No. 646,718. Patented Apr. 3, 1900.

J. WAYLAND & H. B. TAYLOR.

RAILWAY SIGNAL.

(No Model.) (Application filed Aug. 5, 1899.)

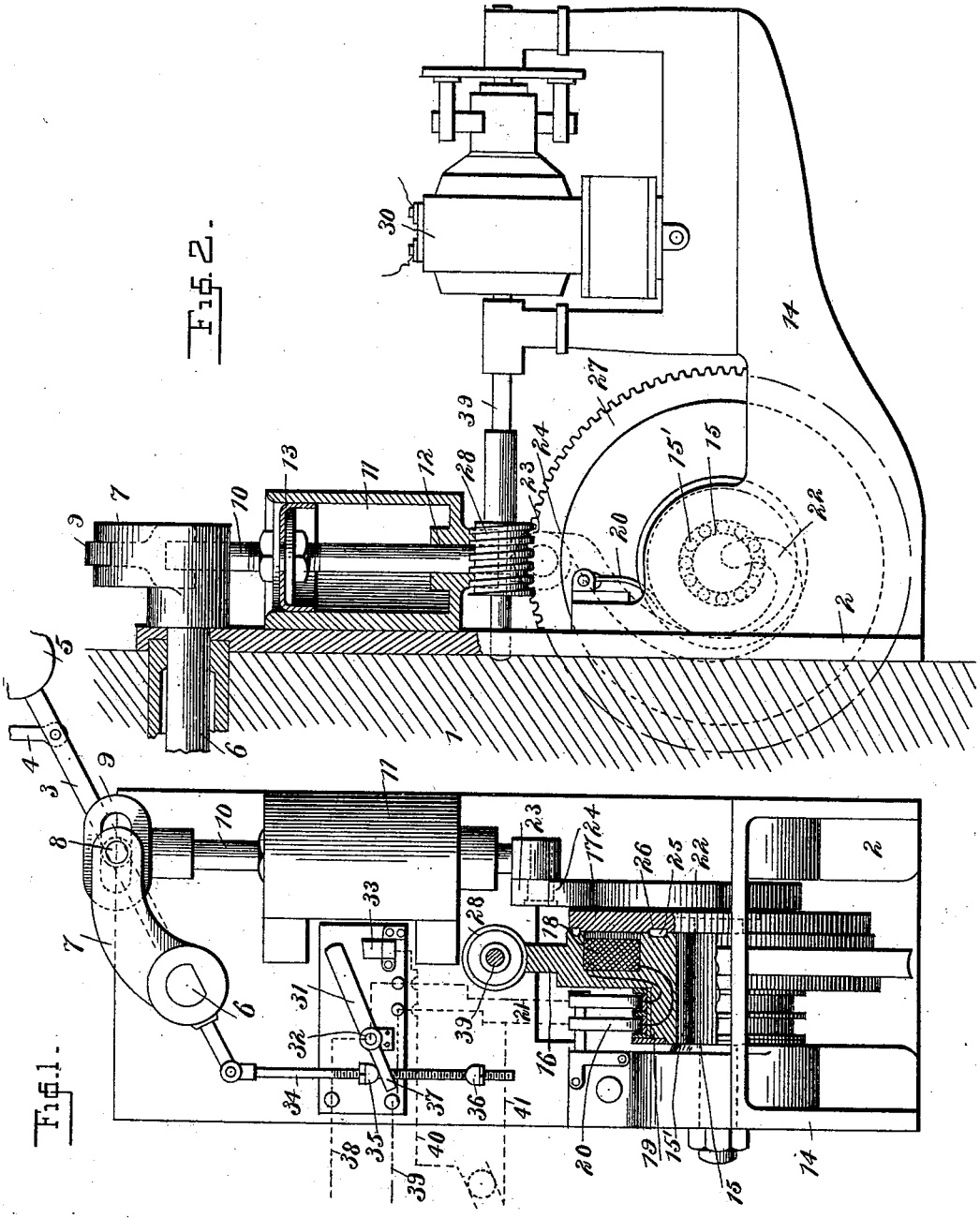

Fig. 2.

Fig. 1.

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RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 646,718, dated April 3, 1900.

Application filed August 5, 1899. Serial No. 726,233. (No model.)

To all whom it may concern:

Be it known that we, JAMES WAYLAND and HERBERT B. TAYLOR, citizens of the United States, residing at Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Railway-Signals, (Case B,) of which the following is a specification.

This invention relates to improvements in railway-signals, and particularly to means for operating the signal and for releasing same to enable it to return automatically to the position from which it was moved by the operating means; and the object of the invention is to provide operating and releasing means which shall be rapid and certain in operation.

The invention consists in the combination of devices for this purpose, as hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a partly-sectional front elevation of a signal-operating mechanism embodying our invention. Fig. 2 is a partly-sectional side elevation of same.

1 represents the post, on which the signal or semaphore is mounted in any usual manner, such signal not being shown, as our invention relates only to the operating devices therefor. A frame 2, attached to said post, serves to support the various devices hereinafter described. The signal-operating lever 3, pivoted to this frame, is pivotally connected to the lower end of the signal-operating rod 4, whose upper end is connected to the semaphore in the usual manner, a weight 5 being provided on this lever which tends to move the signal to danger position. The pivot-shaft 6 of lever 3 also carries an arm 7, provided at its end with a pin 8, engaging in a slotted head 9 at the upper end of a vertically-movable rod 10, which is guided in and by a cylinder 11, the said rod sliding in a bearing 12 in the lower end of cylinder 11 and carrying a piston 13, working in this cylinder, the latter thus constituting a dash-pot.

A bracket 14, projecting from the lower part of frame 2, supports a fixed horizontal stud 15, which has loosely mounted thereon an annular electromagnet 16 and the armature 17 of such electromagnet. The coil 18 of this annular electromagnet is energized by connection through a collector 19 and brushes 20, bearing thereon, to a controlling-track or relay-circuit, the wires of which are shown at 21, the said collector being fastened to and rotating with the annular electromagnet. The armature 17 carries a cam 22, which is fastened thereto or formed thereon, and engages with a roller 23, journaled in the lower end of rod 10, said cam being spiral, so that in the rotation of cam 22 the rod 10 is forced upwardly until the cam reaches the position shown in Fig. 2, at which time a more steeply-inclined portion or tip 24 of said cam comes into engagement with said roller. When the armature is attracted by the annular electromagnet, it is caused to rotate by frictional engagement between them, and in order to render such engagement more effective and at the same time prevent actual sticking of the armature to the magnet we provide annular bearing-rings 25, which are attached to one of such parts and engage in annular grooves 26 in the other part, these rings being of non-magnetic material, such as brass, so as to prevent actual magnetic contact of the armature with the poles of the magnet. As shown in the drawings, the non-magnetic bearing-rings are on the armature, and the grooves are in the poles of the magnet; but they may be reversely arranged. A roller-bearing is provided for the magnet, as shown at 15'.

A worm-gear 27 is attached to or preferably formed as part of the annular magnet 16, the said gear being shown as formed in one piece or integrally with the annular shell of said magnet. This worm-gear is engaged by a worm 28 on the shaft 29 of an electric motor 30, which is supported on an extension of the bracket 14.

A switch 31 is mounted on an insulating-base on the frame 2 and is provided with terminals 32 33, said switch being operatively connected with the signal-operating lever 3, so as to be opened when the switch has been moved to safety position. We have shown for this connection a rod 34, pivoted to the lever 3 and carrying two nuts 35 36, arranged on a screw-threaded portion thereof, said nuts engaging with an arm or tail 37 of the switch. When the signal falls to "danger," the lower nut 36 engages with the switch to close same,

and when the switch is moved to "safety" the upper nut 35 engages with the switch to open the circuit thereof. By adjustment of these nuts on the screw-threaded rod 34 the time of operation of the switch in either direction of movement may be accurately regulated. This switch controls the circuit of the operating-motor 30, being included directly in the circuit. The wires from the track or relay circuit are indicated at 38 39, wire 38 being connected to terminal 32, while the other terminal 33 is connected to the motor by a wire 40, the return-wire 41 from the motor leading to relay or track-wire 39. The electromagnet-coil 18 is connected through wires 21 directly to the wires 38 39 in shunt with the motor-circuit. Thus when the motor-circuit is broken the circuit of magnet 16 remains closed and said magnet remains energized and under the control of the relay-circuit.

The operation of the apparatus is as follows: Assuming that the signal is in danger position, with the signal-actuating rod 10 in its lowest position and engaging with the cam 22 at the innermost part of same, but that the controlling-circuit 38 39 is closed, then as the switch 31 will also be closed current will flow through the motor as well as through the coil 18 of magnet 16. By the resultant energization of magnet 16 the armature 17 thereof will be drawn strongly toward same and the frictional engagement between the rings 25 and grooves 26 will be such that as the annular electromagnet is rotated by its worm-and-gear connection with the motor it will carry the armature with it and will turn the cam. The cam in turning raises the rod 10 by its engagement with roller 23 thereon, and provided the controlling or relay circuit remains closed this operation will continue until the end or tip of the cam is reached, at which time the upper nut 35 or rod 34 is set to engage with the switch and throw it open, thus breaking the motor-circuit and bringing the apparatus to a standstill. The magnet 16 will, however, still be energized by the connection of its coil 18 to the relay-circuit, and the signal will therefore be held to safety as long as the relay or controlling circuit is closed and operative. On opening of the controlling-circuit the coil 18 and magnet 16 will be deënergized, and the magnet will at once release its armature, so that the friction between the annular magnet and the armature or between the rings 25 and the grooves 26 becomes merely nominal. The weighted signal apparatus, bearing down through the rod 10 and roller 23 on cam 22, then forces said cam to return to its original position, the signal at the same time returning to "danger." The starting of the cam in the return movement is insured by the steeply-inclined tip 24 of the cam. As the signal reaches danger position and the rod 10 therefore is nearly in its highest position the nut 35 on rod 34 stops the switch 30 and closes same, thus leaving the circuits in the original condition, ready for operation of the signal as soon as the relay-circuit comes into operation again.

It will be noted that the armature 17 is not provided with any special means for moving it from the poles of the magnet. In practice we find that when absolute closure of the magnet-circuit is prevented, as by the non-magnetic bearing-rings 25, the armature is practically released as soon as the current is broken and such slight friction as may remain between the armature and magnet is readily overcome by the weight of the signal apparatus.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a railway-signal-operating mechanism, the combination with the signal-operating lever, weighted so as to return to danger and the supporting-frame, a horizontal stud fixed in said frame, an annular electromagnet, and an armature both mounted on said stud and capable of turning thereon and adapted to engage frictionally when drawn together, a worm-gear fast on said annular magnet, a motor, a worm on the shaft of said motor, engaging with said worm-gear, a cam fixed to and carried by the armature, a rod connected to the signal-operating lever and carrying means for engaging with said cam, and controlling electric-circuit connections for the aforesaid electromagnet.

2. In a railway-signal-operating device, the combination with the signal-operating lever, weighted so as to return to danger, of an annular magnet and armature therefor both mounted so as to be capable of revolution and adapted to engage frictionally when drawn together, a worm-gear attached to said annular magnet, a motor, a worm on the shaft of the motor engaging with said worm-gear, a cam attached to the armature and a rod engaged by said cam and connected to the signal-operating lever.

3. In a railway-signal-operating mechanism, the combination with the signal-operating lever, weighted so as to return to danger, of an annular magnet and armature therefor, both mounted so as to be capable of revolution and adapted to engage frictionally when drawn together, a worm-gear attached to said annular magnet, a motor, a worm on the shaft of the motor engaging with said worm-gear, a cam attached to the armature, a rod engaged by said cam, connected to the signal-operating lever and carrying a piston, and a cylinder coöperating with said piston to act as a dash-pot.

4. In a railway-signal-operating mechanism, the combination with the signal-operating lever, weighted so as to return to danger, of an annular magnet and armature therefor, both mounted so as to be capable of revolution and adapted to engage frictionally when drawn together, a worm-gear attached to said annular magnet, a motor, a worm on the shaft

of the motor engaging with said worm-gear, a spiral cam attached to the armature having its outer end or tip more steeply inclined than the body of the cam, and a rod engaged by said cam and connected to the signal-operating lever.

5. In a railway-signal-operating mechanism, the combination of the annular electromagnet and a disk armature therefor, both mounted so as to be capable of rotation and adapted to engage frictionally when attracted, a motor, a worm driven by said motor and a worm-wheel on one of said parts engaging with said worm, and a cam carried by the other of such parts, a signal-operating lever actuated by said cam, and controlling circuit connections for said electromagnet.

6. In a railway-signal-operating mechanism, the combination of an annular electromagnet, and a disk armature therefor, both mounted to rotate, and adapted to engage frictionally when attracted, an electric motor, a worm driven by said motor, and a worm-wheel on one of such parts, engaging with said worm, and a cam carried by the other of such parts, a signal-operating lever actuated by said cam, controlling electric-current connection for said electromagnet, and a switch in circuit with said motor and mechanically connected to the signal-operating lever, substantially as and for the purpose set forth.

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