

Nov. 5, 1957

D. F. MOYER
CIRCUIT BREAKER

2,812,403

Filed May 26, 1954

2 Sheets-Sheet 1

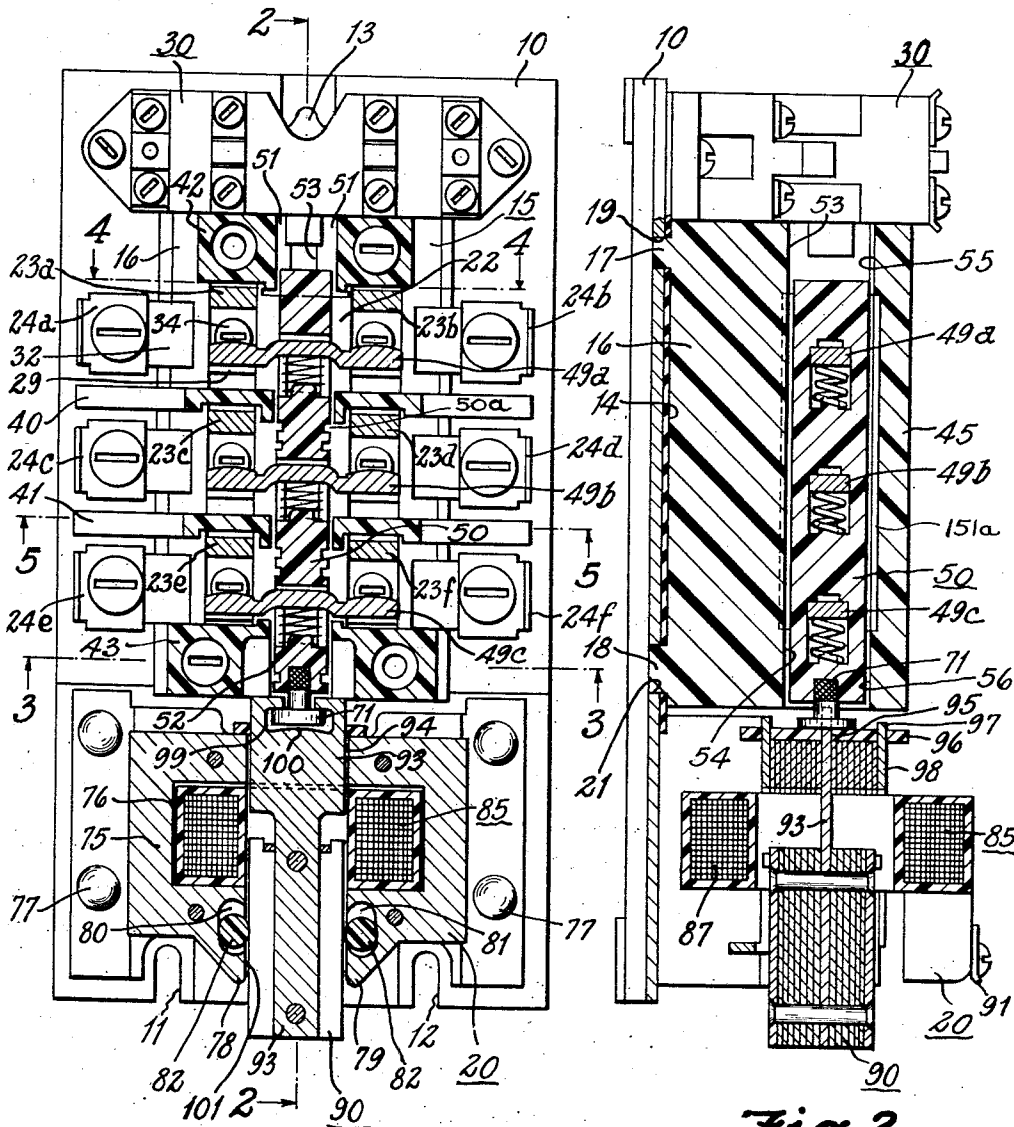


Fig. 1.

Fig. 2.

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2 Sheets-Sheet 2

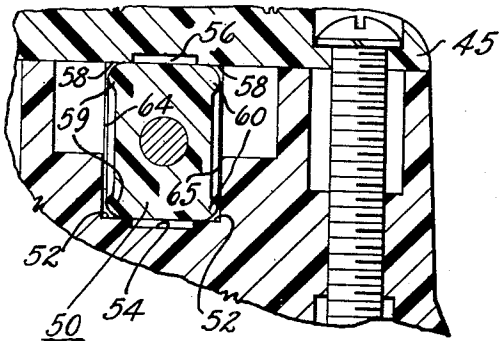


Fig. 3.

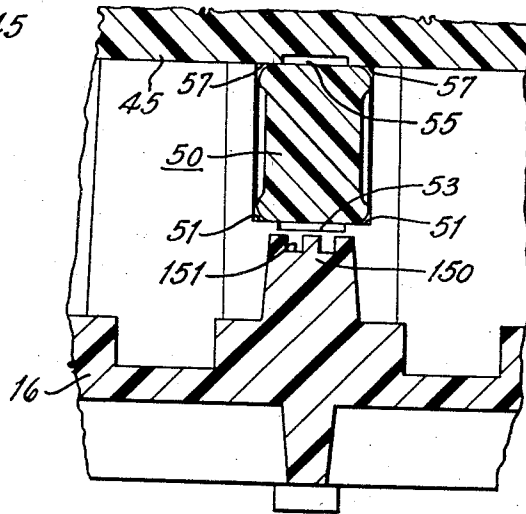


Fig. 4.

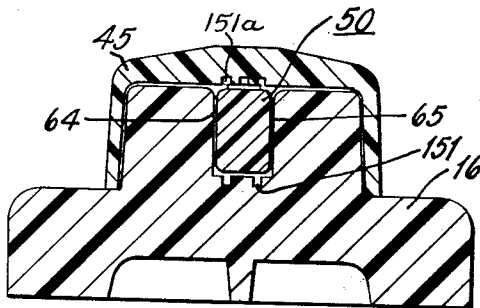


Fig. 5.

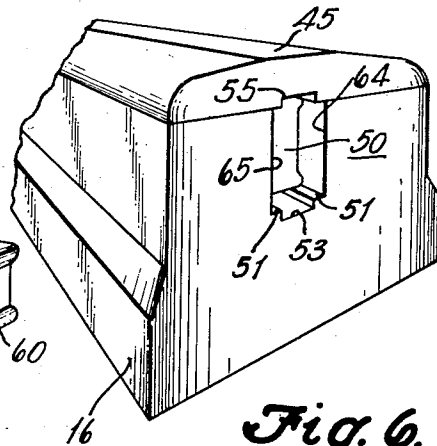


Fig. 6.

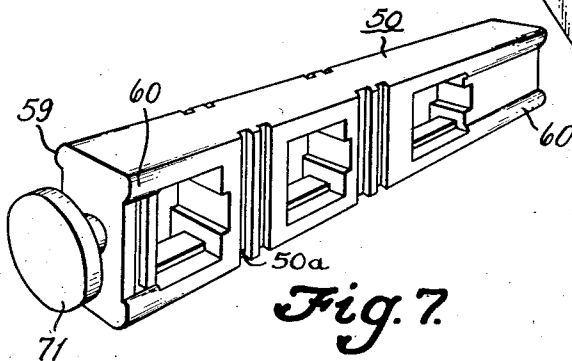


Fig. 7.

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CIRCUIT BREAKER

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Original application January 19, 1954, Serial No. 404,843. Divided and this application May 26, 1954, Serial No. 432,486

1 Claim. (Cl. 200—111)

This invention relates to a motor starting controller.

An object of the invention is to provide an improved structural arrangement of a motor starting controller that is more compact and which provides for quick and easy dis-assembly of the several parts of the structure for replacement and repair when necessary.

Another object of the invention is to provide a motor starting controller with a linearly movable contact carrier that is supported upon guide surfaces in a manner to reduce to a minimum frictional resistance to movement of the carrier and maintain accurate linear movement of the contact carrier.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the invention is clearly shown.

In the drawings:

Figure 1 is a transverse cross sectional view of a motor controller incorporating features of this invention.

Figure 2 is a cross sectional view taken along line 2—2 of Figure 1.

Figure 3 is a horizontal cross sectional view taken along line 3—3 of Figure 1.

Figure 4 is a horizontal cross sectional view taken along line 4—4 of Figure 1.

Figure 5 is a horizontal cross sectional view taken along line 5—5 of Figure 1.

Figure 6 is a perspective elevational view of the end of the contact base for the controller.

Figure 7 is a perspective elevational view of the contact carrier.

In this invention the controller is of the type disclosed in my copending application S. N. 404,843, filed January 19, 1954, of which this application is a division and comprises a mounting plate 10 that supports the main contactor 15. At the lower end of the contactor 15 there is provided an electro-magnet 20 for operating the contactor.

The contactor may also be provided with a second auxiliary control which is the control switch 30 adapted for making and breaking circuit to auxiliary devices that need be electrically synchronized with the operation of the main motor starting control.

The mounting plate 10 has a plurality of screw slots 11, 12 and 13 provided for receiving screw heads by which the plate 10 can be mounted on any suitable support. A sheet 14 of electrical insulating material is placed upon the upper face of the mounting plate 10 on which the terminal and contact base 16 is mounted.

The terminal base 16 has a pair of lugs 17 and 18 extending from the rear face of the base 16 that project into holes 19 and 21 respectively provided in the mounting plate 10 whereby to accurately position the terminal base 16 upon the mounting plate 10. The lug 17 is of a smaller diameter than the lug 18 to insure correct positioning of the terminal base 16 upon the mounting plate 10.

The terminal base 16 has a platform portion 22 on

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which the stationary contacts 23a to 23f inclusive are mounted. Each of the stationary contacts engages one of the line terminals 24a to 24f respectively.

A machine screw 34 extends through the leg 29 of the stationary contact into threaded engagement with the leg 32 of the terminal 24a whereby to retain the two elements together.

It will be apparent that the stationary contact 23a can be removed from the line terminal 24a merely by removing the screw 34, and this can be done without in any way affecting the position of the line terminal 24a with reference to the terminal base 16.

The line terminals 24a, 24c and 24e are adapted to be connected with the three wires of a three phase wiring system. The line terminals 24b, 24d and 24f are linearly aligned with the line terminals 24a, 24c and 24e whereby the wires of the three phase wiring system may be connected straight through the terminal base for simplification of wiring.

The terminal base 16 has partition wall sections 40 and 41 that separate the line terminal set 24c—24d from the line terminal sets 24a—24b and 24e—24f thereby compartmenting the line terminal sets and their cooperating stationary contacts one from the other. The end walls 42 and 43 provide closure walls for confining the terminal sets 24a—24b and 24e—24f. The partition walls 40 and 41 extend substantially above the level of the contacts 23a to 23f to make it more difficult to directly engage the line contacts and terminals by an operator when replacing one of the contacts or disassembling the contactor.

The cover 45 for the terminal base completes the enclosure of the stationary contacts 23a—23f inclusive.

The movable contact bars 49a, 49b and 49c are supported in a contact carrier 50 that has linear movement only to move the movable contacts into and out of engagement with the cooperating stationary contacts.

The contact carrier 50 is of quadrilateral cross section with the angles being 90° and is made of an electrical insulating material and extends through the partition walls 40 and 41 with the transversely extending grooves 50a moving into alignment with the partition walls 40 and 41 when the switch contacts are in closed position. The upper end of the carrier 50 engages the guide surfaces 51 on the terminal base 16. The lower end of the carrier 50 engages corresponding guide surfaces 52 at the opposite end of the base 16. The base 16 has the slightly relieved areas 53 and 54 between the aforementioned guide surfaces whereby to form the same. The base 16 also has the guide ridge 150 extending longitudinally of the base. The ridge 150 has a plurality of longitudinally extending recesses 151 that reduce the area of engagement between the ridge 150 and the carrier 50 to reduce friction to movement of the carrier.

The cover 45 is provided with the relieved areas 55 and 56 that correspond to the relieved areas 53 and 54 on the terminal base 16 whereby to provide guide surfaces 57 and 58 on opposite sides of the relieved areas 55 and 56 engaged by the opposite ends of the carrier 50 longitudinally extending recesses 151a corresponding to recesses 151 in the ridge 150.

The contact carrier 50 has longitudinally extending ridges 59 and 60 on opposite sides thereof that engage the guide walls 64 and 65 provided on the terminal base 16. The guide arrangement for the contact carrier 50 just described provides for minimum of frictional contact of the carrier with the guide surfaces and thereby aids freedom of movement of the carrier.

The lower end of the carrier 50 is provided with a T-head fitting 71 for connection to the armature of the electro-magnet in a manner hereinafter described.

The electro-magnet 20 for operating the contact carrier 50 comprises a substantially C-shaped core 75 thereby providing an opening 76 within the core. The core is secured to the plate 10 by means of rivets 77. The C-shaped core 75 has the opposing legs 78 and 79 provided with recesses 80 and 81 that receive the nylon rollers 82.

A magnet coil 85 is placed within the core 75. Electric current is conducted to the operating coil 87 through the terminals 91.

The armature 90 has an extension member 93 projecting from the upper end thereof. The member 93 extends through the slot 94 in the core 75 and through a slot 95 in the nylon guide plate 96 mounted on the core 75 by means of the tabs 97 extending from outer frame members 98 of the core 75.

The free end of the extension 93 on the armature 90 has a T-slot 99 that engages the T-head 71 on the contact carrier 50 whereby the armature 90 is suspended from the carrier 50 when the controller is in its normal vertical position. The lower wall 100 of the T-slot 99 in the armature extension 93 has a convex curvature whereby to provide for point contact of the armature extension 93 with the lower end of the T-head 71 to maintain as nearly as possible linear actuation of the armature relative to the carrier.

The armature 90 passing through the core slot 101 engages the nylon rollers 82 which maintain accurate spacing of the walls of the armature relative to the walls of the core slot. This establishes and maintains throughout the life of the controller a positively dimensioned air gap between the armature and the core.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted as may come within the scope of the claim which follows.

What is claimed is as follows:

In a control switch, the combination of, a base having stationary contact means thereon, a movable contact carrier having contact means thereon disposed at opposite

sides of said carrier and engageable with said stationary contact means that are disposed at opposite sides of said carrier, wall means projecting upwardly from said base and extending transversely of said carrier and disposed between adjacent contact sets on the carrier as disposed on opposite sides thereof, said carrier extending through said transversely extending wall means and comprising a bar having cooperating pairs of flat surfaces on diametrically opposite sides of said bar, opposite flat surfaces of said bar each having grooves therein extending transversely of the bar to effect air gaps in the flat surfaces of the bar movable into adjacent proximity to and in alignment with said transversely extending wall means when the switch contacts are closed, wall means at each end of said bar engageable by diametrically opposite flat surfaces on said bar for slidable guiding of the bar relative to said base, a cover wall carried on said base and covering said bar, said base having an upwardly projecting ridge extending longitudinally of the carrier and coextensive therewith between said guide wall means, said ridge and cover wall having flat surfaces adjacent opposite flat surfaces on said bar and coextensive therewith, said bar being positioned adjacent said ridge and cover wall with opposite flat surfaces thereon in immediate proximity to the flat surfaces of said ridge and cover wall, said ridge and said cover wall each having longitudinally extending recesses therein in the flat surfaces thereof coextensive with the carrier to effect longitudinally extending air gaps in the face areas of the ridge and cover wall in adjacent proximity to said bar.

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