June 29, 1943. H. G. BLOSSER 2,323,113

ELECTRICAL RELAY

Filed Feb. 25, 1942 3 Sheets-Sheet 1

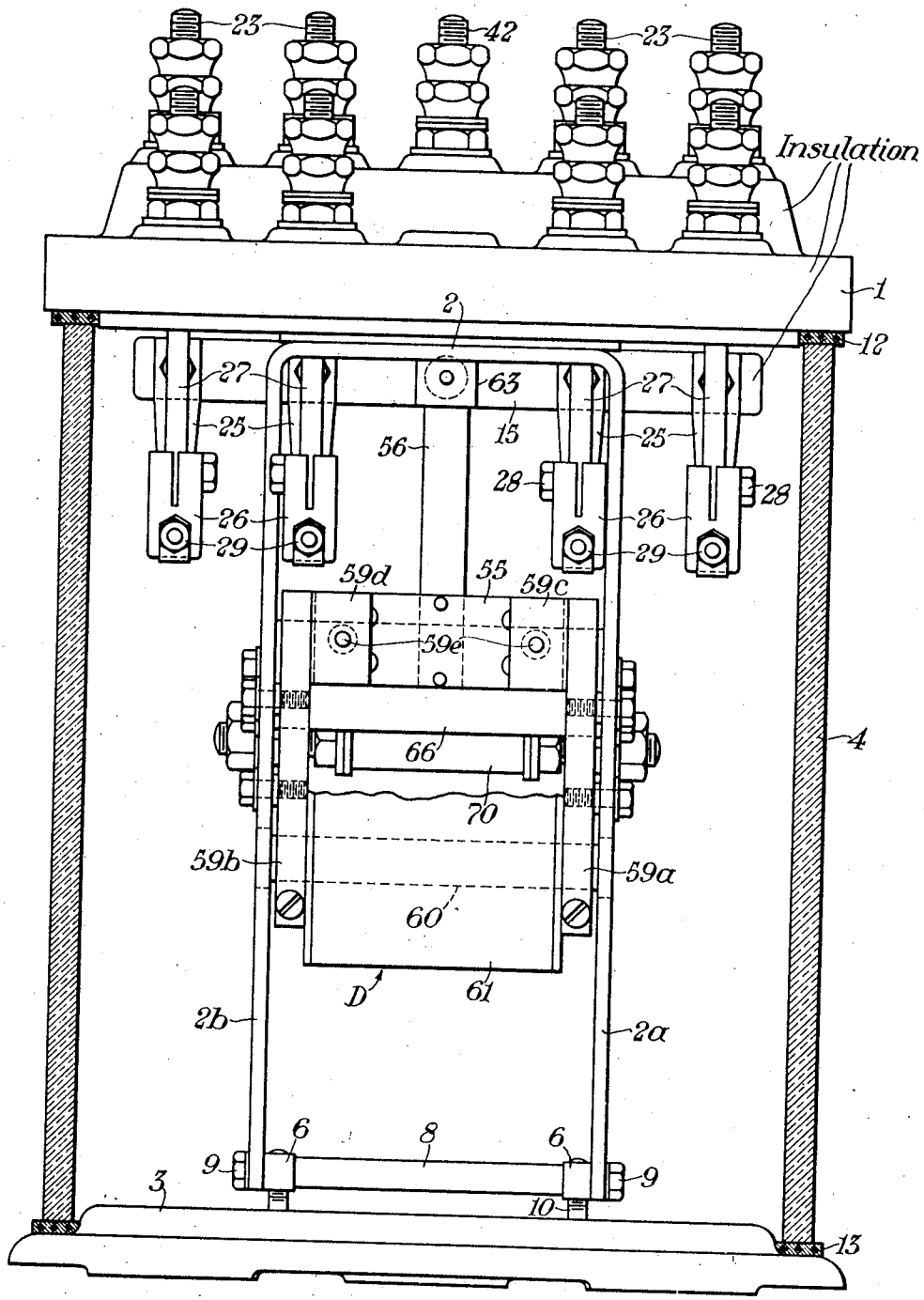


Fig. 1.

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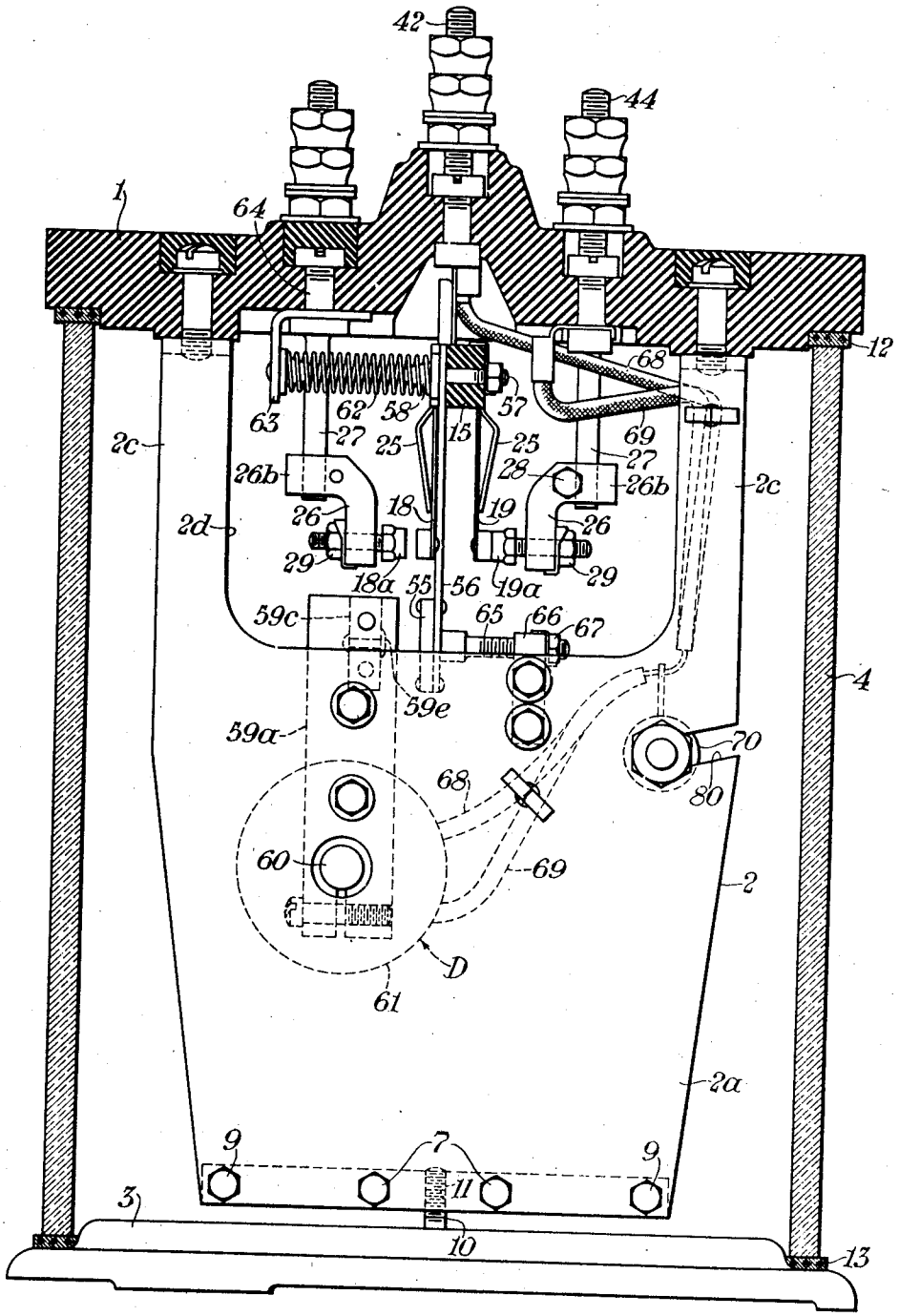


Fig. 2.

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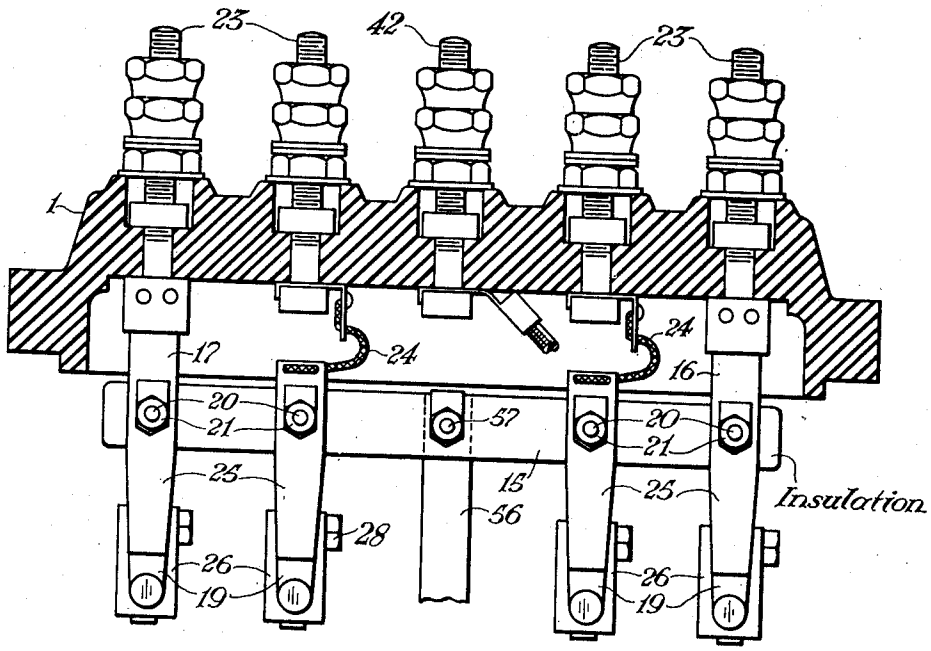


Fig. 3.

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UNITED STATES PATENT OFFICE

2,323,113

ELECTRICAL RELAY

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Original application November 16, 1939, Serial No. 304,811. Divided and this application February 25, 1942, Serial No. 432,281

2 Claims. (Cl. 200—104)

My invention relates to electrical relays, and particularly to electrical relays which are suitable for use in railway signaling systems employing for the control of signaling devices direct current which is periodically interrupted or coded at different frequencies in accordance with traffic conditions.

In signaling systems of the type referred to at least three different types of relays are employed, namely, code transmitters for periodically interrupting the direct current at the desired frequency, code following relays which respond to coded current of one polarity only, and neutral relays which respond to the presence or absence of direct current whether it is coded or uncoded.

One object of my present invention is to provide an improved relay of the third type mentioned above, which relay is simple in construction, rugged, and can be manufactured at a minimum cost.

The present application is a division of my copending application, Serial No. 304,811, filed November 16, 1939, for Electrical relays, which became Patent No. 2,285,890 on June 9, 1942.

Other objects and characteristic features of my invention will become apparent as the description proceeds.

In the accompanying drawings, Fig. 1 is a side view showing one form of relay embodying my invention, certain of the parts being broken away or sectioned to better illustrate the construction of the remaining parts. Fig. 2 is a view at right angles to Fig. 1 of the relay shown in Fig. 1 with certain of the parts in section. Fig. 3 is a detail sectional view of a portion of the relay shown in Fig. 1.

Similar reference characters refer to similar parts in each of the several views.

Referring to the drawings, the relay in the form here shown comprises a suitable case, consisting of a top plate 1 of insulating material secured to the upper end of a non-magnetic frame 2, a metal base plate 3 secured to the lower end of the frame 2, and a transparent glass cylinder 4 clamped between the top plate 1 and the base plate 3. The main or upper part of the frame 2 is formed from a single piece of material bent generally into an inverted U-shape, and comprises two vertically disposed plate portions 2*a* and 2*b* of substantially trapezoidal form terminating at their upper ends in spaced parallel arms 2*c* which form openings 2*d* through which certain portions of the contact mechanism of the relay can be viewed for inspection. A horizontal bar 6 is secured to the lower end of each plate portion 2*a* and 2*b* by means of studs 7, and extending between the bars 6 at their opposite ends are spacing rods 8 held in place by studs 9. The base plate 3 is secured to the frame 2 by means of screws 10 screwed into tapped holes 11 provided in the bars 6. It will be seen, therefore, that the frame provides a rigid support for the various case parts. A gasket 12 of cork or other suitable material is interposed between the top plate 1 and the upper end of the cylinder 4, and a similar gasket 13 is interposed between the bottom plate and the lower end of the cylinder, thereby sealing the case against the entry of dirt or other foreign substances.

A contact carrying rocker 15 of suitable insulating material is suspended from the top plate 1 for swinging movement between two extreme positions by means of two flexible strips 16 and 17 (see Fig. 3), and this rocker is provided with a plurality of flexible contact fingers 18 and 19, each of which cooperates with a fixed contact member 18*a* or 19*a* to close a contact 18—18*a* or 19—19*a* according as the rocker is swung to one or the other of its extreme positions. The contact fingers 18 and 19 are disposed in pairs and are secured to the opposite sides of the rocker within suitable vertical grooves which maintain the fingers in the desired vertical positions, by means of studs 20 moulded into the rocker and provided at each end with a nut 21. The two studs 20 which secure the two end pairs of fingers 18 and 19 to the rocker also serve to secure the lower ends of the strips 16 and 17 to the rocker. A terminal post 23 is mounted in the top plate directly above each pair of fingers 18 and 19 and the upper ends of the strips 16 and 17 are secured to the heads of the two outer terminal posts 23. It will be seen, therefore, that the strips 16 and 17 not only serve to support the rocker, but also serve to electrically connect the two outer pairs of fingers with the associated terminal posts. The remaining two pairs of fingers are electrically connected with the vertically aligned terminal posts 23 by means of flexible connectors 24. The positions of the flexible fingers when the fingers are out of engagement with the associated fixed contact member are determined by stops 25 which are clamped against the outer faces of the fingers by means of the associated studs 20, and which are so adjusted by bending them that the fingers will break the contacts in the desired positions in response to swinging movement of the contact carrying rocker 15.

The fixed contact members 18*a* and 19*a* are all alike, and each comprises a low resistance contact button welded to or formed on one end of an adjusting screw. Each adjusting screw is screwed through the depending vertical leg 26*a* of an angle bracket 26, the horizontal leg 26*b* of which is formed with a split portion which receives the circular lower end of an associated terminal post 27 with sufficient clearance to enable the bracket to be moved freely along the post in an axial direction, and also to be rotated to any desired angular position relative to the

post. A clamping screw 28 is associated with the split portion of each angle bracket and is effective when tightened to clamp the bracket in any position to which it is moved on the associated terminal post. To facilitate turning the adjusting screw, the head of the screw is made polygonal in shape for the reception of a wrench or other suitable tool, and in order to lock the screw in its adjusted position a lock nut 29 is provided on the outer end of the screw. With this arrangement, it will be seen that the low resistance contact buttons of the fixed contact members can be adjusted relative to the contact buttons which are provided on the flexible contact fingers in all directions, thereby readily enabling any desired contact adjustment to be made.

The relay also comprises a suitable motor device for moving the rocker 15 between its two extreme positions to operate the contacts 18—18*a* and 19—19*a*. This motor device in the form here shown consists of an electromagnet D comprising a pair of pole pieces 59*a* and 59*b* secured to the opposite ends of a magnetizable core 60 which is surrounded by a winding 61. The pole pieces 59*a* and 59*b* are secured to the plate portions 2*a* and 2*b* of the frame 2 in vertical positions, and are provided at their upper ends with magnetizable blocks 59*c* and 59*d* toward which an armature 55 which is secured to the rocker 15 by means of a rigid strip 56 is adapted to move when the electromagnet becomes energized. The length of the armature is such that it is free to swing between the pole pieces toward the blocks 59*a* and 59*b*, and in order to prevent the armature from actually touching the blocks, non-magnetizable stop pins 59*e* are provided in the blocks in positions to engage the left-hand face of the armature, as viewed in Fig. 2. The rocker 15 is constantly biased to the position in which the contacts 19—19*a* are closed and the contacts 18—18*a* are open by means of a coil spring 62 one end of which surrounds the conical head 58 of a bolt 57 which serves to secure the upper end of the strip 56 to the rocker, and the other end of which engages a spring support 63. The spring support 63 is secured to the top plate 1 by means of a bolt 64 mounted on the top plate. For the purpose of limiting the movement of the armature in response to the bias of the spring 62, a pair of adjustable stop screws 65 are provided. These screws are adjustably screwed through threaded holes formed in a transverse member 66 secured at its ends to the plate portions 2*a* and 2*b* of the frame 2, and are arranged to be locked in adjusted positions by means of lock nuts 67 screwed onto the outer ends of the screws. The leads 68 and 69 of the winding 61 are connected with terminal posts 42 and 44 mounted in the top plate 1 to facilitate making electrical connection with the winding, and a resistor 70 is shown shunted across the winding to provide the desired operating characteristics. This resistor is supported at its ends in slots 80 provided in the plate portions 2*a* and 2*b* of the frame 2.

With the relay constructed in this manner it will be apparent that when the winding 61 is deenergized, the rocker will be held by the spring 62 in the position in which the contacts 19—19*a* are closed and the contacts 18—18*a* are open. When, however, the winding 61 is supplied with current of either polarity, the flux set up between the pole pieces will attract the armature and will thus move the rocker to the position in which the contacts 18—18*a* are closed and the contacts 19—19*a* are open. It should be pointed out that due to the presence of the magnetizable blocks 59*c* and 59*d* and the arrangement of the armature and pole pieces shown, a very fast response of the armature to the energization of the winding is provided. This is particularly desirable when the relay is to pick up on the pulses of coded current. It should also be pointed out that when the relay is operated as a neutral relay, the contacts 19—19*a* correspond to the usual back contacts, while the contacts 18—18*a* correspond to the usual front contacts.

Although I have herein shown and described only a few forms of electrical relays embodying my invention, it is to be understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. An electrical relay comprising a non-magnetic bracket, an insulating top plate secured to said bracket, an insulating rocker suspended from said top plate by means of flexible strips for swinging movement between two positions, flexible contact fingers secured to said rocker and cooperating with fixed contact members secured to said top plate to form contacts which are operated by movement of said rocker between its two positions, a spring biasing said rocker to one position, an armature suspended from said rocker by means of a rigid strip, and an electromagnet secured to said bracket and cooperating with said armature when said electromagnet is energized to move said rocker to its other position, and an adjustable stop screw supported by said bracket and cooperating with said armature to determine said one position of said rocker.

2. An electrical relay comprising a non-magnetic bracket provided with two vertically disposed plate portions, an insulating top plate secured to said bracket, an insulating rocker suspended from said top plate by means of flexible strips for swinging movement between two positions, flexible contact fingers secured to said rocker and cooperating with fixed contact members secured to said top plate to form contacts which are operated by movement of said rocker between its two positions, a spring biasing said rocker to one extreme position, an armature suspended from said bracket by means of a rigid strip, an electromagnet provided with a pair of pole pieces secured to the plate portions of said bracket in vertical positions and provided at their upper ends with magnetizable blocks toward which said armature is adapted to move when the electromagnet becomes energized, said armature being of such length that it is free to swing between the pole pieces toward the blocks, non-magnetic core pins secured to said blocks to prevent the armature from touching the blocks, and an adjustable stop screw supported by said bracket and cooperating with said armature to determine said one position of said rocker.

HERMAN G. BLOSSER.