May 21, 1935. J. F. MERKEL 2,002,476

TRACTIVE TYPE RELAY

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FIG. 1.

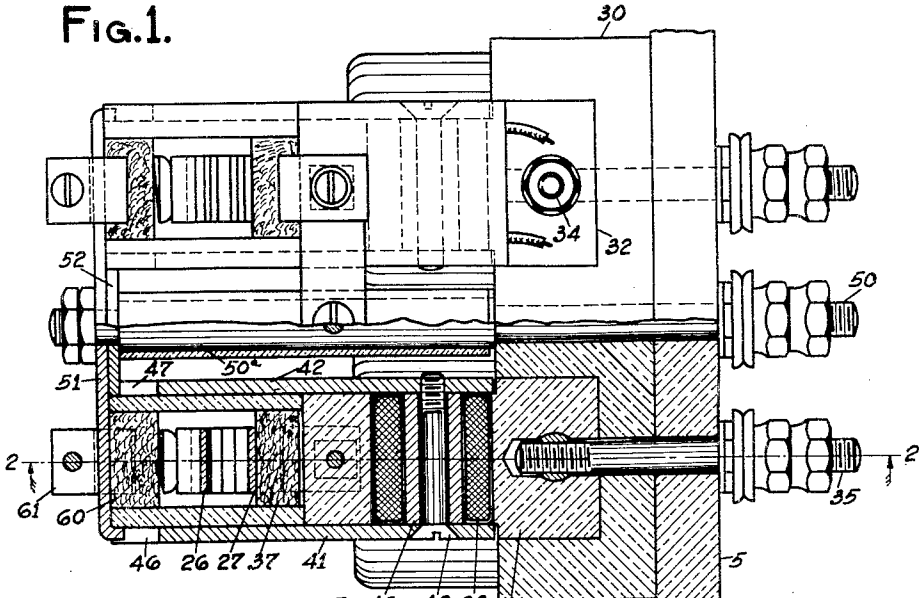
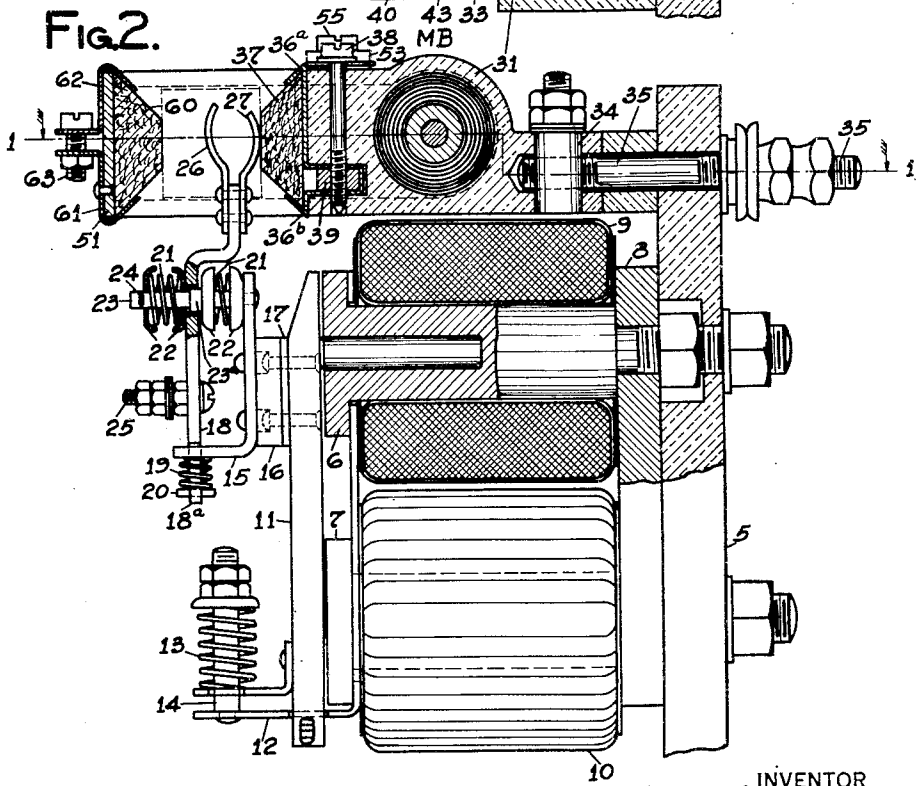


FIG. 2.



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FIG. 3.

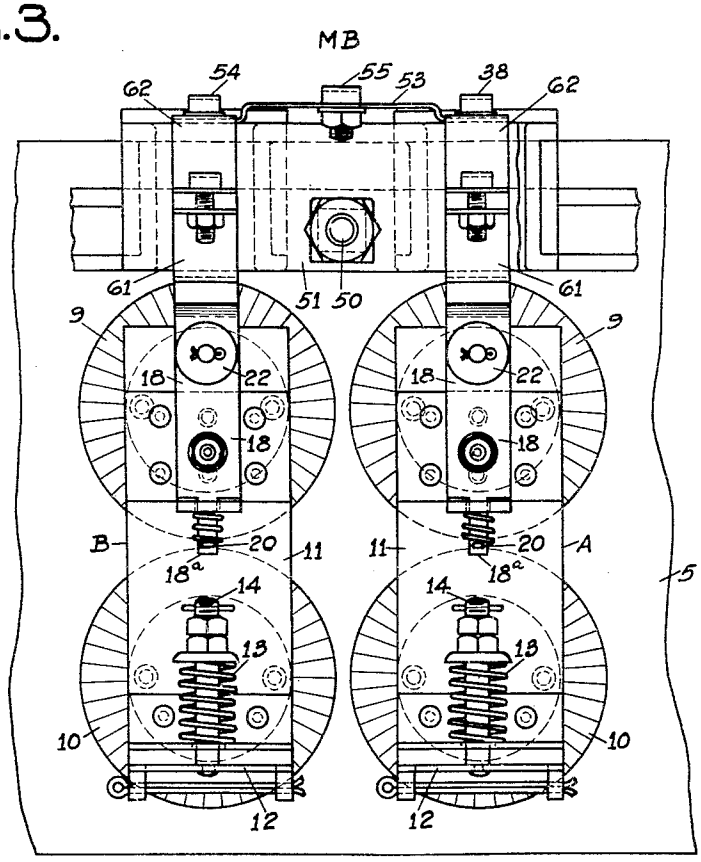
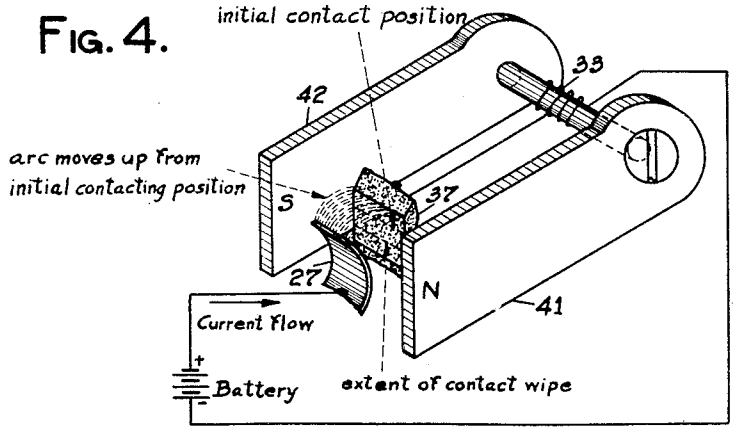


FIG. 4.



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2,002,476

TRACTIVE TYPE RELAY

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Application July 24, 1931, Serial No. 552,906

2 Claims. (Cl. 200—147)

This invention relates in general to relays adapted for railway use, and has more particular reference to relays of the tractive type which are adapted to have associated therewith suitable magnetic blow-out means for arc suppression.

Among the objects of this invention is to provide a tractive type relay and magnetic blow-out structure which is compact in design and rugged in construction with suitable articulated contact fingers that are particularly adaptable for use with magnetic blow-outs for arc suppression.

Other objects, purposes and characteristic features of the present invention will be in part obvious from the accompanying drawings, and in part pointed out as the description of the invention progresses.

In describing the invention in detail, reference will be made to the accompanying drawings, in which similar reference characters refer to corresponding parts throughout the several views, and in which;

Fig. 1 is a top view of a relay and magnetic blow-out structure arranged and constructed as one embodiment of the present invention, with certain parts shown in section as viewed on section line 1—1 of Fig. 2;

Fig. 2 is a side elevational view of the embodiment of this invention with certain parts shown in section as viewed on section line 2—2 of Fig. 1;

Fig. 3 is a front elevational view of the embodiment of this invention; and

Fig. 4 is a graphic illustration of the operation of the embodiment of the present invention.

With reference to the accompanying drawings, the tractive type relay of the present invention is preferably provided in pairs and associated with a magnetic blow-out structure, as illustrated in Fig. 3, where relays A and B are associated with a magnetic blow-out structure MB. These relays A and B and magnetic blow-out structure MB are preferably mounted on a vertical terminal board 5 suitably located and formed of insulating material.

The relays A and B are substantially identical so that the description will be given with more specific reference to relay A. With reference to Fig. 2 of the accompanying drawings, relay A is shown as including two core members 6 and 7 which are attached to a back strap 8 by suitable nuts threaded on extensions of the respective core members. Suitable coils 9 and 10 are mounted on the core members 6 and 7 respectively. The U-shaped electro-magnetic structure thus formed is secured to terminal board 5 by suitable nuts. This electro-magnetic structure has associated therewith an armature 11 which is mounted upon an armature support member 12 suitably attached to the core members 6 and 7. Although the armature 11 is shown in an attracted position for convenience, it is normally biased to a deenergized position by a coil spring 13 which is mounted over a threaded rivet 14 and held in position by suitable nuts and cotter key. The armature 11, when in an energized or attracted position, is held against suitable residual pins located in recesses in the respective core members 6 and 7.

Although it is to be understood that any suitable tractive type electro-magnetic structure may be employed in place of the one illustrated, the embodiment of this invention is shown as employing a tractive type structure which is more completely described in my pending application Ser. No. 545,402 filed June 9, 1931.

A contact support member 15 is attached to an insulated member 16 by suitable rivets, which member is in turn secured to the armature 11 by suitable rivets with an interventing insulated member 17. This arrangement completely insulates the contact support member 15 from the armature.

The contact finger 18 is provided with an extension 18a which passes through a suitable recess in the contact support member 15. This contact finger 18 is biased downwardly by a coil spring 19 that is passed over the extension 18a and secured in a tensioned position by a cotter key 20. The contact finger 18 is thus pivoted on a flat edge bearing, and biased toward a central or mid-position by two coil springs 21 which are mounted within cupped washers 22 over a guide member 23 on opposite sides of the contact finger 18. The guide member 23 has a centrally located shoulder 23a against which the inside cupped washers 22 are biased. The guide member 23 is suitably riveted to the contact support member 15 at one end, while a cotter key 24 at its other end is provided for retaining the coil spring 21 and the cupped washers 22 on the left of the shoulder 23a.

A terminal 25 is provided for attaching suitable lead wires to the contact finger 18. Contact points 26 and 27 are mounted on the free end of the contact finger 18, and are adapted to make contact with front and back fixed contacts. These contact points 26 and 27 are preferably of coin silver or the like, and are in form a curved or semi-circular shape for reasons to be pointed out hereinafter.

The magnetic blow-out structure MB is provided with a back spacer 30 having suitable recesses into which coil mountings 31 and 32 may be fitted. The back spacer and coil mountings are preferably of moulded bakelite.

The coil mountings 31 and 32 are moulded in substantially the same form, each being provided with a circular recess into which a coil may enter. A lug bolt 34 is moulded to the coil mounting 31, for example, so that it may be suitably drilled and top threaded to receive a stud bolt 35 which draws the coil mounting 31 into the recess provided in the back support 30 and against the terminal board 5. The lug bolt 34 is arranged so that it may be suitably employed as a terminal post.

The coil mounting 31 is moulded with a recess to receive a contact frame which is thin metal strips bent to conform with the surface of the coil mounting as well as having extending portions for gripping the fixed contact 37 which is preferably of carbon impregnated with copper, but may be any other suitable contact material. The contact frame is preferably formed in two parts, an upper part 36^a and a lower part 36^b. This frame, thus formed of two parts, is held in position by threading a tap bolt 38 into a nut 39.

The coil 33 is placed within its recess in the coil mounting 31. A core 40 is located on the inside of the coil, with two pole pieces 41 and 42 held in position against the opposite ends of the core 40 by a screw 43. These pole pieces 41 and 42 fit within grooves or depressions on their respective sides of the coil mounting 31, so as to be held in an extending horizontal position and to be flush with the sides of the coil mounting. Two porcelain shields 46 and 47, each in the form of a shallow trough like member, are inserted on the inside of the pole pieces 41 and 42 respectively. The fixed contact 37 is sufficiently narrow to allow these porcelain shields 46 and 47 to pass on either side thereof and come in contact with the coil mounting 31. Thus, the porcelain shields 46 and 47 are held in position by the contacts and by their respective pole pieces.

As above mentioned, the coil mountings 31 and 32 are constructed in a like manner, as well as having their respective coils, cores, pole pieces, contacts, porcelain shields, and the like, mounted thereon in a similar manner. These two units, so to speak, are mounted side by side with a stud bolt 50 located between them. This stud bolt 50 has a shoulder portion 50^a so that at one end of this bolt the back spacer 30 and the terminal board 5 are tightened against the shoulder by suitable nuts; while the opposite end of this stud bolt 50 is employed to hold front spacers 51 and 52 which are also tightened against the shoulder by suitable nuts.

The front spacer 52 is a straight flat piece of metal which serves to space the inside porcelain shields of the respective units; while the front spacer 51 is a flat piece of metal with its ends turned over in order to secure the outer porcelain shields of the respective units. The two units are also connected by a cross strip 53 (see Fig. 3) which is secured at one end by the tap bolt 38 and at its opposite end by a tap bolt 54, which is the counter part of the tap bolt 38. This cross member, as well as mechanically connecting the two units, serves as an electrical connection between the front contacts of the two units, so that a suitable terminal 55 is provided at a central point on the cross member.

Each of these units of the magnetic blow-out structure MB is provided with a back contact in a similar manner. For example, a back contact 60 is mounted between the two porcelain shields 46 and 47 by a suitable contact frame. This contact frame comprises a fixed member 61 which is riveted to the front spacer 51, a movable member 62 and a bolt 63 which serves to draw the two members together, so as to tightly hold the contact 60 in position by the extending portions of the members 61 and 62.

As the front spacer 51 is of conducting material and is connected to the stud bolt 50, the back contacts of the two units are electrically as well as mechanically connected. The stud bolt 50 acts as the terminal for the two contacts.

With the mechanism and contact arrangement constructed as above described, suitable circuits may be completed between the movable contacts and the fixed contacts. For example, one circuit can be completed from the terminal 25 to the terminal on the stud bolt 50 when the relay is in a deenergized position; while another circuit may be completed between the terminal 25 and the terminal 55 when the relay A is energized. Also, the relay B can close two similar circuits between its movable contact terminal and its fixed contact terminals, it being noted that the fixed contact terminals are in common with those of the relay A.

The windings of the respective relays A and B may of course be connected in control circuits as desired, while the coils of the blow-out units are preferably connected in such circuits as are controlled by the movable contacts of the respective relays, as disclosed, for example, in the application of W. H. Hoppe et al., Ser. No. 478,758 filed August 12, 1930. Such a circuit connection provides that the magnetic flux necessary to cause the magnetic blow-out to function is produced by the current in the circuits which are controlled (see Fig. 4). On the other hand, suitable separate energizing means may be provided for the respective blow-out coils.

In either case, the coils of the magnetic blow-out should be connected in accordance with the present invention, so as to produce a magnetic flux which acts upon the current flowing in the circuit to be broken in a manner to cause the arc to move upward and away from the relay mechanism. With reference to Fig. 4, if the current is flowing from the contact point 27 to the fixed contact 37, for example, when the relay A becomes deenergized, then the coil 33 should be so energized as to cause the pole piece 41 to be a north pole and the pole piece 42 to be a south pole. This causes the arc formed upon the breaking or moving apart of the two contacts 27 and 37, to move upwardly and away from the relay mechanism. Similar connections and energization of the respective blow-out coils should be employed with respect to all of the contacts and the currents controlled by them.

When a movable contact is changed from one position to the other, the finger being articulated, moves along the surface of the fixed contact causing what is commonly known as contact wipe. With this arrangement, any arc, which is formed, is initiated at a point on the fixed and movable contacts that is not actually employed as a contacting surface when the relay is in a full deenergized or energized position. Also, as the arc is moved upward along the surface of the fixed contact and along the curved surface of the movable contact by the magnetic flux as above explained, the arc is lengthened and at the same time is

moved away from the active contacting surface of the contacts.

In other words, the arrangement of contacts and magnetic blow-out of the present invention provides that the breaking of the arc shall not burn the actual or final contacting surface of the contact points. This is because the contact wipe movement is in one direction from the initial contacting point, while the arc movement is in the opposite direction (see Fig. 4). This feature in the present embodiment is provided by an articulated contact finger attached to an armature which is pivotally supported on an axis parallel with the path of flux which is employed to blow out or break an arcing current at the associated contacts, it being understood that the current in the circuit being opened has the relation to the magnetic flux as above pointed out.

Having described a relay mechanism and magnetic blow-out structure adapted for cooperation therewith, it is to be understood that the embodiment shown and described is merely illustrative of one specific embodiment of the invention; and it is to be understood that various modifications, adaptations, and additions may be made to this specific embodiment without departing from the spirit or scope of the invention, with the appended claims pointing out the novel features and limitations of the present invention, rather than the foregoing description thereof.

What I claim is:—

1. In combination, a terminal board, a back spacer and a front spacer mounted on the terminal board, two separate units, and a single rod holding the units between said spacers, each unit comprising a molded bakelite coil mounting, a coil within said mounting, a core within said coil, two pole pieces, one mounted on either end of said core, two spaced contacts mounted between said pole pieces, and two porcelain shields for insulating said spaced contacts from the said pole pieces respectively.

2. In combination, in a relay magnetic blow-out means, a panel, a socketed spacer having a plurality of spaced sockets therein, a unit for each socket, each unit including a coil housing having a portion fitting into a spacer socket, means for drawing and holding the housing in its socket, a coil and core in the housing, a pole piece at each end of the core extending away from the panel, spaced fixed contacts positioned between the pole pieces and insulated therefrom, a front spacer bearing against the units, and a rod passing through the front spacer and holding the front spacer and units against the said panel.

JOSEPH F. MERKEL.