No. 788,536. PATENTED MAY 2, 1905.

E. C. IRVING.

PNEUMATIC RAILWAY SIGNALING SYSTEM AND ELECTROPNEUMATIC VALVE THEREFOR.

APPLICATION FILED MAR. 14, 1903.

FIG. 1.

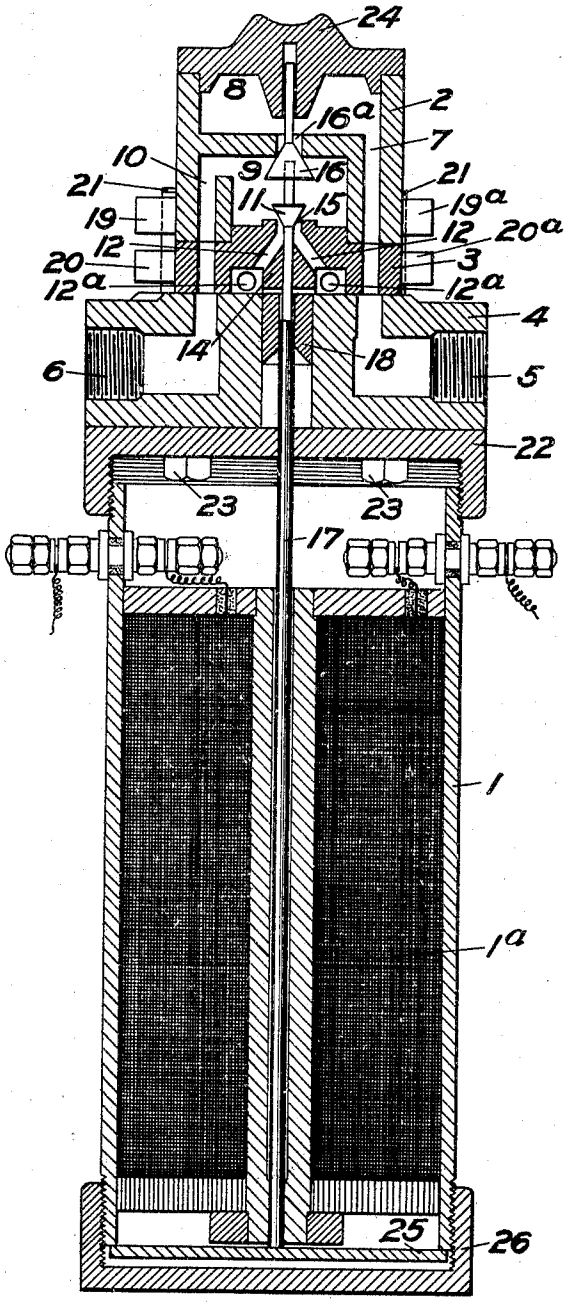


FIG. 2.

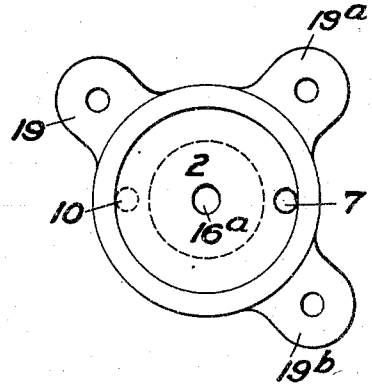
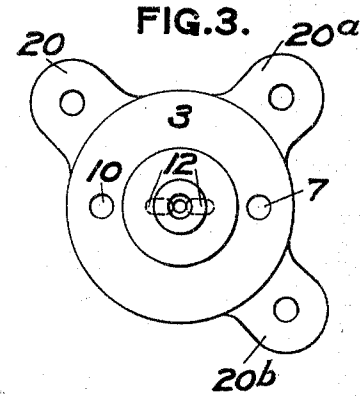


FIG. 3.



Witnesses:
Clarence W. Carroll.
H. Gurnee.

Inventor:
Ernest Copeland Irving
by Osgood & Davis
Associate Attorneys

No. 788,536. Patented May 2, 1905.

UNITED STATES PATENT OFFICE.

ERNEST COPELAND IRVING, OF WESTMINSTER, ENGLAND, ASSIGNOR OF ONE-HALF TO JOHN PATRICK O'DONNELL, OF WESTMINSTER, ENGLAND.

PNEUMATIC RAILWAY SIGNALING SYSTEM AND ELECTROPNEUMATIC VALVE THEREFOR.

SPECIFICATION forming part of Letters Patent No. 788,536, dated May 2, 1905.

Application filed March 14, 1903. Serial No. 147,856.

To all whom it may concern:

Be it known that I, ERNEST COPELAND IRVING, residing at Palace Chambers, Westminster, in the county of Middlesex, England, (whose post-office address is Palace Chambers, Westminster, in the county of Middlesex, England,) have invented certain new and useful Improvements in Pneumatic Railway Signaling Systems and Electropneumatic Valves Therefor; and I do hereby 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.

This invention consists principally in an improved electropneumatic or electromagnetic valve for use in pneumatic railway signaling apparatus whereby said apparatus is simplified and the liability to derangements minimized. In my invention when the electromagnet for actuating the valve is deënergized the fluid-pressure is allowed to pass through the valve, and, on the other hand, when the magnet is energized the passage of fluid-pressure is cut off, so that interruption or failure of the electric current will cause the admission of air to a locking-cylinder or to operate other devices for locking conflicting levers in the interlocking apparatus. The application of this valve to pneumatic railway signaling systems and the like will be readily understood by reference to the prior British specification of Letters Patent No. 5,511, of 1902, and to the specification and drawings accompanying my application for Letters Patent of the United States for "Improvements in railway signaling" filed concurrently with this application.

In the accompanying drawings, Figure 1 is a sectional elevation of my improved electropneumatic valve. Fig. 2 is a plan view of the valve-box part 2, hereinafter referred to. Fig. 3 is a plan view of the intermediate part 3 of the valve-box hereinafter referred to.

In carrying out my invention I provide on the top of the magnet 1^a or magnet-casing 1 a valve box or casing, preferably consisting of three main parts 2, 3, and 4. The part 4 has two pipe connections 5 and 6. Air or other fluid pressure enters at 5, and 6 is the outlet through which the fluid-pressure passes to the locking-cylinder or other apparatus to be operated by compressed air when the valve-magnet 1^a is deënergized. For this purpose the valve-casing has a port or passage 7, which connects with the supply-inlet 5 and leads to the upper chamber 8. The central chamber 9 has a port or passage 10, which communicates in a similar manner with the outlet 6. The intermediate part 3 of the valve box or casing is provided with a valve-seat on top, on which works a conical valve 11, and also with exhaust-ports 12, controlled by said valve 11 and leading to the atmosphere through ports 12^a. There is a central projection 14 in this intermediate part, forming a guide for the valve stem or rod 15. An upper conical valve 16 works on a seat in the upper portion 2 of the valve-box, said valve controlling the passage of fluid-pressure through the port 16^a. The valves are actuated through an armature stem or rod 17, extending through the electromagnet, and also guided at the top end by a bush or sleeve 18 in the lower part 4 of the valve-casing.

The upper portion 2 of the valve-casing is provided with preferably three lugs or projections 19, 19^a, and 19^b, which correspond with similar lugs 20, 20^a, and 20^b on the intermediate portion 3 of the valve-casing. These lugs register with dowel-pins 21, fixed in the lower portion 4 of the valve-casing, and are so arranged as to insure the parts of the valve-casing being always fitted together in their proper position, so that the ports or passages 7 and 10 register correctly. If it is desired to use only two lugs or projections, this may be done by omitting either of lugs 19 or 19^b on the part 2 of the valve-casing and correspondingly either of the lugs 20 20^b on the part 3 of said casing. The lower portion 4 of the valve-casing is secured to a cap or cover 22 by means of screws 23 or otherwise. This cap is screwed internally, so as to receive the magnet-casing 1. The three parts 2, 3, and 4 and the cover 24 are held together by means

of a yoke or strap and screw (not shown in the drawings) of a well-known construction in such a manner as to be easily detachable.

The armature 25 is loosely placed in a box or cap 26, screwed on the lower end of the magnet-casing 1, and normally—that is to say, when an electric current passes through the magnet 1^a, energizing it—the armature 25 is attracted, carrying with it the stem or rod 17, and thereby pushing the valve 16 up against its seat, shutting off the main air-supply from the cylinder or other apparatus to be operated on. The lower valve 11 is held in a raised position from its seat, thus allowing air to exhaust through ports 12. Upon the magnet 1^a becoming deënergized the armature will drop, the valve 11 will close the exhaust-ports 12, and the valve 16 will open port 16^a, allowing the fluid-pressure from the main supply to pass through the port 7, chamber 8, port 16^a, and port 10 to the cylinder or other apparatus to be operated upon. When the magnet 1^a is again energized, the valves 11 and 16 are returned to the position shown in Fig. 1, thus again cutting off the compressed air from the main supply and opening the cylinder or other apparatus to exhaust through 6, 10, 9, and 12.

It will be observed that no spring is employed in connection with the valves.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an electropneumatic valve, the combination of a valve-casing having inlet, outlet and exhaust ports, and passages connecting said inlet and outlet ports, and said outlet and exhaust ports, respectively; a valve adapted in one position to close said connection between the inlet and outlet ports and to open said outlet-port to exhaust, and in another position to close said connection between said outlet and exhaust ports and to open the connection between said inlet and outlet ports; an electromagnet; an armature for said magnet adapted to fall by gravity therefrom when said magnet is deënergized and to approach said magnet when it is energized; and a connection between said armature and said valve, whereby said valve is caused to assume the position first described when said armature approaches said magnet, and the second described position when said armature falls away from said magnet, substantially as shown and described.

2. In an electropneumatic valve, the combination of a valve-casing having inlet, outlet and exhaust ports, and passages connecting said inlet and outlets ports, and said outlet and exhaust ports, respectively; a valve adapted in one position to close said connection between the inlet and outlet ports and to open said outlet-port to exhaust, and in another position to open said connection between said inlet and outlet ports and to close the connection between said outlet and exhaust ports; an electromagnet; an armature for said magnet adapted to fall by gravity therefrom when said magnet is deënergized and to approach said magnet when it is energized; a stem for said valve, attached to said armature whereby said valve is caused to assume the position first described when said armature approaches said magnet, and the second described position when said armature falls away from said magnet, substantially as shown and described.

3. An electromagnetic valve having inlet, outlet and exhaust ports, passages connecting said inlet and outlet ports, and said outlet and exhaust ports, and seats in said passages for valves to close said connection between said inlet and outlet ports, and said outlet and exhaust ports, respectively, said valve being comprised of several separate, coördinating parts having corresponding lugs adapted to register when said parts are in proper relation, and to be connected thereby by locking means, substantially as shown and described.

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

ERNEST COPELAND IRVING.

Witnesses:
W. H. NIXSON,
WALLER E. ROCHE.