Dec. 28, 1965 F. W. KUSSY ETAL 3,226,516

ADD-ON MAIN POLE UNIT FOR CONTACTORS

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FIG. 1.

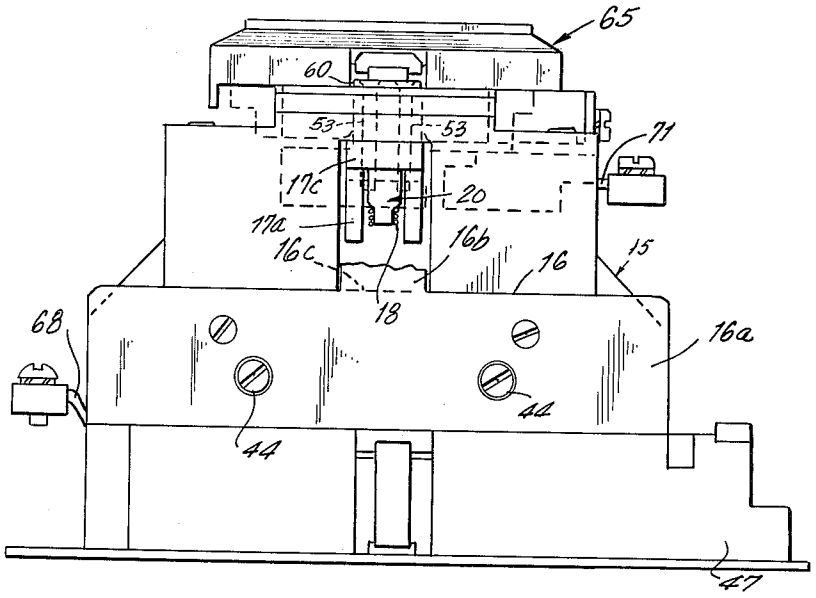
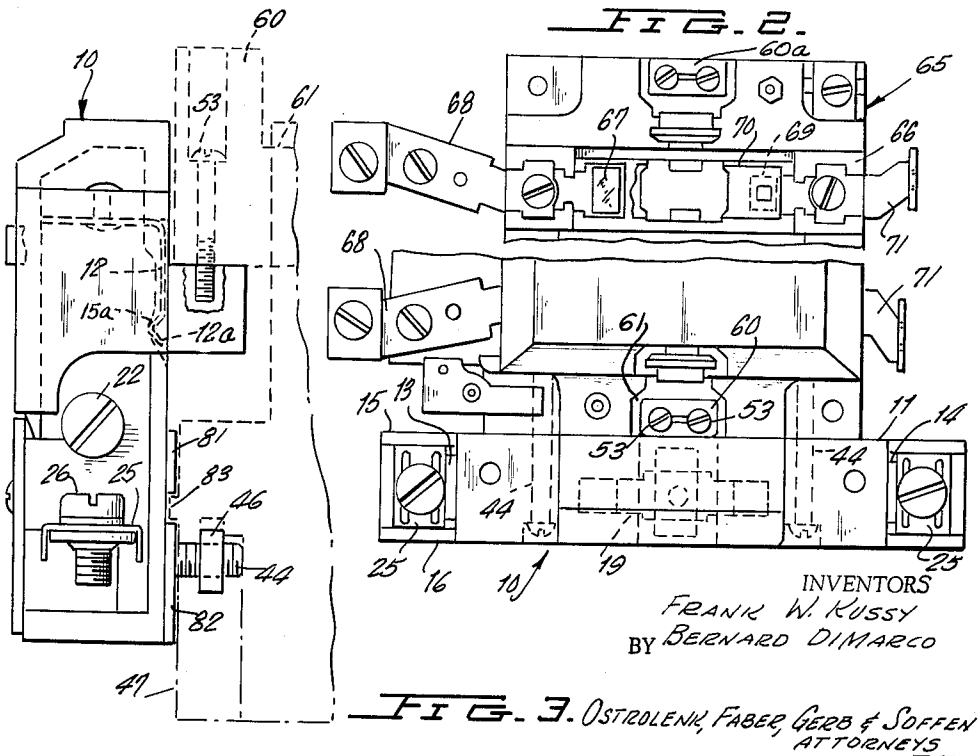


FIG. 2.



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FIG. 4.

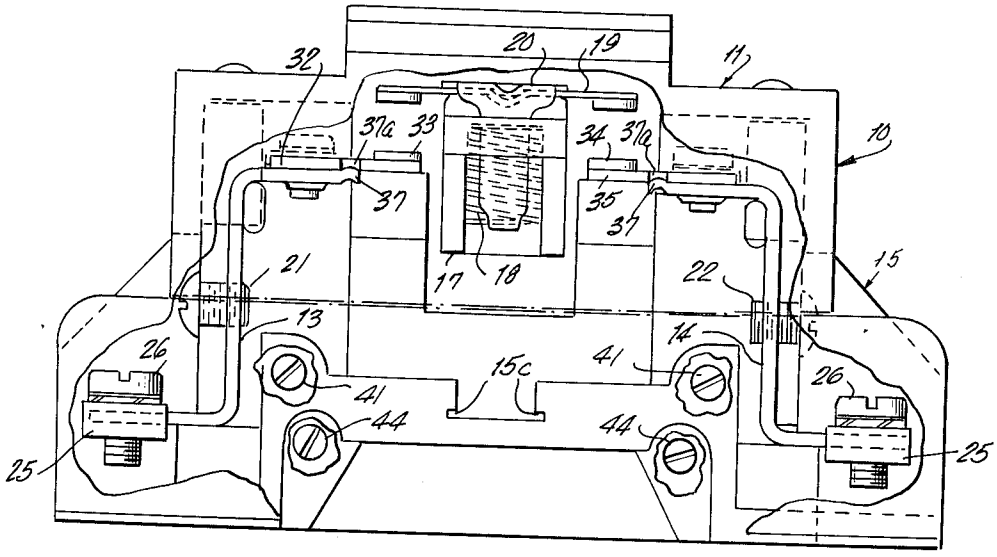
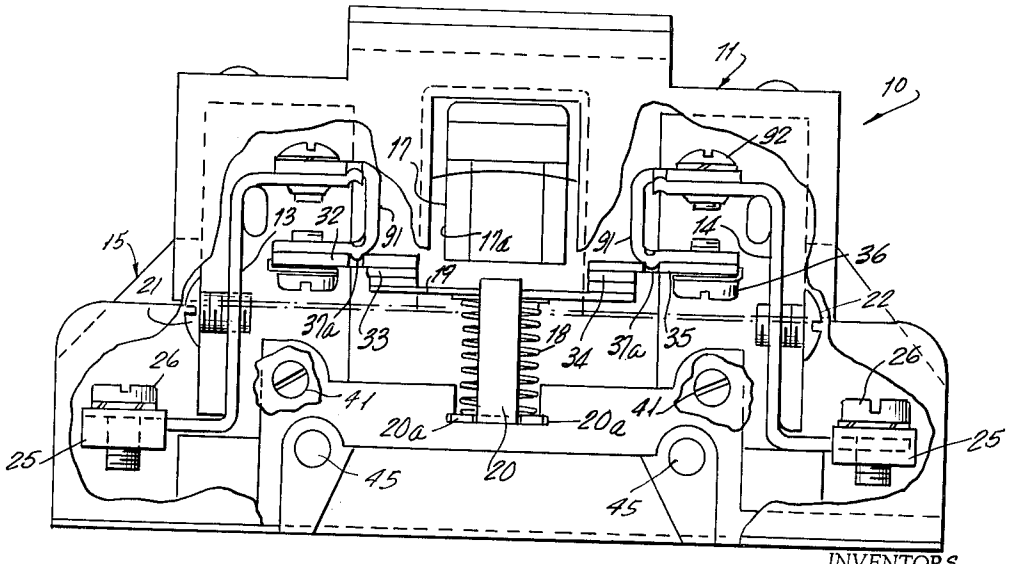


FIG. 6.



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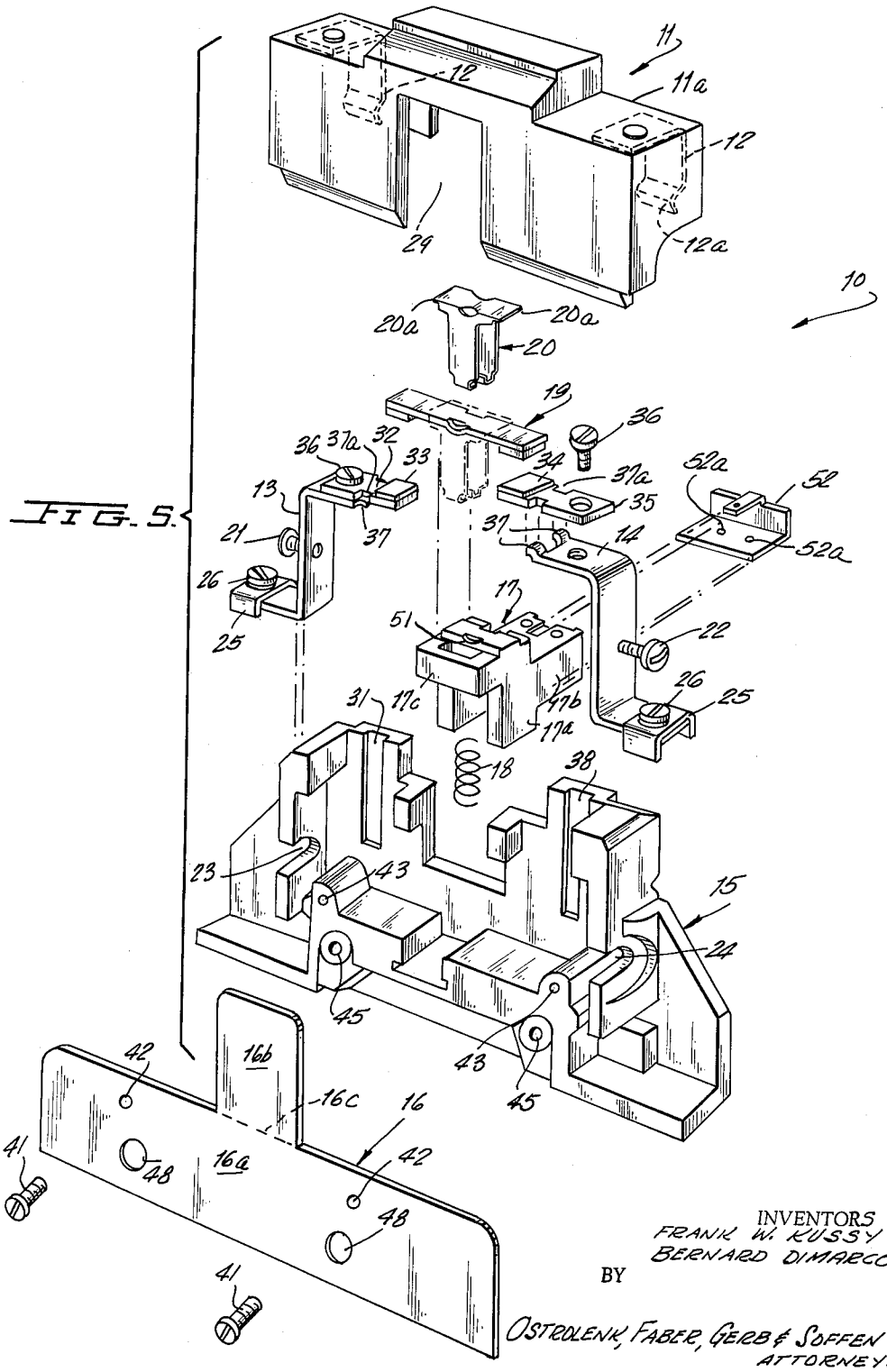
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FIG. 5.



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3,226,516

ADD-ON MAIN POLE UNIT FOR CONTACTORS

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Filed July 1, 1963, Ser. No. 291,648
3 Claims. (Cl. 200—165)

This invention relates to electromagnetic contactors in general and more particularly to a main pole unit which may be readily added to an existing contactor so as to operate simultaneously with the contactor main contacts.

Most commercial electromagnetic contactors are manufactured as three phase units. However, certain motor starter applications require four and five pole units. But, the latter applications are so few in number, that the expense involved in constructing special four and five pole contactors is not warranted.

Because of this the instant invention provides an add-on pole unit which may be mounted to an existing contactor so as to operate in conjunction therewith under the mechanical power supplied by the electromagnet of the contactor. Power required to operate the add-on pole unit or units, as the case may be, is usually found in the existing contactor in that the latter is constructed to operate in conjunction with auxiliary equipment such as mechanical or electromechanical interlocks and latches. Where even more power is required to operate the add-on pole units, this is often obtained by replacing the existing electromagnet coil with one which will operate more ampere turns for the same applied voltage.

Briefly, the add-on pole unit of the instant invention includes a base assembly, a movable contact assembly and a cover. The base assembly is designed to be rigidly secured directly to the contactor base while the movable contact assembly is constructed to be rigidly secured directly to the movable contact carrier of the contactor. The cover is removably mounted to the base assembly with the cover and base assembly cooperating to form a chamber wherein the contacts of the add-on pole unit are disposed. The base assembly includes a pair of spaced apart stationary contacts which become properly positioned for engagement by the movable contact bridge when the base assembly is secured to the contactor base by two screws. The movable contact assembly includes an insulating member which carries the contact bridge and is provided with an extension engaged by means which secure the movable contact assembly to the contact bridge.

Operation of the contactor electromagnet causes movement of the contact carrier and the movable contact assembly of the add-on pole unit, being rigidly secured to the contact carrier, moves in unison therewith. Thus, the contacts of the add-on pole unit are operated at the same time as the contacts for the contactor proper.

Accordingly, a primary object of this invention is to provide a novel construction for an add-on pole unit for electromagnetic contactors.

Another object is to provide a novel construction for add-on pole units, one or two of which may be mounted to an existing contactor.

Still another object is to provide an add-on pole unit having a readily removable cover and in which the contacts are conveniently disposed for inspection and replacement after the cover is removed.

A still further object is to provide a novel construction for a pole unit which when added to a contactor is capable of operating auxiliary equipment such as a mechanical interlock.

A still further object is to provide a novel add-on pole unit in which the contacts are normally closed yet may be readily removed from the pole unit after the cover is removed.

These as well as further objects of this invention shall become readily apparent after reading the following description of the accompanying drawings in which:

FIGURE 1 is a side elevation showing the manner in which the add-on pole unit of the instant invention is mounted to a contactor.

FIGURE 2 is a fragmentary plan view showing the add-on pole unit and contactor of FIGURE 1.

FIGURE 3 is an end view of the add-on pole unit showing in detail the manner in which it is mechanically secured to the contactor.

FIGURE 4 is a side elevation of the add-on pole unit with portions of the housing broken away to reveal the current carrying elements disposed within the housing.

FIGURE 5 is an exploded perspective of the add-on pole unit of FIGURE 4.

FIGURE 6 is a side elevation similar to FIGURE 4 illustrating an add-on pole unit in which the contacts are normally closed.

Now referring to the figures and more particularly to FIGURES 1 through 5. Add-on pole unit **10** consists of three assemblies which will be designated base assembly, movable assembly, and cover. As seen in FIGURE 5 the cover **11** consists of molded element **11***a* having metal clips **12, 12** riveted thereto for a reason to be hereinafter explained.

The base assembly consists of terminal strips **13, 14**, the elements mounted to terminal strips **13, 14**, hollowed out insulating base **15** and insulating cover sheet **16**.

The movable assembly consists of molded insulating member **17**, contact pressure spring **18**, bridging contact **19** and retainer **20**.

Screws **21, 22** extend through slots **23, 24**, respectively, in the side walls of base **15** to secure terminal strips **13, 14** to base **15**. Wire grips **25** are secured by screws **26** at one end of each of the terminal strips **13, 14**. Stationary contact **34** is secured to one end of strap **35** while the other end of strap **35** is secured by screw means **36** to the end of terminal strip **14** remote from wire grip **25**. The end of terminal strip **14** is deformed to provide torques **37** which are received by notches **37***a* in strap **35** for locating strap **35** with respect to terminal strip **14**. In a similar manner, the other stationary contact **33** is mounted at one end of conducting strap **32** which is secured by another screw **36** to the end of terminal strip **13** remote from wire grip **25** with other torques **37** providing locating means which cooperate with strap notches **37***a*.

Screws **41** extending through apertures **42** in insulating sheet **16** are received by threaded apertures **43** in base **15** to secure sheet **16** to base **15**. The end portions of insulating sheet **16** operate with formations at the end of base **15** to define recesses wherein wire grips **25** are disposed. Insulating sheet section **16***b* extends upwardly from main section **16***a* and is received by cut out **29** in cover member **11***a*. The purpose of cut out **29** will be hereinafter explained. Two screws **44** extend through clearance apertures **45** in base **15** and are received by nuts **46** captured in formations of the contactor base **47** to rigidly secure the base assembly of the add on pole unit to the contactor base **47**. It is noted that the heads of screws **44** are of a smaller diameter than apertures **48** of insulating sheet **16** so that the latter may be removed without dismounting base **15** from base **47**.

Insulating member **17**, for purposes of this description, will be deemed to consist of three sections, **17***a*, **17***b* and **17***c*.

In FIGURE 5 section **17***a* is shown as being an inverted U. Spring **18** is a coiled compression member dis-

posed between the arms of section 17*a*. The web of section 17*a* is provided with depressions 51 which receive edge protrusions of bridging contact 19 to locate contact 19 relative to member 17.

Retainer 20 is shown in FIGURE 5 as being an inverted U-shaped member. The arms of retainer 20 extend in the same direction as the arms of insulator section 17*a* but are rotated 90° with respect thereto. The arms of retainer 20 are inturned at the free ends thereof so as to provide seats for one end of spring 18 whose other end bears against the underside of the web of section 17*a*. Bridging contact 19 is interposed between the webs of retainer 20 and section 17*a*.

Section 17*b* carries U-shaped clip 52 which clamps itself to section 17*b* and is provided with threaded apertures 52*a* receive screws 53 carried by extension 60 of contactor contact carrier 61. Thus, it is seen that as carrier 61 is moved up and down insulating member 17, hence bridging contactor 19, will be moved up and down. In the down position with respect to FIGURE 4 it is seen that bridging contact 19 engages both of the stationary contacts 33 and 34.

Contactor 65 is described in detail in the Cataldo et al. copending application 189,915, filed April 24, 1962, entitled Electrical Device and assigned to the assignee of the instant invention. Briefly, contactor 65 includes a stationary insulating plate 66 which carries the stationary contacts for all phases of contactor 65. For each phase there is a stationary contact 67 connected to terminal 68 and another stationary contact 69 connected to another terminal 71. In addition bridging contact 70 operated by contact carrier 61 is provided to simultaneously engage both stationary contacts 67, 69. An electromagnet (not shown) is provided to operate contact carrier 61 in one direction while springs (not shown) are provided to move carrier 61 in the opposite direction.

As seen in FIGURE 3, base 15 is provided with depressions 15*a* which receive protrusions 12*a* at the free ends of clips 12 to retain cover 11 removably mounted to base 15. It is noted that with cover 11 mounted to base 15 a chamber is formed wherein contacts 19, 33 and 34 are disposed so that arcing is essentially confined to the region within base 15.

When it is desired to utilize auxiliary equipment such as a mechanical interlock of the type illustrated in the B. DiMarco copending application, Serial No. 293,596, filed July 9, 1963, entitled Mechanical Interlock, and assigned to the assignee of the instant invention, it is necessary to break off section 16*b* of insulating sheet 16 along score line 16*c*. When this is done the interlock may be mounted with an operating member thereof positioned to be engaged by section 17*c* and be operated thereby.

It is noted that indexing formations 81, 82, projecting from the back of base 15, mate with complementary formation 83 of contactor base 47 for the positioning of add-on pole unit 10 with respect to contactor 65.

With slight modification the add-on pole unit 10, which is a normally open unit, may be changed to a normally closed unit. This is accomplished as follows: U-shaped member 91 is secured to terminal strip 14 at the ends thereof remote from wire grip 25 by means of screw 92. Conducting straps 35 are inverted and secured to the other leg of member 91 by utilizing screw 36. In a similar manner, another U-shaped member 91 is secured to terminal strip 13 and conducting strap 32 carrying the other stationary contact 33 is mounted to the latter member 91.

Retainer 20 is dismounted from insulating member 17 and is inverted with web extensions 20*a* being inserted into base slots 15*c*. Spring 18 is disposed between the arms of retainer 20 and bridging contact 19 rests against the upper end of spring 18 with respect to FIGURE 6. The lower end of spring 18 bears against the web of retainer 20. Thus, spring 18 biases bridging contact 19 upwardly into engagement with stationary contacts 33, 34. When bridging contact 19 is removed for inspection and/or replacement the inturned portion at the free ends of the retainer arms serve to retain spring 18.

In operation, when contact carrier 61 moves downwardly member 17 moves downwardly with the space arms thereof engaging bridging contact 19 to separate the latter from stationary contact 33, 34. It is noted that the arms of section 17*a* extend parallel to the arms of retainer 20 yet are rotated 90° with respect thereto so that there is mutual clearance.

As seen most clearly in FIGURE 2, contact carrier 61 is provided with another extension 60*a* so that another add-on main pole unit may be mounted to contactor 65 on the other side thereof.

Thus, this invention provides a novel construction for an add-on main pole unit which may be mounted directly to existing contactors. The construction is such that a standard contactor may be stocked in the warehouse and when an extra pole or two is required, it may readily be added.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure herein, but only by the appended claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. In a contactor having a base, cooperating stationary and movable contacts, a movable carrier to which said movable contacts are mounted, means for moving said movable carrier between a first and second position in which said movable contacts are in and out of engagement with said stationary contacts, respectively, the improvement comprising an add-on main pole unit which includes:

a base assembly having first means for rigidly mounting said base assembly to the base of said contactor, said base assembly further including a pair of additional stationary contacts spaced apart therein;

a movable assembly having an additional movable contact operable into and out of engagement with said additional stationary contacts, said movable assembly further including an insulating member having a first and section and a spring biased between said first section and said additional movable contact for firmly biasing said additional movable contact into engagement with said additional stationary contacts when the movable carrier of said contactor moves said movable contacts into engagement with said stationary contacts, said first section of said insulating member and said spring residing between said additional stationary contacts;

and a cover including means for mounting said cover to said base assembly in position to form a chamber which encloses said additional stationary contacts and said additional movable contacts;

said second section of said insulating member extending beyond the confines of said chamber and including apertures therein for the reception of a fastening member which passes through said movable carrier of said contactor and into said second section for rigidly securing said second section to said carrier;

movement of said movable carrier of said contactor to its first position causing said additional movable contact to engage said additional stationary contacts, movement of said movable carrier to its second position causing said additional movable contact to disengage said additional stationary contacts, movement of said movable carrier to its second position being the only manner in which said additional movable contact may be disengaged from said additional stationary contacts.

2. The arrangement of claim 1 in which said movable assembly also includes a retainer interposed between said spring and said additional movable contact for transmitting force from said spring to said additional movable contact

and for removably securing said additional movable contact to said insulating member.

3. In a contactor having a base, cooperating stationary and movable contacts, a movable carrier to which said movable contacts are mounted, means for moving said movable carrier between a first and second position in which said movable contacts are in and out of engagement with said stationary contacts, respectively, interlock equipment operating in conjunction with said contactor, the improvement comprising an add-on main pole unit which includes:

a base assembly having first means for rigidly mounting said base assembly to the base of said contactor, said base assembly further including a pair of additional stationary contacts spaced apart therein;

a movable assembly having an additional movable contact operable into and out of engagement with said additional stationary contacts, said movable assembly further including an insulating member having first, second and third sections and a spring biased between said first section and said additional movable contact for firmly biasing said additional movable contacts into engagement with said additional stationary contacts when the movable carrier of said contactor moves said movable contacts into engagement with said stationary contacts, said first section of said insulating member and said spring residing between said additional stationary contacts, said third section of said insulating member being positioned on a first side of said first section for engagement with the interlock equipment operating in conjunction with said contactor;

and a cover including means for mounting said cover to said base assembly in position to form a chamber

which encloses said additional stationary contacts and said additional movable contacts;

said second section of said insulating member being positioned on a second side of said first section opposite said first side and extending beyond the confines of said chamber and including apertures therein for the reception of a fastening member which passes through said movable carrier and into said second section for rigidly securing said second section to said carrier;

movement of said movable carrier of said contactor to its first position causing said additional movable contact to engage said additional stationary contacts, movement of said movable carrier to its second position causing said additional movable contact to disengage said additional stationary contacts, movement of said movable carrier to its second position being the only manner in which said additional movable contact may be disengaged from said additional stationary contacts.

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