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P. M. CHRISTENSEN

2,354,501

CONTACT CONSTRUCTION

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Fig. 1

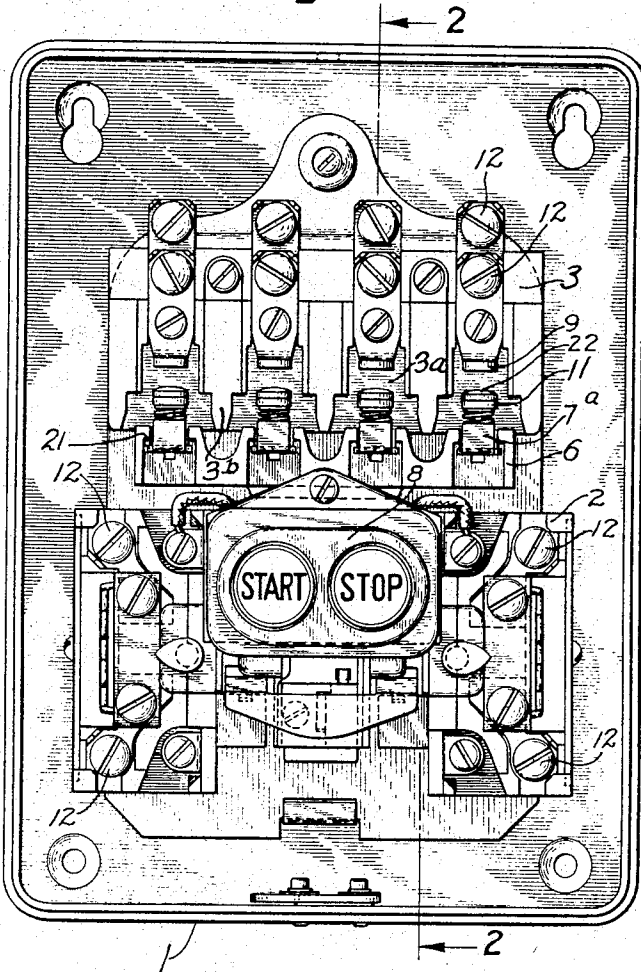


Fig. 2

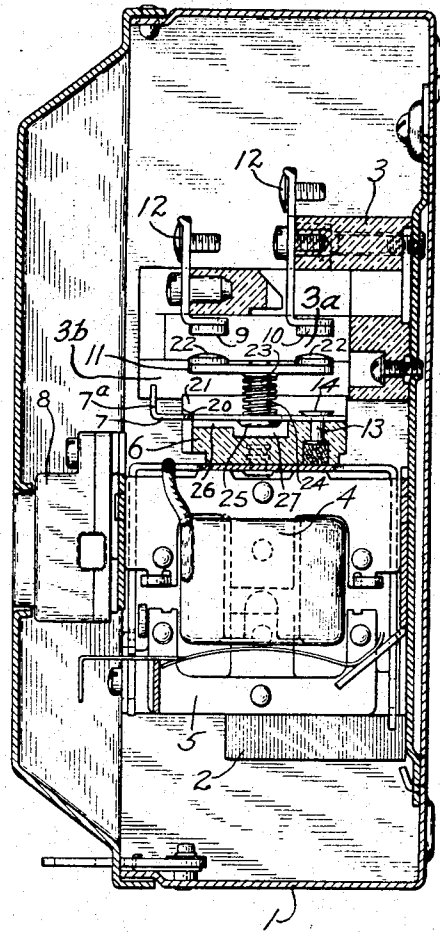


Fig. 3

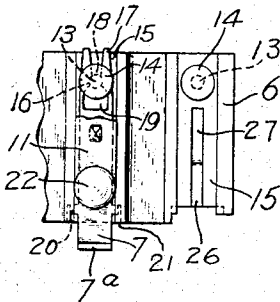


Fig. 4

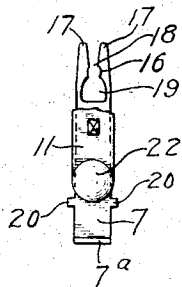
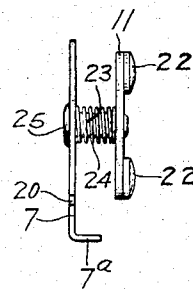


Fig. 5



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CONTACT CONSTRUCTION

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The invention has for its primary object the provision of an electrical contact construction wherein a contact and a supporting member therefor are so constructed that they may be completely assembled or disassembled upon substantially rectilinear relative movement and which includes a projection on one member yieldably locked within a recess in the other member to hold the members in assembled relationship.

Other and further objects and advantages of the invention will be apparent from the following specification to those skilled in the art.

In the accompanying drawing I have shown the now preferred embodiment of the invention, but it will be understood that the drawing is intended for illustrative purposes only and is not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

In the drawing:

Fig. 1 is a front elevational view of a switch incorporating a contact construction embodying the principles of the invention, the casing cover being omitted.

Fig. 2 is a sectional view taken on the line 2-2 of Fig. 1.

Fig. 3 is a fragmentary view of the contact construction shown in Figs. 1 and 2.

Figs. 4 and 5 are, respectively, front and side views of the contact carrying member.

It will be understood that the principles of the invention are applicable to contact constructions as used for various purposes and in various types of switches, although for the purposes of this specification their application to a switch of the magnetic motor starter type has been illustrated.

Referring to the drawing, and particularly to Figs. 1 and 2 thereof, a casing is shown at 1 having a magnetic motor starter mounted therein. As the specific details of the motor starter, aside from the contact construction, are of no particular importance to the present invention, only a brief description thereof will be given. A base 2 upon which the various parts of the motor starter including a stationary contact insulating base 3 are mounted is suitably secured to the back of the casing. Said insulating base 3 is provided in its underside with a plurality of spaced cavities 3^a serving as arcing chambers, said cavities being defined by depending plate-like insulating ribs 3^b forming the opposite sides of each cavity. The cavities are preferably open on two sides, namely, the front and bottom.

The tops of the cavities are shown closed at least by the stationary contacts to be described in detail. The rear side of the cavities are closed. Stationarily mounted on the base 2 is an electromagnet 4 adapted to reciprocate an armature 5. A supporting member 6 is mounted on the armature and removably supports contact carrying members 7, the members 6 and 7 being more fully described hereinafter. A push button control station 8 is mounted on base 2 with the push buttons exposed at the front of the switch as is apparent from Fig. 2. Contacts 9 and 10 are appropriately mounted on base 3 and are adapted to be bridged by contact member 11 on the contact carrying member 7 when moved thereby through the open bottom of the cavity 3^a containing said contacts. Suitable connection binding posts 12 are provided for making the necessary circuit connections.

In conformity with the objects of the invention as above stated, the contact construction includes a supporting member and a contact carrying member mounted thereon, one of the members including a projection receivable in completely assembled position in a recess in the other and positively, but releasably, locked in said recess by a yieldable resilient part of one of the members upon substantially relative rectilinear movement of the members whereby relative separative movement of the members in one direction is normally prevented, the members also including means for preventing separative movement in another direction. It will be understood the term "normally" as used herein with reference to the prevention of separative movement of the supporting and contact carrying members means that the members are inseparable unless forced apart by stressing some resilient part of one of the members to cause it to yield sufficiently to allow relative separative movement of the members, the resilient part returning to its former position upon removal of the stressing force. Figs. 2-5 best illustrate the details of the contact construction of the invention and reference is now made to those figures. A projection or pin 13 having a head 14 extends from one surface of the supporting member and the pin is preferably permanently embedded in the supporting member so as to project from the bottom of a groove 15 therein. As previously pointed out, one of the members of the contact construction is recessed to receive a projection on the other member and when the supporting member is provided with a projection such as the pin 13, the contact carrying member is recessed as at 16. In the specific con-

struction illustrated the end of the contact carrying member 7 is bifurcated, the inner edges of resulting legs 17 being properly shaped to form the recess 16 with a constricted entrance 18. Opening 19 is so formed in the metal of the contact carrying member as to render the legs 17 resiliently yieldable to permit the pin 13 to be forced through the constriction 18, which is of a width less than that of pin 13, into or out of the recess 16 which is of a size to nicely receive it. It is apparent from Figs. 2 and 3 that when the supporting and contact carrying members are in assembled relationship the constriction 18 yieldably locks the pin 13 in the recess 16 to prevent relative separative movement of the members in one direction which is longitudinal of groove 15 and that the head 14 on the pin 13 overlies a portion of the legs 17 to prevent separative movement of the innermost or forward end of the contact carrying member 7 in another direction which is vertical with respect to Fig. 2. The term "vertical" as used herein is relative to the position of the switch shown in Figs. 1 and 2. It is to be understood that, if the switch is mounted in a different position, the term "vertical" will apply in the same relative relationship used with respect to Figs. 1 and 2. Additional means are preferably provided for preventing relative separative movement of the rearward or outer end of the contact carrying member with respect to the supporting member 6 in the vertical direction and the specific means illustrated comprises lugs 20 on the contact carrying member which are receivable behind or under shoulders 21 on the supporting member as clearly shown in Figs. 1-3, inclusive. Member 7 is preferably provided with a grip portion or member 7^a which is readily accessible from the front. Elements 13, 14, 16, 17, 20 and 21 comprise snap-acting, quick-detachable means to normally prevent relative separative movement between the contact carrying members 7 and the supporting member 6.

The contact carrying member 7 may have a contact or contacts mounted thereon as desired, but in the particular application of the invention illustrated the contact member 11 is provided with contacts 22 and is resiliently mounted on member 7 by means of stem 23 and spring 24. An upset head 25 on stem 24 holds members 7 and 11 together and a groove 26 and recess 27 for receiving the head 25 are formed in the bottom wall of groove 15 in the supporting member. The contact carrying members 7, contact members 11, and contacts 22 comprise contact assemblies.

From the foregoing description and the drawing it is apparent that the supporting and contact carrying members can be completely assembled by substantially rectilinear relative movement of the members, the specific operation being that as member 7 is slid longitudinally in groove 15 during assembly the legs 17 pass beneath head 14 on pin 13 and the legs resiliently yield to permit pin 13 to be received in recess 16 as the pin is forced through the constricted entrance portion 18. Constriction 18 normally locks the pin in recess 16 to prevent relative separative movement in one direction which is longitudinal of the groove 15, while shoulders 21 and head 14 overlie portions of member 7 to prevent relative separative movement in another direction which is vertical with respect to Figs. 1 and 2. Disassembly of the members is effected by simply pulling on grip 7^a

and removing the contact carrying members 7 through the front openings of cavities 3^a. In the foregoing description and the appended claims, descriptive terms denoting position and direction, such as front, rear, bottom, vertical, and the like are to be considered when the switch illustrated in the drawing is viewed in its normal position which is that shown when the sheet of drawings is disposed in a vertical position. Said descriptive terms are to be considered in the same relative sense regardless of the position in which the switch may be ultimately disposed.

Various changes and modifications within the scope of the invention will be apparent to those skilled in the art to which the invention relates.

What I claim is:

1. In a switch, a contact construction comprising the combination of a supporting member and a contact carrying member, one of said members having a projection extending from a surface thereof and the other member having a recess therein of a size to receive said projection, said recess having a constricted entrance of a width less than that of said projection for normally locking the same in the recess when received therewithin to prevent relative separative movement of said members, and one of said members including a resilient portion yieldable to allow the projection to be forced through the said constricted entrance into and out of said recess.

2. In a switch, a contact construction comprising the combination of a supporting member and a contact carrying member, one of said members having a projection extending from a surface thereof and the other member having a recess therein of a size to receive said projection, said recess having a constricted entrance with a resilient sidewall, the said entrance being of a width less than that of said projection for normally locking the same in the recess when received therewithin to prevent relative separative movement of said members in one direction and the resilient sidewall of said constricted entrance being yieldable to allow the projection to be forced into and out of said recess, and said members including interengageable portions for preventing relative separative movement thereof in another direction.

3. In a switch, a contact construction comprising the combination of a supporting member having a pin projecting from a surface thereof, and a contact carrying member having a recess therein of a size to receive said pin, said recess having a constricted entrance with a resilient sidewall, the said entrance being of a width less than that of said pin for normally locking said pin in the recess when received therewithin to prevent relative separative movement of said members in one direction and the resilient sidewall of said constricted entrance portion being yieldable to allow the pin to be forced into and out of said recess, and said members including interengageable portions for preventing relative separative movement thereof in another direction.

4. In a switch, a contact construction comprising the combination of a supporting member having a headed pin projecting from a surface thereof, and a contact carrying member having a recess therein of a size to receive said pin, said recess having a constricted entrance portion with a resilient sidewall, the said entrance being of a width less than that of said pin for normally locking said pin in the recess when received therewithin to prevent relative separative move-

ment of said members in one direction and the resilient sidewall of said constricted entrance portion being yieldable to allow the pin to be forced into and out of said recess, the head on said pin overlying a portion of said contact carrying member for preventing relative separative movement of the members in another direction.

5. In a switch, a contact construction comprising the combination of a supporting member having a pin projecting from a surface thereof, and a contact carrying member having a bifurcated end forming a resiliently walled recess therein of a size to receive said pin, said recess having a constricted entrance of a width less than that of said pin for normally locking said pin in the recess when received therewithin to prevent relative separative movement of said members in one direction, the said resilient wall being yieldable to allow the pin to be forced into and out of said recess, and said members including interengageable portions for preventing relative separative movement thereof in another direction.

6. In a switch, a contact construction comprising the combination of a supporting member having a pin projecting forward from a face thereof, and a contact carrying member having therein and adjacent one end thereof a recess with a resiliently sidewalled constricted entrance, said pin being received in said recess and normally locked therein by said constricted entrance when the members are in assembled relationship to prevent relative separative movement of the members in a direction transverse to the longitudinal axis of said pin, and said supporting member including portions overlying the contact carrying member when the members are in assembled relationship to prevent relative separative movement thereof in a direction parallel to the longitudinal axis of said pin.

7. In combination in an electric switch, a supporting member movable in opposite directions along a predetermined path, said member having an open guide groove therein extending transversely to said path, a contact assembly movable with the supporting member and comprising a contact member mounted on a carrying member, said carrying member being detachably secured in said guide groove and the contact face of the contact member being substantially perpendicular to said path of movement, a stationary contact support positioned in the projected path of movement of the movable supporting member, a stationary contact on the stationary support and having its contact face substantially parallel to the contact face of the movable contact and positioned to be engaged and disengaged thereby, and snap-acting quick detachable means comprising component parts respectively carried by said carrying member and movable supporting member to normally connect the said contact assembly with the movable supporting member but enable the said contact assembly to be disconnected from and connected to said movable supporting member by rectilinear movements of the movable contact assembly in reverse directions longitudinally of said guide groove and substantially parallel to the said contact faces and perpendicular to the aforesaid direction of movement while the elements of the switch other than said contact assembly may remain assembled.

8. In combination in an electric switch, a supporting member movable in opposite directions along a predetermined path, said member having

a guide groove therein extending transversely to said path, a contact assembly movable with the supporting member and comprising a contact member mounted on a carrying member, said carrying member being detachably secured in said guide groove and the contact face of the contact member being substantially perpendicular to said path of movement, a stationary contact support positioned in the projected path of movement of the movable supporting member, a stationary contact on the stationary support and having its contact face substantially parallel to the contact face of the movable contact and positioned to be engaged and disengaged thereby, snap-acting quick detachable means comprising component parts respectively carried by said carrying member and movable supporting member to normally connect the said contact assembly with the movable supporting member but enable the said contact assembly to be disconnected from and connected to said movable supporting member by rectilinear movements of the movable contact assembly in reverse directions longitudinally of said guide groove and substantially parallel to the said contact faces and perpendicular to the aforesaid direction of movement while the elements of the switch other than said contact assembly may remain assembled, and a manually engageable grip member on said contact assembly and adapted to be directly manually actuated to move said contact assembly rectilinearly in said guide groove for the aforesaid purposes.

9. In combination in an electric switch, a supporting member movable in opposite directions along a predetermined path, said member having a guide groove therein extending transversely to said path, a contact assembly movable with the supporting member and comprising a contact member having a contact face and mounted on a carrying member in spaced relationship thereto in a direction normal to the face of said contact, said carrying member being detachably secured in said guide groove and the contact face of the contact member being substantially perpendicular to said path of movement, a stationary contact support positioned in the projected path of movement of the movable supporting member, a stationary contact on the stationary support and having its contact face substantially parallel to the contact face of the movable contact and positioned to be engaged and disengaged thereby, and quick detachable means comprising component parts respectively carried by said carrying member and movable supporting member to normally connect the said contact assembly with the movable supporting member but enable the said contact assembly to be disconnected from and connected to said movable supporting member by rectilinear movements of the movable contact assembly in reverse directions longitudinally of said guide groove and substantially parallel to the said contact faces and perpendicular to the aforesaid direction of movement while the elements of the switch other than said contact assembly may remain assembled.

10. In combination in an electric switch, a supporting member movable in opposite directions along a predetermined path, said member having a guide groove therein extending transversely to said path, a contact assembly movable with the supporting member and comprising a contact member having a contact face and mounted on an elongated carrying member in spaced relationship thereto in a direction normal to the face

of said contact, said carrying member being detachably secured in said guide groove and the contact face of the contact member being substantially perpendicular to said path of movement, a stationary contact support positioned in the projected path of movement of the movable supporting member, a stationary contact on the stationary support and having its contact face substantially parallel to the contact face of the movable contact and positioned to be engaged and disengaged thereby, quick detachable means comprising component parts respectively carried by said carrying member and movable supporting member to normally connect the said contact assembly with the movable supporting member but enable the said contact assembly to be disconnected from and connected to said movable supporting member by rectilinear movements of the movable contact assembly in reverse directions longitudinally of said guide groove and substantially parallel to the said contact faces and perpendicular to the aforesaid direction of movement while the elements of the switch other than said contact assembly may remain assembled, and a manually engageable grip member connected to one end of said carrying member of said contact assembly and adapted to be manually actuated to move said contact assembly rectilinearly in said guide groove for the aforesaid purposes.

11. In combination in an electric switch, an insulating member provided with a cavity defined by opposed sides and open at its front side, a stationary contact having a contact face and mounted within said cavity between the sides thereof, a supporting member mounted for movement along a predetermined path intersecting said cavity and the plane substantially occupied by the face of said stationary contact, said supporting member having a surface extending substantially parallelly to said contact face and a guide groove formed in said surface, a contact assembly carried by said supporting member and movable thereby within said cavity between the sides thereof to and from engagement with said stationary contact, said contact assembly comprising a carrying member detachably mounted in said guide groove and also comprising a contact having a contact face engageable with the stationary contact and connected to said carrying member in spaced relationship thereto in a direction normal to the plane of the contact face of said carrying member, and means detachably connecting said contact assembly to said movable supporting member and comprising quick detachable coengaging parts respectively carried by said carrying member and movable supporting member, said coengaging parts being readily disconnectible by moving said carrying member relatively to said guide groove in said supporting member in a direction transverse to said predetermined path of said supporting member and through the open front of said cavity to effect removal of said contact assembly from said switch.

12. In combination in an electric switch, an insulating member provided with a cavity defined by opposed sides and open at its front side, a stationary contact having a contact face and mounted within said cavity between the sides thereof, a supporting member mounted for movement along a predetermined path intersecting said cavity and the plane substantially occupied by the face of said stationary contact, said supporting member having a surface extending sub-

stantially parallelly to said contact face and a guide groove formed in said surface, a contact assembly carried by said supporting member and movable thereby within said cavity between the sides thereof to and from engagement with said stationary contact, said contact assembly comprising a carrying member detachably mounted in said guide groove and also comprising a contact having a contact face engageable with the stationary contact, means detachably connecting said contact assembly to said movable supporting member and comprising quick detachable coengaging parts respectively carried by said carrying member and movable supporting member, said coengaging parts being readily disconnectible by moving said carrying member relatively to said guide groove in said supporting member in a direction transverse to said predetermined path of said supporting member and through the open front of said cavity to effect removal of said contact assembly from said switch, and a manually engageable grip member on said contact assembly and readily accessible for normal engagement adjacent the open front of the cavity of said insulating member whereby said grip member may be normally engaged and actuated to move said contact assembly relatively to said guide groove and supporting member for the aforesaid purposes.

13. In a switch, the combination of operating mechanism, a supporting member movable to and from open circuit position by said operating mechanism and having a plurality of pins projecting from a surface thereof, and a plurality of contact carrying members individually mounted on said supporting member and each having a contact resiliently mounted thereon and a recess therein of a size to receive one of said pins, the said recesses having resiliently sided walls constricted entrances of a width less than that of said pins for normally locking said pins in said recesses when received therewithin to prevent relative separative movement of said members, and the resilient sidewalls of said constricted entrances being yieldable to allow the pins to be forced into and out of said recesses.

14. In a switch, a contact construction comprising in combination, a supporting member having a plurality of projecting surfaces, a contact carrying member longitudinally movable into and out of normal position on the supporting member, securing means normally releasably holding one end of said contact carrying member in such position against said longitudinal movement, and projections extending outward from opposite sides of said contact carrying member and adapted to engage said projecting surfaces when said members are interconnected to hold the other end of said contact carrying member against transverse movement in a substantially vertical direction relative to said supporting member when in operative position.

15. A contact carrying member adapted to be secured to a supporting member in a switch comprising, in combination, a contact member, an element connected thereto and having one end bifurcated to provide a pair of resilient legs, and projections extending from opposite edges of said element adjacent the other end thereof, said legs and projections being adapted to coengage with means on said supporting member to detachably connect said contact carrying member thereto.