

(No Model.)

R. T. BOWNE.  
RAILROAD SWITCH SIGNAL.

No. 441,351.

Patented Nov. 25, 1890.

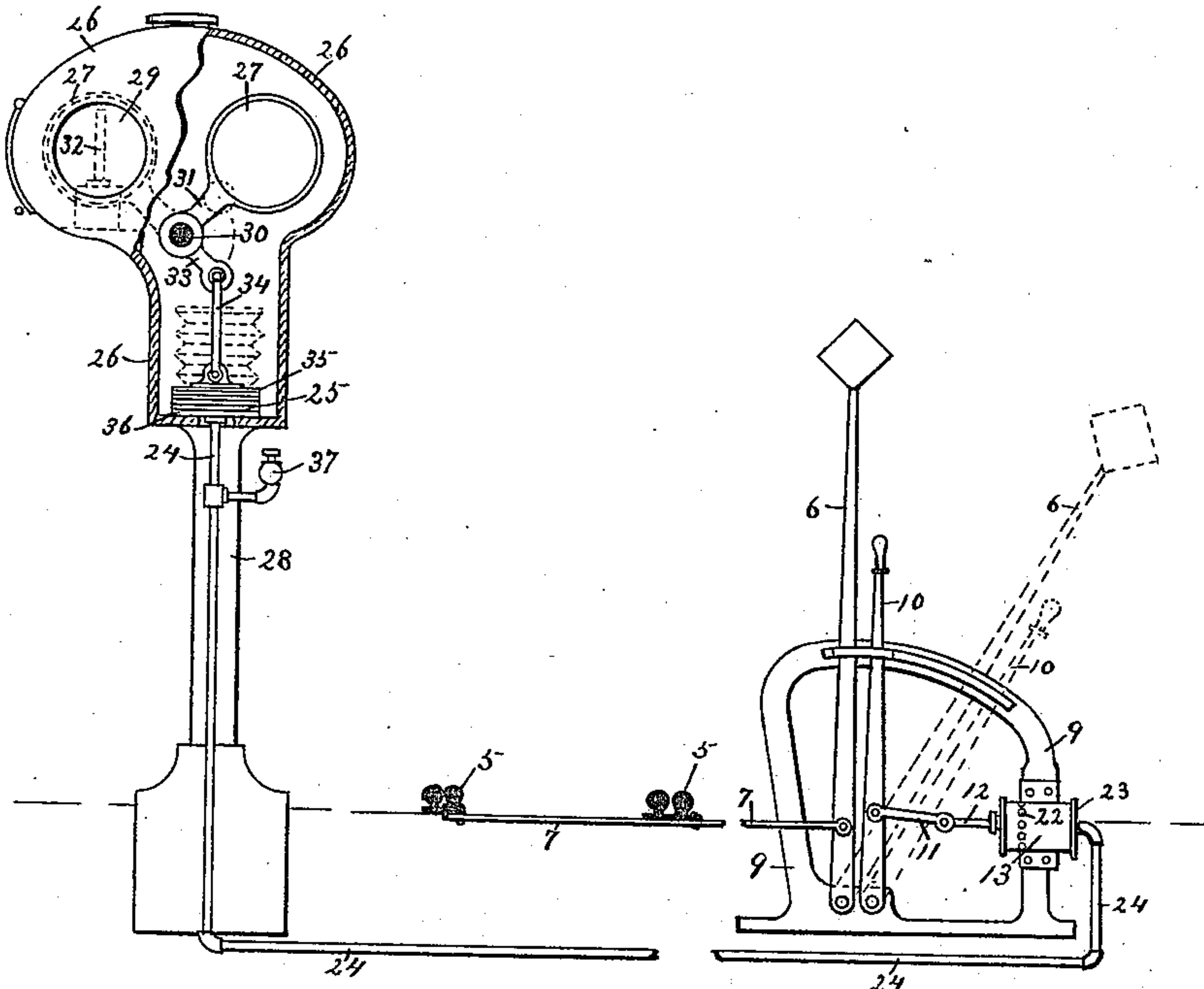


Fig. 1.

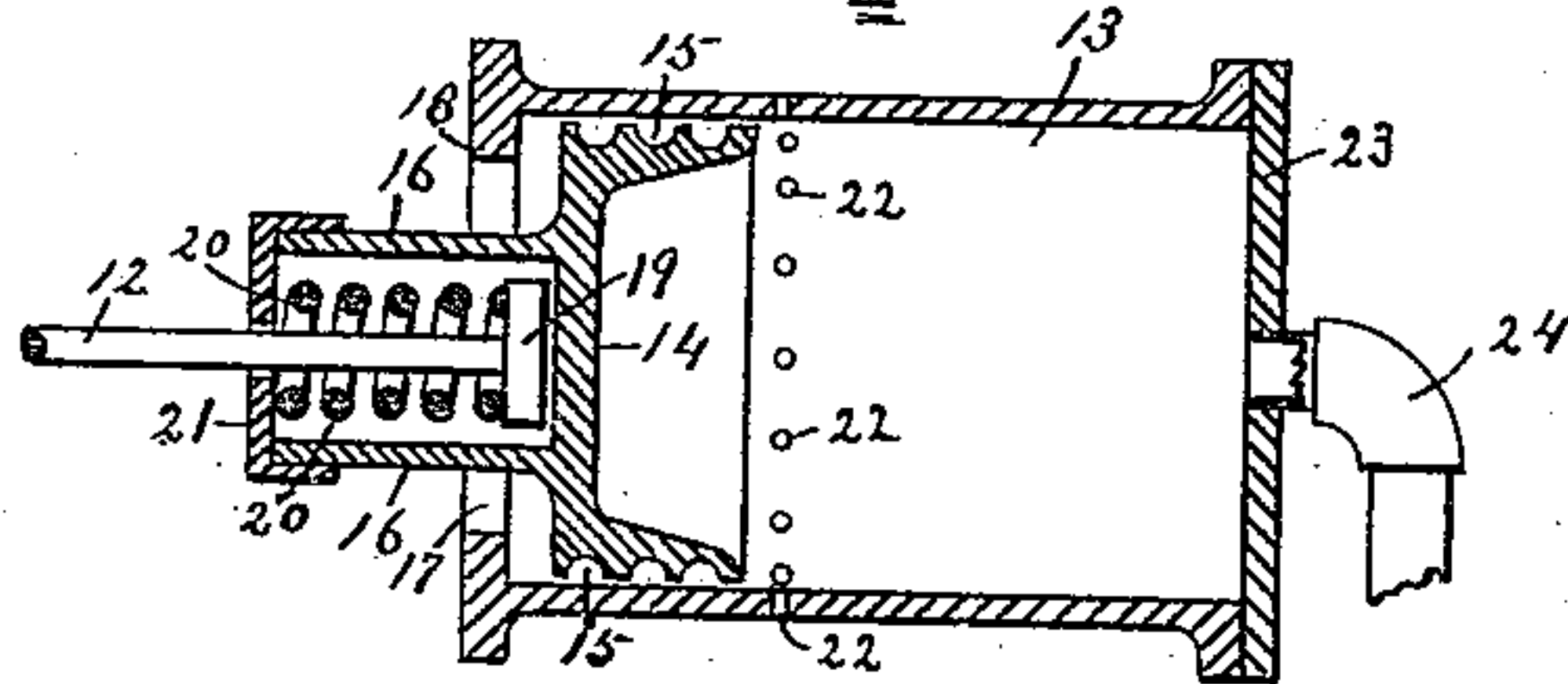


Fig. 2.

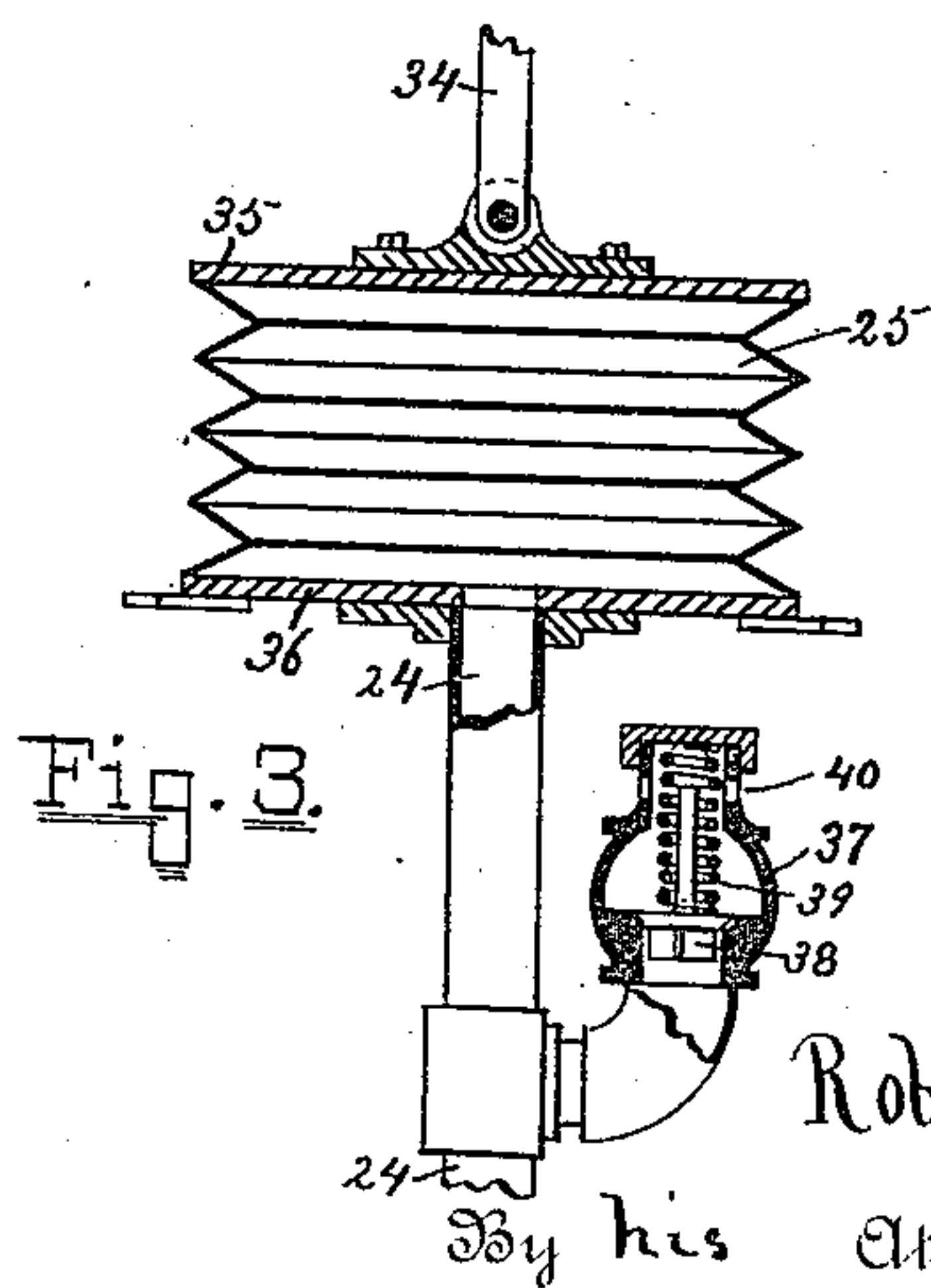


Fig. 3.

Witnesses  
C. R. Ringle  
E. R. Rowley

Inventor

Robert T. Bowne

By his Attorney

Wm. L. Baile

# UNITED STATES PATENT OFFICE.

ROBERT T. BOWNE, OF BENSON, MARYLAND.

## RAILROAD-SWITCH SIGNAL.

SPECIFICATION forming part of Letters Patent No. 441,351, dated November 25, 1890.

Application filed March 15, 1890. Serial No. 343,995. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT T. BOWNE, a citizen of the United States, residing at Benson, in the county of Harford and State of Maryland, have invented certain new and useful Improvements in Railroad-Switch Signals; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

I have for my invention a pneumatic railroad-switch signal by which the open or closed position of a railroad-switch may be indicated at any desired distance from the switch and thereby give sufficient time for the control of an approaching train; and it consists of a pneumatic signal-operating device which, in addition, serves to lock the switch-lever in the safety position, whereby it is necessary to first move the signal-operating mechanism, and thereby display the danger-signal, before the switch-lever can be operated, the construction of the device permitting the switch-lever to be used at will after the danger-signal is shown, which position thereof will be maintained until the switch-lever is again locked in the safe position, the particular operation of the air-cylinder and its appurtenances being such that an air-pressure will cause the signal to be placed in one position and a partial vacuum will be required to place it in the other position, by which arrangement the signal can only be changed by the movement of the signal-lever, and will be unaffected by any leaks or other derangement of the parts thereof, all of which I accomplish by the devices hereinafter fully described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of the device, a part of the signal-casing broken away and showing the interior mechanism thereof in the safe position. Fig. 2 shows an enlarged detailed sectional view of the air-cylinder shown in Fig. 1. Fig. 3 shows an enlarged detailed sectional view of the expansible chamber and its attached parts

shown in Fig. 1, the expansible chamber being shown in the extended position.

The same numbers refer to the same or similar parts throughout the several views.

5 denotes a railroad-switch that is operated by the switch-lever 6 through the rod 7, this lever 6 being fulcrumed at its lower end to a suitable bearing in the frame 9, one end of the rod 7 being pivoted to the said lever 6 and the other end thereof connected in the ordinary manner with the switch 5 to be operated, whereby a vibrating movement of the lever 6 from the closed position shown by the full line in Fig. 1 to the open position shown by the dotted line will cause the said switch to be operated as in ordinary practice. Fulcrumed to the said frame 9 and immediately behind the lever 6 is the signal-lever 10, which has connected thereto by the link 11 the piston-rod 12 of the air-pump 13, whereby when this signal-lever 10 is vibrated between the points represented by the full and dotted lines thereof in Fig. 1 a reciprocating movement will be imparted to the piston 14 of the air-pump, and thereby alternately produce the necessary pressure and partial vacuum for the operation of the signal in a manner which will presently appear. The piston 14 is made of sufficient depth to provide a bearing therefor in its reciprocating movement, suitable packing 15 being provided to make an air-tight joint therein. Extended from this piston is the cylindrical chamber 16, that is free to move through the open head 17 of the air-pump, the lip 18, that is formed at this end of the pump, serving to stop the outward movement of the piston. In this chamber 16 is placed one end of the piston-rod 12, that has thereon the shoulder 19, on which is seated the lower end of the spiral spring 20, the upper end of this spring 20 bearing on a cap 21 that covers the chamber, this arrangement of securing the piston-rod to the piston being provided to compensate for a quick or sudden outward movement of the piston by the movement of its lever 10, whereby a partial vacuum is to be produced in the cylinder, the spring 20 permitting such relative movement between the rod and the piston that the piston will be held in the cylinder



by the air-pressure thereon sufficiently far to cover the holes 22, and thus retain the vacuum until the signal has been properly operated thereby, the gradual outward movement of the piston by the lessening of the vacuum therebehind finally opening these holes 22 to the atmosphere, when the vacuum in the cylinder will be broken.

Connected to the head 23 on the outer end of the cylinder is the air-pipe 24, through which communication is established between the said cylinder and the expansible chamber 25, that is located in the signal-box 26 for operating the signal-disk 27, the construction of which is as follows:

Supported upon a suitable upright 28, which is placed at any desired distance from the switch 5, is the signal-box 26, which may be of any form to suitably incase the mechanism therein, an opening 29 being formed in one or both sides of the box, which is protected by a glass plate, and through which the signal-disk 27 may be seen. Supported by the sides of the box in suitable bearings therefor and free to be rotated therein is the shaft 30, to which is fixed the disk-arm 31, that has on the end thereof the signal-disk 27, which is made of red translucent glass, whereby when this signal-disk is brought over the opening 29 the lamp 32, which is placed in the signal-box, will cause a red light to be shown through the opening 29, and thus denote the position of the switch. In order to impart a vibratory movement to the signal disk-arm, there is extended therefrom the actuating-arm 33, which is connected by a link 34 with the upper head 35 of the expansible chamber 25, this chamber 25 being made cylindrical, with the sides thereof of the accordion form shown in Fig. 3, whereby when an air-pressure is admitted to the interior of the chamber through the air-pipe 24, connected to the bottom head 36 thereof, the said chamber will be extended to the form shown in Fig. 3, and by the upward movement thereof the signal-arm 31 will be caused to pass through sufficient arc to place the disk 27 over the opening 29, as shown by the dotted lines in Fig. 1, this position of the disk 27 being maintained by the weight thereof until a partial vacuum is produced in the expansible chamber, whereby the said chamber will be collapsed to the position shown by the full lines in Fig. 1, and the disk 27 will be brought to the "safety" position, as shown by the full lines thereof in same figure. In order to produce this vacuum in the expansible chamber 25, the air-pump 24 is of such capacity that when the piston thereof is moved to the full inward limit there will be a greater pressure of air forced through the pipe 24 than is required to extend the said chamber 25 and thereby operate the signal. This excess of pressure will escape through the pressure-relief valve 37, that is placed in the pipe 24 and is of ordinary construction, the air-pressure acting under the valve 38 thereof

against the tension of the spring 39, whereby when the desired pressure is reached in the pipe 24 the said valve 38 will be opened and the air from the said pipe will escape through the openings 40 provided therefor in the said relief-valve 37. By allowing a certain quantity of the air to escape it will be seen that when the piston 14 is moved to near its full outward limit a partial vacuum will be produced by the displacement thereof and the chamber 25 will be collapsed, as heretofore described, this vacuum being broken when the piston 14 will have passed over the holes 22 in the air-pump cylinder, and the air-pipe 24 will be charged with air ready for the next operation.

The manner of operating is as follows: The vertical portion of the levers 6 and 10 (shown by the full lines in Fig. 1) represents the "safety" position of the switch when clear for the main line, the red disk 27 being out of sight and the white light showing through the opening 29. When the switch is to be opened, the signal-lever 10 is moved to the position shown by the dotted line thereof in Fig. 1. This movement will force the piston 14 of the air-pump 13 outward, and the air-pressure therefrom will be transmitted through the pipe 24 to the expansible chamber 25, which will be extended thereby to the position shown in Fig. 3, the disk 27, placed over the opening 29 in the manner described, denoting this position of the signal-lever 10, this position of the disk being maintained by the weight thereof, which is sufficient to hold the said chamber 25 in the extended position.

As stated, some quantity of the air-pressure from the pump 13 will by the excess thereof escape through the pressure-relief valve 37, whereby when the lever 10 is again brought to the vertical position, by which a further movement of the switch-lever 6 is prevented, a partial vacuum is thereby formed by the displacement of the piston 14, the chamber 25 will be collapsed by the vacuum, and the disk 27 hidden in the signal-box 26, the particular manner of attaching the piston-rod 12 to the piston 14, as described, insuring this vacuum in the chamber 25 before the piston 14 will have passed over the holes 22 in the air-pump, and the atmospheric pressure thereby established in the air-pump and air-pipe 24.

It will be seen that the switch-lever 6 cannot be moved from the vertical position until the signal-lever 10 is removed from the path thereof, which will insure the display of the danger-signal. The signal-lever 10 may be kept in the position shown by the dotted lines in Fig. 1, with the danger-signal displayed, and permit at the same time the switch-lever 6 to be used at will for a frequent opening or closing of the switch. It will be seen, likewise, that the signal-disk 27 cannot be altered by air-leaks or other derangement of its parts in consequence of its being held in either posi-



tion by its own weight. In the safe position of the signal the parts are under the normal atmospheric pressure, and should an ordinary leak occur when a pressure is put thereon to display the danger-signal it would but permit an increased vacuum and insure a more prompt collapse of the expansible chamber 25 when the air-pump piston 14 is moved outward.

Having described my invention and the manner of operating, what I claim, and desire to secure by United States Letters Patent, is—

1. In combination with a railroad-switch, the switch-lever 6, by which the switch is operated, a signal-lever 10, the free end of which moves in the same path with the said switch-lever, an air-pump 13, operated by said signal-lever 10, whereby an air-pressure will be produced, a vibratory signal-disk 27, an expansible chamber 25, whereby a vibratory movement by the variation of air-pressure therein will be imparted to the said signal-disk, and an air-pipe 24, whereby the air-pressure is conveyed from the said air-pump to the said expansible chamber, for the purpose set forth.

2. In combination with a railroad-switch, the switch-lever 6, by which the switch is operated, a signal-lever 10, the free end of which moves in the same path with the said switch-lever, an air-pump 13, provided with a piston 14, to which a reciprocating movement is imparted by the said signal-lever 10 and whereby an air-pressure will be produced by one stroke of the piston, a vibratory signal-disk 27, arranged to pass a vertical line in its vibratory movement and thereby be held by gravity on either side of the vertical line, an expansible chamber 25, whereby a vibratory movement by the variation of air-pressure therein will be imparted to the said signal-disk, an air-pipe 24, through which air-pressure is conveyed from the said air-pump to the said expansible chamber, and a pressure-relief valve 37, through which a part of the air-pressure from the stroke of said air-pump will escape and whereby a partial vacuum will be produced on the return-stroke of said air-pump piston, for the purpose set forth.

3. In combination with a railroad-switch, the switch-lever by which the said switch is operated, a signal-lever 10, the free end of which moves in the same path with the said switch-lever, an air-pump 13, consisting of a cylinder, a piston 14, a piston-rod 12, connected to said signal-lever 10, and the air-holes 22, formed in the said air pump cylinder, through which air is supplied thereto, a vibratory signal-disk 27, arranged to pass a vertical line in its vibratory movement and thereby be held by gravity on either side of the vertical line, an expansible chamber 25, whereby a vibratory movement by the variation of air-pressure therein will be imparted to the said disk 27, an air-pipe 24, through which air-pressure is conveyed from the said

air-pump to the said expansible chamber, and a pressure-relief valve 37, through which a part of the air-pressure from one stroke of the air-pump piston will escape and whereby a partial vacuum will be produced by the other stroke of said air-pump piston, for the purpose set forth.

4. In combination with a railroad-switch, the switch-lever 6, by which the said switch is operated, a signal-lever 10, the free end of which moves in the same path with the said switch-lever, an air-pump 13, consisting of a cylinder, a piston 14, provided with the extended chamber 16, a piston-rod 12, provided with a shoulder 19, that fits in the said extended chamber 16, a spring 20, one end of which bears on the said shoulder, the other end thereof bearing on the cap 21 of said chamber 16, whereby movement will be permitted between the said piston 14 and the piston-rod 12, and the holes 22, formed in said cylinder near the end of the outer stroke of said piston, wherethrough air will be admitted to the said air-pump cylinder, a vibratory signal-disk 27, arranged to pass a vertical line in its vibratory movement and thereby be held by gravity on either side of the vertical line, an expansible chamber 25, whereby a vibratory movement by the variation of air-pressure therein will be imparted to the said disk 27, an air-pipe 24, through which air-pressure is conveyed from the said air-pump to the said expansible chamber, and a pressure-relief valve 37, through which a part of the air-pressure from one stroke of the air-pump piston will escape and whereby a partial vacuum will be produced by the other stroke of said air-pump piston, for the purpose set forth.

5. The combination of a signal-lever 10, an air-pump 13, provided with a piston 14, to which a reciprocating movement is imparted by the lever 10, a vibratory signal-disk 27, arranged to pass a vertical line in its vibratory movement and thereby be held by gravity on either side of said vertical line, an expansible chamber 25, whereby a vibratory movement will be imparted to said signal-disk, an air-pipe 24, through which air-pressure is conveyed between the said air-pump and expansible chamber, a pressure-relief valve 37, through which a part of the air-pressure from the air-pump will escape, and thus on the return-stroke of the piston 14 produce a partial vacuum in the said pipe 24, and the vent-holes 22, formed in the cylinder of the air-pump, whereby at the proper position of the piston 14 the vacuum in the said pipe 24 will be broken, for the purpose set forth.

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

ROBERT T. BOWNE.

Witnesses:

WM. L. BAILIE,  
JNO. T. MADDOX.