No. 646,717. Patented Apr. 3, 1900.

J. WAYLAND & H. B. TAYLOR.

RAILWAY SIGNAL.

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

2 Sheets—Sheet 1.

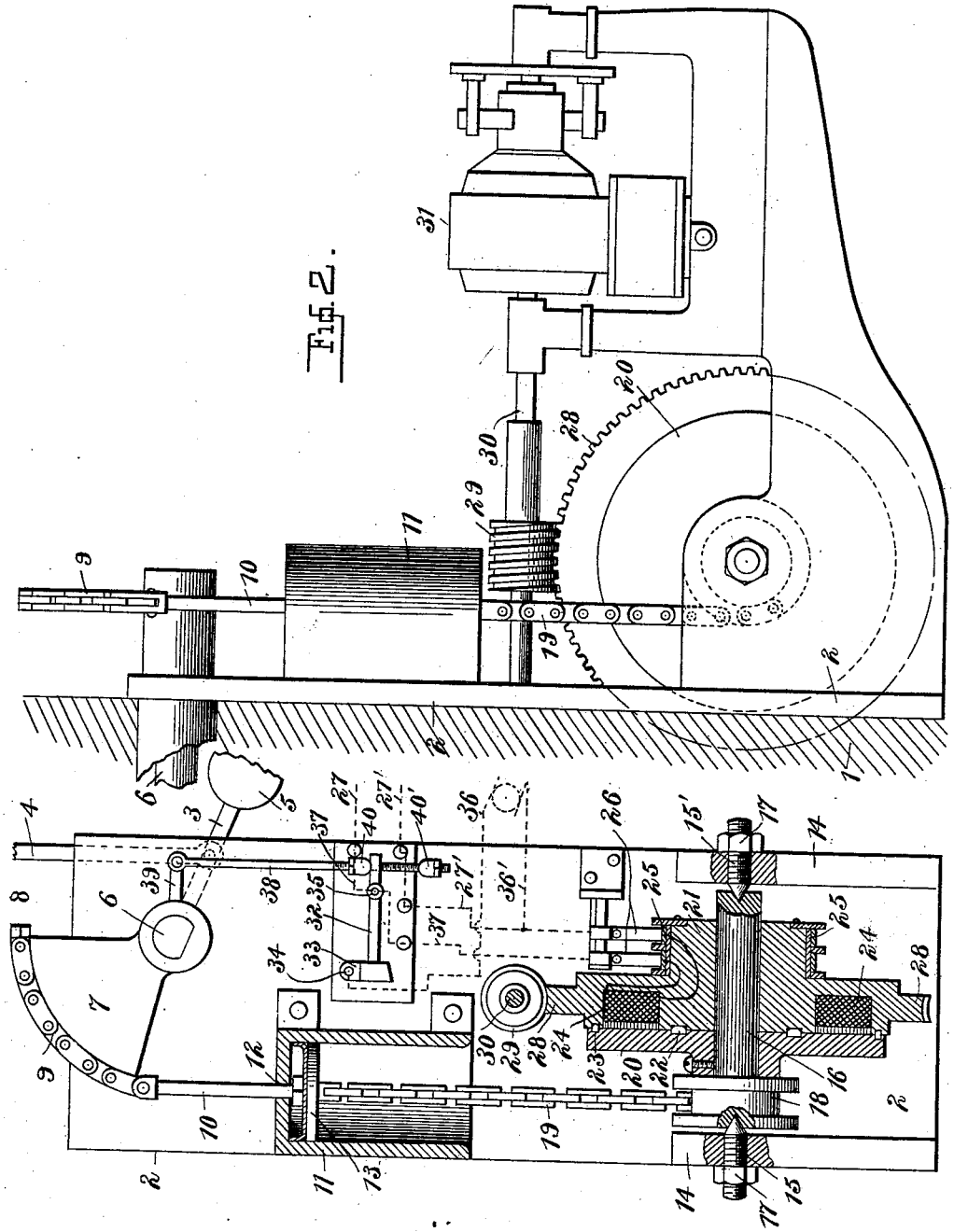

FIG. 2.

FIG. 1.

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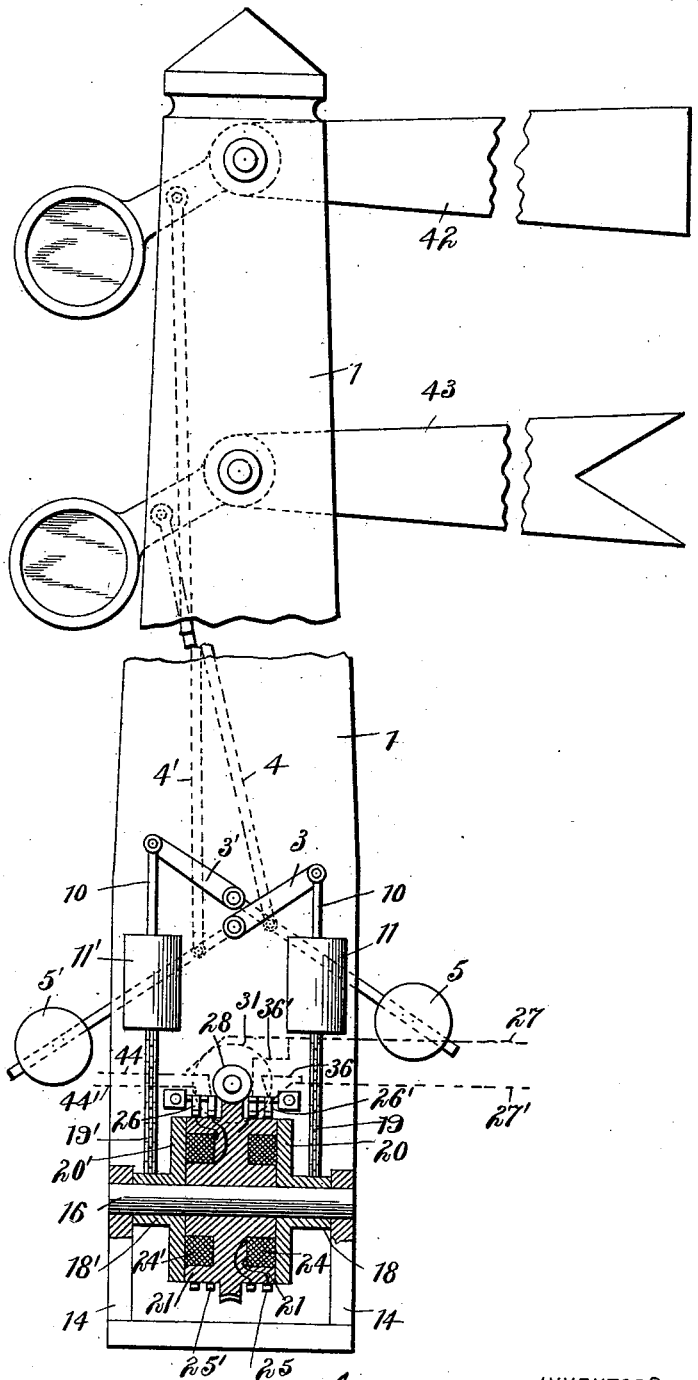
Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES WAYLAND AND HERBERT B. TAYLOR, OF NEWARK, NEW JERSEY.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 646,717, dated April 3, 1900.

Application filed August 5, 1899. Serial No. 726,232. (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, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Railway-Signals, (Case A,) 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 removed 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 vertical section of the apparatus. Fig. 2 is a side elevation of same. Fig. 3 shows the application of the invention to the combined home and distant signal.

Referring to Figs. 1 and 2, the semaphore or signal proper is not shown, as it may be of any usual construction, and our invention relates only to means for operating same. 1 represents the post of the signal, to which is secured the frame 2, which serves as the support for the devices hereinafter described. On this support is pivoted the signal-operating lever 3, which operates the semaphore through a rod 4, pivotally connected thereto, said lever being provided with a weight 5 for returning the signal to danger position. On the pivot-shaft 6 of lever 3 is fastened a segment or sector plate 7, to which is secured at 8 one end of a chain 9, which in the angular movement of the sector winds on and off the circumference of same. Depending from the other end of this chain is a rod 10, sliding in a vertical bearing 12 in the closed end of a vertical cylinder 11, a piston 13 on the lower end of said rod working in said cylinder, which thus acts as a dash-pot.

Brackets 14, projecting from the lower part of frame 2, serve to support pivot-pins 15 15, between which is mounted a shaft 16, adapted to turn freely between such pivots, the said pivot-pins being screw-threaded, as shown, and screwing into the brackets 14 14, so as to be capable of adjustment longitudinally of the shaft to insure centering of same and prevent lateral play. These pivot-pins may be locked in position by lock-nuts 17.

On the shaft 16, and preferably formed integrally therewith, is a drum or collar 18, adapted to receive a chain 19, which is fastened thereto and winds thereon at one end, while its other end is attached to the piston 13 on rod 10, so that as the shaft 16 turns it will draw the rod 10 downward or allow it to ascend, according to the direction of movement. On the shaft 16 is mounted a disk-shaped armature 20, which is mounted to rotate with the shaft either by being fastened thereon or by a spline connection. An annular magnet 21 is loosely mounted on the shaft 16 and is adapted to engage frictionally with same. To prevent actual magnetic contact between the magnet and armature and to insure smoothness of frictional bearing, as well as certainty of release of same, we provide bearing-rings 22 22, of brass or other non-magnetic material, which are fastened on one of such parts and engage with correspondingly-shaped grooves 23 23′ in the other part, the rings being shown as on the armature and the grooves as formed in the poles of the magnet. The energizing-coil 24 of the magnet is inclosed between the core and the outer shell of the magnet and is connected through the collector 25, attached to and rotating with such magnet, and the brushes 26 to the wires 27 27′ of a controlling-circuit, such as a track or relay circuit. A worm-gear 28 is fast on the annular magnet 21 and preferably formed as an integral peripheral extension of same, this construction giving the maximum strength with the minimum weight. This worm-gear is engaged by a worm 29 on the shaft 30 of an electric motor 31, which motor is supported on extensions of the bracket 14 14′. The circuit of this motor is controlled by a switch 32, mounted on an insulating-base 33 on frame 2 and having terminals 34 35, respectively connected by wires 36 37 with one side of the motor 31 and, with the track or relay wire 27′, is connected to the other side of the motor through wire 36′. This switch is operated by a rod 38, depending from and pivoted to an arm 39 on

the pivot-shaft 6 of the signal-operating lever 3, the rod 38 being screw-threaded and provided with nuts 40 40', screwing thereon and engaging, respectively, above and below the arm 41 of the switch-lever 32, so that when the lever 3 has moved the signal to "safety" or to "danger" these nuts will throw the switch open or closed.

The operation of the mechanism is as follows: Assuming that the parts are in the position shown in the drawings, (the danger position,) with the rod 10 and piston 13 raised and the switch 32 closed, and that the controlling-circuit is closed, the motor will be energized and will drive the worm and worm-gear, thus rotating the annular magnet 21, while the energization of this magnet by the current established in its coil through the closed switch 32 will cause sufficient friction between the magnet and armature, or between the engaging rings and grooves thereon, to cause the armature 20, with the shaft 16, to rotate with the magnet, the chain 19 being thereby wound on the drum or collar 18, drawing down the piston 13, rod 10, and chain 9, thereby turning the lever 3 so as to throw the signal to "safety." This having been effected, the nut 40' engages with arm 41 to open the switch 32 and break the motor-circuit. The circuit of the magnet 21 being independent of switch 32 remains closed, and thus the magnet holds its armature in frictional engagement and maintains the signal in safety position as long as the controlling-circuit remains operative. When for any reason current ceases to flow in the wires 27 27' of the controlling-circuit, the magnet 21 is deënergized and releases its armature 20, which under the influence of weight 5, acting through lever 3, rod 10, chain 19, and drum 18, draws the armature around and returns the apparatus to danger position. In this operation the armature is not actually thrown from contact with the magnet, or at least not necessarily so, as the diminution of frictional engagement due to deënergization of the magnet suffices to enable the armature to be drawn around relatively to the magnet, as stated. During both of these operations the dash-pot serves to regulate the movement and to prevent shock.

Our invention is particularly applicable to the operation on a single post of two signals, such as "home" and "distant" signals controlled by different relay-circuits, but both intended to be moved to "safety" at the same time. Fig. 3 shows such an adaptation of the invention, the parts being characterized as in Figs. 1 and 2, except that in this case there are two chains 19 and 19' winding on drums 18 18', which with the rigidly-connected armatures 20 20' in this case turn freely on a shaft 16, which is fixed in brackets 14. The annular electromagnet is double and in effect consists of two magnet 21 21', the poles, both core and shell portions, projecting each way from a central disk, so as to face the respective disk armatures 20 20' and to attract one or the other of same when the respective coils 24 24' of the magnet are energized. The magnets being connected at their neutral portions they will be magnetically independent, although mechanically rigid with each other. The electromagnetic device, comprising two sets of poles and two energizing-coils, is adapted to operate in all respects like the annular electromagnet of Figs. 1 and 2 and is preferably adapted to engage with the armature by ring-bearings of non-magnetic material, as explained with reference to said Figs. 1 and 2. The actuating worm-gear 28 is arranged on the annular magnet-shell, as are also the collector-rings 25 25'; but the motor is arranged just as in Fig. 1. From the collector-brushes 26 26, corresponding to magnet-coil 24 for the upper signal, a controlling-circuit 27 27' runs to the home or local relay-circuit, which is also connected to the motor 31, as indicated in dotted lines at 36 36', while the other or distant relay-circuit 44 44' is connected only with the collector-brushes 26', leading the magnet-coil 24'.

The home signal or semaphore 42 and the distant signal 43 are both pivoted on post or support 1, the home signal, for example, being above the distant signal, and they are connected, respectively, to the signal-operating arms 3 3' by rods 4 4' and returned to "danger" by weights 5 5' in obvious manner. A separate dash-pot 11 or 11' is provided for each signal-operating rod.

Upon the operation of the local circuit 27 27' by a train both signals will be moved to "safety," provided both the local circuit and the next circuit (the distant circuit) are in operation—that is, provided the line is clear—and if the distant circuit only is blocked then only the home signal will be operated. After both signals have been set they are free to return independently to "danger" under the control of the respective controlling-circuits. The operation of both signals is therefore controlled by a single circuit—namely, the local circuit, which controls the motor—while the release of the signals is controlled by independent circuits.

The electromagnetic clutches employed are continuously in engaging relation, so that the motor is never thrown out of the possibility of connection with either of the signals for a single instant. Thus if after one signal has been operated or while it is being operated the circuit conditions become such that the other signal should operate the apparatus is always in condition to permit of such operation.

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 to return the signal to danger position, of a horizontal shaft, a drum mounted on said shaft so as to turn therewith, a chain connected to and winding around said

drum and connected to the signal-operating lever, an annular electromagnet mounted so as to be capable of turning on said shaft, a disk armature for said electromagnet adapted to engage frictionally with said magnet and mounted so as to rotate with the drum, a collector attached to the magnet and connected to its energizing-coil, connections from such collector to a controlling-circuit, a worm-gear fast on said annular magnet, a worm engaging said worm-gear, and a motor adapted to drive said worm-gear.

2. In a railway-signal-operating mechanism, the combination with the signal-operating lever weighted to return the signal to danger position, and a segment connected to said lever, of a horizontal shaft and pivot-pin bearings for same, a drum pinned on said shaft, a chain device connected and winding around said drum, and also connected to and winding around said segment, an annular electromagnet mounted so as to be capable of turning on said shaft, a disk armature for said electromagnet adapted to engage frictionally with said magnet mounted so as to rotate with the drum, a collector attached to the magnet and connected to its energizing-coil, connections from such collector to a controlling-circuit, a worm-gear fast on said annular magnet, a worm engaging said worm-gear, and a motor adapted to drive said worm-gear.

3. In a railway-signal-operating mechanism, the combination with the signal-operating lever, weighted to return the signal to danger position, and a segment connected to said lever, of a horizontal drum mounted so as to be capable of turning, a chain connected to and winding around said segment, a rod connected to both of said chains and carrying a piston, a cylinder coöperating with said rod and piston to act as a dash-pot, an annular electromagnet mounted so as to be capable of turning, a disk armature for said electromagnet adapted to engage frictionally with said magnet and mounted so as to rotate with the drum, a collector attached to the magnet and connected to its energizing-coil, connections from such collector to a controlling-circuit, a worm-gear fast on said annular magnet, a worm engaging said worm-gear, and a motor adapted to drive said worm-gear.

4. In a railway-signal-operating mechanism, the combination with the signal-operating lever weighted to return the signal to danger position, of an annular electromagnet and a disk armature mounted to rotate independently of one another but provided with means for frictional engagement comprising a ring of non-magnetic material on one of such parts and an annular groove in the other part, electric connections from said electromagnet to a controlling-circuit, mechanical connection from such armature to the signal-operating lever, a worm-gear fast on the annular electromagnet, a worm engaging with said gear, a motor adapted to drive said worm, and a switch operated by the movement of the signal-operating lever and controlling the circuit of the motor.

5. In a railway-signal-operating mechanism, the combination with the signal-operating lever, of an annular electromagnet and a disk armature mounted to rotate independently of one another, but adapted to engage frictionally when the magnet is energized, a worm-gear formed integrally with and surrounding the annular magnet, a worm engaging said worm-gear, a motor adapted to drive said worm, connections from the said electromagnet to a controlling-circuit, and a mechanical connection from the armature to the signal-operating lever.

6. In a signal mechanism the combination of a signal-operating motor, two signals, controlling-circuits for each signal, magnetic friction-clutches operated by the motor and so arranged as to be continuously in position for engagement with signal parts in all positions thereof, and adapted to move or release one or both signals instantaneously when the controlling-circuits are energized or deënergized.

7. The combination of two signals, two disk armatures adapted to rotate and mechanically connected to the respective signals, an annular electromagnet device comprising two coils and two sets of poles for attracting the said armatures and adapted to engage with same, a motor connected to rotate said annular magnetic device, and two controlling-circuits, one connected to said motor and to one of the magnet-coils, while the other circuit is connected to the other magnet-coil.

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