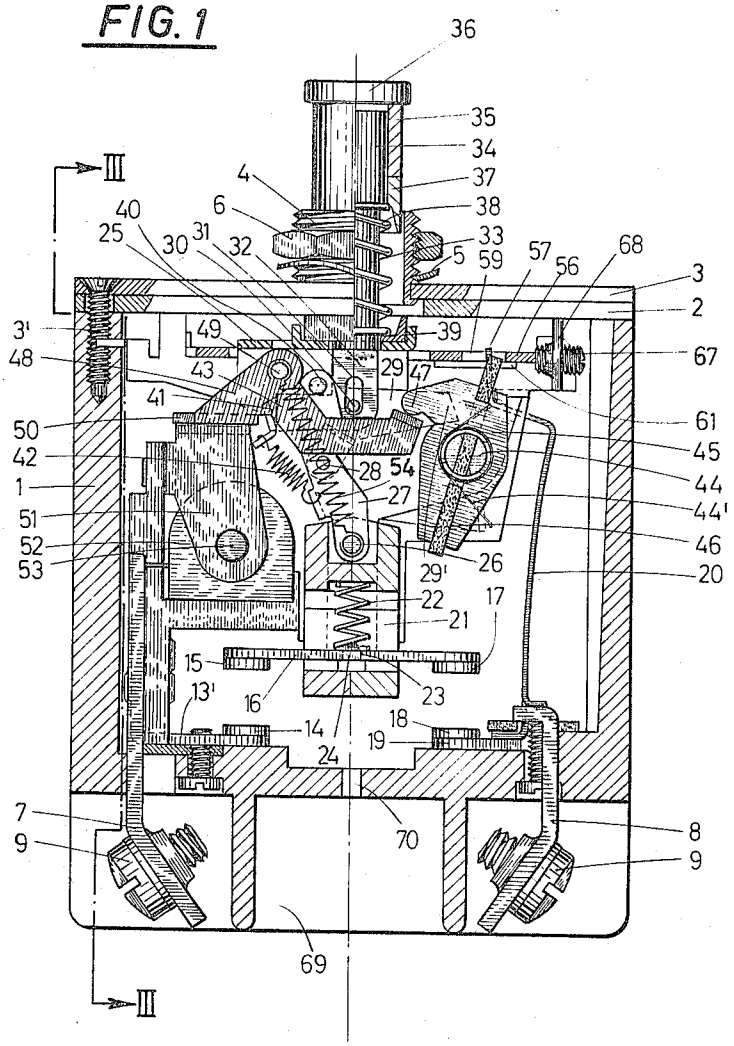
June 17, 1969 J. ELLENBERGER 3,451,016

PUSHBUTTON-ACTUATED OVERLOAD CIRCUIT BREAKER

Filed Nov. 7, 1967 Sheet 1 of 5

FIG. 1



INVENTOR

Jakob Ellenberger

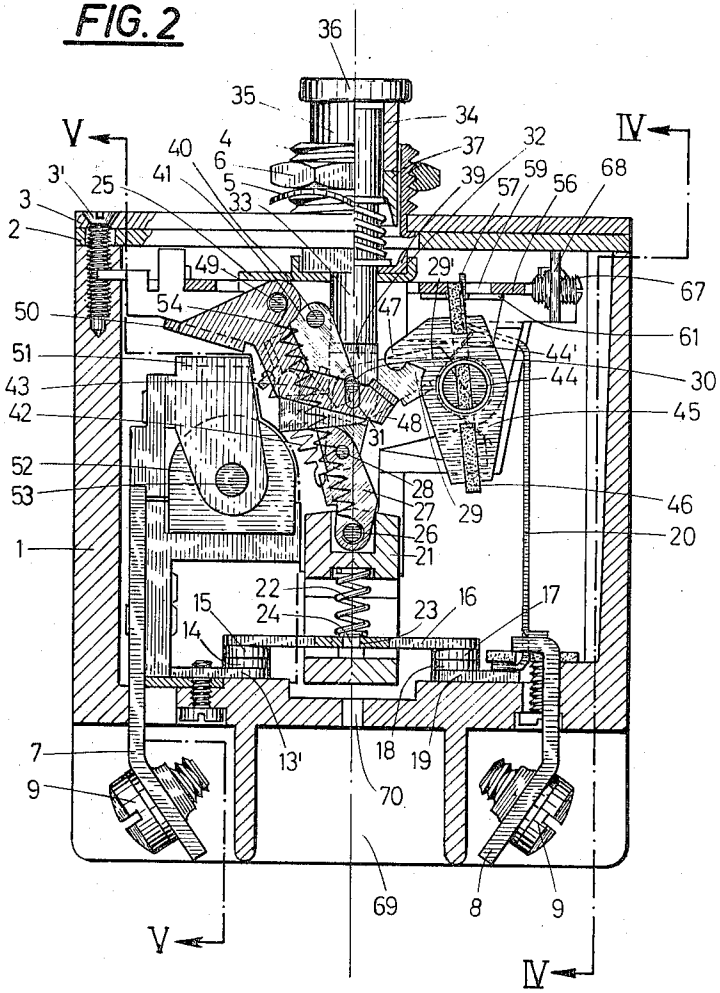
BY Otto John Munz

ATTORNEY

PUSHBUTTON-ACTUATED OVERLOAD CIRCUIT BREAKER

Filed Nov. 7, 1967

FIG. 2



INVENTOR
Jakob Ellenberger

BY Otto John Munz

ATTORNEY

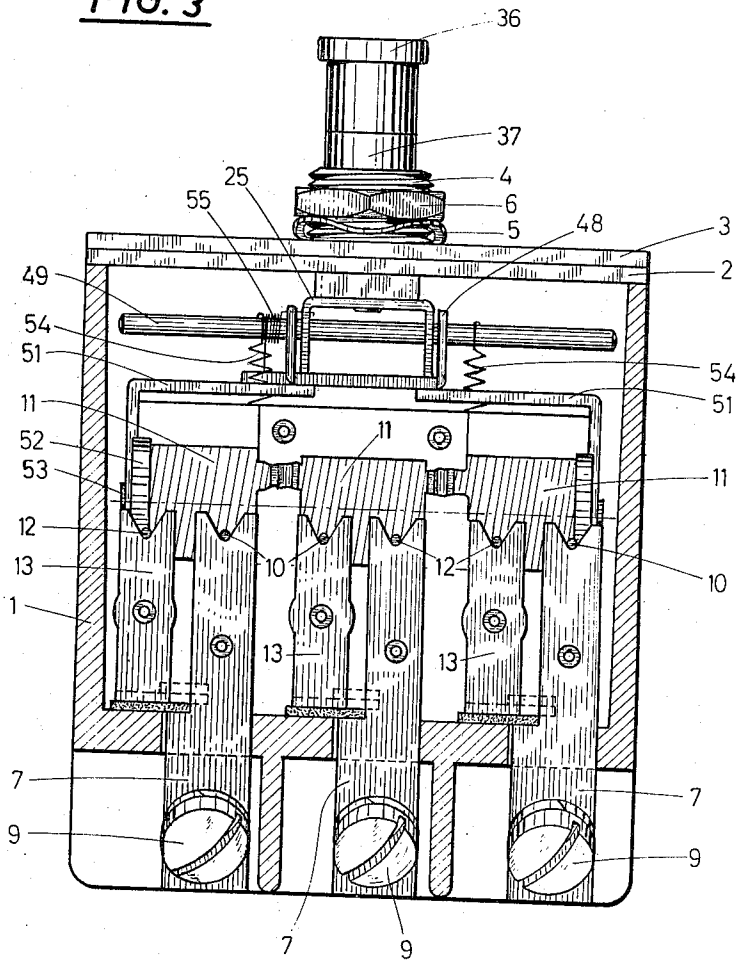
June 17, 1969 J. ELLENBERGER 3,451,016

PUSHBUTTON-ACTUATED OVERLOAD CIRCUIT BREAKER

Filed Nov. 7, 1967

Sheet 3 of 5

FIG. 3



INVENTOR

Jakob Ellenberger

BY Otto John Munz.

ATTORNEY

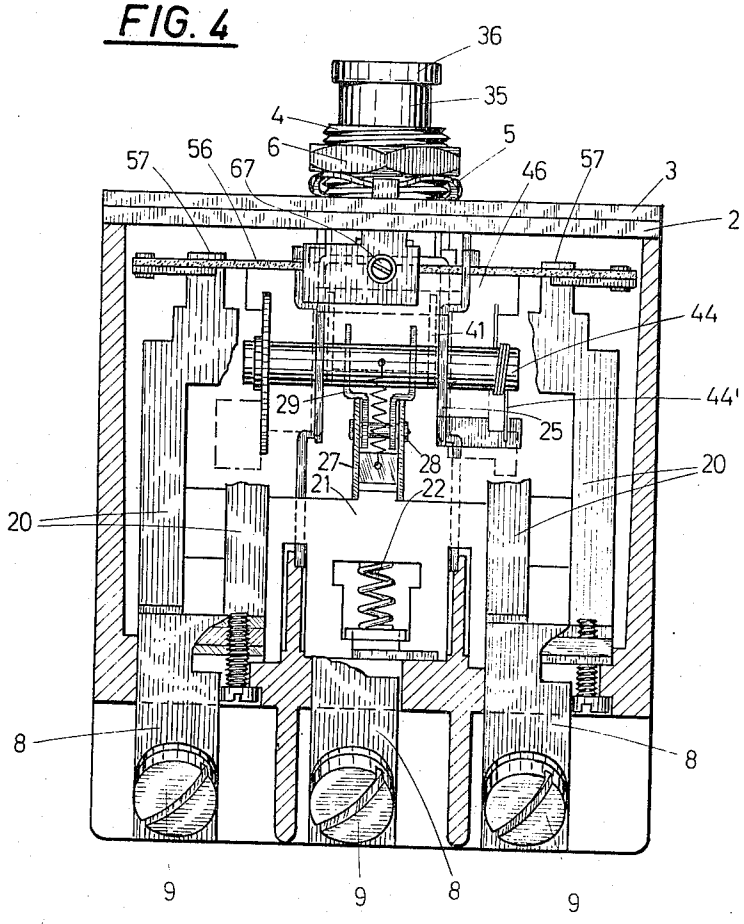
June 17, 1969 J. ELLENBERGER 3,451,016

PUSHBUTTON-ACTUATED OVERLOAD CIRCUIT BREAKER

Filed Nov. 7, 1967

Sheet 4 of 5

FIG. 4



INVENTOR

Jakob Ellenberger

BY Peter John Murray

ATTORNEY

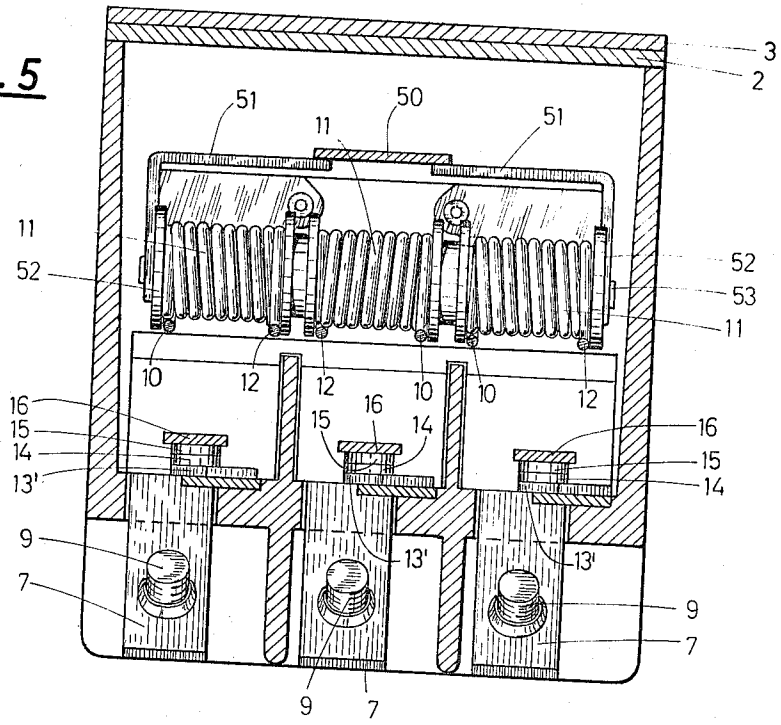
June 17, 1969 J. ELLENBERGER 3,451,016

PUSHBUTTON-ACTUATED OVERLOAD CIRCUIT BREAKER

Filed Nov. 7, 1967

Sheet 5 of 5

FIG. 5



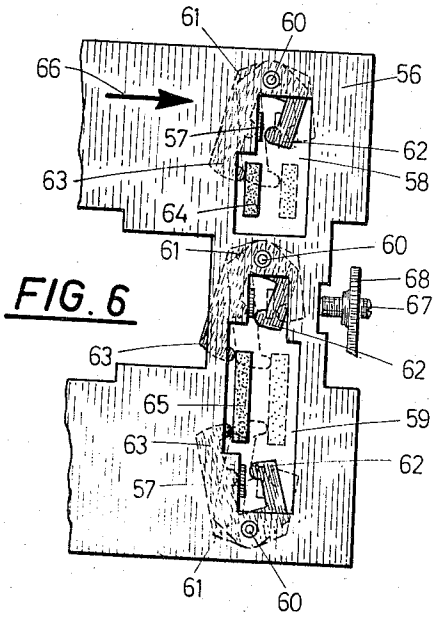


FIG. 6

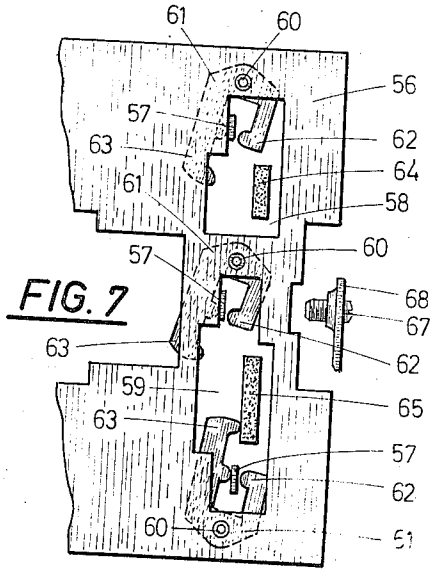


FIG. 7

INVENTOR

Jakob Ellenberger

BY Otto John Munz.

ATTORNEY

United States Patent Office 3,451,016
Patented June 17, 1969

3,451,016

PUSHBUTTON-ACTUATED OVERLOAD CIRCUIT BREAKER

Jakob Ellenberger, Altdorf, Germany, assignor to Ellenberger & Poensgen GmbH, Altdorf, near Nuremberg, Germany, a firm of Germany

Filed Nov. 7, 1967, Ser. No. 681,255
Claims priority, application Germany, Nov. 10, 1966, E 32,818
Int. Cl. H01h 73/56
U.S. Cl. 335—23 10 Claims

ABSTRACT OF THE DISCLOSURE

A pushbutton-actuated overload circuit breaker with a thermal release, an electromagnetic release, and a trip-free release, and also with a manual release by pulling the pushbutton outwardly, wherein the thermal release and the electromagnetic release occur independently of each other and without interfering with each other by means of a toggle joint and an easily rotatable half-shaft. If this overload circuit breaker forms a polyphase circuit breaker, each circuit thereof contains a separate bimetal strip and also a separate magnet coil one of which is reversed in polarity relative to the other coils to increase the power of this magnet.

The present invention relates to a pushbutton-actuated overload circuit breaker which is provided with a thermal release and an electromagnetic release and with at least one contact bridge which is connected to the pushbutton by means of a pair of levers forming a toggle joint.

The overload circuit breakers of this type which were known prior to this invention are designed so that either the bimetal strip of the thermal release acts upon the armature of the electromagnetic release or, vice versa, the armature acts upon the bimetal strip so that this bimetal strip and the armature will interfere with each other. Furthermore, the tripping or release of the circuit breaker requires considerable forces since at every actuation of the bimetal strip the armature must also be pivoted, while at every actuation of the armature the bimetal strip must also be bent. It is especially difficult to attain a proper release of such a circuit breaker if the latter is of a polyphase type in which each circuit is provided with a separate bimetal strip.

It is an object of the present invention to provide an overload circuit breaker of the type as above described which is designed so that the thermal release and the electromagnetic release will occur entirely independently of each other and will require the least possible forces so that the circuit breaker according to the invention will be especially suitable for being designed and employed as a polyphase circuit breaker. A further object of the invention is to provide this overload circuit breaker with a manual release of a very simple and effective nature and, if desired also with means for accurately indicating whether it is in its on or off position.

For attaining these objects the invention provides the lever of the toggle joint which is connected to the pushbutton to be in the form of an angular lever the free arm of which rests on a half-shaft when the circuit breaker is in the on position. To this half-shaft a pair of arms are rigidly secured one of which is operatively associated with the armature of the electromagnetic release and the other arm with the bimetal strip of the thermal release. The invention further provides that the pivot pin which rotatably connects the pushbutton to the angular lever will be arrested in the on position by means of a pawl which is pivotable about a fixed axis and connected by a

spring to the lever of the toggle joint which is connected to the contact bridge.

The circuit breaker according to the invention is designed so that the armature of the electromagnetic release and the bimetal strip of the thermal release act upon different arms which are secured to the mentioned half-shaft so that the armature and the bimetal strip cannot possibly interfere with each other. Since for turning this half-shaft only very small forces are required, it also requires only small forces for effecting either an electromagnetic or thermal release of the circuit breaker. When the angular lever disengages from the shaft, the spring which acts upon the pawl and upon the lever of the toggle joint which is connected to the contact bridge will contract the toggle joint and thereby lift the contact bridge together with its contacts from the associated fixed contacts. At the same time, the pawl releases the pivot pin which rotatably connects the pushbutton to the angular lever, so that the pushbutton may then be moved by its releasing spring to its off position. Since the mentioned spring which acts upon the pawl and one lever of the toggle joint will also contract the toggle joint when the pushbutton is arrested in its on position and thus disengages the contact bridge and it contacts from the associated fixed contacts, a trip-free release of the circuit breaker will also be attained.

In the known overload circuit breakers which are provided with a toggle joint, the two levers forming this joint are pivoted relative to each other beyond the dead-center position in which they are disposed at an obtuse angle to each other. According to the present invention, however, the two levers of the toggle joint are not even pivoted up to the dead-center position but only to a point at a short distance therefrom. Although these levers are then also disposed at an obtuse angle to each other, the advantage is now attained that, when the circuit breaker is released, the angle between the two levers of this toggle joint will immediately decrease. Consequently, when the circuit breaker according to the invention is being released, the pivoting movement of its two toggle-joint levers requires a considerably smaller force than those of the known circuit breakers in which these levers have to be pivoted back from a point beyond their dead-center position.

In order to effect in a very simple manner a manual release of the circuit breaker, the pivot pin of the angular lever is connected to a part of the pushbutton by being slidable along an oblong hole which extends in this part in the direction of its movement, and the pushbutton the free outer end of which is provided with a manipulating flange has on its inner end a lateral extension which, when the pushbutton is depressed to its on position, engages upon the pawl under the action of the release spring. If the circuit breaker is to be released manually, it is only necessary to grip the flange on the end of the pushbutton and to pull the latter outwardly. The lateral extension on the pushbutton will then pivot the pawl against the action of its spring until the pawl will disengage from the pivot pin which connects the pushbutton to the angular lever.

If the overload circuit breaker according to the invention is designed as a polyphase circuit breaker, each of its circuits is provided with a magnet coil for the electromagnetic release. The poles of one of these coils are reversed to those of the other coils. This results in a very strong force for attracting the magnet armature and insures that the electromagnetic release will always occur properly. Due to this simple reversal of the poles of one coil, it is possible to omit complicated and expensive parts for attaining a phase displacement between the magnetic fluxes of the coils. All coils may be mounted on a common spool

which facilitates the manufacture and assembly of the magnetic system. If the circuit breaker is made of a polyphase type, a separate bimetal strip is also provided in each circuit. The free end of each bimetal strip engages into an aperture in a moveable release plate on which for each bimetal strip a substantially U-shaped lever is pivotably mounted one arm of which is acted upon by the associated bimetal strip, while its other arm engages upon one of the arms which are secured to the half-shaft. If a current of the same excess strength flows through all of the bimetal strips, all of these strips will bend equally. Each bimetal strip will then act equally upon one arm of the associated U-shaped lever the other arm of which acts upon the arm which is secured to the half-shaft. The U-shaped levers will then shift the release plate in the same direction until it engages upon a stop. Since the release plate can thereafter no longer move, the bimetal strips will then pivot the U-shaped levers further so that the latter will then pivot one of the arms on the half-shaft and thus also turn the latter and thereby start the releasing movement.

If an excess current flows only through one or two bimetal strips, while no current or only a normal current flows through another bimetal strip, this other strip will hold back the release plate and prevent it from being moved by the first bimetal strips. By means of associated U-shaped levers, these first bimetal strips will then pivot the arm which is secured to the half-shaft and thereby start the thermal release of the circuit breaker. When the individual circuits are unsymmetrically loaded, the thermal release will therefore occur much sooner than when they are symmetrically loaded. This constitutes an important advantage of the polyphase circuit breaker according to the invention over similar circuit breakers as known in the art.

The stop member for limiting the shifting movement of the release plate may consist, for example, of a setscrew which may be mounted in a temperature-compensating bimetal strip which will prevent the circuit breaker from being affected by the surrounding temperature.

Within the area of the housing in which the control bridge carrying the contact bridges is located, the housing is provided in its outside with a cup-shaped recess in which a suitable signal switch may be mounted, and the intermediate wall of the housing is provided with an aperture for receiving a rod or the like by means of which the control bridge may actuate the signal switch.

The features and advantages of the present invention will become more clearly apparent from the following detailed description thereof which is to be read with reference to the accompanying drawings, in which:

FIGURE 1 shows a longitudinal section of a push-button-actuated overload circuit breaker according to the invention in its off position;

FIGURE 2 shows the circuit breaker according to FIGURE 1, but in the on position;

FIGURE 3 shows a section which is taken along the line III—III of FIGURE 1;

FIGURE 4 shows a section which is taken along the line IV—IV of FIGURE 2;

FIGURE 5 shows a section which is taken along the line V—V of FIGURE 2, and in which the armature is in the attracted position;

FIGURE 6 shows a top view of the part of the release plate adjacent to the bimetal strips; while

FIGURE 7 likewise shows a top view of the release plate according to FIGURE 6, but with this plate and the bimetal strips in a different position.

As illustrated in the drawings, the three-pole overload circuit breaker according to the invention comprises a one-piece housing **1** of insulating material the open side of which is covered by an insulating plate **2** and on top of the latter by a cover plate **3** of metal which is secured to the housing **1** by screws **3'**. For requiring only a single hole for securing the circuit breaker thereto, a threaded sleeve **4** is riveted to the cover plate **3** and carries a lock washer **5** and a nut **6**.

For electrically connecting the circuit breaker, each of its three circuits is provided with a pair of connecting lugs **7** and **8** and terminal screws **9** thereon. As shown particularly in FIGURE 3, the upper end of each of these connecting lugs **7** is connected to one end **10** of a magnet coil **11**, the other end **12** of which is electrically connected to a connecting bar **13** the lower end **13'** of which, as shown in FIGURE 1, is bent at a right angle and provided with a fixed contact **14**. As shown in FIGURE 3, the ends **10** and **12** of coil **11** of the central circuit are reversed as compared to the ends **10** and **12** of the two other coils so as to attain a sufficient tripping force also when the three circuits are loaded symmetrically. The fixed contact **14** is operatively associated with a contact **15** of a movable contact bridge **16** which has a further contact **17** which is adapted to be connected to a fixed contact **18** on a connecting bar **19** to which one arm of a U-shaped directly heated bimetal strip **20** is electrically connected and mechanically secured. The other arm of the bimetal strip **20** is electrically connected and mechanically secured to the connecting lug **8**.

Thus, for the three circuits there are three contact bridges **16** provided which are loosely inserted into a control bridge **21** of insulating material and each of which is acted upon by a compression spring **22**. Each contact bridge **16** has a bore **23** into which a corresponding stud **24** on the control bridge **21** engages. This control bridge **21** is guided in housing **1** within a metallic frame **25** so as to be moveable in a vertical direction in the housing, that is, upwardly and downwardly within the plane of FIGURE 1. This frame **25** is inserted into suitable recesses in housing **1** so as to be immoveable therein.

By means of a pivot pin **26** which is mounted in frame **25**, control bridge **21** is pivotably connected to a lever **27** which, in turn, is pivotably connected to an angular lever **29** so that levers **27** and **29** together form a toggle joint. By means of its pivot pin **30**, the angular lever **29** is guided in slots in the frame **25** and also slidable in an oblong hole **31** which is provided in an angular member **32** which is rigidly secured to a control rod **33** which, in turn, is rigidly connected to the pushbutton **34**. Fitted over and locked to the pushbutton **34** is a cap **35** which thus forms a part of the pushbutton and has an enlarged upper end or flange **36** to facilitate the manual operation of the pushbutton. Underneath the cap **35**, pushbutton **34** further carries a tubular member **37** which is also secured to the pushbutton and forms a part thereof. Pushbutton **34** is acted upon by a compression spring **38** serving as a release spring, the lower end of which is supported on a cup-shaped spring guide **39** which is secured to the frame **25**.

Frame **25** further contains a pawl **41** which is pivotable thereon about an axis **40** and to which a spring **42** is connected the lower end of which is hooked into the lever **27**. Pawl **41** is operatively associated with a projection **43** on the lateral extension of the lower end of the control member **32**. When the circuit breaker is in its on position, as shown in FIGURE 2, this projection **43** engages upon pawl **41** because of the action of the release spring **38**, and the right end **29'** of the angular lever **29** then rests on a half-shaft **44** the cylindrical ends of which are rotatably mounted in frame **25**. This half-shaft **44** has secured thereto two arms **45** and **46**. Arm **45** has a projection **47** upon which an armature **48** may act which is pivotable on a pin **49** in frame **25**. Armature **48** has a flat part **50** which is operatively associated with two magnet yokes **51** on coils **11**. All coils **11** are wound upon a one-piece spool **52** through which a magnet core **53** extends which is connected to the two yokes **51**. A pair of springs **54** are hooked with one end over pin **49** and with the other end over pin **26**, and a torsion spring **55** tends to maintain the arma-

ture 48 in the position as illustrated in FIGURE 2.

The upper transverse part of the U-shaped frame 25 which is stamped of sheet metal has slidably mounted thereon a release plate 56 which, as shown in FIGURES 6 and 7, is provided with apertures 58 and 59 into which the upper ends 57 of the bimetal strips 20 project. On the lower side of the release plate 56 three U-shaped levers 61 are pivotably mounted on pins or studs 60, each lever 61 being associated with one of the bimetal strips 20. One arm 62 of each of these levers 61 will be acted upon by the end 57 of the associated bimetal strip 20 when the latter is bent, while the other arm 63 abuts against a projection 64 or 65 on the arm 46 of half-shaft 44. The extent of the movement of release plate 56 in the direction of the arrow 66 is limited by a setscrew 67 which is screwed into a part 68 of frame 25.

The mode of operation of the overload circuit breaker as above described is as follows:

If an excess current occurs symmetrically in all three circuits of the circuit breaker when the latter is in its on position as illustrated in FIGURE 2, all bimetal strips 20 will bend uniformly toward the right. The ends 57 of the bimetal strips 20 will then act upon the arms 62 of the U-shaped levers 61. Since the other arms 63 of these levers 61 engage upon the projections 64 and 65 of arm 46 against the force of a torsion spring 44' on half-shaft 44 which tends to maintain this half-shaft in the position as shown in FIGURE 2, the release plate 56 will be taken along in the direction of the arrow 66 as shown in FIGURE 6 until it abuts against the setscrew 67. Thereafter the U-shaped levers 61 will be pivoted, whereby arm 46 will be pivoted and thus also shaft 44 will be turned in the clockwise direction, as seen in FIGURE 2, so that the angular lever 29 will be released under the action of springs 42 and 54 which will draw the levers 27 and 29 of the toggle joint toward each other and thereby move the control bridge 21 together with the contact bridges 16 to the off position as shown in FIGURE 1, in which the ends 57 of the bimetal strips 20, the release plate 56, the U-shaped lever 61, and the projections 64 and 65 of arm 46 are in the positions as indicated in dot-and-dash lines in FIGURE 6. When the bimetal strips 20 have cooled off, their ends 57 will push the release plate 56 back to its original position.

In the event that an excess current only occurs in one circuit, for example, in the lower circuit according to FIGURE 7, only the associated bimetal strip 20 will bend, while the two other bimetal strips 20 will remain in their original positions. The upper ends 57 of these two strips 20 will then hold the release plate 56 in the position as shown in FIGURE 7, in which this plate is spaced at a certain distance from the setscrew 67. Since the release plate 56 cannot move further, the lower U-shaped lever 61 will be pivoted immediately by the upper end 57 of the lower bimetal strip 20 as soon as the latter is bent, and the arm 63 of lever 61 will therefore pivot the projection 65 of arm 46 and thus this arm itself in the clockwise direction as seen in FIGURE 2 and thus release the circuit breaker to the off position. Consequently, when its circuits are over-loaded unsymmetrically, the circuit breaker will be released earlier than when they are overloaded symmetrically.

If an excess current occurs, for example, of a strength eight times higher than that of the normal current, the armature 48 will be attracted and pivoted in the counterclockwise direction, as seen in FIGURE 2, and against the action of the torsion spring 55 so that the right outer end of the armature 48 will hit against the projection 47 on arm 45. This arm 45 and thus also the half-shaft 44 to which it is rigidly secured will then be pivoted or turned in the clockwise direction and thereby effect the release of the circuit breaker to the position as shown in FIGURE 1.

If the circuit breaker is released thermally or electromagnetically while the pushbutton 34 is held depressed in its on position as shown in FIGURE 2, a trip-free release will occur since under the action of springs 42 and 54 the two levers 27 and 29 are drawn toward each other and the control bridge 21 together with the contact bridges 16 are moved to their off position.

When the pushbutton 34 is depressed from its off position as shown in FIGURE 1 to its on position according to FIGURE 2, at first the free arm of the angular lever 29 will engage upon the half-shaft 44 which has then again been turned by torsion spring 44' to its locking position. By means of pivot pin 30, lever 29 is then pivoted about the axis of this pin in the counterclockwise direction, as seen in FIGURE 2, while its free end remains on the half-shaft 44, and at the same time the levers 27 and 29 of the toggle joint are pivoted away from each other and springs 42 and 54 are tightened. When the pushbutton has been fully depressed and the circuit breaker is in its on position as shown in FIGURE 2, a pawl 41 engages upon pivot pin 30 under the action of the tightened spring 42 and thus maintains the control bridge 21 and the contact bridges 16 in their position until another cause for their release occurs.

For manually releasing the circuit breaker, it is only necessary to pull the pushbutton 34 out of the housing 1, 3 from the position as shown in FIGURE 2 to that as shown in FIGURE 1. During this movement, the projection 43 on the control member 33 presses upon the pawl 41 and pivots the latter in the clockwise direction, as seen in FIGURE 2, until pawl 41 disengages from pivot pin 30 of the angular lever 29. Springs 42 and 54 will then draw the levers 27 and 29 toward each other and thereby move the control bridge 21 together with the contact bridges 16 to the off position as shown in FIGURE 1.

Instead of being mounted in frame 25, setscrew 67 may also be screwed into a temperature compensating bimetal strip so that the thermal release of the circuit breaker will occur independently of the surrounding temperature.

The lower end of housing 1 underneath control bridge 21 is provided with a cup-shaped recess 69 in which a signal switch may be mounted, and the lower end wall of the housing is provided with an aperture 70 for receiving a rod which may be shifted by the contact bridge 21 so as to actuate the contacts of the signal switch to indicate the on and off positions of the circuit breaker. For indicating these positions of the circuit breaker at a remote point, it is also possible to connect optical or acoustical signal means into the circuit or circuits of the signal switch.

Lever 27, the angular lever 29, pawl 41, and armature 48 are stamped parts of sheet metal which are bent to a U shape so as to provide them with larger bearing surfaces. The two arms of each of these elements (only one of which is visible in FIGURES 1 and 2) are of an identical shape and are traversed by the pivot pins 26, 28, 30, 40 and 49, respectively.

Frame 25 and the various elements which are mounted therein or secured thereto may be assembled separately from the housing 1 so as to form a structural unit which may then be inserted by one operation into the housing. Thereafter, the insulating and cover plates 2 and 3 are applied upon the housing 1 and are secured thereto by the screws 3'. Pushbutton 34 then projects from the threaded sleeve 4 to the outside. Finally, the cap 35 with the enlarged end portion 36 is fitted over and locked to the pushbutton 34.

Although my invention has been illustrated and described with reference to the preferred embodiment thereof, I wish to have it understood that it is in no way limited to the details of such embodiment but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. An overload circuit breaker having a housing, a pushbutton slidable in said housing and partly projecting therefrom and adapted to be manually depressed into said housing from an off position to an on position, a release spring acting upon said pushbutton tending to return it to its off position, fixed contacts in said housing and means for connecting said contacts to a circuit, at least one contact bridge adapted to be moved from an off position to an on position in engagement with said contacts, means for connecting said pushbutton to said contact bridge for transmitting the motion of one to the other, said connecting means comprising a pair of levers each pivotably connected to the other at one end to form a toggle joint and adapted to be pivoted to an extended position and a contracted position relative to each other, a first of said levers having another end pivotably connected to said contact bridge, the second lever being angular and having a free other end, pivot means pivotably connecting said second lever at a point near its apex to said pushbutton, spring means tending to pivot said two levers from said extended position to said contracted position, a half-shaft rotatably mounted in said housing and adapted to be turned from a first position to a second position, a pair of arms secured to and radially projecting from said half-shaft, said free end of said angular lever engaging upon said half-shaft when in its first position when said pushbutton is depressed and being released from said half-shaft when said arms are pivoted and said half-shaft is thereby turned to its second position in which said two levers can then pivot from said extended position to said contracted position and thereby move said contact bridge under the action of said spring means quickly to its off position, a pawl pivotably mounted in said housing and moveable from a neutral first position to a second position in which it engages upon said pivot means to arrest said free end of said angular lever on said half-shaft when in its first position and when said two levers are in their extended position, said spring means also acting upon said pawl to pivot the same from its first to its second position when said levers are pivoted to said extended position and said spring means are thereby tightened, thermal releasing means and electromagnetic releasing means each responsive to an excess current of a different strength to release at least said bridge from its on position when one of said excess currents occurs in said circuit, said thermal releasing means comprising at least one bimetal strip which when heated by an excess current of a lower strength pivots a first of said arms and thereby turns said half-shaft to its second position, said electromagnetic means comprising at least one electromagnet and an armature pivotably mounted in said housing and, when attracted by said magnet due to an excess current of a higher strength passing through said magnet, pivoting the second arm and turning said half-shaft to its second position, resilient means tending to turn said half-shaft with said arms to its first position, means permitting a limited axial movement of said pushbutton relative to said pivot means of said angular lever, and means on said pushbutton engaging upon said pawl during said movement under the action of said release spring to pivot said pawl to its first position and thereby releasing it from said pivot means when said angular lever is released from said half-shaft.

2. An overload circuit breaker as defined in claim 1, wherein said spring means comprise a first tension spring connecting said pawl to said first lever and a second tension spring connected at one end to said first lever near its point of connection to said contact bridge and at its other end to a fixed point in said housing.

3. An overload circuit breaker as defined in claim 1, wherein when said contact bridge is in its on position and said levers are in said extended position, said levers are

disposed at an obtuse angle to each other, said angle only decreasing during the movement of said levers from said extended position to said contracted position in which said contact bridge is in its final off position.

4. An overload circuit breaker as defined in claim 1, wherein said pivot means comprise a pivot pin on said angular lever guided within said housing so as to be moveable in the direction of movement of said pushbutton, said means permitting said limited axial movement of said pushbutton relative to said pivot means being formed by an oblong hole in said pushbutton extending in its axial direction near the inner end thereof, said pivot pin extending into said hole and being slidable from one end to the other end thereof, said pushbutton having a lateral projection near its inner end engaging upon said pawl under the action of said release spring so that when said pushbutton is moved from its on position to its off position, said projection will press against said pawl and thereby pivot the same so as to disengage it from said pivot pin.

5. An overload circuit breaker as defined in claim 4, wherein the outer end of said pushbutton has a lateral projection to permit said pushbutton to be firmly gripped by hand when said pushbutton is pulled manually from its on position to its off position.

6. An overload circuit breaker as defined in claim 1 designed as a polyphase circuit breaker having one of said electromagnets and one of said contact bridges for each circuit, and a control bridge carrying said contact bridges, each of said magnets comprising a coil, one of said coils being wound and connected in reverse to the winding and connection of the other coils.

7. An overload circuit breaker as defined in claim 6, further comprising a common spool carrying all of said coils.

8. An overload circuit breaker as defined in claim 1 designed as a polyphase circuit breaker having one of said bimetal strips and one of said contact bridges for each circuit, and a control bridge carrying said contact bridges, each of said bimetal strips having one end mounted in a fixed position in said housing and connected to a terminal and a free other end moveable in one direction when said bimetal strip is heated, an insulating release plate slidable within said housing in said direction of movement of said free ends of said bimetal strips, a plurality of substantially U-shaped levers pivotably mounted on said release plate and each associated with one of said bimetal strips and having two arms, said free end of each bimetal strip engaging upon one of said arms and the other arm engaging upon one of said arms on said half-shaft.

9. An overload circuit breaker as defined in claim 8, further comprising adjustable stop means for limiting the sliding movement of said release plate.

10. An overload circuit breaker as defined in claim 1, wherein said housing has an outwardly extending cup-shaped projection on one wall thereof adjacent to said contact bridge within which a signal switch may be mounted, said wall having an aperture adapted to receive a rod for connecting said contact bridge to said signal switch for actuating the same.

References Cited

UNITED STATES PATENTS

3,307,002	2/1967	Cooper	335—23
3,324,429	6/1967	Ellenberger	337—66

BERNARD A. GILHEANY, *Primary Examiner.*

H. BROOME, *Assistant Examiner.*

U.S. Cl. X.R.

337—66