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(54) **COMBINATION MECHANICAL AND ELECTRICAL INTERLOCK MECHANISM.**

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## Description

### Field of the Invention

The present invention relates to electric circuit controllers, and particularly to a combination electrical and mechanical interlock mechanism for preventing the closure of one motor starter contactor when a second contactor is closed and for preventing closure of the second contactor when the first contactor is closed.

### Background Art

In many applications it is necessary to provide two motor starters or contactors connected to energize the same electrical device from the same energy source. A typical application of this type may be found in a polyphase reversible motor.

There are known individual mechanical and electrical interlocking arrangements for avoiding simultaneous closure of both contactors. It is also known to provide starter circuits wherein components permit both electrically and mechanically interlocking. In general, mechanical interlocking devices may take the form of those shown in U. S. Patents US-A-3,240,889, US-A-3,536,868 or US-A-3,564,466, each of which are assigned to the assignee of the present invention. Devices for preventing the simultaneous closure of two or more control circuits have been known since the advent of the 1912 Bechoff U. S. Patent 1,037,580. This concept has evolved into self-contained mechanical interlock assemblies, such as those disclosed in the Ward Patent US-A-3,510,612 and in US-A-3,210,491 granted to Di-Marco. In both of the latter-mentioned assemblies, there is an provided arrangement for seating the self-contained unit between adjacent contactors.

In situations where both electrical and mechanical interlocking is deemed to be beneficial or necessary, as in the case of requirements in certain industry standards, electrical interlocking required separate auxiliary contacts individually attached to the contractors, requiring considerable space with extra wiring for connection of these auxiliary switches with the various terminals of the individual contactors. An example of this is FR-A-1,340,955 which provides a housing with the mechanical assemblies on the exterior of the housing, and the electrical assemblies mounted in the housing interior.

From a practical and commercial standpoint, it is obvious that reduction in size of electrical control devices is a user convenience and is often a requirement. Reversing motor starters are often contained within modular control centers where the user/customer expects such centers to be of a size suitable for location of a maximum number of control devices, wiring and adjunct equipment within a minimum amount of space.

The object of the present invention is to provide a unitary, self-contained interlock mechanism of

simplified constructions, which eliminates separate auxiliary contact devices heretofore required for electrical interlocking purposes.

The present invention provides an interlock mechanism for a pair of circuit controllers each having normally open contact assemblies concurrently operable with a respective circuit controller, said mechanism responsive to movement of individual controller elements movable in the same direction, said mechanism comprising a stationary support member, first and second movable operators supported by said support members, each of said operators including means for respectively engaging one of said individual controller elements, each of said operators including a blocking formation, said operators being independently movable from a first position to a second position, said operators positioned so that predetermined movement of either operator partway from its first position toward its second position places the blocking formation of this operator in the path of movement of the blocking formation of the other of said operators so that the latter is prevented from moving to its second position; characterized by the combination therewith of first and second electrical interlock contact assemblies within the same housing, each electrical contact assembly respectively including a first and a second pair of stationary contacts and a first and second movable bridging contact, said bridging contacts each respectively operated by the said first and second operators from a first normally closed contact position to a second contact open position concurrently with contact closure of the auxiliary contact assembly of a respective one of said pair of circuit controllers, and biasing means urging each of the movable contacts of said interlock contact assemblies toward contact closed position.

The combination electrical and mechanical interlock mechanism includes, in its preferred construction, not only pivotally mounted operators individually defining a physical blocking formation for preventing simultaneous operation of movable members of the respective contactors, but further confines the electrical interlock contacts entirely within the container housing to be operated concurrently with the mechanical operators. The electrical interlock contacts are preferably mounted on each of the respective operators in a manner which permits a movable contact member to move from a normally closed contact position in an electrical interlocking circuit to an alternative open contact position concurrently with the closure of a movable holding contact in conjunction with the actuation of a movable element located on a reversing motor starter contactor.

In the drawings:

Figure 1 is a schematic diagram illustrating a typical wiring circuit for a pair of electrically interlocked circuit controllers, such as reversing

motor starters, and wherein certain portions of the circuit illustrate the location of auxiliary electrically interlocking contact assemblies a pair of which are contained within a unitary, self-contained structure along with mechanical interlock operators in accordance with the present invention.

Figure 2 is a longitudinal view of the mechanism a first embodiment of the present invention preferably housed in a transparent enclosure, and illustrating the initial operating position of the operating elements of the combined electrical circuit interlocking contacts operated by respective mechanical interlocking operators for motor starters contactors and wired in accordance with the diagram of Figure 1.

Figure 3 is the same view as Figure 2, but with the elements shown in their respective second, alternative operating position.

Figure 4 is an end view taken from the right side of the views of Figures 2 and 3 of the interlocking mechanism.

Figure 5 is a view similar to the view of Figure 2, illustrating another embodiment, wherein the respective circuit holding contact assemblies of respective circuit controllers are also contained within a unitary housing along with the mechanical and electrical interlocking elements of the combination interlock mechanism of this invention.

#### Detailed Description of the Preferred Embodiment

With reference to the drawings, it will be observed that the interlock mechanism 10 (also indicated in phantom outline in Fig. 1) of the present invention includes its operating components confined within the chamber or cavity 11 of a two-part, preferably transparent, housing or enclosure 12. As will be noted, interlock mechanism 10 provides a relatively thin, self-contained unit capable of being mounted between adjacent motor starter contactors (not specifically shown). Typical controllers are described and claimed in U. S. Patent 3,962,658 assigned to the assignee of the present invention. The reversing motor starter assembly, combined with an interlock mechanism, is preferably arranged in a manner quite similar to that disclosed in the DiMarco U. S. Patent 3,210,491.

Reversing, electromagnetically operated circuit controllers, or motor starter contactors, are illustrated symbolically in the view of Fig. 1, and identified generally by reference characters R (reversing) and F (forward), respectively, and are operated by control coils RCR and FCR. The motor reversing control contactor R, by means of its coil RCR, operates appropriate, normally open, power pole contacts R1, R2 and R3, respectively and the forward motor control coil FCR of contactor F actuates normally open power poles F1, F2 and F3, respectively. Both control coils RCR and FCR may be energized by means of a manually operated, momentary pushbutton station PS with appropriately identified normally

open contacts FC and RC for forward and reverse motor operation and normally closed contact SC, which provides means for stopping the motor M.

With reference to Figs. 2, 3 and 4, the housing 12 of the mechanism 10 comprises identically formed, mating sections 12a and 12b, both preferably molded of transparent, plastic insulating material. The mating sections 12a and 12b are joined together to provide an enclosed construction by conventional means, such as heat staking, riveting or other well-known attaching means. In the present device, the sections or halves 12a and 12b are heat staked at the areas indicated by the reference numeral 13. As previously stated, the sections 12a, 12b are preferably identical for ease in assembly and manufacture, as well as minimal cost considerations. The sections 12a, 12b are preferably molded from transparent material in order to provide a convenient means for orienting internally located components during assembly of the mechanism 10 and also for convenience in locating the mechanism between adjacent contactors (not shown). As shown in Fig. 3, the component parts of the interlock mechanism 10 have been actuated to motor reversing position. Operation will be explained later in connection with Fig. 1.

It will become apparent from later explanation that a particular mechanical operator will be actuated by a particular moving element of a selected contactor F or R. It is imperative that each of the electrical interlocking elements operate concurrently with alternative movement of its respective mechanical interlocking operator, and that this concurrent operation must be assured during initial mounting of the interlock mechanism between adjacent motor starter contactors to achieve the deserved interlocking function for correct and safe directional movement of the motor M. Visual observation of the relative operating position of the contacts and of the operators during assembly of the mechanism with respect to the contactors R and F provides this assurance.

Projecting from opposite sides of the housing 12, and integrally molded therewith, are mounting elements 14. The elements 14 are not considered to be part of the present invention, but are provided for lateral support with cooperating elements of a particular circuit controller design (not shown).

As stated previously, the present interlock mechanism finds ultimate cost advantage and simplicity of inventory and manufacturing tooling, fixturing and assembly by providing its various components as identically configured parts. For instance, as aforesaid, the housing sections 12a and 12b are identical, and are arranged to define the chamber, or cavity 11 in which there is disposed identically formed operators 20a and 20b, pivotally supported at 21a and 21b by means of laterally extending pivot projections 22a and 22b. The sidewalls of respective housing sections 12a and 12b are each provided with elongated openings 23 for permitting unobstructive movement of laterally projecting operating handles in

the form of steel pins 24a and 24b, press fit into an opening in the embossed area 25 of the respective operators 20a and 20b.

It will be further observed that the operators 20a and 20b are respectively provided with cooperating blocking formations comprising integrally formed projections 26a and 26b each respectively defining blocking cam surfaces 27a, 27b and 28a, 28b. The external cam surface 27b and 28a of the operators 20b and 20a are shown in Fig. 3 in blocking formation, simultaneously with the operation of a reversing contactor R (see Fig. 1) to circuit closed position by means of its control coil RCR responsive to momentary manual closure of pushbutton contact RC. The normally open pole line contacts R1, R2, R3 will have been mechanically moved to their respective closed position by conventional electromagnetic operation of the relay RCR to complete the current to start the motor M in its reverse direction. This operation will be described later in detail. For the present purposes, it may be stated that the handle 24b, projecting from the reversing operator 20b, will be in the down position as shown in Fig. 3, having been moved downwardly from the normal operating position shown in the view of Fig. 2 by an operating element (not shown) on the reversing starter contactor R.

It will be further observed from the views of Figs. 2 and 3 that the present invention provides a novel combination of electrical interlock contact assemblies operated conjointly with the mechanical operating members 20a and 20b. It is preferable to mount the spanner or bridging movable contact members 30a and 30b of each interlock contact assembly directly on, or supported by, a respective operator 20a and 20b. The essence of novelty in this arrangement provides minimal space requirements in the assembly of adjacent reversing contactors or electrical controllers, with both the operator and the contacts housed together in a self-contained unit.

The identically formed bridging contact spanners 30a and 30b are slidably retained within the confines of an L-shaped, integrally formed contact retainer portions 31a, 31b of the respective operators 20a and 20b. A biasing spring 32 provides a means of biasing a respective spanner 30a, 30b towards circuit closed position relative to its stationary contact pairs 33a or 33b. The respective ones of each of the stationary contact pairs 33a and 33b are preferably identical in configuration, and each are provided with threaded openings for receiving identical terminal screw assemblies 34. It will be apparent that other means of termination, such as by means of stab type terminals may be provided when required by a customer-user.

Referring again to the views of Figs. 2 and 3, it will be noted that Fig. 2 depicts the operating components of the interlock mechanism 10 in the normal or initial operating position with both of the interlock contact spanners 30a, 30b in circuit closed position with respect to stationary contact pairs 33a and 33b. This should also be considered

with reference to Fig. 1, in the normal operating position with the motor M stopped, contactors or controllers R and F have their respective motor power poles R1, R2, R3 and F1, F2, F3 in normal circuit open position. The three-phase motor M is electrically connected to these respective power poles. The pushbutton contact assemblies FC and RC are shown in their normally open, manual operating position with the start button contact SC in normally closed position. Thus, responsive to momentary manual operation of reversing pushbutton contact RC, line current will be supplied from terminals RL1, RL2, RL3 to the power poles R1, R2, R3 to complete the circuit from contact RC through conductor 40 through the stationary auxiliary contact terminals 33a, via normally closed contact spanner 30a, through conductor 41, through the coil of the control relay RCR of reversing contactor R, the conductor 42, via the normally closed overload relay contact OLR, conductor 43 to the terminal of incoming line RL2. The circuit is then completed at the other side of manually closed contact RC, via normally closed contact SC of the stop button, the conductors 44 and 45 to incoming line terminal FL1. The normally open holding contact assembly RA will be closed concurrently with closure of power pole contacts R1, R2 and R3. When closed, holding contact RA will act as a circuit holding contact upon manual release of momentary pushbutton contact RC, to thereby maintain the circuit through the control coil RCR of reversing starter R until such time as the normally closed stop button contact SC is depressed to de-energize the circuit of Fig. 1.

Thus, upon completion of the motor reversing circuit, as just described, the mechanical interlock operators 20a and 20b will be pivotally moved by means of handle 24b engaging a moving element (not shown) on the contactor R to the position shown in Fig. 3 and simultaneously with energization of the reversing control coil RCR. Movement of reversing operator 20b to the position shown in Fig. 3 will cause the bridging spanner contact 30a to remain in closed position with respect to stationary contacts 33a as the forward mechanical operator 20a will be blocked from movement by interference of the cam surface 27b, underlying the concave surface 28a of operator 20a. Again, with reference to the views of Figs. 1 and 3, it will be noted that the normally closed reversing contact spanner 30b will have been moved away simultaneously with counterclockwise pivotal movement of reversing operator 20b, from circuit connection with its respective stationary terminal contacts 33b. This action will also provide concurrent electrical interlocking means for preventing closure of the second motor contactor F which controls forward movement of the motor M. Electric power will be prevented from entering the control relay FCR when the spanner 30b has been moved to circuit open position of Fig. 3. It may be noted that the contact spanner 30a is additionally biased towards its closed position by means of the compres-

sion spring 32 seated in the well 35 of the portion 31a of the operator 20a.

It will be apparent from the circuit diagram of Fig. 1 that the motor may be stopped and later restarted in a forward direction upon momentary manual operation of the pushbutton contacts SC which opens the circuit through conductors 44 and 45, and thereby permit the control coil RCR to open its pole line contacts R1, R2, R3 and holding contact RA.

Operation of the motor in the forward direction is accomplished in similar manner as that of reverse operation. In this mode, upon momentary manual closure of contact FC, the forward contactor coil FCR will be energized via conductors 44, normally closed contact SC of pushbutton PS, conductor 45 to power line terminal FL1 on one side of the line, and via conductors 46 and 47, the interlock contact 30b, normally bridging its stationary contacts 33b, the normally closed contact on overload coil relay contact OLR and conductor 43 to power line terminal RL2 on the return side.

Another embodiment of the present invention will next be discussed in connection with the illustration of Fig. 5. It will be noted, for ease in discussion, that all like elements of the versions of Fig. 5 and of the previously discussed version of Figs. 2-4, will be referred to by like reference characters.

The unitary construction of the present embodiment operates in the same manner as previously described in connection with the embodiment of Figs. 2-4, inclusive. That is, a set of normally closed electrical interlocking contact assemblies comprising the movable bridging contacts 30a and 30b are also normally closed as shown in the view of Fig. 5 to complete the circuit through stationary contacts 33a and 33b, respectively. This initial position was also discussed in connection with the view of Fig. 2. Also, the components comprising the terminals 34 are preferably identically formed, as are the spanners 30a and 30b and respective stationary contacts 33a and 33b.

The present embodiment, with reference to Fig. 1, features removal of the normally open holding contacts RA and RF from the position shown in the Fig. 1 circuit drawing to be included within the area defined by the phantom outline 10. The embodiment of the invention, as shown in Fig. 5, provides for the addition of normally open holding contact assemblies 130a, 133a and 130b, 133b within the confines of the housing 112. Each of the respective terminal connections 34, and 134a, 134b are offset laterally relative to its respective adjacent upper contact set to permit insertion of conventional screwdrivers for completing termination to electrical connections (not shown). The present embodiment provides for terminations 134a and 134b which have several components identical in nature, such as the terminal screws, pads and the like, but the stationary contact portions 133a and 133b have been elongated when compared to 33a and 33b, and 134b is of a longer construction than 134a to permit the aforementioned offset construction for unincum-

bered reception of screwdrivers, Allen wrenches or other fastening tools.

In the present construction, it will be noted that the operators 120a and 120b are substantially identical in their camming and blocking arrangements and portions interacting with one another, as previously described embodiments of Figs. 2 and 3. In the present version the operators 120a and 120b, have been modified at their respective lower portions to include integrally formed portions 131a and 131b, each extending downwardly relative to the view of Fig. 5, the portions 131a and 131b provide means for slidably retaining movable spanners or contacts 130a and 130b, respectively. These spanners 130a, 130b are identical with the spanners 30a and 30b and are retained in the same manner by the integrally formed portions 131a and 131b as previously described in connection with integrally formed operator portions 31a and 31b. A biasing spring 132 normally biases the respective spanner 130a, 130b towards closed position with respect to its stationary contacts 133a, 133b. It will be noted that this contact assembly comprising the contacts 130a, 133a and 130b, 133b are normally open as shown, and are the physical embodiment of holding contacts RA and RB of Fig. 1, respectively.

Thus, it will be observed that an additional set of auxiliary contacts may be contained within the unitary housing 112. Again, the housing 112 is preferably comprised of two mating halves, as in the case of the housing 12 for economics in construction and ease in assembly. The mating members comprising the housing are also preferably transparent as above described in connection with the housing 12.

It will be obvious that the disposition of the normally closed, interlocking contact assemblies, respectively comprised of the elements 30a, 33a and 30b, 33b and the normally holding contact assemblies 130a, 133a and 130b, 133b, eliminate the need for separate auxiliary units, to thereby provide considerable additional space on the individual circuit controllers or motor starter contactors for mounting of additional auxiliary contacts for indicator lights, closing or opening ancillary circuit connections, or for any other purposes normally accomplished by auxiliary contact constructions intended to be moved concurrently with movable elements on respective motor starter contactors.

## Claims

1. In an interlock mechanism (10, 110) for a pair of circuit controllers each having normally open contact assemblies concurrently operable with a respective circuit controller, said mechanism (10, 110) responsive to movement of individual controller elements movable in the same direction, said mechanism (10, 110) comprising a stationary support member, (12, 112) first and second movable operators (20a, 20b ; 120a, 120b) supported by said support member, each of said operators

including means for respectively engaging one of said individual controller elements, each of said operators (20a, 20b ; 120a, 120b) including a blocking formation (26a, 26b), said operators (20a, 20b ; 120a, 120b) being independently movable from a first position to a second position, said operators (20a, 20b ; 120a, 120b) positioned so that predetermined movement of either operator partway from its first position toward its second position places the blocking formation (26a, 26b) of this operator in the path of movement of the blocking formation (26a, 26b) of the other of said operators (20a, 20b ; 120a, 120b) so that the latter is prevented from moving to its second position ; characterized by the combination therewith of first and second electrical interlock contact assemblies within the same housing (12, 112), each electrical contact assembly respectively including a first and a second pair of stationary contacts (33a, 33b ; 133a, 133b) and a first and second movable bridging contact, (30a, 30b ; 130a, 130b) said bridging contacts (30a, 30b ; 130a, 130b) each respectively operated by the said first and second operators (20a, 20b ; 120a, 129b) from a first normally closed contact position to a second contact open position concurrently with contact closure of an auxiliary contact assembly of a respective one of said pair of circuit controllers, and biasing means (32, 132) urging each of the movable bridging contacts (30a, 30b ; 130a, 130b) of said interlock contact assemblies towards contact closed position.

2. The interlock mechanism of Claim 1, wherein said stationary support member (12, 112) comprises a relatively thin enclosure of transparent insulating material having internal formations cooperating to define a chamber (11) for receiving and supporting said movable operators (20a, 20b ; 120a, 120b) and the respective interlock contact assemblies and said normally open contact assembly.

3. The interlock mechanism of Claim 1, wherein the moveable bridging contacts (30a, 30b ; 130a, 130b) of the interlock contact assemblies are respectively supported by and movable conjointly with said movable operators (20a, 20b ; 120a, 120b) from said first normally closed position to said second contact open position dependent upon selective alternative movement of its respective operator.

4. The interlock mechanism of Claim 3, wherein the said movable operators (20a, 20b ; 120a, 120b) are pivotally supported by said stationary support member (12, 112).

5. The interlock mechanism of Claim 4, wherein said stationary support member (12, 112) comprises a relatively thin enclosure of transparent material having internal formations cooperating to define a chamber (11) for receiving and supporting the respective interlock contact assemblies.

6. The interlock mechanism of Claim 2, wherein said transparent enclosure is comprised of a pair of identical mating sections, (12a, 12b ; 112a, 112b) the first and second electrical interlock

contact assemblies are each composed of identically formed, interchangeable stationary (33a, 33b ; 133a, 133b) and movable contacts, (30a, 30b ; 130a, 130b) and wherein said first and second operators (20a, 20b ; 120a, 120b) are each identical and interchangeable with one another.

7. The interlock mechanism of Claim 1, wherein the said normally open contact assemblies each include a pair of stationary contacts (33a, 33b ; 133a, 133b) and a movable bridging contact, (30a, 30b ; 130a, 130b) and wherein each of the movable contacts of each of said pairs of normally open contact assemblies is operated by an concurrently movable with a respective one of said movable operators (20a, 20b ; 120a, 120b) towards circuit closed position with respect to its pair of stationary contact.

8. The interlock mechanism of Claim 7, wherein the bridging contact (30a, 30b ; 130a, 130b) of each of said normally open contact assemblies is supported by and concurrently movable with a respective operator (20a, 20b ; 120a, 120b).

9. The interlock mechanism of Claim 8, wherein said stationary support member (12, 112) comprises a relatively thin enclosure of transparent insulating material having internal formations cooperating to define a chamber (11) for receiving and supporting each said movable operators, (20a, 20b ; 120a, 120b) each of said respective interlock contact assemblies and each of said normally open contact assemblies.

## Patentansprüche

1. Verriegelungsmechanismus (10, 110) für ein Paar von Stromkreissteuergeräten, von denen jedes Schließeranordnungen besitzt, die gleichzeitig mit je einem zugeordneten Stromkreissteuergerät betätigbar sind, wobei der Mechanismus (10, 110) auf eine Bewegung von einzelnen Steuergeräteelementen anspricht, die in derselben Richtung bewegbar sind, und der Mechanismus (10, 110) einen ortsfesten Träger (12, 112) besitzt, ferner ein erstes und ein zweites bewegbares Betätigungsorgan (20a, 20b ; 120a, 120b), die von dem Träger getragen werden und von denen jedes Mittel zum Angriff an einem der einzelnen Steuergeräteelemente besitzt, wobei jedes der Betätigungsorgane (20a, 20b ; 120a, 120b) mit je einem Sperrteil (26a, 26b) ausgebildet ist und die Betätigungsorgane (20a, 20b ; 120a, 120b) unabhängig voneinander aus einer ersten in eine zweite Stellung bewegbar sind, die Betätigungsorgane (20a, 20b ; 120a, 120b) so angeordnet sind, daß eine vorherbestimmte Bewegung eines Betätigungsorgans über einen Teil des Weges von der ersten in die zweite Stellung den Sperrteil (26a, 26b) dieses Betätigungsorgans in die Bewegungsbahn des Sperrteils (26a, 26b) des anderen Betätigungsorgans (20a, 20b ; 120a, 120b) bewegt, so daß dieses nicht in seine zweite Stellung bewegt werden kann, gekennzeichnet durch die Kombination mit einer ersten und einer zweiten elektrischen Verriegelungskontaktanordnung,

die in demselben Gehäuse (12, 112) angeordnet sind und von denen jede ein erstes und ein zweites Paar von ortsfesten Kontakten (33a, 33b ; 133a, 133b) und eine erste und eine zweite bewegbare Kontaktbrücke (30a, 30b ; 130a, 130b) besitzt, wobei jede der Kontaktbrücken (30a, 30b ; 130a, 130b) von einem ihr zugeordneten ersten bzw. zweiten Betätigungsorgan (20a, 20b ; 120a, 120b) gleichzeitig mit dem Schließen einer Hilfskontaktanordnung eines zugeordneten Stromkreissteuergeräts aus einer ersten bzw. Schließstellung in eine zweite bzw. Offenstellung bewegbar ist und eine Vorbelastungseinrichtung (32, 132), die jede der bewegbaren Kontaktbrücken (30a, 30b ; 130a, 130b) der Verriegelungskontaktanordnungen in die Schließstellung zu bewegen trachtet.

2. Verriegelungsmechanismus nach Anspruch 1, dadurch gekennzeichnet, daß der ortsfeste Träger (12, 112) eine relativ dünne Umschließung aus einem durchsichtigen Isoliermaterial umfaßt, die im Innern mit Teilen ausgebildet ist, die so miteinander zusammenwirken, daß sie eine Kammer (11) zur Aufnahme und zum Abstützen der bewegbaren Betätigungsorgane (20a, 20b ; 120a, 120b), der entsprechenden Verriegelungskontaktanordnungen und der Schließeranordnung begrenzen.

3. Verriegelungsmechanismus nach Anspruch 1, dadurch gekennzeichnet, daß die bewegbaren Kontaktbrücken (30a, 30b ; 130a, 130b) der Verriegelungskontaktanordnungen von je einem der bewegbaren Betätigungsorgane (20a, 20b ; 120a, 120b) getragen werden und gemeinsam mit ihm in Abhängigkeit von einer gewählten alternativen Bewegung des zugeordneten Betätigungsorgans aus der ersten bzw. Schließstellung in die zweite bzw. Offenstellung bewegbar sind.

4. Verriegelungsmechanismus nach Anspruch 3, dadurch gekennzeichnet, daß die bewegbaren Betätigungsorgane (20a, 20b ; 120a, 120b) auf dem ortsfesten Träger (12, 112) schwenkbar abgestützt sind.

5. Verriegelungsmechanismus nach Anspruch 4, dadurch gekennzeichnet, daß der ortsfeste Träger (12, 112) eine relativ dünne Umschließung aus durchsichtigem Material besitzt, die innen mit Teilen ausgebildet ist, die miteinander unter Bildung einer Kammer (11) zur Aufnahme und zum Abstützen der Verriegelungskontaktanordnungen zusammenwirken.

6. Verriegelungsmechanismus nach Anspruch 2, dadurch gekennzeichnet, daß die durchsichtige Umschließung aus zwei identischen komplementären Teilen (12a, 12b ; 112a, 112b) besteht, die erste und die zweite elektrische Verriegelungskontaktanordnung jeweils aus miteinander identischen, auswechselbaren ortsfesten (33a, 33b ; 133a, 133b) und bewegbaren (30a, 30b ; 130a, 130b) Kontakten bestehen und das erste und das zweite Betätigungsorgan (20a, 20b ; 120a, 120b) miteinander identisch und auswechselbar sind.

7. Verriegelungsmechanismus nach Anspruch 1, dadurch gekennzeichnet, daß jede der Schließeranordnungen zwei ortsfeste Kontakte (33a,

33b ; 133a, 133b) und eine bewegbare Kontaktbrücke (30a, 30b ; 130a, 130b) aufweist und jeder der Paare von Schließeranordnungen mit einem zugeordneten, gleichzeitig bewegbaren Betätigungsorgan (20a, 20b ; 120a, 120b) gegenüber dem zugeordneten Paar von ortsfesten Kontakten zu der Schließstellung hin bewegbar ist.

8. Verriegelungsmechanismus nach Anspruch 7, dadurch gekennzeichnet, daß die Kontaktbrücke (30a, 30b ; 130a, 130b) jeder der Schließeranordnungen von einem zugeordneten Betätigungsorgan (20a, 20b ; 120a, 120b) getragen wird und gleichzeitig mit ihm bewegbar ist.

9. Verriegelungsmechanismus nach Anspruch 8, dadurch gekennzeichnet, daß der ortsfeste Träger (12, 112) eine relativ dünne Umschließung aus durchsichtigem Isoliermaterial besitzt, die innen mit Teilen ausgebildet ist, die unter Bildung einer Kammer (11) zusammenwirken, die zur Aufnahme und zum Abstützen jedes der bewegbaren Betätigungsorgane (20a, 20b ; 120a, 120b), jeder der zugeordneten Verriegelungskontaktanordnungen und jeder der Schließeranordnungen dienen.

## Revendications

1. Dans un mécanisme de verrouillage (10, 110), pour une paire de dispositifs de commande de circuit, chacun comportant des contacts normalement ouverts pouvant être actionnés simultanément avec un dispositif de commande de circuit concerne, ledit mécanisme (10, 110) réagissant au mouvement des éléments du dispositif de commande se déplaçant dans le même sens, ledit mécanisme (10, 110) comprenant un élément support fixe (12, 112), un premier et un deuxième organe de commande mobile (20a, 20b ; 120a, 120b) en appui sur lesdits éléments supports, chacun des organes de commande comprenant des moyens pour engager l'un desdits éléments isolés du dispositif de commande, chacun desdits organes de commande (20a, 20b ; 120a, 120b) comprenant une structure de blocage (26a, 26b), lesdits organes de commande (20a, 20b ; 120a, 120b) étant mobiles séparément à partir d'une première position vers une deuxième position, lesdits organes de commande (20a, 20b ; 120a, 120b) étant positionnés de telle sorte qu'un déplacement prédéterminé de l'un ou l'autre des organes de commande à mi-chemin de sa première position vers sa deuxième position place la structure de blocage (26a, 26b) de cet organe de commande sur le trajet de la structure de blocage (26a, 26b) de l'autre desdits organes de commande (20a, 20b ; 120a, 120b) de sorte que ce dernier est contrarié dans son déplacement vers sa deuxième position, caractérisé par la combinaison d'un premier et d'un deuxième ensembles à contacts de verrouillage électriques disposés dans le même logement (12, 112), chaque ensemble à contacts électriques comprenant une première et une deuxième paires de contacts fixes (33a, 33b ; 133a, 133b) et un premier et un

deuxième contacts mobiles de pontage (30a, 30b ; 130a, 130b), lesdits contacts de pontage (30a, 30b ; 130a, 130b) étant chacun actionné par lesdits premier et deuxième organes de commande (20a, 20b ; 120a, 120b) à partir d'une première position de contact normalement fermée vers une deuxième position de contact ouverte simultanément avec la fermeture du contact auxiliaire de l'une de ladite paire de dispositifs de commande, et des moyens (32, 132) poussant chacun des contacts mobiles (30a, 30b ; 130a, 130b) desdits ensembles de verrouillage vers la position de fermeture.

2. Mécanisme de verrouillage selon la revendication 1, sur lequel ledit élément support fixe (12, 112) comprend une enceinte relativement mince dans un matériau d'isolation transparent avec des structures internes définissant un compartiment (11) destiné à recevoir et à supporter lesdits dispositifs de commande mobiles (20a, 20b ; 120a, 120b) et les ensembles de verrouillage et ledit contact normalement ouvert.

3. Mécanisme de verrouillage selon la revendication 1, sur lequel les contacts de pontage mobiles (30a, 30b ; 130a, 130b) des ensembles de verrouillage sont supportés par et mobiles conjointement avec lesdits organes de commande mobiles (20a, 20b ; 120a, 120b) à partir de ladite position normalement fermée vers ladite deuxième position ouverte en fonction du mouvement alternatif choisi de son organe de commande.

4. Mécanisme de verrouillage selon la revendication 3, sur lequel lesdits organes de commande mobiles (20a, 20b ; 120a, 120b) sont en appui pivotant sur ledit élément support fixe (12, 112).

5. Mécanisme de verrouillage selon la revendication 4, sur lequel ledit élément support fixe (12, 112) comprend une enceinte relativement mince dans un matériau transparent avec des structures intérieures définissant un compartiment (11) destiné à recevoir et à supporter les ensembles de

verrouillage.

6. Mécanisme de verrouillage selon la revendication 2, sur lequel ladite enceinte transparente est formée de deux parties appariées identiques (12a ; 12b ; 112a, 112b) les premier et deuxième ensembles à contacts électriques comprenant chacun des contacts interchangeable fixes (33a, 33b ; 133a, 133b) et des contacts mobiles (30a, 30b ; 130a, 130b) de configuration identique, et sur lequel lesdits premier et deuxième organes de commande (20a, 20b ; 120a, 120b) sont identiques et interchangeables.

7. Mécanisme de verrouillage selon la revendication 1, sur lequel lesdits ensembles de contacts normalement ouverts comprennent chacun une paire de contacts fixes (33a, 33b ; 133a, 133b) et un contact mobile de pontage (30a, 30b ; 130a, 130b), et sur lequel chacun des contacts mobiles de chacune desdites paires des ensembles de contacts normalement ouverts est actionné et déplacé simultanément avec l'un desdits organes de commande mobiles (20a, 20b ; 120a, 120b) vers la position de fermeture du circuit eu égard à sa paire de contacts fixes.

8. Mécanisme de verrouillage selon la revendication 7, sur lequel le contact ponté (30a, 30b ; 130a, 130b) de chacun des ensembles de contacts normalement ouverts est supporté par et déplacé simultanément avec un organe de commande (20a, 20b ; 120a, 120b).

9. Mécanisme de verrouillage selon la revendication 8, sur lequel ledit élément support fixe (12, 112) comprend une enceinte relativement mince d'un matériau isolant transparent avec des structures intérieures définissant un compartiment (11) destiné à recevoir et à supporter chacun desdits organes de commande mobiles (20a, 20b ; 120a, 120b), chacun desdits ensembles de contacts de verrouillage et chacun desdits ensembles de contacts normalement ouverts.

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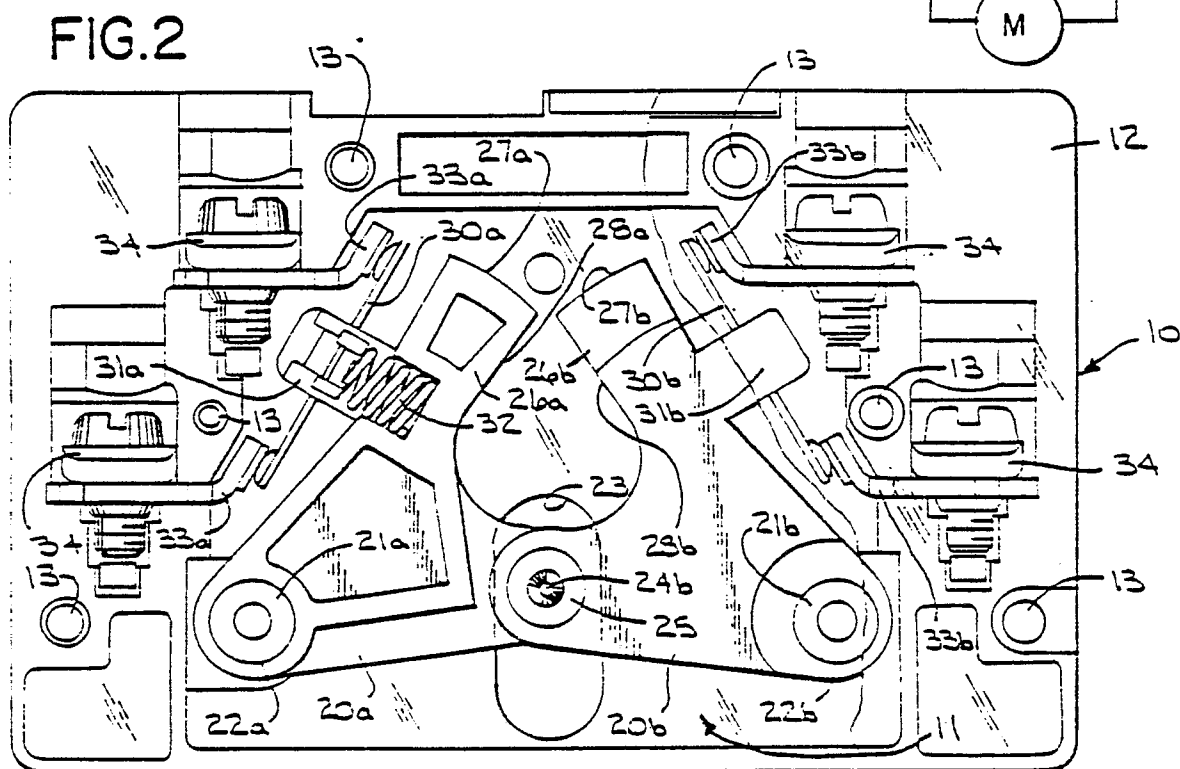
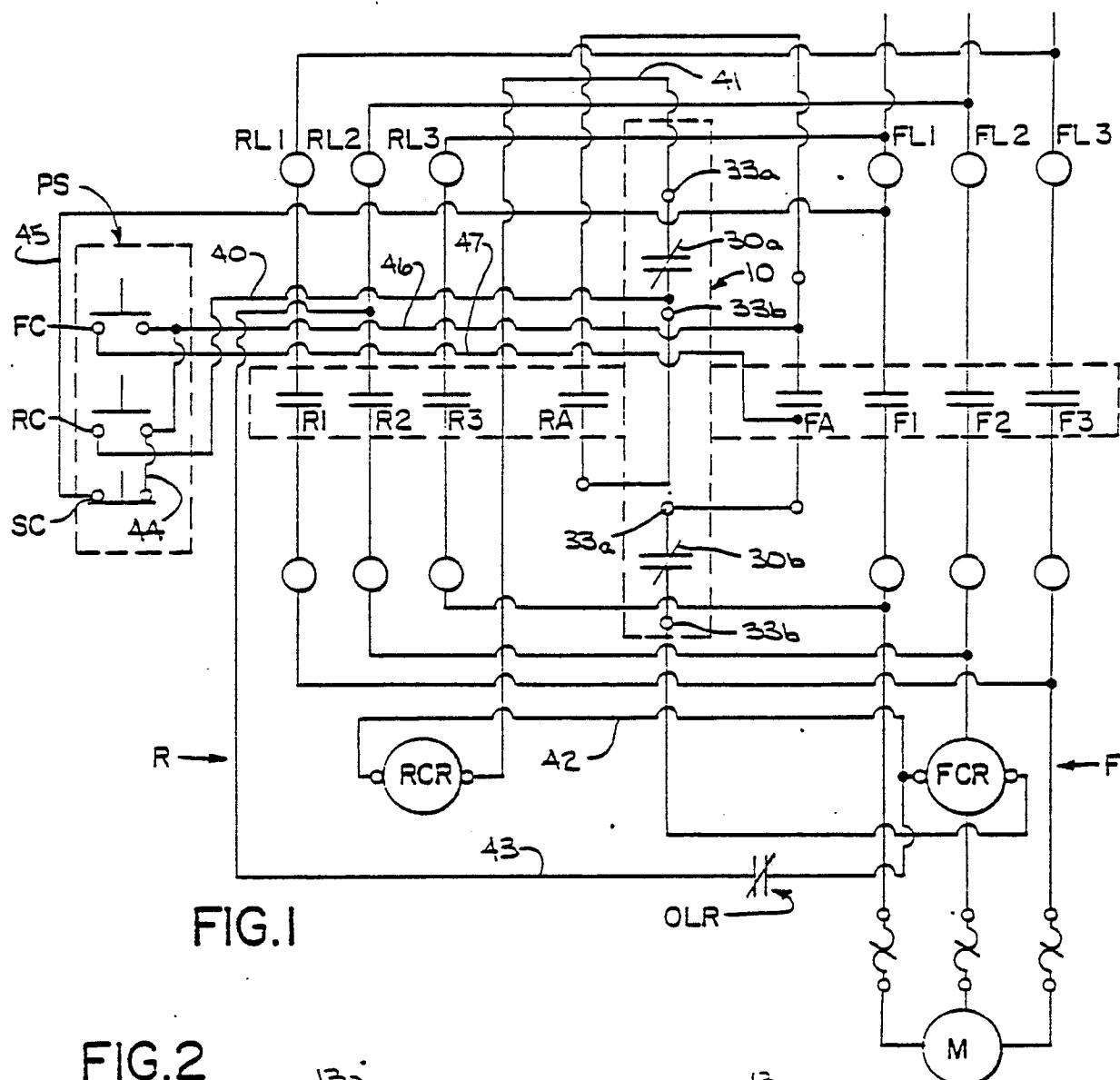
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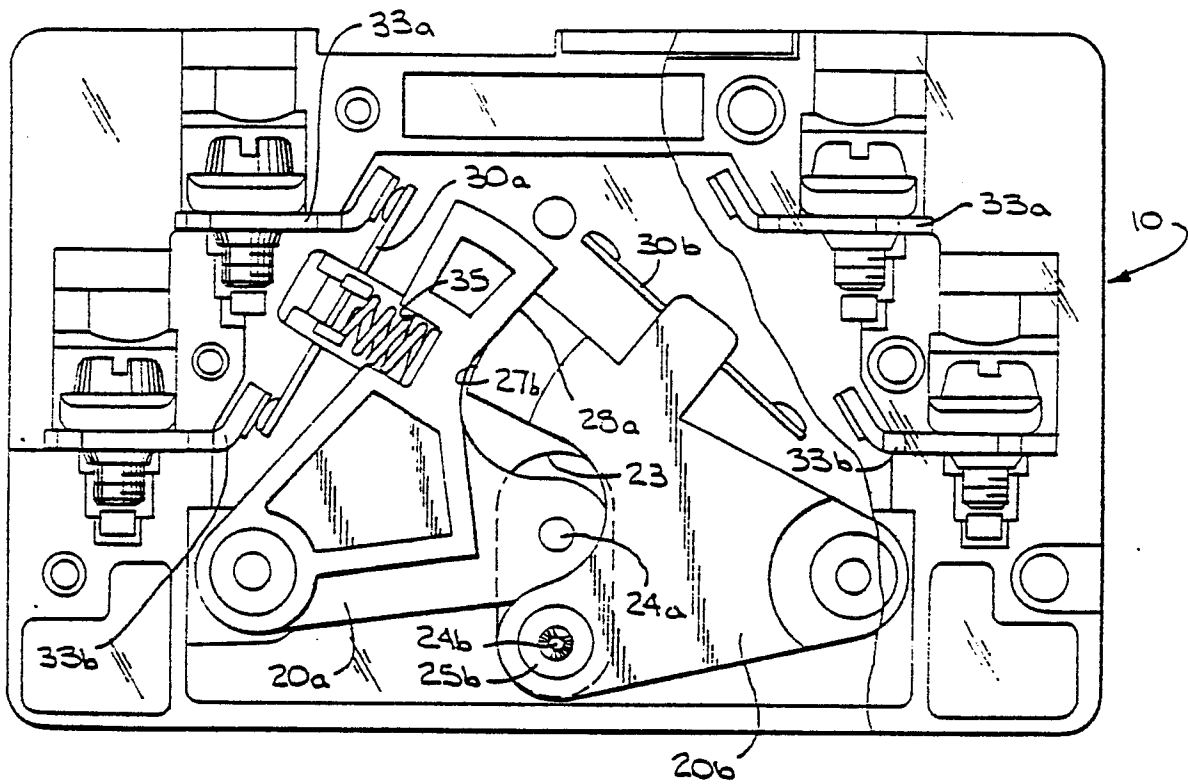


FIG. 3

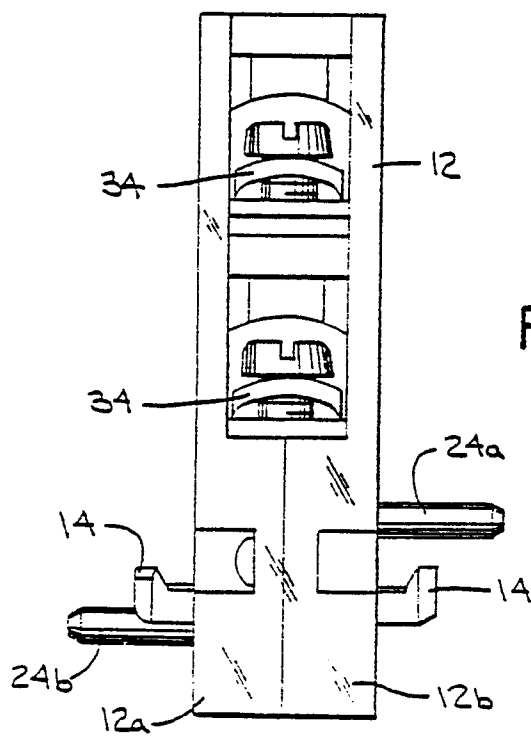


FIG. 4

FIG. 5

