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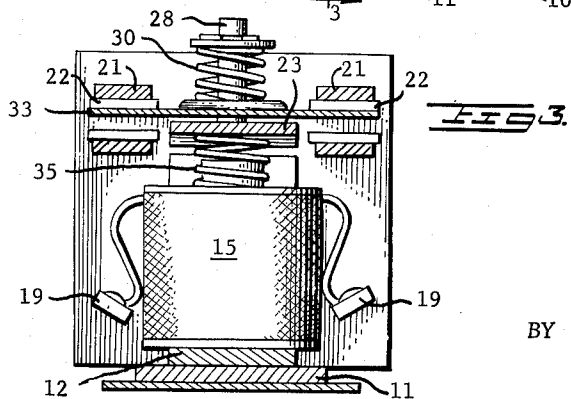
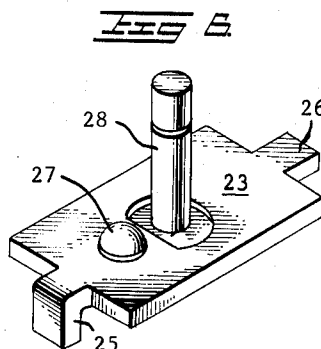
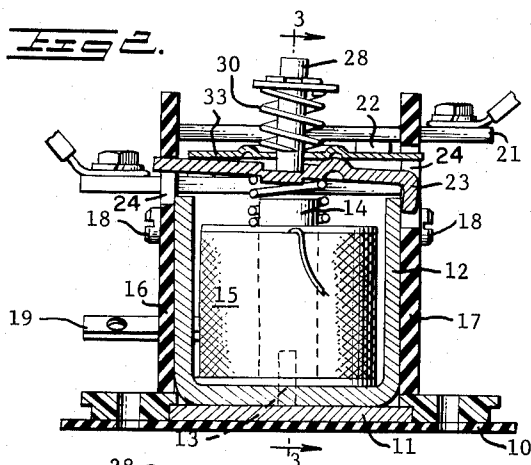
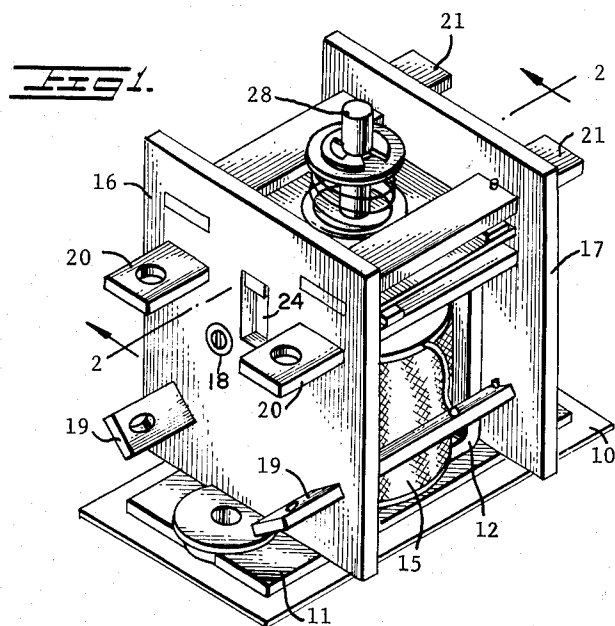
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3,205,324

CONJOINT ARMATURE-CONTACT PLATE RELAY

Filed June 14, 1963

2 Sheets-Sheet 1



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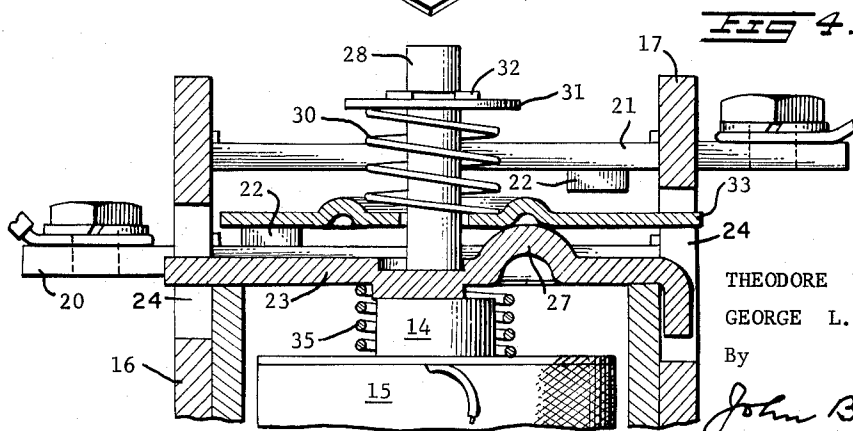
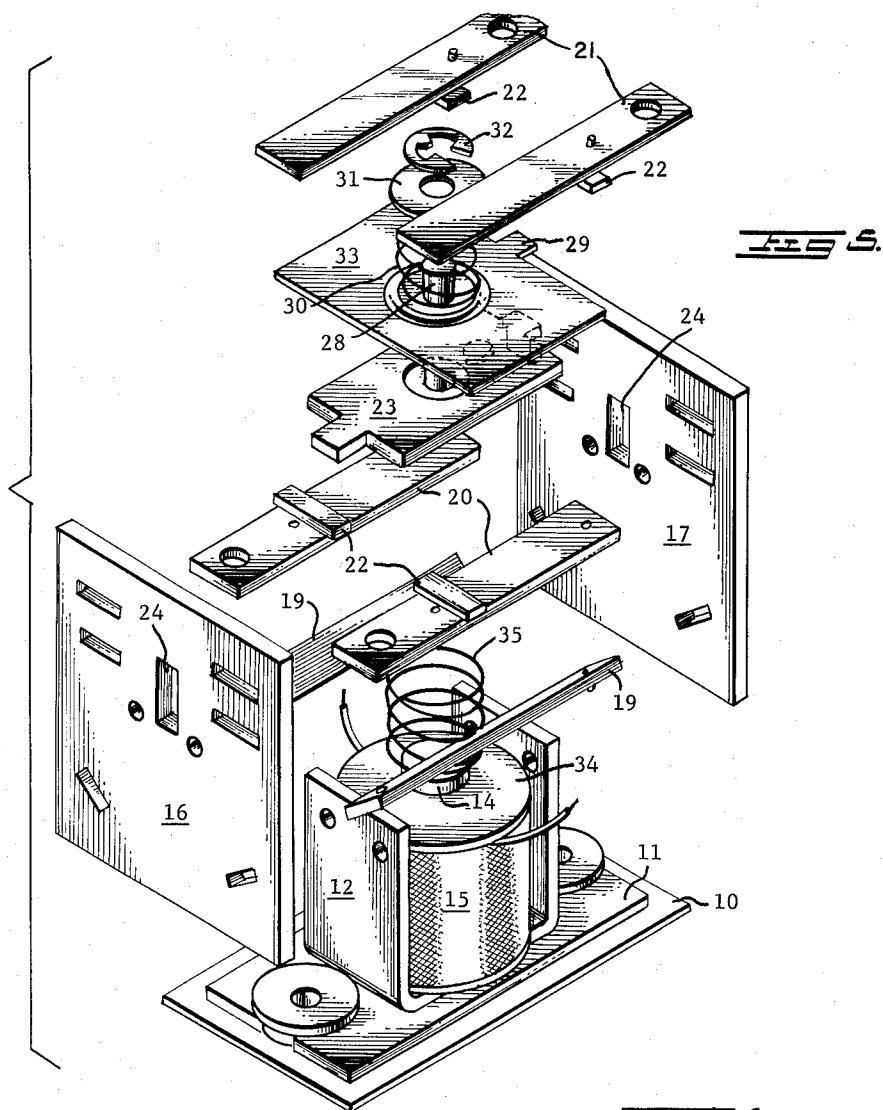
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CONJOINT ARMATURE-CONTACT PLATE RELAY

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4 Claims. (Cl. 200—87)

This invention relates to electromagnetically operated contactors or relays for opening and closing relatively heavy current carrying circuits.

More particularly this invention is directed to a direct current, low voltage contactor having provisions for dissipating heat rapidly from the contact making and breaking element.

Low voltage, direct current motor driven devices frequently require the interruption of relatively high values of current. This is especially true with battery operated trucks and similar devices due to repeated stopping, starting and reversing. Electromagnetic or solenoid operated contactors customarily used in this type service are required to be of rugged construction and reliable operation and at the same time low in cost. Furthermore, since battery operated trucks and the like are operated under many different conditions and environments where expert maintenance personnel may be unavailable, most components of these vehicles are required to be of simple construction and arrangement of parts.

It is an object of this invention to provide an improved direct current contactor that is of simple and rugged construction and economical to manufacture.

Another object of this invention is to provide a direct current contactor having contacts capable of a high rate of heat dissipation.

Still another object of this invention is to provide an electrical contact making and breaking device having a minimum of precious metal material.

A feature of the invention is the provision of a floating, clapper type armature driving a contactor plate through a spring coupling and a raised portion on the armature face to obtain a wiping action between the fixed contacts and the contactor plate.

The invention is set forth with particularity in the appended claims. The principles and characteristics of the invention, as well as other objects and advantages are revealed and discussed through the medium of the illustrative embodiments appearing in the specification and drawings which follow.

In the drawings:

FIGURE 1 is a perspective view of the contactor.

FIGURE 2 is a sectional view substantially along the line 2—2 of FIGURE 1.

FIGURE 3 is a sectional view substantially along the line 3—3 of FIGURE 2.

FIGURE 4 is an enlarged view of the top part of FIGURE 2, and shows details of the contact structure of the contactor.

FIGURE 5 is an exploded view (in perspective) of the contactor.

FIGURE 6 is a perspective view of the armature member of the contactor.

Referring now to FIGURES 1 and 5, particularly, the contactor is made up of an insulated base 10 surmounted by a metallic base 11 to which is attached a U-shaped core 12, the latter being fastened by a screw 13 (see FIGURE 2), which also secures a cylindrical core member 14 to the inside of the U-shaped core, thereby providing a so-called E-shaped core structure. A winding 15 is provided for the cylindrical core member. The sides of the U-shaped core 12 also provide for the mechanical mounting of a pair of insulated plates 16 and 17 secured

by screws 18 (see FIGURE 2), slots being cut through the plates 16 and 17 to accommodate the remainder of the contactor assembly. Referring now to FIGURE 5, a pair of metal terminal strips 19 are force fitted into the lowermost slots (slanted) of the end plates 16 and 17, these strips being electrically connected to the ends of the winding 15 to provide terminals for energizing the contactor. Two pairs of metal strips 20 and 21, respectively, are force fitted into the four horizontal slots near the tops of the plates 16 and 17, these strips carrying "block" contacts 22 of precious metal as well as terminal connections thereto.

The contactor is provided with a floating armature 23 (see also FIGURE 6) which coacts with the core members 12 and 14, being guided and contained loosely within a pair of vertical slots 24, one in each end plate 16 and 17, via projections 25 and 26 of the armature 23. A raised portion, or button, 27 is formed upon the top side of the armature 23, together with a post 28, both of these cooperating with a contactor plate 33, the button 27 acting directly therewith and the post 28, which passes loosely through an opening in the plate 33, via a spring 30 clamped between the plate 33 and a bearing washer 31 and lock washer 32 fitted into a groove near the top of the post 28 (see also FIGURE 4). A projection 29 on the contactor plate 33 is guided and contained loosely in the vertical slot 24 of the end plate 17. The winding 15 may be formed upon a spool having a flange 34 to provide the backing for an armature return spring 35 partially surrounding the core member 14 and effectively clamped between a cut out portion on the under side of the armature 23 and the aforesaid flange 34.

The operation of the contactor is best illustrated by reference to FIGURES 2 and 4, the former showing the contactor in its de-energized state and the latter in its energized state. Normally the armature 23 is urged upwards by the spring 35 to bear against contactor plate 33 via the button 27 and the top of the armature, thereby forcing plate 33 against contacts 22 of the strips 21 to establish a circuit continuity (see also FIGURE 3) between the terminal connections formed thereby; i.e., the normally closed contacts. When the winding 15 is energized the armature is magnetically drawn downward to the ends of the U-shaped core 12 and the core member 14 so that the post 28 carried by the armature 23 forces contactor plate 33 via spring 30 into contact with contacts 22 carried by strips 20 to establish circuit continuity therebetween, i.e., the normally open contacts. It is obvious that by electrically connecting either of the strips 21 to either of the strips 20 a transfer type of operation of the contactor may be effected, the connected strips being the common terminal and the remaining unconnected strips being, respectively, the transfer terminals.

A wiping action of the contacts 22 with the plate 33 is obtained whenever the winding 15 is energized or de-energized due to the arrangement of the button 27 on the armature 23, the floating plate 33, and the vertical slots 24 through which the projections 25 and 26 of the armature 23 extend. For example, when the winding 15 is energized the armature 23 is drawn downward; however, the end of the armature having the projection 25 (see also FIGURE 6) is drawn downward first since the button 27 normally retains that end of the armature closer to the core 12 than the other end of the armature. Consequently, when the spring 30, which is attached to the post 28, acts upon the plate 33 it is pivoted in its movement so that it wipes over the contacts 22 on the strips 20 until it is finally seated against them. When the winding 15 is de-energized the action is reversed so that the plate 33 wipes the contacts 22 upon the strips 21 until it is finally seated in the fully de-energized position. A

unique wiping action of the contacts is thereby obtained whenever the contactor is energized or de-energized.

In addition to the unique wiping action of the contacts, however, the contactor plate 33 provides heat dissipation of a very high order in respect to current carrying capacity since only a small portion of the plate actually carries high current density, the remainder of the plate providing a cooling zone. This novel contactor plate also offers the further advantage in the dissipation of contact heating since the current paths for "making" and "breaking" occur at opposite ends of the plate thereby providing another novel means of dissipating heat of the contacts.

While the invention has been explained and described with the aid of particular embodiments thereof, it will be understood that the invention is not limited thereby and that many modifications retaining and utilizing the spirit thereof without departing essentially therefrom will occur to those skilled in the art in applying the invention to specific operating environments and conditions. It is therefore contemplated by the appended claims to cover all such modifications as fall within the scope and spirit of the invention.

What is claimed is:

1. An electrical contactor comprising an armature, a core and a winding on said core for actuating said armature, a plurality of contacts, a floating, movable plate for coacting with said contacts to establish predetermined paths through said plate, a coupling between said armature and said plate to provide conjoint movement of the latter against said contacts with the former upon its actuation, and a projection upon said armature coacting with said plate for disrupting said conjoint movement to an extent whereby said plate wipes over said contacts.

2. An electrical contactor comprising an armature, a core and a winding on said core for actuating said armature, a plurality of contacts, a floating, movable plate for coacting with said contacts to establish predetermined paths through said plate, resilient means attaching said

plate to said armature normally retaining said plate against said armature to produce movement of the former into contact with said contacts upon actuation of the latter, and a projection upon said armature interposed against said plate to provide a sliding action of the latter over said contacts when said armature is actuated.

3. An electrical contactor comprising a floating, movable armature, means for constraining the movement of said armature within predetermined limits, a core and a winding thereon for actuating said armature, a plurality of contacts, a floating, movable contact plate operative by its movement against said contacts to establish predetermined electrical paths through said plate, and resilient means coupling said plate to said armature for conjoint movement thereof within said limits when said winding is energized.

4. An electrical contactor comprising a floating, movable armature, means for constraining the movement of said armature within predetermined limits, a core and a winding thereon for actuating said armature, a plurality of contacts, a floating, movable contact plate operative by its movement against said contacts to establish predetermined electrical paths through said plate, and resilient means connecting said armature and said plate for coordinating the operation of the latter and the former within the said predetermined limits.

References Cited by the Examiner

UNITED STATES PATENTS

649,102	5/00	Flechtenmacker	200—93
2,391,692	12/45	Estes	200—87

FOREIGN PATENTS

1,266,541	6/61	France.
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