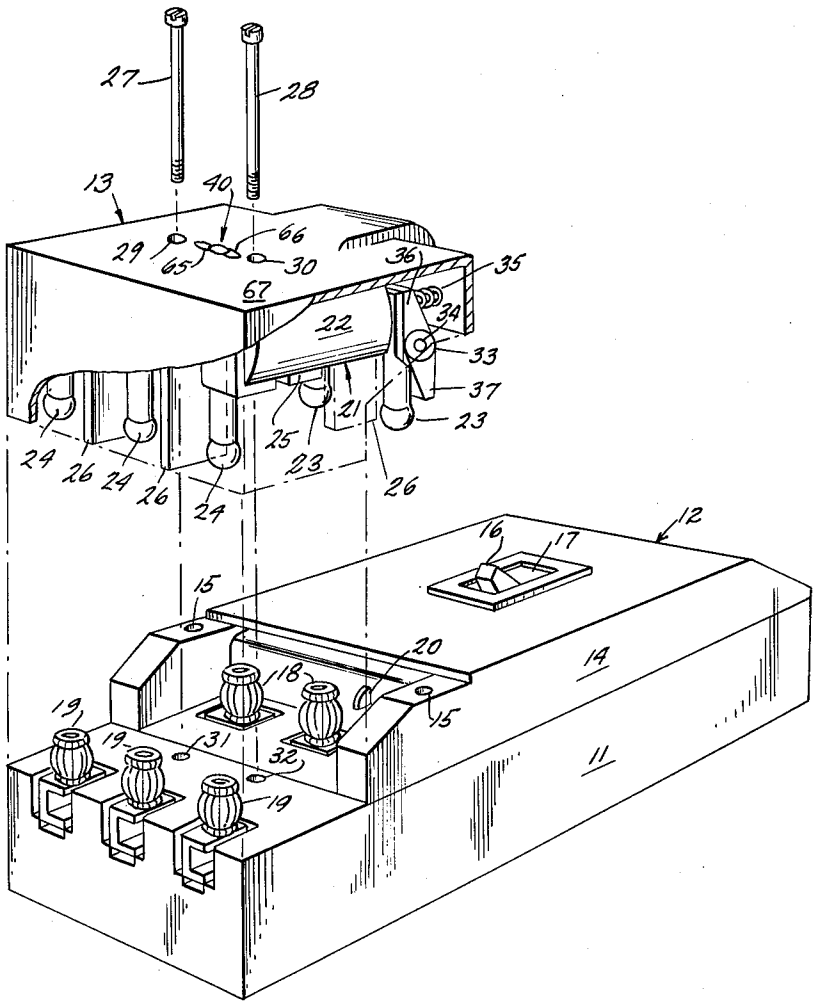
Jan. 2, 1962 A. BODENSCHATZ 3,015,709

COVER LIFT PIN

Filed April 9, 1959 2 Sheets-Sheet 1

FIG. 1




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Jan. 2, 1962 A. BODENSCHATZ 3,015,709

COVER LIFT PIN

Filed April 9, 1959 2 Sheets-Sheet 2

FIG. 3

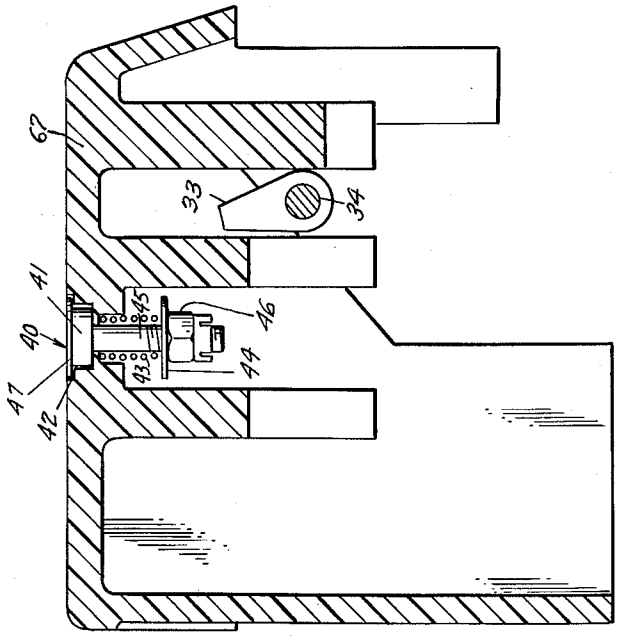



FIG. 4

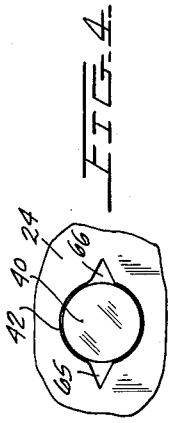
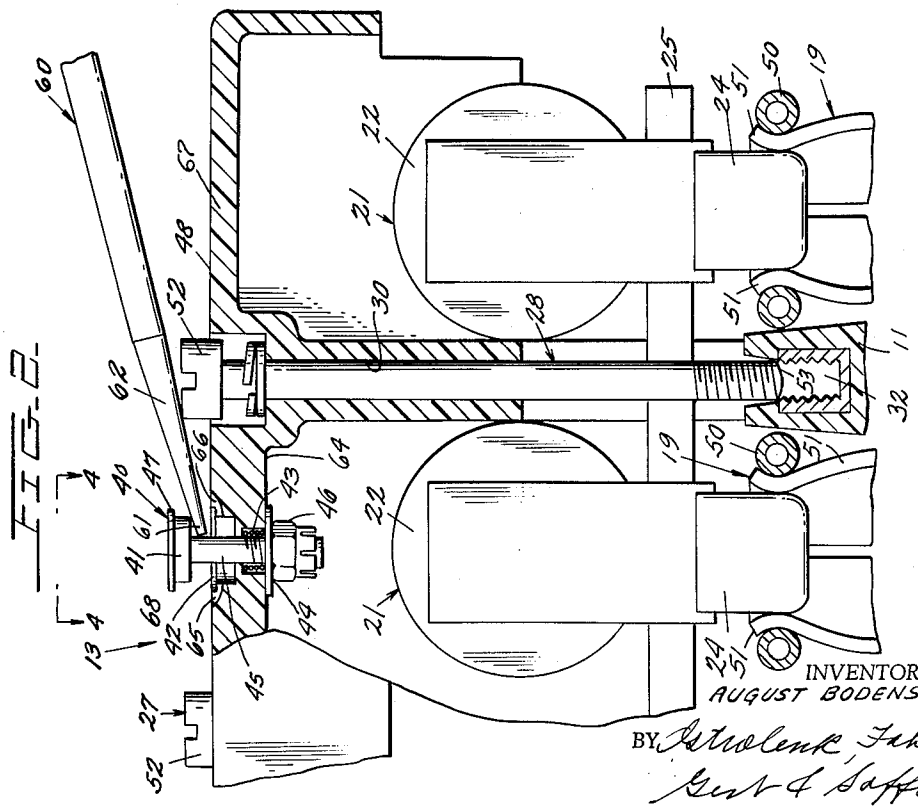



FIG. 2




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United States Patent Office

3,015,709

Patented Jan. 2, 1962



3,015,709

# COVER LIFT PIN

August Bodenschatz, Philadelphia, Pa., assignor to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

Filed Apr. 9, 1959, Ser. No. 805,183
9 Claims. (Cl. 200—114)

The instant invention generally relates to coordinated circuit breaker and fuse means which are mounted to a common base and more particularly to means for assisting in the removal of the fuse means from the base.

A molded case circuit interrupter unit wherein a circuit breaker and fuse means are mounted to a common base is described in detail in copending application Serial No. 622,042 filed November 14, 1956, now Patent No. 2,924,688 entitled "End Mounting of a Current Limiting Device Associated with a Circuit Breaker" with William Harold Edmunds as inventor, and assigned to the assignee of the instant invention.

The fuses of this type circuit interrupter are mounted to a cover which is removable from the base. The circuit breaker is usually a three-phase unit so that removal of the cover to which the fuses are secured results in the severing of six electrical connections.

Each of these electrical connections is made by a stud, projecting from the fuse, which is entered into a tulip type terminal connector mounted to the base. The tulip connector includes a biasing means which forces a plurality of fingers snugly against the fuse stud. This creates a good electrical connection and at the same time a mechanical force of considerable magnitude which holds the stud and tulip connected together. This mechanical force, when multiplied six times, makes it extremely difficult to separate the cover holding the fuses from the base.

In prior art circuit breakers of this type, it was necessary to rock the cover back and forth or to work a screw-driver between the cover and base on both sides of the circuit breaker in order to remove the fuse means from the base. In many installations, because of a front sheet in the panelboard to which the circuit breaker is mounted, the juncture between the base and cover was not accessible so that a screw-driver could not be conveniently entered at this juncture.

The instant invention provides means which assist in the separation of the cover from the base. This assist means comprises a lift pin which is mounted to the cover and is operatively positioned in close proximity to one of the screws which fastens the cover to the base. When it is desired to remove the cover from the base, the fastening screws are turned out of the base so that the ends thereof opposite the screw heads rest at the tops of the threaded base apertures which receive the securing screw. Now the screw heads are raised above the outer surface of the cover.

The tip of a screw driver is then placed under the head of the lift pin and the blade of the screw-driver is made to bear against one of the screw heads. By bearing on the handle of the screw-driver so as to apply a force acting toward the cover, the head of the securing screw acts as a fulcrum with the tip of the screw-driver raising the lift pin and in so doing lifting the cover which is free to move with respect to the securing screw.

The movement of the cover is sufficient to move the fuse studs with respect to the tulip connectors to a position wherein the mechanical force exerted by the tulip connectors against the fuse studs is materially decreased or completely eliminated. Thereafter the fuse cover and fuses may readily be removed from the base by hand.



The lift pin is normally disposed with the head thereof in a recess at the outer surface of the fuse cover with a spring means biasing the lift pin to this position. In this position, the head of the lift pin is flush with the outer surface of the cover. The recess for the lift pin head is provided with extension notches into which the screw-driver tip may be entered so that the tip may conveniently be placed below the lift pin head when it is desired to remove the fuses from the base at all other times the spring means biases the lift pin to a position where the head thereof is flush with the outer surface of the fuse cover.

Accordingly, a primary object of the instant invention is to provide novel means for assisting in the removal of a fuse means of a circuit interrupter from the base to which it is mounted.

Another object is to provide novel arrangement for prying a fuse cover and the fuses mounted thereto loose from the base to which it is mounted.

Still another object of my invention is to provide a retractable lift pin for a base cover which will assist in the removal of the cover from the base.

These as well as other objects of the instant invention shall become readily apparent after reading the following description of the accompanying drawings in which;

FIGURE 1 is a partially exploded perspective of a molded case circuit interrupter unit wherein a circuit breaker and coordinated fuse means are mounted to a common base with the fuse means being removable from the base.

FIGURE 2 is a crosse-section of the removable fuse means taken through line 2—2 of FIGURE 1 looking in the direction of arrows 2—2.

FIGURE 3 is a cross-section of the fuse means housing, with the fuses removed, taken through line 3—3 of FIGURE 1 looking in the direction of the arrows 3—3.

FIGURE 4 is a fragmentary plan view of the fuse means cover looking in the direction of arrows 4—4 of FIGURE 2.

Now referring to the figures, circuit interrupter unit 10 is of the type described in detail in the aforesaid copending application Serial No. 622,042. Circuit interrupter unit 10 generally comprises a common base 11 having circuit breaker 12 and fuse means 13 mounted thereto. Circuit breaker 12 includes a molded cover 14 removably secured to base 11 by fasteners 15. Operating handle 16 extends through cover opening 17 and is operatively connected to the cooperating contacts (not shown) of circuit breaker 12 for manual operation thereof. Circuit breaker 12 is a three-phase unit having three load terminals 18 only two of which are shown. A slidable pin 20 extends through cover 14 and provides the mechanical connection between the operating mechanism of circuit breaker 12 and fuse means 13 as will be hereinafter described.

Fuse means 13 comprises a current limiting fuse 21 in series with each of the three-phases of circuit breaker 12. The fusible element (not shown) of fuse 21 is housed in cylindrical casing 22. Studs 23, 24, at each end of casing 22 form the terminals for fuse 21.

The three fuses 21 are secured to fuse housing 67 by insulating strip 25 and suitable fastening means (not shown). Internal formations 26 of housing 67 provide electrical barriers between adjacent studs 24 and adjacent studs 23. Fuse terminals 23, 24 are positioned to be entered into tulip connectors 18, 19, respectively, which are mounted to base 11 when fuse means 13 is mounted to base 11. Screws 27, 28 are entered through clearance apertures 29, 30, respectively, of fuse cover 24 with the threads of screws 27, 28 mating with the threads of apertures 31, 32, respectively, in base 11.

Fuse means 13 also includes common tripper bar 33

pivotally mounted at 34 and biased thereabout in a counterclockwise direction by compression spring 35 which bears against fuse cover 67 and upper extension 36 of common tripper bar 33. When fuse means 13 is mounted to base 11, extension 37 of common tripper bar 33 engages slide pin 20 forcing it to the right with respect to FIGURE 1 thereby forming the mechanical connection between fuse means 13 and circuit breaker 12. The function and operation of this mechanical connection forms no part of the instant invention. A complete discussion of this subject is found in the aforesaid copending application Serial No. 622,042.

Secured to fuse cover 67 midway between apertures 29, 30 is lift pin 40. The head 41 of lift pin 40 is normally disposed within recess 42 formed in the outer surface 48 of fuse cover 67, being urged to this position by compression spring 43. One end of compression spring 43 bears against the inside surface of cover 67 while the other end of spring 43 bears against washer 44 which is mounted to the shank 45 of pin 40. Self-locking nut 46 threaded to pin 40 serves to retain pin 40 to cover 67. The head 41 of lift pin 40 is provided with an overhanging section 47, a surface of which lies flush with outside surface 48 of cover 67 when head 41 is disposed within recess 42.

When fuse means 13 is mounted to base 11, the garter springs 50 of the tulip connectors 18, 19 urge the contact members 51 of tulip connectors 18, 19 firmly against the outer surfaces of fuse terminals 23, 24. This creates a strong mechanical force acting to retain the connection between studs 23, 24 and terminals 18, 19 so that a considerable force is required to separate fuse means 13 from base 11.

Dismounting of fuse means 13 from base 11 is accomplished by first removing fastening screws 27, 28 from their respective threaded apertures 31, 32 so that the screw heads 52 are raised above the outer surface 48 of fuse cover 67 and the ends 53 of screws 27, 28 opposite heads 52 rest on the top threads of threaded apertures 31, 32. The tip 61 of screw-driver blade 60 is then forced under the head 41 of lift pin 40 and another portion 62 of screw-driver blade 60 is brought to bear against head 52 of screw 28.

By applying force upon the screw-driver handle (not shown) in a direction toward the outside surface 48 of cover 67, lift pin 40 is first raised out of recess 42. At the time when washer 44 is forced against the inner surface 64 of housing 24 by nut 46, continued movement of lift pin 40 will cause cover 67 to rise. This will also cause fuse terminals 23, 24 to rise being moved relative to their respective tulip connectors 18, 19 to a position wherein the force exerted by garter springs 50 is materially reduced. Now, fuse means 13 may be grasped by hand and dismounted from base 11.

In order to simplify the working of screw-driver tip 61 beneath lift pin head 41, recess 42 is provided with wing notches 65, 66 which extend beyond the portion of recess 42 occupied by head 41. Thus, when head 52 of securing screw 28 is utilized as a fulcrum screw-driver, tip 61 is entered into wing notch 66, worked under head extension 47, and then under the main portion of head 41 to abut the shank 45 of lift pin 40. Upon the removal of the screw-driver tip 61, compression spring 43 will retract lift pin 40 to the position wherein the top of head 41 is flush with the outside surface 48 of cover 67.

Thus, I have provided a novel means for assisting the dismounting of fuse means 13 from base 11. It is readily seen that the distance between screw-driver blade portion 62 and the point on the screw-driver handle where force is applied is considerably longer than the distance between blade portion 62 and blade tip 61. The mechanical advantage thereby obtained readily enables a person to overcome the mechanical force created by garter springs 50 of tulip connectors 18, 19 which tends to retain the connections between fuse stud terminals 23, 24 and their respective tulip connectors 18, 19.

In the foregoing, I have described my invention only in connection with preferred embodiments thereof. Many variations and modifications of the principles of my invention within the scope of the description herein are obvious. Accordingly, I prefer to be bound not by the specific disclosure herein but only by the appending claims.

I claim:

1. A circuit interrupter comprising a base, a circuit breaker mounted to said base, a fuse means operatively connected to said circuit breaker, securing means removably mounting said fuse means to said base; said fuse means being comprised of a cover and a fuse mounted to said cover; said fuse having a first and a second terminal; a third and a fourth terminal mounted to said base and removably engaged with said first and said second terminals, respectively; means carried by said cover and operatively positioned with respect to said securing means so as to be engageable by and cooperable with a prying device which utilizes said securing means as a fulcrum to thereby readily overcome the mechanical force which accompanies the engagement between said fuse terminals and said base mounted terminals when said fuse means is mounted to said base; said means comprising a lift pin having an enlarged head; said securing means being comprised of a screw passing through a clearance hole of said cover; one end of said screw having an enlarged head and the other end of said screw having threads mated with a threaded aperture in said base; said head being positioned beyond a first surface of said cover when said screw is at the entrance of said aperture; said means carried by said cover extending above said cover first surface when the prying device is manipulated to overcome the aforesaid mechanical force.

2. A circuit interrupter comprising a base, a circuit breaker mounted to said base, a fuse means operatively connected to said circuit breaker, securing means removably mounting said fuse means to said base; said fuse means being comprised of a cover and a fuse mounted to said cover; said fuse having a first and a second terminal; a third and a fourth terminal mounted to said base and removably engaged with said first and said second terminasl, respectively; means carried by said cover and operatively positioned with respect to said securing means so as to be engageable by and cooperable with a prying device which utilizes said securing means as a fulcrum to thereby readily overcome the mechanical force which accompanies the engagement between said fuse terminals and said base mounted terminals when said fuse means is mounted to said base; said securing means being comprised of a screw passing through a clearance hole of said cover; one end of said screw having an enlarged head and the other end of said screw having threads mated with a threaded aperture in said base; said head being positioned beyond a first surface of said cover when said screw is at the entrance of said aperture; said means carried by said cover extending above said cover first surface when the prying device is manipulated to overcome the aforesaid mechanical force; said last recited means comprising a lift pin having an enlarged head with the head extending above said first surface when said prying device is manipulated to overcome the mechanical force.

3. A circuit interrupter comprising a base, a circuit breaker mounted to said base, a fuse means operatively connected to said circuit breaker, securing means removably mounting said fuse means to said base; said fuse means being comprised of a cover and a fuse mounted to said cover; said fuse having a first and a second terminal; a third and a fourth terminal mounted to said base and removably engaged with said first and said second terminals, respectively; means carried by said cover and operatively positioned with respect to said securing means so as to be engageable by and cooperable with a prying de-

vice which utilizes said securing means as a fulcrum to thereby readily overcome the mechanical force which accompanies the engagement between said fuse terminals and said base mounted terminals when said fuse means is mounted to said base; said securing means being comprised of a screw passing through a clearance hole of said cover; one end of said screw having an enlarged head and the other end of said screw having threads mated with a threaded aperture in said base; said head being positioned beyond a first surface of said cover when said screw is at the entrance of said aperture; said means carried by said cover extending above said cover first surface when the prying device is manipulated to overcome the aforesaid mechanical force; said last recited means comprising a lift pin having an enlarged head with the head extending above said first surface when said prying device is manipulated to overcome the mechanical force; said cover having a recess in said first surface constructed and operatively positioned to receive said head of said lift pin.

4. A circuit interrupter comprising a base, a circuit breaker mounted to said base, a fuse means operatively connected to said circuit breaker, securing means removably mounting said fuse means to said base; said fuse means being comprised of a cover and a fuse mounted to said cover; said fuse having a first and a second terminal; a third and a fourth terminal mounted to said base and removably engaged with said first and said second terminals, respectively; means carried by said cover and operatively positioned with respect to said securing means so as to be engageable by and cooperable with a prying device which utilizes said securing means as a fulcrum to thereby readily overcome the mechanical force which accompanies the engagement between said fuse terminals and said base mounted terminals when said fuse means is mounted to said base; said securing means being comprised of a screw passing through a clearance hole of said cover; one end of said screw having an enlarged head and the other end of said screw having threads mated with a threaded aperture in said base; said head being positioned beyond a first surface of said cover when said screw is at the entrance of said aperture; said means carried by said cover extending above said cover first surface when the prying device is manipulated to overcome the aforesaid mechanical force; said last recited means comprising a lift pin having an enlarged head with the head extending above said surface when said prying device is manipulated to overcome the mechanical force; said cover having a recess in said first surface constructed and operatively positioned to receive said head of said lift pin; biasing means urging said head of said lift pin into said recess.

5. A circuit interrupter comprising a base, a circuit breaker mounted to said base, a fuse means operatively connected to said circuit breaker, securing means removably mounting said fuse means to said base; said fuse means being comprised of a cover and a fuse mounted to said cover; said fuse having a first and a second terminal; a third and a fourth terminal mounted to said base and removably engaged with said first and said second terminals, respectively; means carried by said cover and operatively positioned with respect to said securing means so as to be engageable by and cooperable with a prying device which utilizes said securing means as a fulcrum to thereby readily overcome the mechanical force which accompanies the engagement between said fuse terminals and said base mounted terminals when said fuse means is mounted to said base; said securing means being comprised of a screw passing through a clearance hole of said cover; one end of said screw having an enlarged head and the other end of said screw having threads mated with a threaded aperture in said base; said head being positioned beyond a first surface of said cover when said screw is at the entrance of said aperture; said means carried by said cover extending above said cover first surface when the prying device is manipulated to overcome the aforesaid mechanical force; said last recited means comprising a lift pin having an enlarged head with the head extending above said first surface when said prying device is manipulated to overcome the mechanical force; said cover having a recess in said first surface constructed and operatively positioned to receive said head of said lift pin; said recess including a notched extension projecting toward said cover clearance hole whereby the prying device may conveniently be worked to a position below the head of said lift pin.

6. A first assembly comprising a screw and a member having a clearance hole operatively positioned to receive said screw which will removably mount said first assembly to a second assembly; said first assembly including first means operatively positioned with respect to said hole to be engaged by and cooperate with a prying device which utilizes said screw as a fulcrum so as to assist in dismounting said first assembly from said second assembly; said first means comprising a lift pin having an enlarged head; said lift pin having limited axial movement.

7. A first assembly comprising a screw and a member having a clearance hole operatively positioned to receive said screw which will removably mount said first assembly to a second assembly; said first assembly including first means operatively positioned with respect to said hole to be engaged by and cooperate with a prying device which utilizes said screw as a fulcrum so as to assist in dismounting said first assembly from said second assembly; said first means comprising a lift pin having an enlarged head; said pin having limited axial movement and being movable to a first position wherein said enlarged head is disposed within the confines of a recess of said member in said first surface thereof.

8. A first assembly comprising a screw and a member having a clearance hole operatively positioned to receive said screw which will removably mount said first assembly to a second assembly; said first assembly including first means operatively positioned with repsect to said hole to be engaged by and cooperate with a prying device which utilizes said screw as a fulcrum so as to assist in dismounting said first assembly from said second assembly; said first means comprising a lift pin having an enlarged head; said pin having limited axial movement and being movable to a first position wherein said enlarged head is disposed within the confines of a recess of said member in said first surface thereof; means biasing said lift pin to said first position.

9. A first assembly comprising a screw and a member having a clearance hole operatively positioned to receive said screw which will removably mount said first assembly to a second assembly; said first assembly including first means operatively positioned with respect to said hole to be engaged by and cooperate with a prying device which utilizes said screw as a fulcrum so as to assist in dismounting said first assembly from said second assembly; said first means comprising a lift pin having an enlarged head; said pin being movable to a first position wherein said enlarged head is disposed within the confines of a recess of said member in said first surface thereof; means biasing said lift pin to said first position; said assembly including a plurality of fuses and means for securing said plurality of fuses to said member.

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