the lugs 22 of said lever 15 engages with the hook 14 on the trip-lever 9, which has been elevated by the pressure of the spring 38 to a raised exposed position beyond the

case 8, whereby the lever 15 engages with the trip-lever 9 to lock the same in its raised position.

I employ a novel construction of the case 8, which contains the signal-operating mechanism, and in Figs. 6, 7, and 8 of the drawings I have shown the sheet-metal blank, the complete case, and the overhanging hood of said case, respectively. I prefer to construct this case 8 from a sheet-metal blank of the character illustrated by Fig. 6, by an inspection of which it will be seen that I have produced a blank which may be bent or struck up to provide a complete inclosure for the working parts of the signal-operating mechanism and which case is constructed for ready application to the under side or foot of a track-rail. The metallic blank is represented in its entirety at 23, and at one end of said blank slits 24 are produced therein. At the opposite end of the blank notches 25 are cut in lines coincident with the slits 24. In the side edges of the blank 23 are provided the slots 26, and said blank is adapted to be bent on the lines indicated at 27, 28, and 29. The bend lines 27 extend from the slits 24 to the notches 25, while the lines of bend 28 29 are at right angles to the lines 27 and near the inner terminals of the slits 24 and notches 25. The slits 24 produce at one end of the blank the tongue 31, adapted to form one end of the case 8; but the notches 25 produce at the other end of the blank a similar tongue 32, which forms the opposite end of the case. At the sides of the blank 23, near the notched end 25, are provided the wings 30, which lie outside of the blank proper, and each have one end thereof extended beyond the notched end edge of said blank. The case is formed by bending the blank longitudinally along the lines 27, thus forming a bottom and two side walls. The tongues 31 32 are bent at right angles to the bottom and between the sides. The ends of the sides are bent inwardly on the lines 28 29 to overlap the tongues 31 32, and the wings 30 are bent inwardly over one end of the case, all the parts of the case being suitably riveted or otherwise united together to present a substantial structure. The slots 26 in the sides of the case 8 provide ample spaces for the ends of the cross-bar 12 on the trip-lever 9 to project therethrough, and the wings 30 are bent at their ends to form a clip adapted to embrace the bottom face and side edges of the foot of a track-rail, as shown by Fig. 3. The case is thus constructed to provide an inclosure of the working parts of the signal-operating mechanism and to enable the same to be attached securely to a rail. It is evident that the case may be further secured in position on or to a tie, as may be desired.

The hood 33 is represented by Fig. 8 of the drawings as being stamped from a single piece of metal, and at one end said hood has a broadened foot 34, adapted to be bent at right angles to the stem or shank of the hood and again bent to fit the case near the slots therein and on the opposite side of the slots from the clip formed by the wings 30, said foot of the hood being riveted securely to the sides of the case. The upper end of the hood-blank is adapted to be bent on the line indicated by Fig. 8 to overhang the upright controlling-lever 15 for the purpose of excluding dirt and refuse from said lever 15, and to the upright shank of said hood is attached the fulcrum 16 of the lever 15, the hood thus serving to support the lever and exclude dirt therefrom.

One of the switch-operated track mechanisms is shown by Figs. 1, 13, and 14 of the drawings, and it has as one element thereof a bell-crank lever 42, which is fulcrumed at the juncture of its arms by a suitable bolt 43, attached in any preferable way to one of the ties of a railway-track. This bell-crank lever is arranged adjacent and at one side of one of the movable switch-rails 2, and to one arm of said lever 42 is loosely connected one end of a rod 45, which is provided at its other end with a clip 46 to embrace the foot of one of the switch-rails 2. The other arm of the bell-crank lever has its free extremity bent to provide the offset 44, to which is attached one end of a spring 47, having a rod or wire or a cable 48 connected thereto and which leads from said offset extremity 44 of the bell-crank lever 42 to and is connected with the clip 21 of the signal-operating mechanism applied to the track close to the switch 2.

I will now proceed to describe my improved wheel-operated track mechanism 6, one of which devices is placed at suitable intervals along the track and is connected with two of the signal-operating devices 4.

Each wheel-operated track mechanism 6 consists of a series of casings 50, which are spaced at suitable intervals from each other, as shown by Fig. 12. Each casing 50 is preferably formed of sheet metal, as represented by Fig. 11, to fit against the foot, the web, and the lower side of the head of the rail, one edge of the casing being parallel to the vertical part of the outer side thereof. The parallel sides 51 of the casing form a guide-slot 52^a, and the series of the three casings which accommodate an elongated vertically-movable bar 52 are applied to the rail to have the guide-slots 52^a therein in alinement with each other. Each casing 50 is fitted snugly to the rail, to which it may be secured by bolts or screws to remain fixed thereof, and the other side 51 of each casing terminates substantially flush with or slightly below the upper face of the rail. The vertically-movable bar 52 fits between the extended upper ends of the outer sides 51 and the side face of the rail-head and also between the parallel sides 51 of the series of casings, whereby the elongated bar is free to move edgewise in a vertical direction. Said bar 52 is beveled at one or both edges, as at 53, and at the point where the bar is confined in the end castings of said casings 50 it is provided with integral de-

pending lugs 54, a slot 55 being provided in said lugs and the bar to receive a guide and stop pin 56, which is attached to the end casings 50 and arrests the upward movement of the bar under the pressure of the strong coiled springs 56ª. In each of the end casings 50 is mounted a bell-crank lever 57, one arm of which is connected or attached to a parallel arm 58, and said lever 57 and the free ends of the arms 58 have the trunnions 59, which are journaled in the sides of the bent casing. To the bolt or pin which connects the short arm of the bell-crank lever 57 and the arm 58 is loosely fitted a roller 60, that lies below the lower edge of the vertically-movable bar 52; but this roller is normally free from engagement with said bar 52, because the spring 56ª holds the bar 52 above the position of said roller 60. To the long arm of the bell-crank lever 57 is rigidly attached an offstanding arm 61, and to the free end of said arm 61 is fastened a clip 62, held in place by suitable pins or keys. As each end casing 50 is provided with one of the bell-crank levers 57, constructed as just described, a series of said levers 57 are arranged below the vertically-movable bar 52, which is held normally in a raised position above and free from contact with the rollers 60 of said series of bell-cranks. These bell-cranks are connected together by short lengths of wire or cable 65, which are suitably attached to the clips 62 of said levers, and the operating wires or cables 66 67 connect said series of levers with the signal-setting mechanism and with other lengths of cables or wires forming part of the track mechanism by which the signal-operating mechanism is controlled. The vertically-movable bar 52 is sustained by the springs 56ª in the path of the wheels of the train, which may pass over the track 1, and as the ends of said bar are beveled or inclined the wheels may ride thereon without injury. When a train passes one of these wheel-operated track devices 6 at or a suitable distance from a crossing or switch, the wheels of the train depress the bar 52, which in turn acts on the rollers 60 of the bell-crank levers 57, thereby rocking the latter and pulling on the cables 66 67 to set the signal-operating mechanism or mechanisms 4, whereby the trip lever or levers 9 are raised and projected beyond the casings 8, so as to lie in the path of the signal mechanism on an engine.

I will now proceed to describe the improved signal mechanism which is mounted on the locomotive and is adapted for engagement automatically with the trip-lever of the signal-operating mechanism when the latter is raised. This signal mechanism has a rock-shaft 73, which is arranged transversely across the engine, so as to project from opposite sides of the rails of the track 1, and said rock-shaft is loosely mounted in bearings 70, which may be attached to the stays 71 of the locomotive cow-catcher or to a part of the front wheel-truck of said locomotive. One of these bearings 70 is provided with a single notch 72, and on said rock-shaft is loosely fitted a coiled spring 74. One end of this spring bears against a collar 75, held by a set-screw 76 at a suitable point on the shaft 73, the other end of said spring bearing against the fixed bearing 70, having the notch 72 therein, whereby the rock-shaft is normally impelled endwise in one direction by the spring. On this rock-shaft, opposite to the notched end 72 of the bearing, is fitted a clutch-sleeve 77, which is fixed to the shaft to rock and slide therewith by means of a set-screw 78, and the single rounded tooth or spur 79 of this clutch is adapted to engage with the notch 72 of the bearing 70, to thereby hold the shaft 73 normally against rocking or sliding movement in its bearing. The rock-shaft when it strikes one of the trip-levers of the series of signal-operating devices is adapted when the engine travels in either direction on the track to automatically free itself from the notched bearing 70, because the rounded tooth or spur is adapted to slip out of the notch to permit the rock-shaft to have a limited sliding and turning movement in its bearings, thus preventing injury to the devices when the crank-arm strikes the signal-lever. One end of said rock-shaft is bent to form a crank-arm 80, and on the other end of said shaft is sleeved a crank-arm 81, having a set-screw 82, by which the arm 81 may be rigidly and adjustably fastened to occupy any desired position with relation to the shaft 73, and to the arms 80 81 are fastened the tappet-arms 83, which are adapted to engage with the trip-lever 9 of any one of the series of signal-operating devices 4. These tappet-arms are adjustably fastened to the crank-arms of the rock-shaft by means of clamping screws or bolts 85, which pass through the slots 84, provided in the crank-arms and are suitably fastened to the tappet-arms, thus enabling the crank-arms to be lengthened or shortened, as desired.

The rock-shaft 73 is provided at a point intermediate its length with a lever 86, fastened centrally on the shaft to have both arms of the lever extend radially from said shaft, and to the extremities of the double-armed lever are fastened the branch ends 89 of a connecting cord or chain 87, which is guided by a tube 88, which is suitably attached to the locomotive beneath the running-footboard thereof. This longitudinal guide-tube 88 is bent to extend from the cow-catcher or front wheel-truck upwardly to and beneath the footboard on a locomotive, and the rear end of said guide-tube terminates at or in the locomotive-truck. The operating-cord 87 has its other extremity fastened to a coiled spring 90, which in turn is attached to one arm of a bent lever 91, fulcrumed, as at 92, to a supporting-plate 94, the latter being provided with a rack or ratchet 93, with which may engage the free extremity of the arm of said lever 91 when the latter is adjusted by the sig-

nal-operating mechanism and the rock-shaft to actuate the audible signal 96. Normally the lever 91 is free from engagement with the rack on the supporting-plate 94, and it is held in the desired position against the tension of the spring 90 by a coiled retracting-spring 95, the extremities of which are suitably fastened to said lever 91 and the plate 94. The signal 96 is shown as a whistle, which is operatively connected by a cord 97 with the lever 91; but the form of the signal device may be varied within the skill of the mechanic.

In applying my block-signaling system to a railway-track I connect one of the bell-crank levers 42 to the movable switch-rails 2 of each of the switches, and adjacent to said switch is arranged one of the signal-operating devices 4, the latter being connected by a cable or wire 48 to the switch-operated lever 42. A series of these signal-operated devices 4 are arranged at suitable intervals from each other along the length of the track, and said signal-operating devices are connected with each other by the cables or wires 66 67. One or more of the wheel-operated track mechanisms 6 are arranged at suitable intervals along the track and between the signal-operating devices 4, and said cables 66 67 are also employed to connect the devices 6 with the devices 4. To maintain the connecting wires or cables 66 67 under proper tension, I provide at suitable points in the lengths or sections of the connecting wires or cables 66 67 the compensating springs 98, which are suitably attached to said wires 66 67. The fish-plates 99 at the joints of the track-rails are offset a sufficient distance from the track-rails by interposing suitable spacing-plates between the fish-plates and the rails, and, if desired, the sections or lengths of the connecting-wires 67 may be carried or led over the bolts which unite the fish and spacing plates to the rails at the joints thereof. I prefer to employ springs 100, which are disposed on opposite sides of the rail-joints and at opposite ends of the fish-plates, and said springs are attached to the rail-joint bolts and looped or otherwise connected, as at 101, to the lengths or sections of the connecting-wires 66 67. These springs provide for holding the connecting-wires under proper tension to insure immediate response to the signal-operating mechanism to either of the setting devices 6 or 7, and said springs also provide for expansion and contraction in the connecting-wires due to the atmospheric changes.

In Fig. 15 of the drawings I have illustrated a simple and efficient device for applying and stretching the connecting wires or cables along the track. This stretching device consists of a clamping-bar 110, which is bent at a point intermediate of its length, as at 111, to form a clamp 113, and the other end of said bar is bent to form the flange 112. In the offset part 111 of the bar 110 and in the flange 112 of said bar is mounted an adjustable threaded clamping-rod 114, one end of which coacts with the clamp 113 to afford a means whereby the stretching device may be detachably and rigidly secured in a transverse position on the foot of a rail. The clamping-bar 110 is provided with a guide-pin 106, that fits in the longitudinal slot of an endwise-movable bar 107, the edges of which are toothed or serrated, as at 108. This endwise-movable bar is thus slidably attached to the clamping-bar 110, and to one end of said notched bar 107 is provided any suitable means for the attachment of the wire—as, for instance, a clamp 109, to which a cable or wire may be fastened or clamped preliminary to the operation of the device for the purpose of stretching said wire or cable to place the latter and its spring under the proper tension. The stretching-bar is actuated by means of a lever 115, which is fulcrumed on the cross-bar 110 in a position for one end of the lever to engage with the teeth on one side of the bar, and with the teeth on the opposite side of the bar is adapted to engage a check-pawl 116, that is pivoted to the bar 110 to hold the stretching-bar against retrograde movement.

Under normal conditions the trip-lever 9 of the signal-operating mechanism 4 is lowered within the case 8 and out of the path of the tappet-arms on the signal mechanism carried by the locomotive, and the controlling-lever 15 engages with the cross-bar 12 to hold said trip-lever in its depressed position against the tension of its spring. When a switch is opened, the lever 42 is operated to pull on the wire or cable 48 and thereby adjust the controlling-lever 15 away from engagement with the trip-lever. The spring 38 now lifts the trip-lever to project the heel 11 thereof into the path of the tappet on the engine, and as the trip-lever is raised and the controlling-lever turned to a deflected position one of the lugs 22 on the controlling-lever is adapted to engage with the hook 14 of the trip-lever, thus locking the latter in its raised position. Should a locomotive approach the open switch one of the tappet-arms on its rock-shaft will strike against the heel of the trip-lever, thereby rocking said shaft and operating the lever 86 to pull the cord 87 and move the lever 91, which in turn actuates the signal, said lever 91 engaging with the rack 93 to prolong the operation of the signal until the lever is released from the rack. The engineer is thus warned of the opening of the switch and is able to arrest the train in time to prevent running into the switch. When the switch is closed, the lever 42 actuates, through its connections, the controlling-lever 15, the roller of which rides upon the notched cross-bar until it reaches the notch therein, thereby lowering the lever 9 and locking it in position. The train may now proceed in safety, and accidents are thus avoided by automatically signaling the engineer at a proper distance in advance of the switch. In the event

that two trains are approaching each other on the same track the wheels riding on one of the vertically-movable bars 52 depresses the latter to throw the levers 57 off their centers, and as the levers are connected in series with suitably-placed signal devices 4 the controlling-levers 15 of said signal-operating devices are moved to release the trip-levers, so that the latter are raised into their operative positions by their springs and locked by the controlling-levers. An engineer passing one of the exposed trip-levers is warned of the approach of the other train and may thus bring his train to a standstill to prevent collisions. The vertically-movable bar 52 being held by its spring free from contact with the levers 57, the latter will not be actuated to set the signal-operating mechanism unless the train passes over the wheel-operated track mechanism. 6. Any suitable means may be provided for restoring the signal-operating mechanism to a normal position after the passage of a train over the track mechanism 6.

The wheel-operated track devices 6 are applied at intervals along the track, say at every hundred or two hundred feet apart; but the signal-operating devices 4 are at longer intervals from each other, say one-fourth or one-half a mile apart. A preferred arrangement of these signal-operating devices is to place them midway between an adjacent pair of the springs 98, while the springs 100 should be twice as far apart as the springs 98. The wire leading from the switch-operated device is independent of the other operating-wires.

I have also devised a mechanism by which a path through snow may be cleared in advance of the crank-arms 83 on the rock-shaft 73. This device is represented by Fig. 16 as consisting of a clearer-plow 117, which is carriedby a sleeve or tube 118, arranged in a vertical position at one side of the clearer-plow and fitted loosely and revolubly on a vertical spindle 119, which is rigidly held in position on the fender or cow-catcher of a locomotive. This clearer-plow is attached to the fender in the plane and in advance of each crank-arm, and it is adapted to be deflected laterally by contact with the signal-lever, so as to be thrown out of the path of the same and avoid injury to the parts. This sleeve has a lug or shoulder 120, against which bears one end of the coiled spring 121, fitted on the spindle, the other end of said spring bearing against a fixed shoulder or lug 122. This spring serves to hold the clearer-plow in a position proper to clear a path for the crank-arm through snow, and when the plow approaches the signal-lever it impinges against the same, to be deflected out of the path of said lever, and the spring serving to return the plow to its proper position. The turning movement of the clearer-plow may be restricted within certain limits by the provision of a suitable stop or stops.

I am aware that changes in the form and proportion of parts and in the details of construction may be made by a skilled mechanic without departing from the spirit or sacrificing the advantages of this invention, and I therefore reserve the right to make such modifications as clearly fall within the scope of the invention.

Having thus described the invention, what I claim is—

1. In an automatic railway-signal, the combination of a signal-operating mechanism adjacent to a track and having a normally-concealed trip-lever, a switch-operated setting mechanism connected with said signal-operating mechanism, and a wheel-operated setting mechanism also connected with said signal-operating mechanism, substantially as described.

2. In an automatic railway-signal, the combination of a switch-operated setting mechanism, a wheel-operated setting mechanism adjacent to a track and a single signal-operating mechanism having a trip-lever adapted to be thrown into the path of a signal mechanism and provided with a controlling arm or lever which is operatively connected with said setting mechanism, substantially as described.

3. In an automatic railway-signal, the combination of a trip-lever, a controlling-lever arranged to normally hold the trip-lever in its depressed position and to engage therewith and lock the same in its raised position, and means for operating said controlling-lever, substantially as described.

4. In an automatic railway-signal, the combination of a trip-lever, a controlling-lever normally engaging with said trip-lever to hold the latter in its depressed position, a spring to elevate the trip-lever when free from the controlling-lever, and means for engaging with said trip-lever to lock the latter in its exposed raised position, substantially as described.

5. In an automatic railway-signal, the combination of a spring-controlled trip-lever, a controlling-lever mounted above the trip-lever and engaging with the latter under normal conditions to depress and lock the trip-lever when lowered out of the path of a locomotive signal mechanism, and devices carried by said controlling-lever to engage with the trip-lever when raised, substantially as described.

6. In an automatic railway-signal, the combination of a trip-lever provided at its free end with a heel, a cross-bar rigid with said lever, a controlling-lever fulcrumed above the trip-lever and arranged to ride upon the cross-bar thereof, locking devices carried by the controlling-lever, a projection on the trip-lever to engage with said devices, and a spring to lift the trip-lever, substantially as described.

7. In an automatic railway-signal, the combination of a trip-lever, a controlling-lever engaging therewith, a switch-operated lever

connected at one end with a switch-rail, a wire or cable between the controlling-lever and said switch-operated lever, and a spring, substantially as described.

8. The combination with a trip-lever and a controlling device therefor, of a switch-operated lever having at one end an offset, a clip-formed rod attached to a switch-rail and to the other end of said switch-operated lever, a spring connected to the offset end of the switch-operated lever, and a rod, wire or cable between said spring and the controlling device for the trip-lever, substantially as described.

9. The combination with a trip-lever and a controlling device therefor, of a wheel-operated track mechanism comprising a vertically-movable bar, levers in the path of said bar to be actuated thereby, and connections between said bar and the controlling device for the trip-lever, substantially as described.

10. The combination with a trip-lever and a controlling device therefor, of a wheel-operated track mechanism comprising a vertically-movable bar lying adjacent to a track-rail and normally in the path of wheels adapted to travel thereon, a series of connected levers in the path of said vertically-movable bar, means for sustaining the said bar normally free from the series of levers, and connections between said levers and the controlling device for the trip-lever, substantially as described.

11. The combination with a trip-lever, and a controlling device therefor, of a series of casings fixed to a track and forming vertical guides at one side of the head of a rail, a vertically-movable bar confined in said guides provided by the casings, means for normally lifting said bar, a series of connected levers supported below said bar, in the path thereof, and provided with antifriction devices for contact and normally free from engagement with, said bar, and connections between said levers and the controlling device for the trip-lever, substantially as described.

12. The combination with a trip adjacent to a track and means for controlling the same, of a signal mechanism embodying a rock-shaft having tappets adapted to contact with said trip, a signal and connections between said signal and the rock-shaft, substantially as described.

13. The combination with a trip and means for controlling the same, of a signal mechanism including a rock-shaft provided with tappet-arms, a lever carried by said shaft, a spring-controlled lever operatively connected with a signal device, and connections between the lever of the rock-shaft and the signal-device lever, substantially as described.

14. The combination with a trip, of a signal mechanism including suitable bearings, a rock-shaft mounted in said bearings for turning and sliding movement, a clutch on the shaft and one of the bearings, a spring acting against the shaft, tappet-arms carried by said shaft, a signal device, and connections between the shaft and said signal device, substantially as described.

15. The combination with a trip, of a signal mechanism including a rock-shaft having suitable tappets, a signal device, a plate provided with a ratchet, a lever fulcrumed to said plate and having one arm thereof arranged to engage with said ratchet of the plate, connections between said signal device and said lever, a spring connected with said lever, and connections between the signal-lever and the rock-shaft, substantially as described.

16. In a signal-operating device for railway-signals, a housing or case struck up from a single piece of sheet metal and provided with a clip adapted for attachment to a track-rail, substantially as described.

17. In a signal-operating mechanism for railway-signals, a housing or case struck up from a single piece of sheet metal and provided with a clip, and a hood united to said case at one side of the clip thereof, substantially as described.

18. In an automatic railway-signal, the combination with switch-operated setting devices, of a signal-operating mechanism between said switch-operated devices, and spring-controlled wires or coils connected to the signal-operating mechanism and the switch-operated setting devices, substantially as described.

19. In an automatic railway-signal, the combination with switch-operated setting devices at a suitable interval from each other, a signal-operating mechanism, a wheel-operated track mechanism, connecting wires or cables between said devices, and coiled springs connected with said wires or cables to hold all the devices under tension and in operative positions, substantially as described.

20. The combination with a suitable signal mechanism on a locomotive including a crank-arm, of a yieldable clearer-plow arranged in advance of said crank-arm, substantially as described.

21. The combination with a signal mechanism on a locomotive, including a tappet or crank arm, of a clearer-plow arranged in advance of the tappet or crank arm, a spindle by which the clearer-plow is revolubly held in position, and a retracting-spring connected to said clearer-plow, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

MATHEW C. OSTER.

Witnesses:
R. J. HUGHES, Jr.,
T. F. DREW.