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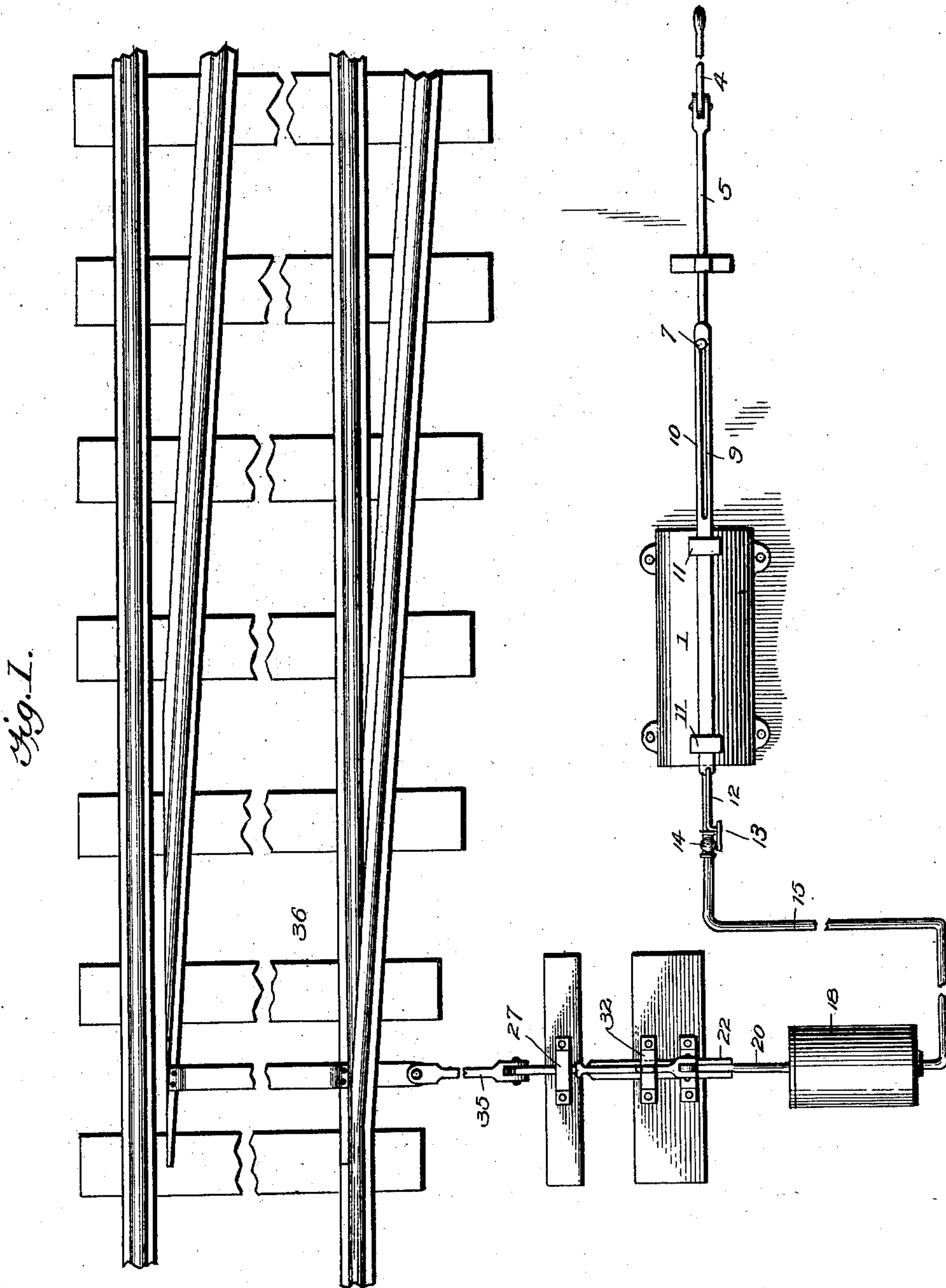
Patented Jan. 28, 1902.

J. W. KEENEY.
PNEUMATIC SWITCH AND SIGNAL.

(Application filed Dec. 31, 1900.)

(No Model.)

3 Sheets—Sheet 1.



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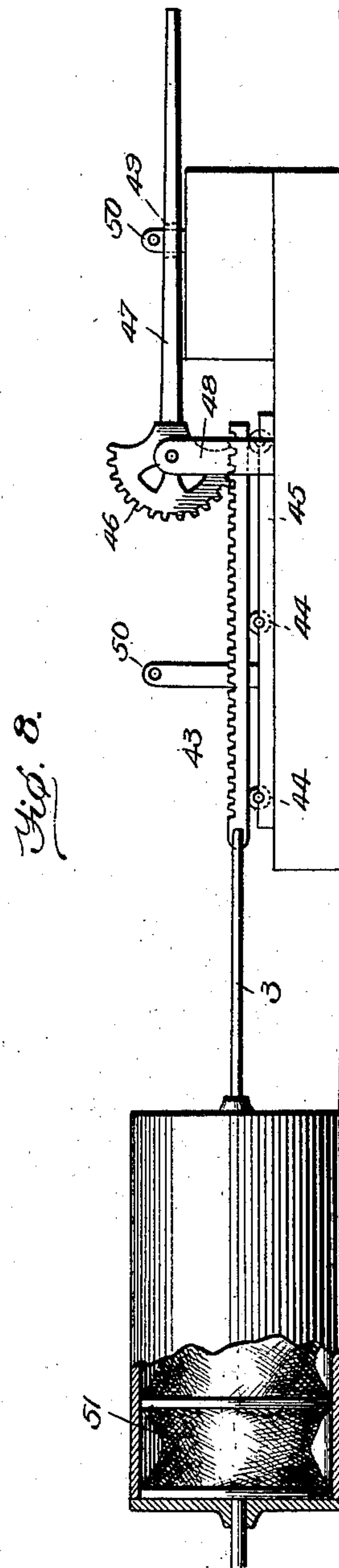
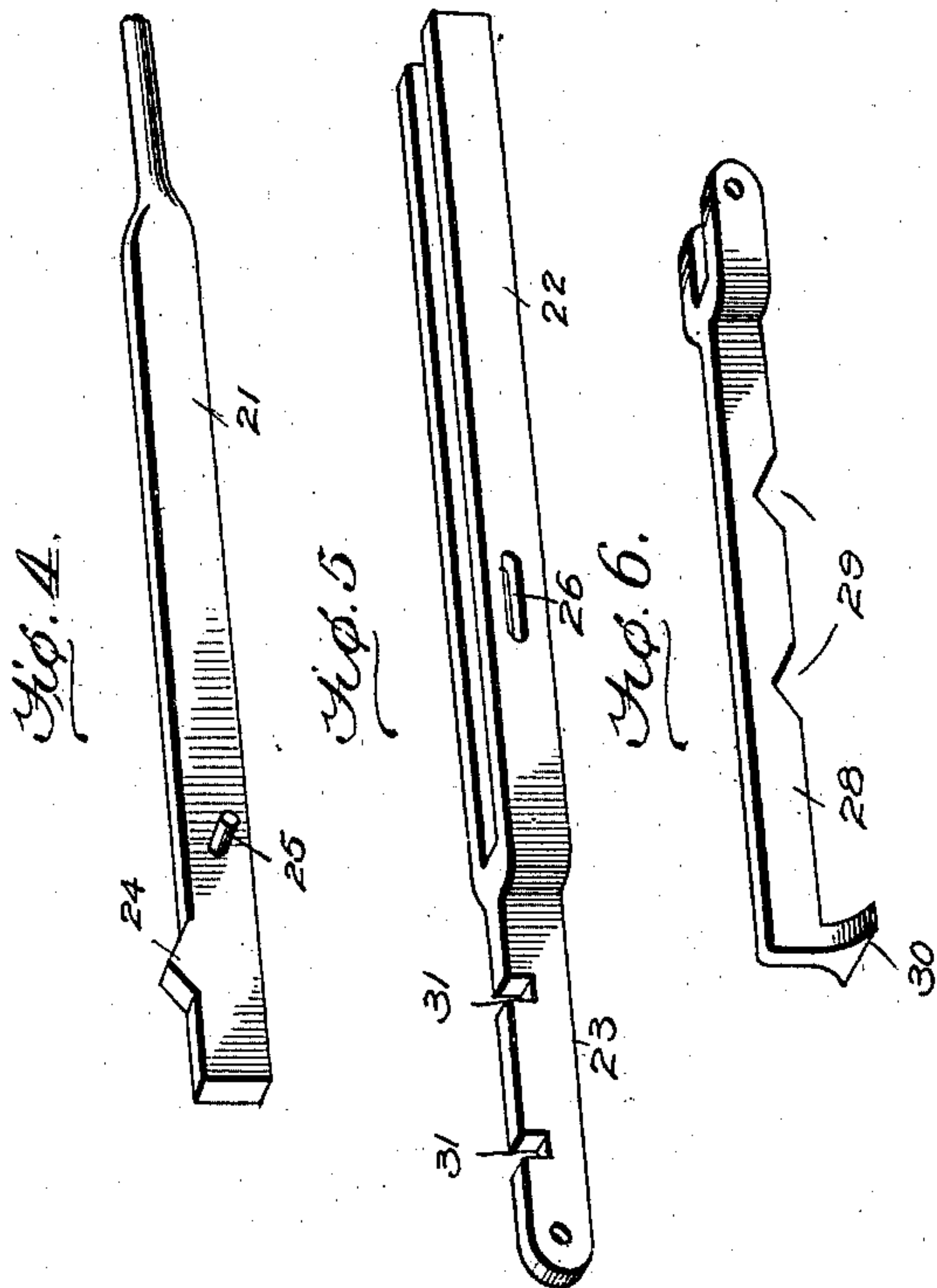
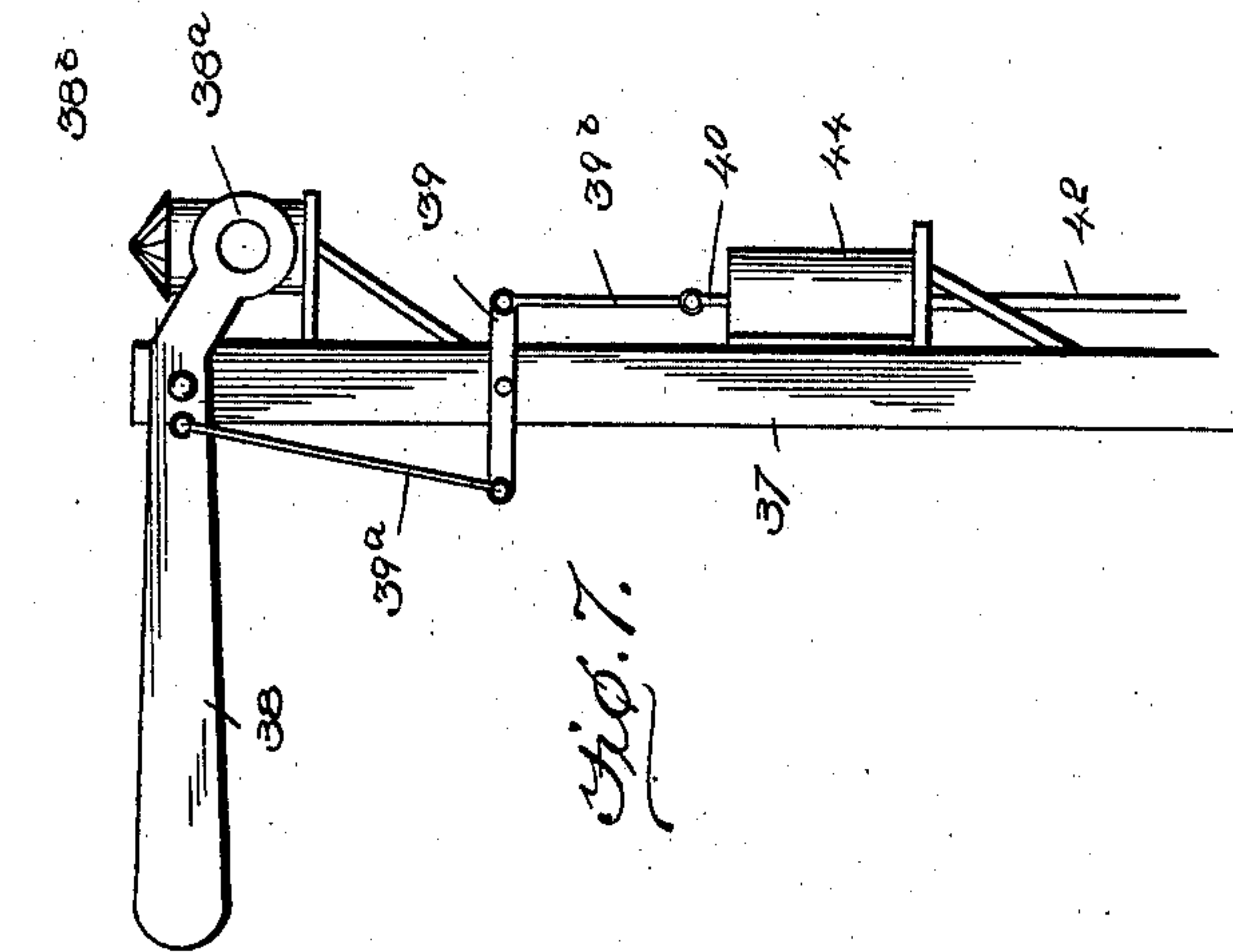
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC SWITCH AND SIGNAL.

SPECIFICATION forming part of Letters Patent No. 692,015, dated January 28, 1902.

Application filed December 31, 1900. Serial No. 41,651. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. KEENEY, a citizen of the United States, residing at Coalburg, in the county of Kanawha and State of West Virginia, have invented new and useful Improvements in Pneumatic Switches and Signals, of which the following is a specification.

This invention relates to new and useful improvements in pneumatic switch-operating and signaling apparatus; and its primary object is to provide a device by means of which a switch may be readily operated from a point removed therefrom and which is provided with means connected to a danger-signal, which will be displayed should the switch-operating mechanism be out of its proper position.

A further object is to provide means whereby the switch, signal, or both, may be operated from a point adjacent thereto independently of the pneumatic operating mechanism.

With these and other objects in view the invention consists in a cylinder which is located at the point at which the switch is to be operated and within which is mounted a piston. This piston is connected by means of a suitable rod with an operating-lever, and an arm extends from said rod and engages a slide, which is adapted when moved in either direction to open and close a valve mounted within an air-outlet pipe arranged at one end of the cylinder. This pipe extends to a point adjacent to the switch to be operated and opens into a bellows, the opposite end of which is connected to a forked bar, which is suitably secured to the switch. This bar is provided with means of peculiar construction, whereby the switch is automatically locked and unlocked.

The invention also consists in certain novel features of construction and combination of parts, which will be hereinafter fully described and claimed, and illustrated in the accompanying drawings, showing the preferred form of my invention, and in which—

Figure 1 is a plan view showing the apparatus in use. Fig. 2 is an elevation of the apparatus at the operating end of the system. Fig. 3 is a similar view of the opposite end of the apparatus, showing the casing of the bellows in section. Fig. 4 is a detail view of the lifting-bar of the locking bar or latch. Fig. 5 is a detail perspective of the

forked pull-bar, showing the recesses which are engaged by the lug of the latch and the slot in which the pins of the locking-bar engage and slide. Fig. 6 is a detail view of the locking-bar. Fig. 7 is an elevation of a signal which may be used in connection with the switch-operating mechanism. Fig. 8 is an elevation of a modified form of the compressor-operating mechanism illustrated in Fig. 2, showing the cylinder partly broken away and a bellows substituted for the piston, the valve-operating mechanism being omitted from the illustration.

Referring to the drawings by numerals of reference, 1 is a cylinder, within which is mounted a piston 2, which fits air-tight within the cylinder. This piston is connected to a rod 3, which is secured at its outer end to a lever 4, having its lower end pivotally connected to the outer end of a link 5, secured to a suitably-disposed hanger 6 or mounted in any other suitable manner. An arm 7 is mounted on the piston-rod 3 and is secured thereon at the desired point by means of a set-screw 8. The arm 7 extends vertically, with its upper end slidingly projected into a slot 9, formed in a pull-bar or slide-bar 10, secured to the cylinder 1. This slot 9 is made shorter than the length of the stroke of the piston in order that the arm 7 will contact at each end of the slot and move the bar 10, and with it the valve arm or rod, sufficient to open and close the valve. The inner end of the slide-bar 10 is pivotally connected to a rod 12, the other end of which is pivotally connected to an arm 13, mounted on the projecting end of a valve-stem 14, arranged in the air-pipe 15, which communicates with the cylinder of a bellows adjacent to the switch mechanism. It may now be perceived that when the mechanism or parts directly associated with the cylinder are in the positions indicated in Fig. 2 of the drawings the valve is closed and the end of the arm 7 in contact with the inner end of the slot 10. Now, when the lever 4 is drawn outward the piston is moved in the same direction the length of its stroke, of course, creating a vacuum in the inner end of the cylinder. During the outward movement of the piston-rod the arm 7 is carried with it, the head of the arm traveling freely in the slot 9 until it reaches the outer end of the slot, with which it engages, and the movement of the piston being con-

tinued to its limit the arm 7 moves the slide-rod 10, which in turn swings the arm 13 and opens the valve, whereupon the air forcibly expands to fill the chamber in the cylinder and causes the operation of the switch mechanism, as hereinafter specified.

The pipe 15 may be of any suitable length and is of course air-tight. This pipe extends to a point adjacent to the switch to be operated and opens into one end of a bellows 17, which is preferably inclosed by a cylinder 18, having perforations 19 in its inner head, as indicated, whereby when the air in the bellows is exhausted by escape into the cylinder 1 the atmospheric pressure through the apertures collapses the bellows and aids in operating the switch mechanism. A rod 20 extends from the end of the bellows which is farthest removed from the pipe 15, and is flattened a distance, as at 21, to adapt it to be slidably arranged between the parallel arms or forks 22 of a pull-bar 23. The part 21 adjacent to its free end is formed with a double inclined projection 24, adapted to engage in coincident recesses in the latch or lock, as hereinafter specified, and at a determined point behind the projection 24 a pin 25 is projected through the bar, its ends engaging in slots 26 in the links 22 of the bar 20. Projecting from the base or union of the fork 22 is a flat extension 23, integral with the fork and having a pin-hole in its outer end, and in the upper edge of this extension 23 are formed notches 31, arranged to be engaged by the flange or stud 30 on the free end of the pivotally-supported latch or lock bar 28. This latch or lock bar 28 has a downward-directed stud 30 at its free end to engage in the notches 31 and is provided with inclined recesses 29, which engage over the projection 24 on the extension 21 of the bar 20, the assembled elements and their relations being shown in Fig. 3 of the drawings. A sprocket 32 straddles the locking and sliding bars and is of sufficient height to permit the locking-bar to be swung upward a sufficient distance to allow the extension 24 to pass from one recess 29 to the remaining similar recess.

A hooked arm 33 is mounted upon the bracket 32 and is adapted to be engaged by a bail or loop 34, which is hinged to the locking-bar. This bail is only placed in engagement with the hooked arm when it is desired to operate the switch independently of the pneumatic switch-operating mechanism.

A rod 35 is pivoted to the end of the bar 23 which is farthest removed from the rod 20, and this rod 35 is connected in the usual manner to the switch 36.

If desired, a standard 37 may be provided adjacent to each switch and a semaphore-arm 38 pivoted thereto. This arm may be provided with a counterbalance 38^a, which is adapted to swing in front of a lamp 38^b, arranged upon the standard.

In the drawings I have shown a lever 39 which is connected, at one end of the sema-

phore, by means of a rod 39^a to the semaphore-arm at a point adjacent to the pivot thereof. A second rod 39^b connects the other end of the lever to a piston-rod 40, the piston of which is mounted in a cylinder 41, secured to standard 37. A pipe 42 extends from the cylinder 41 to the pipe 15, and thus it will be seen that the switch and signal will operate in unison.

When it is desired to operate the switch, the lever 4 is swung in the proper direction. If drawn to the right, when in the position shown in Fig. 1 the piston 2 will compress the air in the path thereof and will create a partial vacuum in its rear. The arm 7 will contact with the end of the slot 29 within the strip 10 just before the piston reaches the limit of its outward stroke, and will then draw the strip 10, by reason of the engagement of the arm 7, within its guides and open the valve 14. It is obvious that as soon as this valve is opened the air contained within the bellows 17 will pass into the pipe 15, causing said bellows to contract. The strip 21 will thus be slid longitudinally within the fork 22, causing the wedge-shaped extension 24 to bear upon the inclined edge of the recess 29, within which it rests. This will throw the locking-bar 28 upward, and as soon as the same is raised the studs 25 will come into contact with the ends of the slots, within which they are mounted. The sliding bar 23 will then be carried with the strip 21, causing the switch 36 to move therewith. As soon as the extension 24 arrives in position under the second recess 29 the locking-bar 28 will fall into its normal position, the stud 30 thereon dropping into the recess 31, which will then be in a position directly under the same. It is of course understood that when the extension 24 raises the locking-bar it also lifts the stud 30 thereon out of the recess within which it was resting.

It will be seen that when it is desired to move the switch back to its first position it is merely necessary to reverse the operation above described. As the piston 2 and its rod 3 travel inward within the cylinder the air in the path thereof will be compressed. The arm 7 will then come into contact with the end of the slot 9 and open the valve 14. The air within the cylinder will then promptly rush into the pipe 15 and the bellows, causing said bellows to expand and operate the device, as before described.

Where it is desired to shift the switch independently of the pneumatic operating mechanism, it is merely necessary to raise the locking-bar 28 by means of the bail 34, and said bail may be placed in engagement with the hooked arm 33, thereby supporting the locking-bar in raised position. The switch can then be shifted in the desired direction, and when it arrives in position the locking-bar may be released, and thereby hold the switch in the position to which it is adjusted.

In the foregoing description I have referred

to the simplest form of piston-operating mechanism, but in Fig. 8 I have illustrated a modified form which may be employed in lieu thereof. This comprises a rack 43, which is
 5 connected to the piston-rod 3 and is mounted upon rollers 44, which are suitably journaled within the base-plate 45. A toothed segment 46 engages the rack and is formed at the lower end of a lever 47, said lever being ful-
 10 crumed upon a bracket 48, extending above the rack. A slot 49 is formed within the lever and is adapted to receive either one of two staples 50. These staples are adapted to re-
 15 ceive suitable locking means, as a padlock, and it is obvious that in this manner the lever can be locked when lowered in either direc-
 tion.

While I have described this apparatus as employing a piston at the operating end of
 20 the system, I do not wish to limit myself thereto, for, if desired, a bellows 51, similar to but larger than the bellows 17 at the opposite end of the system, may be employed. I have illustrated this bellows in Fig. 8 of the
 25 drawings.

The cylinder 1 is considerably larger than the bellows 17, operated therefrom, so that a sufficient amount of air may be compressed therein or a sufficiently large vacuum may be
 30 formed to force the bellows to the limit of its movement in either direction. The spring 16 is so arranged as to hold the valve 14 normally in closed position.

While I have shown and described one form
 35 of signal for use in connection with the switch, I do not wish to be understood as limiting myself thereto, as any desired signal may be employed, and, if desired, said signal may be operated independently of the switch.

40 Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. The combination with a compressor; of a bellows, a pipe connection between said
 45 compressor and bellows, a strip connected to the bellows, and formed with a double inclined lug, a forked bar adapted to receive the strip and formed with notches, said strip being movable a short distance independently
 50 of the bar, a switch connected to the bar, and a pivotally-supported locking-bar adapted to engage the notches in said bar and the lug of the strip.

2. The combination with a compressor; of
 55 a bellows, a pipe connection between said compressor and bellows, a strip secured to the bellows, an extension to said strip, a slidable forked bar having notches in its upper edge adapted to receive the strip, said strip
 60 being movable a short distance independently of the forked bar, a switch connected to the bar, a pivotally-supported locking-plate, having recesses therein, either one of which is adapted to receive the extension of the
 65 strip, and a stud to said locking-bar adapted to engage a notch in the forked bar.

3. In a pneumatic railway-switch, the combination with an air-cylinder, a bellows, and piston in the cylinder, of a pipe connecting the bellows and the cylinder, a valve in the
 70 pipe, a valve-rod slidingly mounted on the cylinder, having a slot shorter than the stroke of the piston, and connected to the valve-stem, an arm on the piston-rod with its free end slidingly arranged in said slot, means
 75 to reciprocate the piston, and switch-operating mechanism between the bellows and the switch, substantially as set forth.

4. The combination with a cylinder; of a piston therein, means for operating the pis-
 80 ton, a bellows, a pipe connecting the cylinder and bellows, a valve within the pipe, a slotted slide connected to the valve, an arm connected to the piston and engaging the slot and adapted to operate the slide to open the
 85 valve just before the piston reaches the limits of its movements, and a switch connected to the bellows.

5. The combination with a cylinder; of a piston therein, means for operating the pis-
 90 ton, a bellows, a pipe connecting the bellows and cylinder, a valve within the pipe, a slotted slide connected to the valve, an arm connected to the piston and adapted to engage the ends of the slot, to operate the slide and
 95 open the valve when the piston reaches the limits of its movements, a strip connected to the bellows, formed with a wedge-shaped extension thereto, a forked bar adapted to receive the strip and having slots therein, and
 100 having studs engaging the slots, a switch connected to said bar, a pivotally-supported locking-bar having recesses therein either of which is adapted to receive the wedge-shaped extension, and a stud adapted to engage a re-
 105 cess in the forked bar and lock the same against movement.

6. In an apparatus of the character described, the combination with a cylinder; of a piston therein, means for operating the pis-
 110 ton, a bellows, a pipe connecting the bellows and cylinder, a valve within the pipe, a slotted slide connected to the valve, and an arm connected to the piston and adapted to engage the said slide and move it to open the
 115 valve when said piston reaches the limits of its movements.

7. In an apparatus of the character described, the combination with a compressor; of a bellows, a pipe connecting said compressor
 120 and bellows, a switch secured to, and adapted to move with, the bellows, a standard, a semaphore-arm pivoted thereto, a cylinder, a piston therein, a rod connecting said piston and arm and a pipe connecting the cylinder and
 125 the pipe of the bellows.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN W. KEENEY.

Witnesses:

W. T. COLE,
 J. W. BIRD.