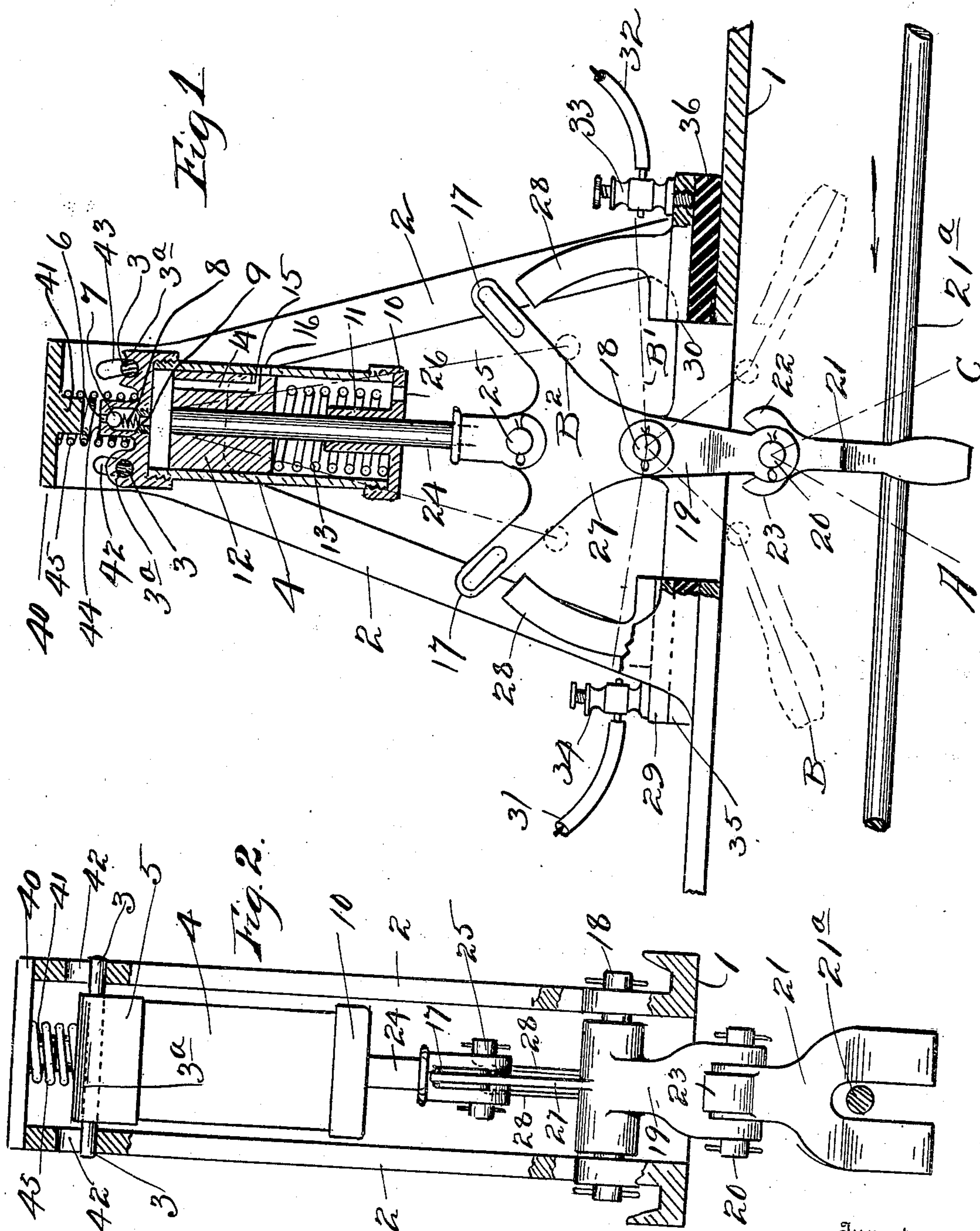


No. 828,585.

PATENTED AUG. 14, 1906.

H. THURSTON.
CIRCUIT CLOSER FOR TROLLEY SIGNALS.
APPLICATION FILED JAN. 2, 1906.

APPLICATION FILED JAN. 2, 1906.



UNITED STATES PATENT OFFICE.

HORACE THURSTON, OF PROVIDENCE, RHODE ISLAND.

CIRCUIT-CLOSER FOR TROLLEY-SIGNALS.

No. 828,585.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed January 2, 1906. Serial No. 294,109.

To all whom it may concern:

Be it known that I, HORACE THURSTON, a citizen of the United States, residing at the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Circuit-Closers for Trolley-Signals, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to automatic signaling apparatus for trolley-cars, and has for its object to provide a circuit-closer that is preferably mounted on or near the trolley-wire for operating the signals, said circuit-closer being actuated through a lever hanging in the path of the passing trolley-wheel.

This invention is an improvement on my patent application for circuit-closer for trolley-signals filed June 9, 1905, Serial No. 264,449.

The contact made by the trolley-car upon the actuating-lever is very short even if the car is running at a moderate speed, and when the car proceeds at a high speed the contact on said lever is so short as to be entirely ineffective. Means therefore have been provided for prolonging the electrical contact period to a suitable length of time to properly operate the signals that may be located at some distant point.

A further object of the invention is to so construct the device that a single actuating-lever may be employed to operate a pair of contact-arms, so that by moving said lever in one direction one of said contacts will be closed and when moving in the opposite direction the other contact will be closed.

The ordinary actuating-lever is made in one piece and depends into the path of the trolley-wheel, and said lever is usually connected at its upper end directly to the working mechanism. Therefore when the rapidly-passing trolley-wheel strikes this lever the shock is transmitted immediately through the same to the working mechanism and soon destroys the parts. The trolley-wheel also when coming in contact with such a lever is soon battered up and destroyed, and the impact also has a tendency to throw the wheel from the wire. All of these above difficulties are obviated in my improved device which consists of a hinged or yielding tongue that

is hung in the path of the trolley-wheel, so that when the trolley strikes the same it yields and swings to one side without resistance, thereby materially reducing the initial shock both upon the wheel and the actuating mechanism. When the lever has swung a predetermined distance, the wheel then rides easily under the same, raising it comparatively slowly and readily removes the contact-arms to close the circuit, thus materially relieving the initial shock and reducing the wear and tear on the mechanism.

This invention is also provided with a retarding device preferably comprised of an oscillating air-compression cylinder, whereby a prolonged closure of the circuit is obtained whenever either of the contact-arms is in connection, said cylinder being constructed to so control the movement of the contact-arms that a quickmake and break of the contacts is obtained.

Another and most important feature of my present invention is the construction by which the compression-cylinder is caused to positively prevent the making of a back contact. In practice, as is well known, it is necessary to make and break the connection quickly, and in doing this it is found that the contact-arm on leaving the contact-fingers often jumps over and makes a back contact on the opposite fingers. When this occurs, the signals are again acted upon and completely disarranged, the whole system then becoming unreliable, rendering traffic on a road equipped with such a system dangerous. The above objections have been positively obviated by my present construction, which is that of suspending the compression-cylinder from the frame on two independent trunnions, said trunnions being attached to either side of the cylinder, whereby the cylinder in swinging to the center comes to a complete stop at once and will not swing by, as is its tendency when hung on a single trunnion.

The invention is fully set forth in this specification and more particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation of my improved device, partly in section, showing the operating mechanism. Fig. 2 is an end view of the device, also partly in section.

Referring to the drawings, at 1 is the base

of the frame that supports the mechanism, said base itself being preferably supported from the trolley-wire in the usual way, (not shown,) or it may be supported by any other means adjacent said wire. On this base is mounted two supporting side frames 2 2, joined together at their upper ends by the cap-plate 40, said plate being provided with a boss 41, depending from its center portion. Each frame 2 2 is provided with two slots 42 43. These slots are each formed on the arc of a circle, the radius for each being taken from the center of the rounding portion at the bottom of the opposite slot. In these slots is suspended the cylinder 4 from its two trunnions 3 3. These trunnions may be connected to the cylinder in any desired manner; but for convenience I have cast bosses 3^a 3^a for them on either side of the cylinder-cap 5 and fixed said trunnion-pins 3 3 therein to project out on either side thereof and engage their respective curved slots 42 43. This cap 5 is preferably threaded to the upper end of the cylinder 4 and is provided with an upwardly-extending boss 44, which boss corresponds to the depending boss 41 from the cap-plate, and over both of these bosses is the spring 45, exerting a tension against the cylinder-cap, thereby serving in addition to its gravity to cause said cylinder to set upright and rest squarely on both of its trunnions. This boss 44 is also provided with an air-inlet passage 6, controlled by a ball-valve 7, said valve being kept normally closed by the action of the spring 8. This spring is inserted into the enlarged portion of the inlet and held in place by the screw-plug 9. The lower end of this cylinder is also provided with a threaded cap 10, which cap has an air-vent 26 and an inwardly-projecting boss 11, which serves as a bearing for the piston-rod 24. Mounted to slide in this cylinder is the piston 12, held normally in its up position by the action of the spring 13.

At 14 is an air-passage in the piston leading from its upper end down part way through it and out through its side at 15 and in a position to register with a hole 16 through the wall of the cylinder. This hole in the piston is designed to register with the said hole in the cylinder when the piston is on its up-stroke and just as the contact-arms 17 17 break their connection with the contact-fingers. These two contact-arms 17 17 are connected to a lever member 27 and set on an angle of about ninety degrees from each other, said lever member being pivoted below at 18. Extending downwardly below this pivoting-point is the lever 19, and pivoted at 20 to the lower end of this lever is the depending swinging forked tongue 21, straddling the trolley-wire 21^a and hanging in the path of the trolley-wheel. This tongue swings freely in either direction for a short distance to

about the points marked A and C before it brings up against the limit-lugs 22 and 23, after which a further movement of said tongue in either direction actuates the operating mechanism. A connecting-rod 24 is rigidly attached to the piston 12 and extends down through the bearing 11 and is pivotally connected at 25 to the lever member 27. At 28 28 are two pair of flexible contact-fingers extending upward from their base-plates 29 and 30. To these plates are connected the conductor-wires 31 and 32 by the binding-posts 33 and 34, and said plates are insulated at 35 and 36 from the frame 1. The whole of the mechanism may be covered over by any suitable casing to protect the same from the weather, if desired.

The operation of the device may be further described as follows: The cylinder 4 is suspended on two independent trunnions 3 3, that are preferably fixed on either side of the cylinder-head 5. When the cylinder is swung to the left, it is supported alone on its right trunnion, the left one being raised in the slotted portion 42 in the frame 2, the reverse action taking place when the cylinder swings to the opposite side of the center. Owing to the use of the two trunnions spread apart in the manner indicated it is at once apparent that the cylinder has a strong tendency to stop and hang suspended on both trunnions when it comes to the center and especially so when acting under the pressure of the tension-spring 45. Therefore by this construction the swinging by or back contacting of the parts is entirely obviated. In addition to the above the piston 12, acting under the influence of the spring 13, takes its uppermost position, which also serves to draw the contact-arms to their central position, both being held normally out of contact with their contact-fingers on either side, and when in this position the depending tongue 21 hangs over the trolley-wire in position to engage the passing trolley-wheel. Supposing the car to be approaching from the right or in the direction indicated by the arrow, when the trolley comes in contact with the depending tongue the same yields and swings forward for a short distance into the position shown by the dotted line at A without materially affecting a movement of the rest of the operating mechanism. As the wheel continues forward the tongue is forced from position A to position B, the movement of which carries the contact-arm 17 down on the opposite side in between the flexible contact-fingers 28 to the position indicated by the dotted line B', thereby swinging the pivoted cylinder 4 over to the right and drawing the joint of the piston-rod down to the point B². As the trolley-wheel passes out from under the tongue the spring 45, pressing down on the cylinder-head 5, acting in con-

junction with the spring 13, pressing upon the piston 12, would naturally throw the same back quickly and break the contact at once; but as the piston is drawn down it automatically draws in air through the inlet-valve 7 and fills the cylinder, which air is now trapped in the cylinder and allows the piston to return only as fast as said air can leak out by the same. Therefore a slow return or a prolonged contact is assured; but when the contact-arm has reached the upper end of the contact-fingers the air-passage 14 in the piston registers with the vent-hole 16 in the cylinder, allowing the pressure of air to escape therethrough, and the piston thus relieved springs upward and with a quick jump draws the contact-arm from between the contact-fingers, thus preventing the objectionable arc. The quick make and break of the connections in devices of this character where high-tension currents are used are, as is well known, vital to its practical working. The retarding of the return action of the piston allows the contact-arm to remain in connection a sufficient length of time to insure a completion of the circuit, and consequently a sure operation of the signals. To work in conjunction with the double trunnions to prevent a connection being made with the opposite contact-fingers by the force of the quick jump of the contact-arms, I have arranged the air-passage 15 in the piston, so that it will have passed and closed the vent 16 in the cylinder just before the piston reaches the upper end of its stroke, thereby trapping the air in the top of the cylinder to form a cushion and again retarding the last end of the upward stroke of the piston, thereby causing the mechanism to come slowly to its central or stop position. The double-trunnions construction working in conjunction with this piston-trap arrangement obviates any possibility of the contact-arms going past and making a connection on the opposite side.

The device is extremely simple and practical in construction and most effective in its operation.

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

1. In a circuit-closer, a pair of contacts, a pair of contact-arms, means whereby said arms may be actuated to close the circuit by a passing car, means including a piston working in a cylinder for automatically prolonging the period of contact, means in said cylinder for causing a quick break in the connection, and means for preventing a back contact.

2. In a circuit-closer, a pair of contacts, a pair of contact-arms, means whereby said arms may be actuated to close the circuit each time a car passes, means including a

movable cylinder for prolonging the period of contact and causing a quick break in the connection.

3. In a circuit-closer, a pair of contacts, a pair of contact-arms, means whereby said arms may be actuated to close the circuit each time a car passes, means including an oscillating cylinder for automatically prolonging the period of contact, means in said cylinder for causing a quick break in the connection, and means for causing the swinging cylinder to stop on coming to its central position.

4. In a circuit-closer, a pair of contacts, a pair of contact-arms, means whereby said arms are actuated to close the circuit by a passing car, a piston in a swinging cylinder for automatically prolonging the period of contact, means for causing a quick break in the connection, and means in said cylinder-support whereby said cylinder is stopped from swinging to prevent the contact-arm from making a back contact.

5. In a circuit-closer, a pair of contacts, a pair of contact-arms, means whereby said arms are actuated to close the circuit by a passing car, a piston in a swinging cylinder for automatically prolonging the period of contact, means for causing a quick break in the connection, and means including a pair of trunnions on which said cylinder is supported, whereby the cylinder is stopped from swinging at a predetermined point to prevent the contact-arm from making a back contact.

6. In a circuit-closer, a pair of contacts, a pair of contact-arms, means whereby said arms may be actuated to close the circuit each time a car passes, means including a piston working in an oscillating cylinder for automatically prolonging the contact period, means in said cylinder for causing a quick break in the connection, and means including a pair of trunnions on which said cylinder is suspended for causing the swinging cylinder to stop on coming to the central position.

7. In a circuit-closer, a pair of contacts, a pair of contact-arms, means including a yieldable depending tongue through which said arms are actuated to close the circuit by a passing car, means for automatically prolonging the period of contact, and means for causing a quick break in the connection.

8. In a circuit-closer, a pair of contacts, a pair of contact-arms, means including a yieldable depending tongue through which said arms are actuated to close the circuit by a passing car, means including a piston working in a cylinder for automatically prolonging the period of contact and causing a quick break in the connection, and means connected to said cylinder for preventing a back contact.

9. In a circuit-closer, a pair of contacts, a

pair of contact-arms, means whereby said arms are actuated to close the circuit by a passing car, a piston in a swinging cylinder for automatically prolonging the period of
5 contact, means for causing a quick break in the connection, and means including a pair of trunnions on which said cylinder is supported whereby the cylinder is stopped from swing-

ing at a predetermined point to prevent the contact-arm from making a back contact. 10

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

HORACE THURSTON.

Witnesses:

HOWARD E. BARLOW.

E. D. OGDEN.