(No Model.) 3 Sheets—Sheet 1.

T. B. DIXON.

RELAY.

No. 544,351. Patented Aug. 13, 1895.

Fig. 1.

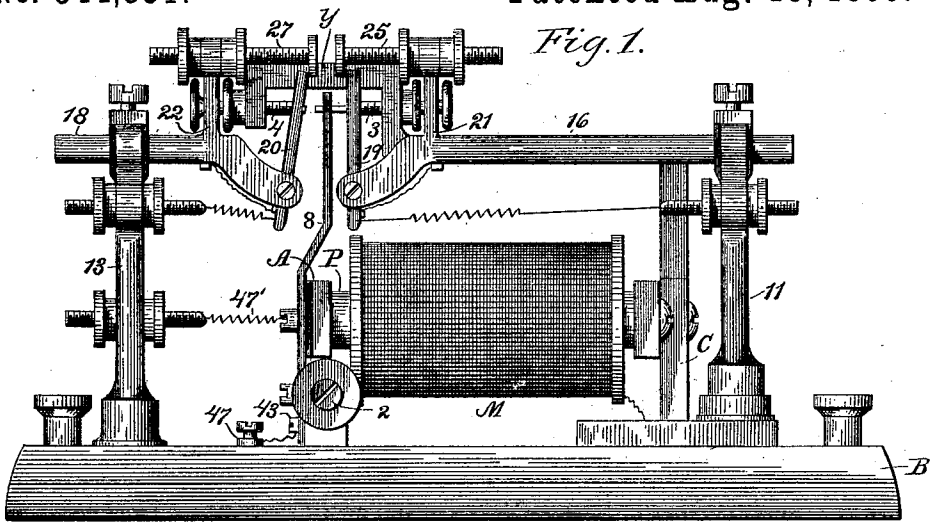
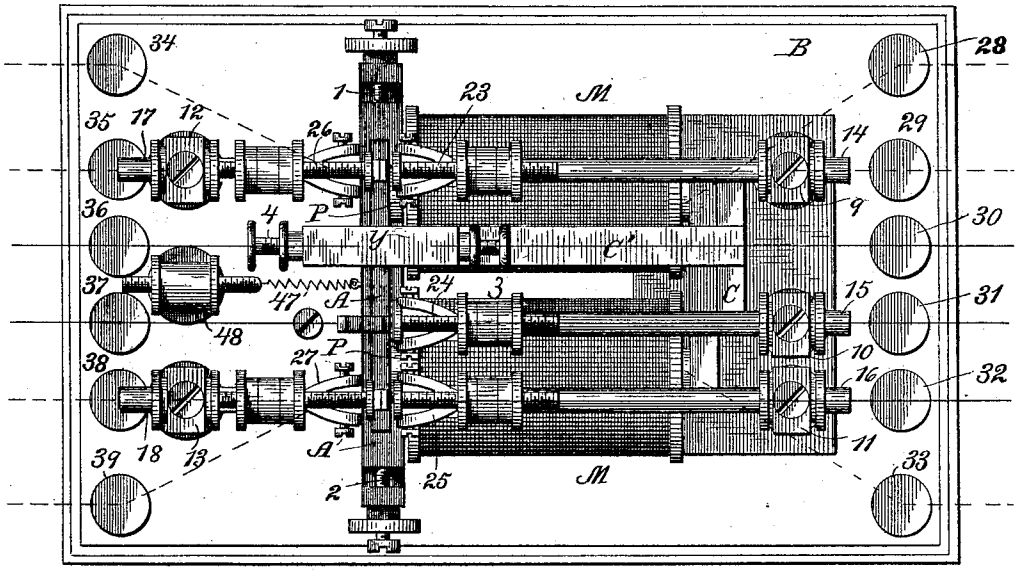


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

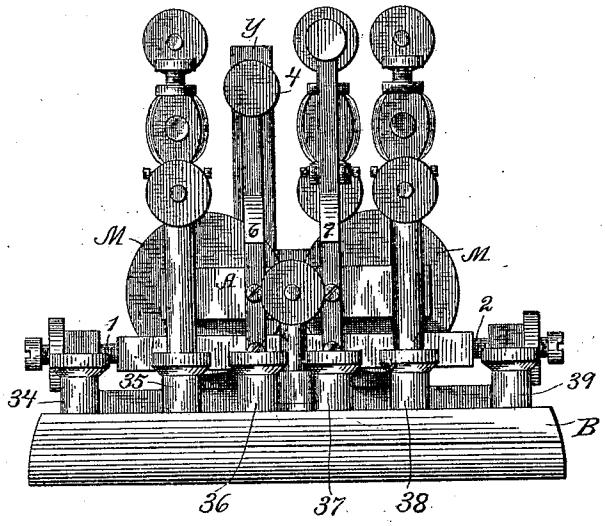
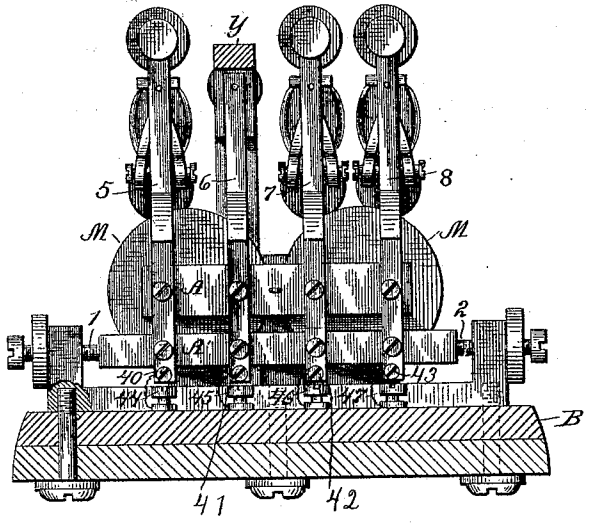


Fig. 4.



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3 Sheets—Sheet 3.

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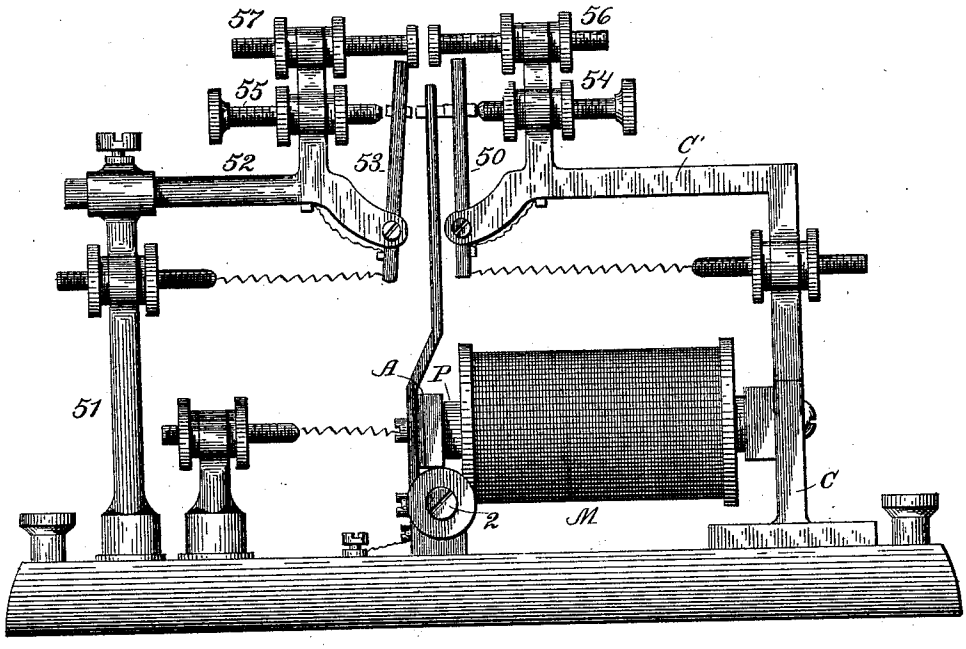
RELAY.

No. 544,361. Patented Aug. 13, 1895.

Fig. 5.



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UNITED STATES PATENT OFFICE.

THOMAS BULLITT DIXON, OF HENDERSON, KENTUCKY.

RELAY.

SPECIFICATION forming part of Letters Patent No. 544,351, dated August 13, 1895.

Application filed November 17, 1892. Renewed July 10, 1895. Serial No. 555,579. (No model.)

To all whom it may concern:

Be it known that I, THOMAS BULLITT DIXON, a citizen of the United States, residing at Henderson, in the county of Henderson and State of Kentucky, have invented certain new and useful Improvements in Relays; 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.

My invention relates to relays for controlling electric circuits, and especially to relays for controlling two or more circuits from one governing-circuit; and it consists in the novel and improved construction and arrangement of the parts constituting my relay, as is more fully hereinafter described. My relay is especially adapted to be used in connection with my system of electric-railway signals, which forms the subject-matter of an application for Letters Patent of even date herewith, in which application the relay is termed the "governor." In this system the breaking or closing of a circuit by the track-instrument is required to produce changes in the condition of a number of auxiliary circuits, the relay being the means through the action of which a change in condition of the track-instrument circuit is effective to cause a change in condition in the auxiliary circuits. It is, however, equally applicable to any other situation in which it is required to produce a change in the condition of several circuits through a change in the condition of one circuit.

The objects of my invention are, first, to provide an instrument which shall be able to make or break a number of secondary circuits through a change in condition of one governing-circuit; second, to so construct this instrument that it shall be simple, strong, not liable to derangement of any sort, and inexpensive; third, to provide means for the separate adjustment of the contact-points of each circuit and of the time of making and breaking contact with each contact-point without affecting the adjustment or operation of the other contact-points. These objects are attained in the instrument herein described and illustrated in the drawings which accompany and form a part of this specification, in which the same reference letters and numerals indicate the same or corresponding parts, and in which—

Figure 1 represents a side elevation of my improved relay; Fig. 2, a plan view thereof, and Fig. 3 an end elevation. Fig. 4 is a vertical section taken in front of the armature and looking toward the poles of the magnets, and Fig. 5 is a side elevation of a modified form of my relay.

In the drawings, M M are the magnets of the relay; P P, their pole-pieces; A, the armature, and A′ a metal bar directly below A and securely fastened to it by the rods 5, 6, 7, and 8, to be hereinafter mentioned. The ends of the bar A′ have in them conical recesses, in which fit the points of the pivot-screws 1 and 2, forming a pivotal support for the bar A′ and armature A. By separating the armature A from the part which engages with the pivot-screws I am able to make the moving parts very light without interfering with the efficiency of the relay.

B is the base of the instrument, and is of wood or some other non-conducting material. To the iron back piece of the magnets is fastened a metal plate C, a portion C′ of which extends upward and over the magnets, and at the end is bent into an inverted U-shaped figure, forming the yoke Y of the instrument. In opposite sides of the yoke are set-screws 3 and 4, of which 3 has for its point a metal contact-piece, and 4 has a hard-rubber point, and is therefore an insulating-point. The construction so far is that of the ordinary relay as used on telegraph-lines.

The armature has fastened to it, but insulated from it, four vertical metal rods 5, 6, 7, and 8, which at their upper ends carry contact-points and therefore may be termed "contact-rods." These rods extend downward and are likewise secured to the bar A′, forming the means of connection between A and A′, as previously mentioned. They are insulated from both A and A′, and therefore from each other. The contact-points of 6 engage with the set-screws 3 and 4 of the yoke Y before mentioned, the screws thus serving to limit the motion of the armature, the amplitude of the movement of the armature being adjusted

by turning the screws, which are provided with lock-nuts to hold them fast when adjusted.

9, 10, and 11, to the rear of, and 12 and 13 in front of, the magnets are metal posts insulated from the base B and from each other. They form supports for the rods 14, 15, 16, 17, and 18, respectively, which pass through eyes in the posts and are held in place by set-screws. These rods are provided with forked ends, and in these forks are secured, by means of pivot-screws, levers, such as 19 and 20, Fig. 1, termed "contact-levers," which carry at their upper ends contact-points adapted to engage with the contact-points on the contact-rods 5, 7, and 8.

The rods 14, 15, 16, 17, and 18 have upward projections, such as 21 and 22, Fig. 1, which carry the horizontal stop-screws 23, 24, 25, 26, and 27. These screws have enlarged heads adapted to engage with the upper ends of the contact-levers 19, &c., and these heads therefore act as stops to limit the motion of these contact-levers. The stop-screws are held in place by lock-nuts, as shown. Springs connecting the contact-levers with the posts 9, 10, 11, 12, and 13 tend to hold the swinging contact-levers against their respective stops. The tension of these springs is adjusted by means of screws passing through screw-holes in the posts 9, &c., to which screws the springs are directly connected. These screws have lock-nuts to hold them in position.

The contact-levers, with their pivotal supports, stops, and springs, constitute what is known as "continuity-preserving" contact-points. By adjusting the stops the armature contact-rod can be made to make or break contact with one of its continuity-preserving contact-levers at any chosen position of the armature, and where there are two continuity-preserving or swinging contact-levers to one armature contact-rod the armature contact-rod can be made to make contact with one contact-lever before contact with the other lever is broken.

The instrument shown in the drawings has four armature contact-rods, viz., 5, 6, 7, and 8, as previously mentioned. Of these, as shown in Figs. 2, 3, and 4, 5 and 8 engage each with two continuity-preserving contact-levers, 7 engages with one continuity-preserving contact-lever, and 6 engages with the set-screws of the yoke Y. It is evident that any desired arrangement of contact rods and levers might be made, that there might be other sets of contacts as well or fewer sets, that there may be one or two continuity-preserving contact-levers to any armature contact-rod, as may be necessitated by the circuits to be controlled, and that all of the armature contact-rods may engage with continuity-preserving contact-levers if desired, in which case some other method of limiting the motion of the armature must be provided than that shown in Fig. 1, as, for instance, the method shown in Fig. 5.

28 to 39, inclusive, are binding-posts of the usual construction. 28 and 33 connect with the coils of the magnet, and 29, 31, and 32 with the posts 9, 10, and 11, respectively, and therefore with the contact-levers carried by the rods 14, 15, and 16, which are supported by these posts. 35 and 38 connect with the posts 12 and 13, respectively, and therefore with the contact-levers carried by the rods 17 and 18, and 30 connects with plate C, and therefore with the screw 3 of the yoke Y. The armature contact-rods 5, 6, 7, and 8 have at their lower ends screws 40, 41, 42, and 43, which form binding-posts for wires connecting with small binding-posts 44, 45, 46, and 47, respectively, in the base of the instrument. Binding-posts 34, 36, 37, and 39 connect with these small binding-posts 44, 45, 46, and 47, respectively, and therefore with their respective armature contact-rods. A spring 47′, connecting the armature A and the post 48, tends to pull the armature away from the poles of the magnet. The tension of the spring is adjusted by means of a screw passing through a screw-hole in the post 48, to which screw the spring is directly connected. This screw is likewise provided with lock-nuts.

In Fig. 5, as previously stated, is shown another method for limiting the motion of the armature, to be used where all the contact-points of the relay must be of the continuity-preserving type. Fig. 5 shows a relay having only one armature contact-rod and one set of continuity-preserving or swinging contact-levers engaging therewith, this form of governor being used in the signaling system when applied to double-track roads. The general construction and arrangement of the parts of the instrument are similar to that of the one first described. The upward extension C′ of the back plate C is forked at its forward end, and in this fork is pivoted contact-lever 50. The post 51 supports the rod 52, which, as in the other relay, passes through a hole in 51 and is adjustably secured there by a screw, the head of the post 51 being so formed as to give a large bearing-surface to the rod 52, this being necessary because of the weight and thrust that it is now called upon to bear. The rod 52 has its end formed into a fork and carries the swinging contact-lever 53. Both C′ and rod 52 have upward projections carrying the set-screws 54 and 55 and the stop-screws 56 and 57. The ends of the set-screws 54 and 55 engage with the contact-points of the levers 50 and 53, respectively, and limit their motion, and by so doing limit the motion of the armature. When there is more than one armature contact-rod and all of the contact-levers engaging with these contact-rods are continuity-preserving or swinging contact-levers, one set of these contact-levers will be provided with the device shown in

Fig. 5 for limiting the motion of the armature and the others will be as shown in Figs. 1 and 2.

The operation of my relay is as follows: Normally I intend to use the relay or governor with a closed circuit passing through the coils of the magnet. The armature will then be in close proximity to the pole-pieces and the armature contact-rods will be in contact with the contact-levers of the horizontal rods 14, 15, and 16 and with the contact-screw 3 of the yoke Y. The circuits are then complete between binding-posts 34 and 29, 36 and 30, 37 and 31, and 39 and 32. When the governing-circuit is broken—*i. e.*, the circuit passing through the coils of the magnet—the spring 47′ draws the armature away from the poles of the magnet and contact is immediately broken with the contact-screw 3 of the yoke. The continuity-preserving or swinging contact-points, however, follow the movements of the armature, owing to the action of their springs, so far as their respective stop-screws, as 25, will permit, in each case contact being maintained with the corresponding armature contact-rod until the head of the stop-screw is reached. In like manner contact is made with the continuity-preserving or swinging contact-levers of the horizontal rods 17 and 18, and these contact-levers then swing with the armature until the latter is stopped by the insulated set-screw of the yoke. Circuit is then complete between the binding-posts 34 and 35 and 38 and 39. When the governing-circuit is again completed, the magnet attracts the armature, and the contact-levers of the rods 17 and 18 follow the armature so far as their respective stops will permit, when contact is broken. Contact is made with the contact-levers of the horizontal rods 14, 15, and 16, which then swing with the armature until the motion of the latter is stopped by contact with the contact-screw 3 of the yoke Y.

The operation of the relay shown in Fig. 5 is in all respects similar to that already described, the set-screws 54 and 55 stopping the backward swing of the contact-levers 50 and 53 when the latter reach them and so checking the armature.

In order to insure perfect contact between the swinging contact-levers, such as 19, and the horizontal supporting-rods which carry them, I prefer to connect the same by a wire which is held in place by small set-screws inserted in the rods and contact-levers. These wires are very fine and flexible, and are left sufficiently loose so that they do not interfere with the motion of the contact-levers.

Having thus completely described the construction and operation of my improved relay, what I claim, and desire to secure by Letters Patent, is—

1. In a relay for electric circuits, the combination, with an electro-magnet, a pivoted armature therefor, and a retractile spring attached to said armature, of two contact rods carried by said armature and insulated from each other, set screws engaging with one of said contact rods, on opposite sides thereof, and so adapted to limit the movement of the armature, one or both of said screws being likewise adapted to serve as electrical contact points and to make electrical contact with said contact rod, and two swinging and spring-actuated contact levers engaging with the other contact rod, on opposite sides thereof, and adapted to make electrical contact therewith, substantially as described.

2. In a relay for electrical circuits, the combination, with an electro-magnet, a pivoted armature therefor, a retractile spring attached to said armature, and means for limiting the movement of the armature, of an extension of the armature provided with a contact point, a pivotally supported contact lever adapted to engage with said contact point, means for causing said contact lever to press against said contact point, and a stop 25 having a flanged head adapted to engage with the end of said contact lever and to cause it to break contact with the armature contact point when the armature operates, substantially as described.

3. In a relay for electric circuits, the combination, with an electro-magnet, a pivoted armature, a retractile spring acting on said armature, and means for limiting the motion of the armature, of contact rods, as 8, carried by the armature and insulated from each other, pivoted and spring actuated levers as 19 and 20 adapted to engage with said armature contact rods, and screws, as 25 and 27, having flanged heads adapted to engage with the ends of the contact levers, by which the movement of the said contact levers is limited, substantially as described.

4. In a relay for electric circuits, the combination, with an electro-magnet, a pivoted armature therefor, a retractile spring acting on said armature, and means for limiting the motion of the armature, of a contact rod, as 8, projecting from the armature, a longitudinally adjustable support, as 16, having a forked end, a contact lever pivoted in said fork and adapted to engage with said contact rod 8, a spring acting on said contact lever and tending to hold it in contact with said contact rod, and an adjustable stop screw, 25, carried by said support 16, engaging with said contact lever, and adapted to cause said lever to break contact with the contact rod 8, substantially as described.

5. In a relay for electric circuits, the combination, with an electro-magnet, a pivoted armature therefor, a retractile spring acting on said armature, and means for limiting the motion of the armature, of a contact rod, as 8 projecting from the armature, a support 16, a contact lever 19 pivoted to said support 16

and adapted to engage with said contact rod 8, a spring connected to said lever 19 and adapted to hold said lever in contact with the contact rod 8, a projection 21 of said support 16, and a stop screw 25 adjustably mounted in said projection 21, and having a flanged end engaging with the contact lever 19, and adapted to cause said contact lever to break contact with the contact rod 8 when the armature is operated, substantially as described.

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

THOMAS BULLITT DIXON.

Witnesses:
JAS. CHRISTOPHER,
HARRY LYNE.