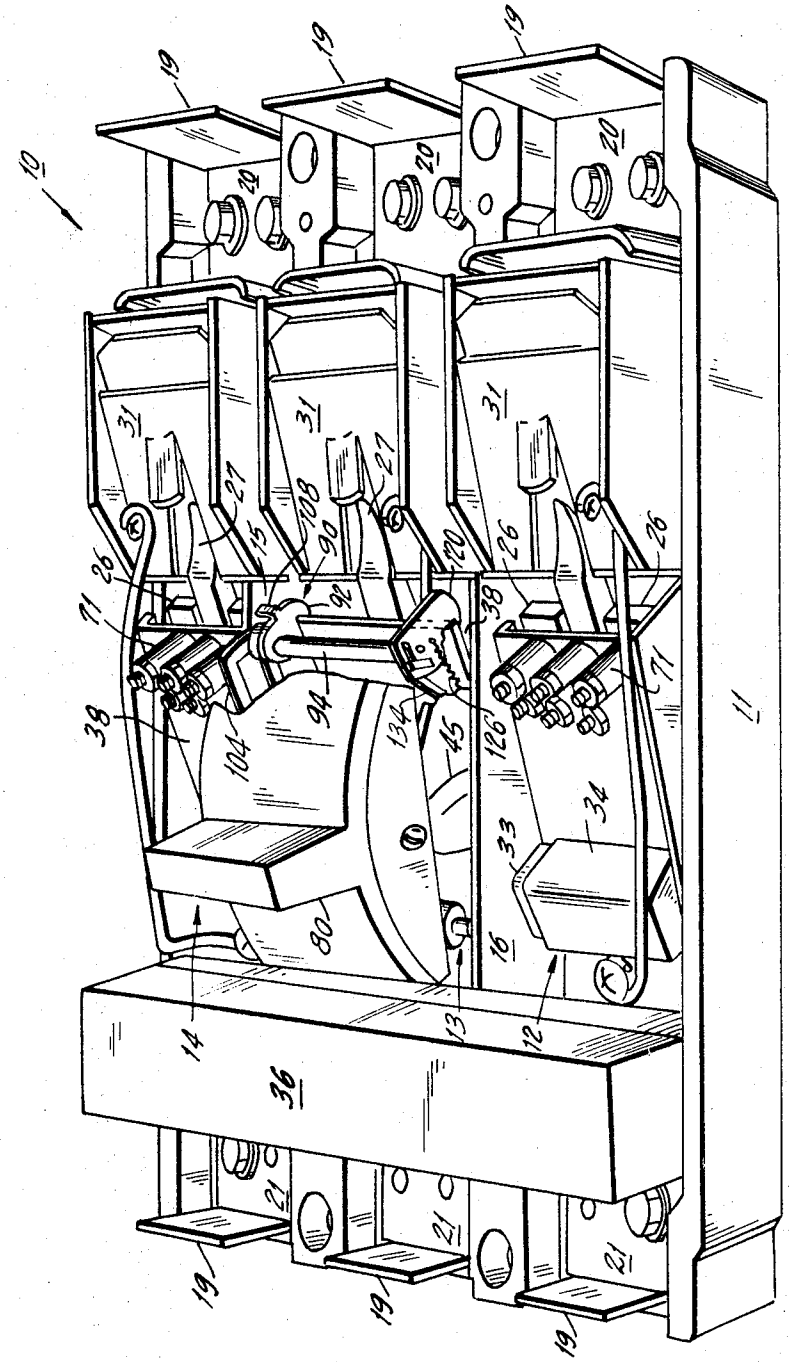
June 30, 1970 W. A. HUGGINS 3,518,587

CIRCUIT BREAKER HOLD OPEN LATCH RELEASE MEANS

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FIG. 1.



INVENTOR
WILLIAM A. HUGGINS

BY

OSTROLENK, FABER, GERB & SOFFEN

ATTORNEYS

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CIRCUIT BREAKER HOLD OPEN LATCH RELEASE MEANS

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FIG. 1.

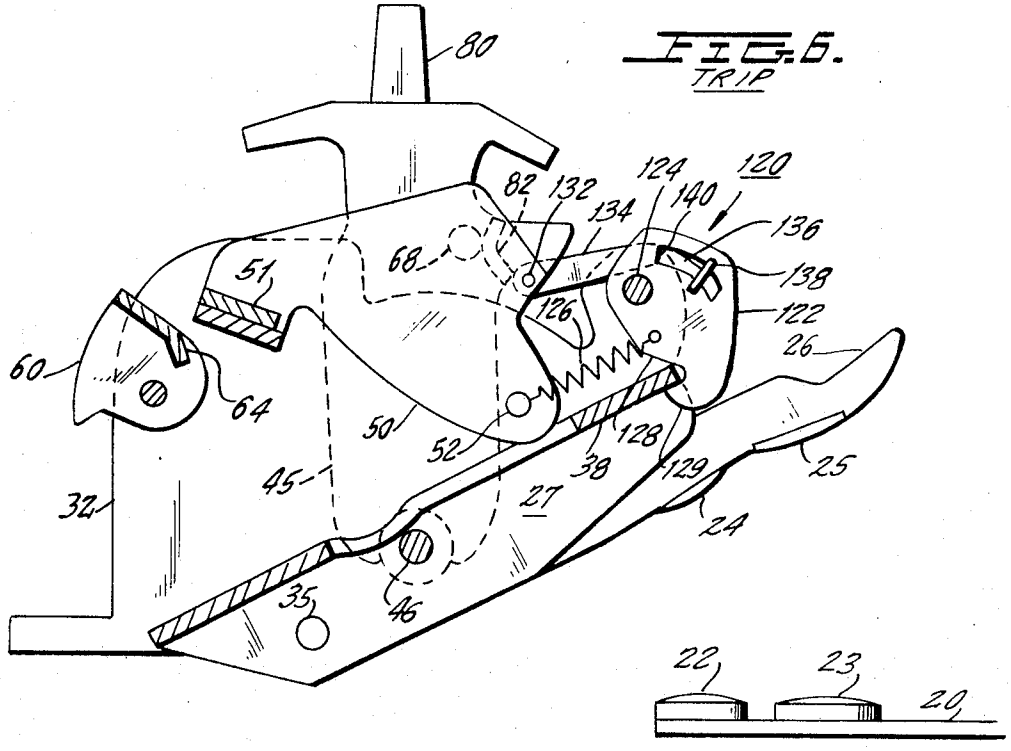
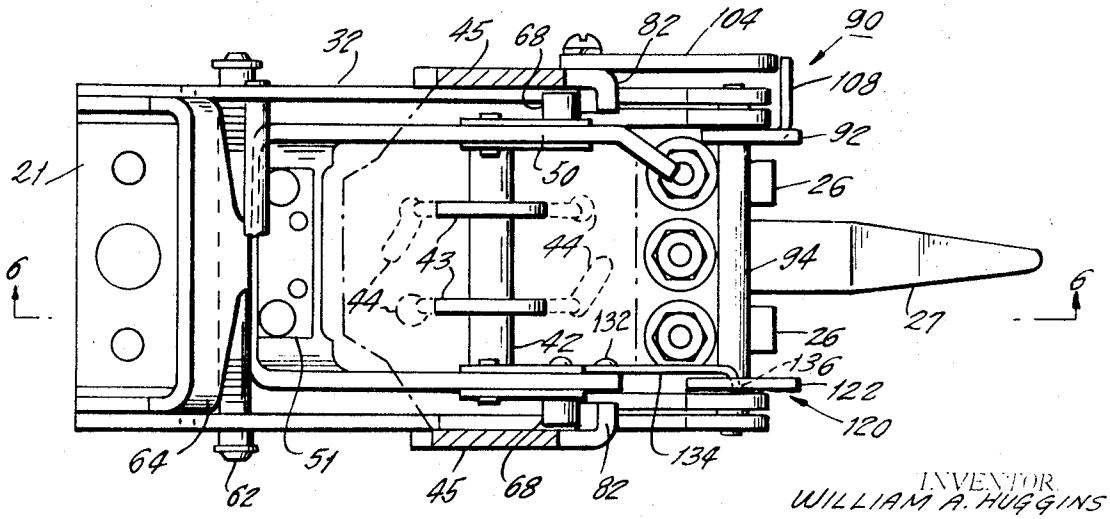


FIG. 2.



INVENTOR
WILLIAM A. HUGGINS

BY

OSTROLENK, FABER, GERB & SOFFEN

ATTORNEYS

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CIRCUIT BREAKER HOLD OPEN LATCH RELEASE MEANS

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FIG. 7.

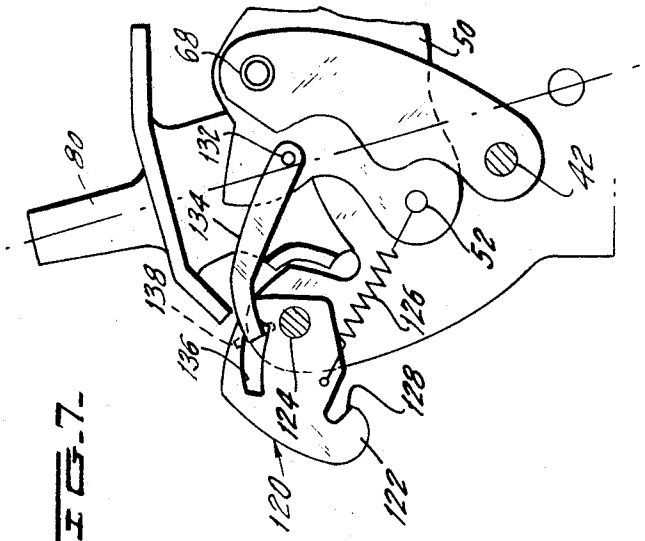
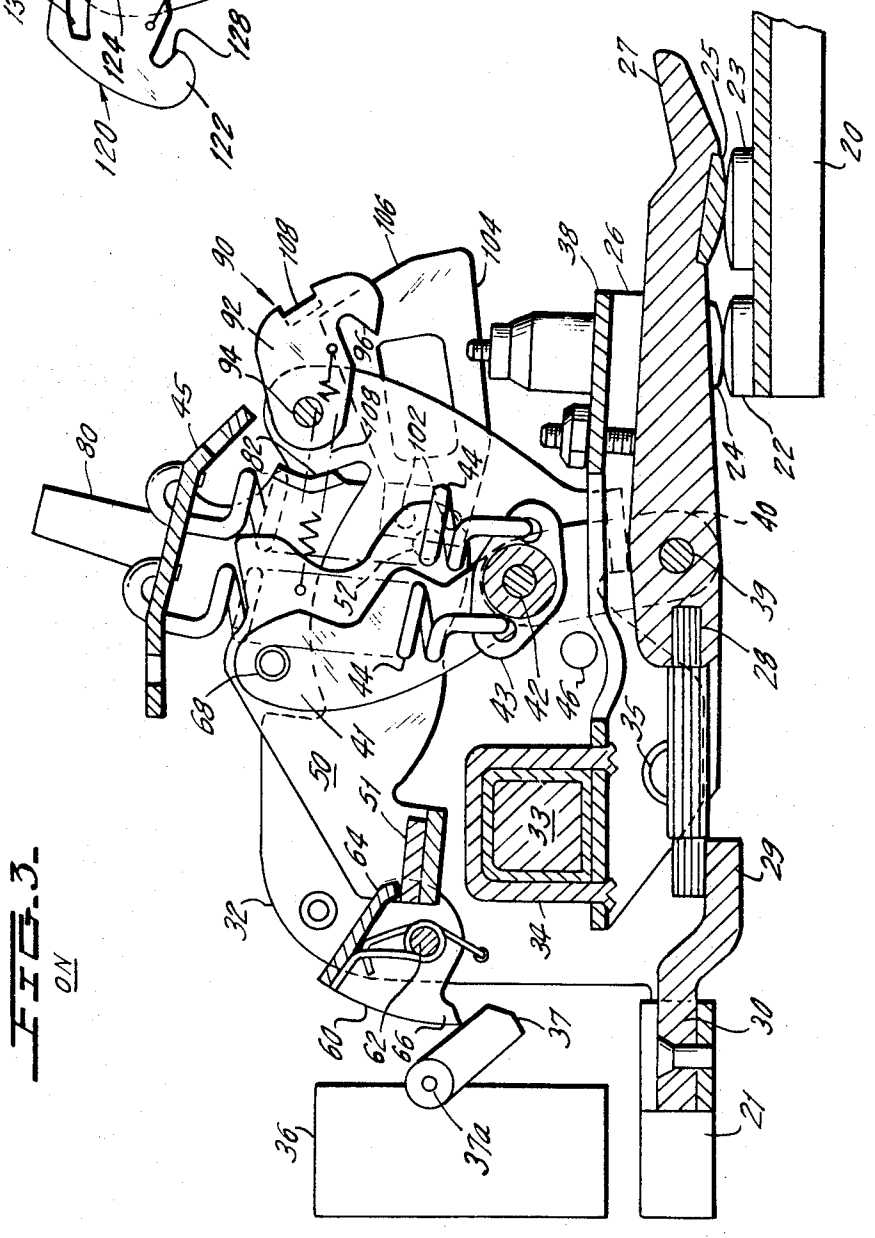


FIG. 3.

ON



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CIRCUIT BREAKER HOLD OPEN LATCH RELEASE MEANS

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FIG. 5.
TRIP

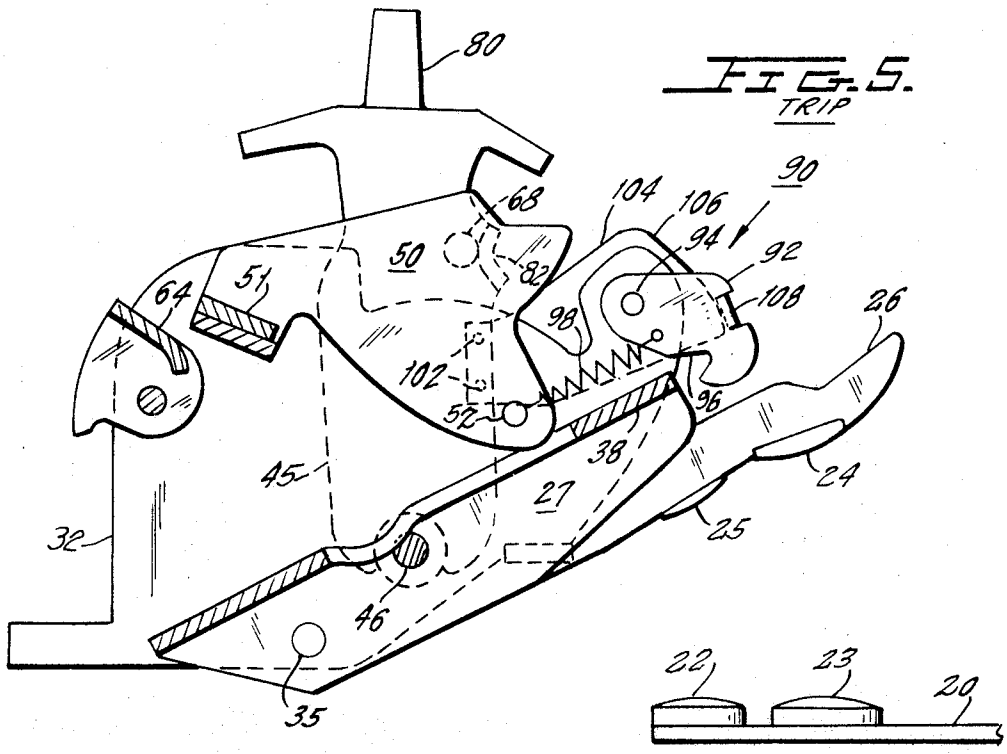
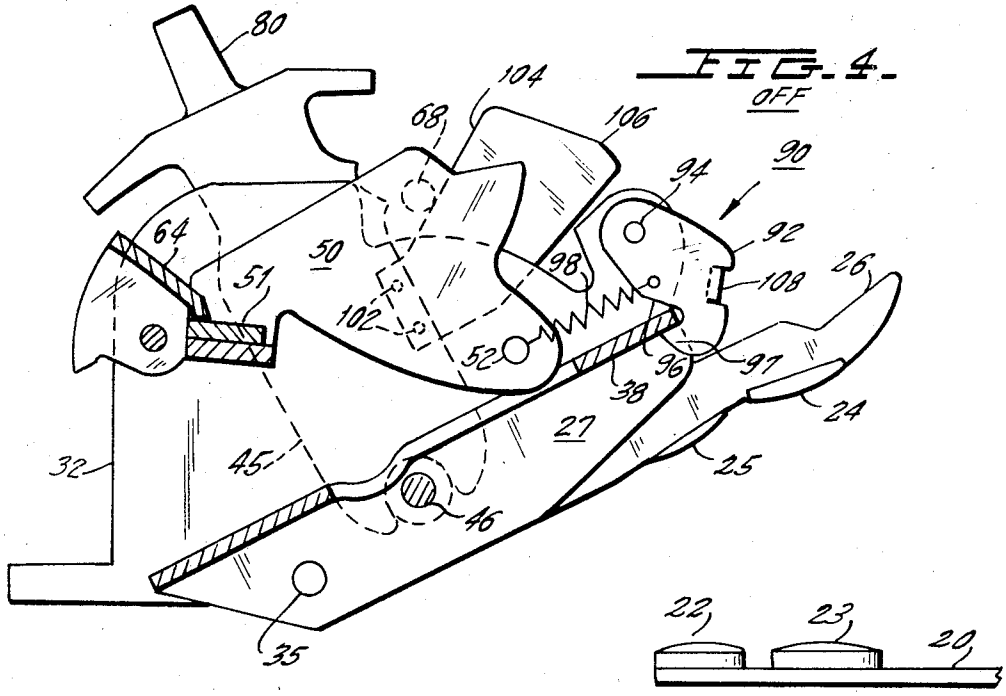


FIG. 4.
OFF



United States Patent Office 3,518,587 Patented June 30, 1970

3,518,587

CIRCUIT BREAKER HOLD OPEN LATCH RELEASE MEANS

William A. Huggins, Lansdowne, Pa., assignor to I-T-E Imperial Corporation, Philadelphia, Pa., a corporation of Delaware

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Int. Cl. H01h 75/02
U.S. Cl. 335—46 8 Claims

ABSTRACT OF THE DISCLOSURE

A circuit breaker having a hold-open latch pivotable into position for engaging one of a pair of cooperating contacts and holding the same apart from the other cooperating contact; the latch having a cam follower thereon; a circuit breaker operating handle movable between an "on" position where the cooperating contacts are in engagement and an "off" position, where the cooperating contacts are out of engagement; said operating handle having a latch release means comprising a cam surface secured to the handle, which surface engages the cam follower as the operating handle approaches the "on" position, and moves the cam follower and the hold-open latch away from the position which supports the one contact away from the other cooperating contact; the cam surface being shaped and positioned to engage the cam follower at an angle oblique to the direction in which the cam surface is moving when the cam surface first engages the cam follower, in order to reduce the shock of initial abutting engagement.

This invention relates to circuit breakers and more particularly to means for preventing unwanted closing of the contacts of a circuit breaker, either because of contact arm rebound on contact separation or because of impact to the circuit breaker from a blow from without the circuit breaker casing.

Heretofore, some circuit breakers have been provided with hold-open latches to maintain the relatively movable contact separated from the relatively stationary contact under both static and dynamic conditions. Statically, a circuit breaker in the "off" position may receive a blow directed in a particular direction tending to move the movable contact arm to the closed position. To avoid momentary closure, a hold-open latch is usually locked in such a position as to maintain the movable contact arm in an open position. This latch can be released only by the circuit breaker operating handle, or an attachment thereto, as the handle approaches its extreme "on" position. Dynamically, the latch sometimes serves to hold the movable contact arm open while the circuit breaker operating spring, which was connected both to the circuit breaker operating handle and to the movable contact arm, becomes loaded during the slow mechanical movement of the operating handle. As the circuit breaker handle approaches the "on" position, the latch is released enabling the operating spring to provide positive high speed movement for the movable contact arm as it moves the cooperating contacts of the circuit breaker into engagement.

An example of a hold-open latch and a release means therefor appears in U.S. Pat. No. 2,932,706, issued to August Bodenschatz on Apr. 12, 1960, entitled "Hold-Open and Anti-Rebound Latches," and assigned to the assignee hereof.

The hold-open latch release means shown in the aforementioned patent has one major drawback. The initial contact between the latch release means and the hold-open latch occurs as the operating handle is approaching its extreme "on" position. Under the force of the operating spring of the circuit breaker, the handle, and thus the latch release means attached to it, may be moving rather rapidly at the time of impact. The hold-open latch is a movable element and through repeated use it will be subject to impact and wear and, eventually, to possible distortion.

The present invention is designed to reduce the jolt of the impact between the latch and its release means. In accordance with the invention, the hold-open latch has a cam follower attached to it, which follower is adapted to be engaged by a cam surface connected with or secured to the operating handle. This engagement occurs as the operating handle is moving toward the "on" position. The cam surface continues to press against the cam follower while the handle moves to the "on" position. The cam surface serves as a latch release means to cause the hold-open latch to release the movable contact and permit the movable contact to move into engagement with the stationary contact.

To reduce the jolt of the initial engagement between the latch releasing cam surface and the cam follower on the latch, the cam surface is shaped and positioned, and tilted at such an angle with respect to the cam follower and with respect to the direction of movement of the cam surface, such that the cam follower slidingly engages the cam surface rather than being joltingly abutted by it.

Accordingly, it is a primary object of the present invention to provide a circuit breaker hold-open latch for holding the circuit breaker cooperating contacts apart when the operating mechanism of the circuit breaker is in the "off" position; and to provide a release means for releasing the latch to prevent its operating when the circuit breaker is not in the "off" position.

It is another object of the present invention to provide a circuit breaker hold-open latch release means designed so as to minimize the jolt of the initial impact between the release means and the hold-open latch.

These and other objects of the present invention will become apparent after the following description is read in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of a molded case circuit breaker which includes the hold-open latch of the present invention with the cover of the circuit breaker removed for the sake of clarity;

FIG. 2 is a top plan view, with the operating handle removed to facilitate a view of the components, of a circuit breaker operating mechanism adapted with the hold-open latch of the present invention;

FIG. 3 is a side elevation view of a circuit breaker provided with the hold-open latch of the present invention, where the circuit breaker is in the "on" position;

FIG. 4 is a partially schematic side elevation of the operating mechanism of FIG. 3 with the circuit breaker in the "off" position;

FIG. 5 is a partially schematic side elevation of the circuit breaker operating mechanism of FIG. 3 in the "trip" position;

FIG. 6 is a partially schematic side elevation of the circuit breaker operating mechanism shown in FIGS. 3–5, showing an anti-rebound latch for use in conjunction with the present invention and showing the circuit breaker operating mechanism in the "trip" position; and

FIG. 7 is a fragmentary side elevation of the circuit breaker operating mechanism of FIG. 6, viewing said operating mechanism from a direction of view opposite that in FIG. 6, and showing the anti-rebound latch when the circuit breaker is in the "on" position.

Referring to the figures and particularly to FIGS. 1–3, circuit breaker **10**, in which one form of the present invention is incorporated, is shown as a commercially avail-

able three-phase molded case circuit breaker. It should be understood that the present invention may be incorporated in any of numerous other types of circuit breakers, with the breaker **10** being shown merely for illustrative purposes: Circuit breaker **10** is assembled within a housing comprised of a molded base **11** which is separated into compartments **12, 13,** and **14,** respectively, for holding the operating mechanisms for each of the phases. Adjacent compartments are separated by housing walls **15** and **16.** There is a molded cover (not shown) over the circuit breaker, which contains cooperating walls for maintaining the separation between the compartments. End shields **19** are located at the line and load ends of the circuit breaker **10.**

Each of the breaker phases includes an identical interruptable current path through circuit breaker **10.** For the sake of brevity, only the current path of the circuit breaker phase in compartment **13** will be described. The current path between line terminal strap **20** and load terminal strap **21** proceeds from stationary contacts **22–23–22** to movable contacts **24–25–24,** the latter contacts being carried by contact arms **26–27–26** respectively. The path then proceeds through flexible braid **28,** contact carrier strap **29,** and trip unit strap **30.**

Since circuit breaker **10** has a relatively high current carrying capacity, cooperating contacts **23, 25** function as arcing contacts and are situated to engage and disengage within the opening defined by the circuit breaker arc chute assembly **31.**

The contact arms **26–27–26** are pivotally mounted at pivot **35** in bearings in the circuit breaker support frame **32.** A tie-bar **33** is secured by cover **34** to the carrier **38** on the arms **26–27–26.** The tie-bar connects the movable contact arms **26–27–26** for all of the phases of the circuit breaker, so that if the contacts in one of phases separate, those in the other phases will simultaneously separate.

The circuit breaker is provided with a circuit responsive automatic trip mechanism **36,** including a trip unit for each phase of the circuit breaker. A trip unit is responsive to an overload condition in one of the phases being protected. It may be a conventional magnetically or thermally actuated unit or may be a unit like that shown in U.S. patent application Ser. No. 690,878, filed Dec. 15, 1967, by Albert Strobel, entitled "Trip Unit Latch Positioning Means for Constant Latch Bite," and assigned to the assignee hereof. Each trip unit has a trip unit latch **37** extending out of it, which is biased to drive the bracket **60,** to be described, clockwise, as viewed in FIG. 3.

The movable contacts **26–27–26** are secured to the carrier **38** which cooperates with the hold-open latch **90,** in a manner to be described. The center phase carrier **38** is connected at a pivot rod **39** to the lower link **40** of the operating mechanism toggle linkage **40, 41.** Upper toggle link **41** has its upper end pivotally mounted to cradle **50,** to be described, at pivot **68.** Toggle links **40, 41** are joined at knee **42.**

Positioned at knee **42** is a pivotally mounted plate **43** to which one end of each of the circuit breaker operating springs **44** is hooked. The other end of each of the springs **44** is hooked in a suitable aperture in the operating handle frame **45.** The lower end of handle frame **45** is pivotally mounted at **46** to the circuit breaker operating mechanism frame **32.** The springs **44** provide overcenter snap action for the circuit breaker operating mechanism by causing rapid movement of the toggle linkages about knee **42** for causing rapid engaging and disengaging movement of the cooperating contacts, as will be described further below.

The operating mechanism also includes a cradle **50** which has fixedly secured to it a transverse latching plate **51** to be engaged by the extension **64** on bracket **60.** Cradle **50** is pivotable about its mounting pivot **52** which is supported in position on the circuit breaker frame **32.**

A bracket **60** is positioned on and rotatable about a post **62** on the circuit breaker operating mechanism frame. The bracket **60** has an extension **64** which sits on and is normally pressed against the transverse plate **51** on cradle **50.** Trip unit latch **37** remains stationary. Nose **66** of bracket **60** presses against latch **37.** Bracket **60** is held stationary by latch **37** against the pull of springs **44** which act, through knee **42,** to pull toggle link **41** upward and clockwise, thereby pulling the toggle link pivot mount **68** in the same manner, which, in turn, pulls cradle **50** and the plate **51** thereon in the same manner which pulls extension **64** which cannot move.

FIG. 3 shows the circuit breaker operating mechanism in the "on" position. The cooperating contacts **22, 24,** and **23, 25** are in engagement. The operating handle **80** is to the right of center, as viewed in FIG. 3, so that it is pulling cradle **50** to pivot clockwise and so that the toggle links **40, 41** hold the cooperating contacts in secure engagement.

Turning to FIG. 4, when it is desired to manually disengage the cooperating contacts and open the circuit being protected, the operating handle **80** is shifted to the left, as shown in FIG. 4. As soon as handle **80** passes to the left of upper toggle link pivot **68,** springs **44** draw toggle knee **42** to the left, which rapidly collapses the toggle and snaps the movable contact arms **26–27–26** counterclockwise around their pivot **35,** thereby disengaging the movable contacts **24–25–24** from the stationary contacts **22–23–22.** The position of cradle **50** is unaffected when manually operable handle **80** is shifted to the "off" position.

To reengage the cooperating contacts, manually operable handle **80** is again shifted to its "on" position of FIG. 3. When the handle moves to the right of upper pivot **68,** knee **42** is drawn to the right and the movable contact arms **26–27–26** are snapped clockwise, as viewed in FIG. 4 so that the cooperating contacts snap into engagement.

In the event that an overload condition develops in the trip unit, the lever **37,** shown in FIG. 3, pivots clockwise around its pivot **37***a,* thereby removing the lever from the blocking position with respect to the nose **66** on bracket **60.** Springs **44** are exerting great force to draw knee **42** upward, thereby to pivot cradle **50** clockwise about pivot **52,** through the intermediate components described above. Cradle **50** is no longer prevented by bracket extension **64** from pivoting clockwise, because bracket **60** is free to pivot counterclockwise, as viewed in FIG. 3, and out of the way of transverse plate **51.**

As cradle **50** pivots clockwise, pivot **68** thereon passes to the right of handle **80.** Thereafter, springs **44** draw knee **42** to the left. When this occurs, the movable contact arms **26–27–26** pivot counterclockwise around pivot **35,** thereby snapping the movable and stationary contacts apart.

As the cradle **50** is pivoting clockwise, handle **80** pivots counterclockwise around its own pivot **46** to a position intermediate the extreme "on" position of FIG. 3 and the extreme "off" position of FIG. 4. The circuit breaker is now in its "trip" position.

It is significant for the operation of the hold-open latch release means **104, 106,** to be described below, that the operating handle **80** is at the extreme left, in FIG. 4, while the circuit breaker is in the "off" position, at the extreme right, in FIG. 3, while the circuit breaker is in the "on" position, and is intermediate the two extremes, in FIG. 5 while the circuit breaker is in the "trip" position.

When it is desired to reclose the contacts of the circuit breaker when it is in the "trip" position, the operating handle **80** is shifted counterclockwise, as viewed in FIG. 5, until it is in the "off" position of FIG. 4. Operating handle **80** has an inwardly extending tab **82** mounted thereon which, as handle **80** is shifted counterclockwise, engages an outwardly extending post at pivot

68 on cradle 50. Continued counterclockwise pivoting of handle 80 shifts the cradle counterclockwise sufficiently to latch the transverse plate 51 beneath the overhanging bracket extension 64, thereby relatching the circuit breaker. The circuit breaker is now in the "off" position of FIG. 4. To thereafter reclose the circuit breaker contacts, the procedure for returning the circuit breaker from the "off" position of FIG. 4 to the "on" position of FIG. 3 is followed.

The circuit breaker is provided with a hold-open latch 90 for holding the circuit breaker contacts apart when the circuit breaker has been manually shifted to the "off" position of FIG. 4. There may be one or more than one hold-open latching means, and there may be one such latch for each phase. Since the contacts for all phases operate simultaneously, the latches must operate simultaneously to latch or unlatch the movable contacts. To be effective, latch 90 must be adapted to hold the contacts apart only when the circuit breaker is in the "off" position and should not interfere with the engagement or disengagement of the contacts while the circuit breaker is in the "on" or the "trip" position or while the circuit breaker is moving between the "on" and the "trip" positions.

Latch 90 includes a plate 92 which is pivotally supported on a fixed position post 94 which is, in turn, supported in position on the circuit breaker frame 32. Plate 92 is provided with a hook 96 adapted to hook the carrier plate 38 to which the movable contact arms 26–27–26 are secured. A spring 98 connects plate 92 with a relatively fixed support, like cradle 50, so that spring 98 normally biases plate 92 clockwise to pull hook 96 into supporting engagement with the carrier 38.

Hook 96 has a lower lip 97 which is the portion first engaged by the carrier 38 as the contact arms 26–27–26 are pivoting counterclockwise while the circuit breaker is moving into the "off" position of FIG. 4. The pressure exerted on lip 97 by carrier 38 momentarily pivots the plate 92 counterclockwise until carrier 38 slips into the notch of hook 96. The spring 98 pulls the plate 92 so that hook 96 moves around the carrier and secures it.

As shown in FIG. 4, when the circuit breaker is in the "off" position with the contacts separated, the hook 96 is hooked on the carrier 38 and is held in hooking engagement by spring 98, so that there is no possibility of accidental or undesired reclosing of the circuit breaker contacts.

Connected with operating handle 80, e.g. by being secured to frame 45 by screws 102, is a cam 104 having a cam surface 106. This is the latch release means.

Fixedly secured to the plate 92 is a cam follower 108 designed to be engaged by cam surface 106 when the circuit breaker is in the "on" or the "trip" position, but not while the circuit breaker is in the "off" position. Operating handle 80 moves cam surface 106 into and out of engagement with cam follower 108. Cam 104 is so shaped, and positioned with respect to handle frame 45 to which it is secured, and with respect to cam follower 108, that the cam surface 106 first engages the cam follower 108 as the operating handle 80 is being moved from the "off" to the "on" position and before the operating handle reaches the "on" position and that cam surface 106 engages cam follower 108 at an angle oblique to the direction in which cam 104 is being moved by the handle 80 at the time of engagement. As handle 80 continues to move after the initial engagement between cam surface 106 and cam follower 108, the cam follower slides along the surface 106 from near the bottom thereof, as viewed in FIG. 3, to near the top.

Cam surface 106 is designed so as to engage cam follower 108 at an oblique angle to reduce the jarring effect of the initial contact between the cam surface and the cam follower, The overcenter spring 44 causes cam 104 to move rapidly as the handle is shifting to the "on" position and the contacts are snapping together. Oblique engagement is much smoother and less shocking to the operating handle 80, the circuit breaker operating mechanism, the cam follower 108, the plate 92 and the pivot mounting of plate 92 than would be the flat abutting engagement, like that shown in Pat. No. 2,932,706.

Cam surface 106 extends outward sufficiently far to cause cam follower 108 to be moved to the right, as viewed in FIG. 3, which pivots plate 92 counterclockwise around pivot 94 against the normal bias of tension spring 98. Therefore, while the circuit breaker is in the "on" position of FIG. 3 and cam surface 106 is in engagement with cam follower 108, the hook 96 is at a location where it is incapable of hooking the carrier 38, and, the hold-open latch could not serve to hold the cooperating contacts apart in the event that an unexpected jarring of the circuit breaker should move the carrier 38 into the vicinity of hook 96.

As shown in FIG. 5, cam 104 is so shaped and cam surface 106 is of sufficient length that when the operating handle 80 shifts from the "on" to the intermediately located "trip" position of FIG. 5, due to an overload current condition, and the cooperating contacts snap apart, cam surface 106 combines to remain in engagement with cam follower 108, thereby holding plate 92 in the outwardly pivoted position shown in FIG. 3, so that hook 96 cannot hook carrier 38.

When, as shown in FIG. 4, the circuit breaker is in the "off" position and operating handle 80 is at the extreme left, cam 104 has shifted so far counterclockwise and upward that cam surface 106 is disengaged from cam follower 108. Plate 92 is then able to be rotated clockwise by the tension of spring 98 to that hook 96 on plate 92 can hook carrier 38, thereby holding the movable contact arms 26–27–26 and the movable contacts 24–25–24 away from the stationary contacts 22–23–22 and preventing the contacts from accidentally coming together as a result of a sudden shock to the circuit breaker.

FIGS. 6 and 7 illustrate an anti-rebound latch 120 such as that shown in U.S. Pat. No. 3,299,244 issued on Jan. 17, 1967 to Albert Strobel and David T. Gray, entitled "Anti-Rebound Latch," and assigned to the assignee hereof.

An anti-rebound latch is designed to hold the breaker cooperating contacts apart after the circuit breaker has tripped and is in the "trip" position. The anti-rebound latch is intended not to function when the circuit breaker is in either of the "on" or "off" positions shown in FIGS. 3 and 4.

The anti-rebound latch 120 is comprised of a plate 122 which is normally biased clockwise, as viewed in FIG. 6, around pivot 124. This pivot may comprise the same post that forms the pivot 94 for the plate 92. Plate 122 is biased clockwise by tension spring 126. The plate includes a hook 128 adapted for hooking carrier 38.

When the circuit breaker is in the "trip" position of FIGS. 5 and 6, cradle 50 has pivoted clockwise, as viewed in FIG. 6, around its pivot 52 so that transverse plate 51 has moved past extension 64 on bracket 60. Cradle 50 does not interfere with the action of biasing spring 126 in biasing plate 122 clockwise to enable hook 128 to hook the carrier 38. Thus, while the circuit breaker is in the "trip" position position, there is no danger that the cooperating contacts will accidentally be jarred into engagement.

As with plate 92, hook 128 of plate 122 has a lower lip 129 which is the portion of plate 122 which is first engaged by carrier 38 as the movable contact arms 26–27–26 are moving into the "trip" position of FIG. 6. The contact between lip 129 and carrier 38 momentarily pivots plate 122 counterclockwise, as viewed in FIG. 6, until carrier 38 slips into the notch of hook 128. Spring 126 draws plate 122 clockwise so that the hook 128 traps the carrier 38 and holds same once the carrier has passed lip 129.

Turning to FIG. 7 and noting FIG. 3, when the circuit breaker is in the "on" position, the cradle **50** has been pivoted, as compared with FIG. 6, so that the transverse plate is beneath the overhanging extension **64** of bracket **60**. Pivotally secured at pivot **132** is one of the ends of arm **134**, the other end of which is connected with plate **122**, by means of the tab **138** on shaft **134** passing through slot **136** in the plate. When cradle **50** pivots counterclockwise, as viewed in FIG. 6, to relatch the circuit breaker, the cradle draws shaft **134** along with it, thereby drawing tab **138** against the left wall **140** of slot **136**. This pivots plate **122** counterclockwise about its own pivot **124** against the bias of spring **126**. This, in turn, moves hook **128** away from a position where it might hook carrier **38**, whereby there is no possibility that carrier **38** will be hooked by hook **128** when the circuit breaker is in the "on" position illustrated in FIG. 7.

As can be seen by a comparison of FIGS. 3 and 4, when the circuit breaker is in either of the "on" or the "off" positions, cradle **50** is in the identical location with its transverse latch plate **51** beneath bracket extension **64**. Hence, in both the "on" position shown in FIG. 7 and in the "off" position, plate **122** is pivoted so that it could not engage carrier **38**. In this manner the anti-rebound latch **120** operates to hold the cooperating contacts apart only when the circuit breaker is in the "trip" position.

There has just been described a circuit breaker employing a novel hold-open latch and a novel latch release means therefor, wherein the latch release means comprises a cam surface attached to the breaker manual operating handle. The cam surface engages a cam follower on the latch at an angle oblique to the direction of movement of the cam surface when it first engages the cam follower on the latch, thereby to reduce the shock of initial contact between the latch release means and the latch itself.

Although the invention has been described above with respect to its preferred embodiments, it will be understood that many variations and modifications will be obvious to those skilled in the art. It is preferred therefore that the scope of the invention be limited not by the specific disclosure herein but only by the appended claims.

I claim:

1. In a circuit breaker including a pair of cooperating contacts, an operating handle, and means operatively connected between said handle and said cooperating contacts, whereby said contacts are connected to be movable by said handle from a disengaged to an engaged position, and vice versa; said handle being movable into a first position in which said contacts are engaged and being movable out of said first position;

a movable hold-open latch normally positioned to operatively engage one contact of said pair of cooperating contacts and thereby maintain said contacts disengaged;

said hold-open latch having a cam follower thereon adapted to be engaged by and moved by a cam surface;

the improvement comprising, a latch release means, said latch release means comprising a cam surface connected with said handle and movable thereby;

said cam surface being so positioned and being of a length so that it moves with reduced impact into engagement with said cam follower as said operating handle is moving toward said first position, then said cam follower slides along said cam surface until said operating handle is in said first position, and said cam follower slides along and in engagement with said cam surface as said operating handle moves out of said first position, and said cam follower thereafter separates from said cam surface;

said cam follower being so positioned that said cam surface is shifted through force exerted thereon by said cam surface to move said hold-open latch away from engagement with said one contact.

2. In the circuit breaker of claim **1**, said hold-open latch having a biasing means therewith connected for normally biasing said hold-open latch into position to engage said one contact.

3. In the circuit breaker of claim **1**, wherein said handle is movable between said first position which is a breaker "on" position, at which said contacts are engaged, and a breaker "off" position, at which said contacts are disengaged;

said circuit breaker further including a trip assembly for tripping apart said contacts when they are engaged, in the event of a current overload in the circuit being protected by said circuit breaker;

said handle being moved by said trip assembly to a "trip" position intermediate said "on" and said "off" position in the event of a current overload;

the improvement further comprising, said cam surface being so shaped and positioned as to remain in engagement with said cam follower to hold said hold-open latch out of engagement with said one contact before, during and after the movement of said handle to said "trip" position.

4. In the circuit breaker of claim **1**, the improvement further comprising,

said cam surface facing in a direction which causes it to engage said cam follower at an angle oblique from the direction in which said cam surface is moving when said cam surface first engages said cam follower, whereby said cam surface engages and disengages from said cam follower gradually without jarring said hold-open latch;

said cam surface having sufficient length that it will continuously remain in engagement with said cam follower from the time it first engages said cam follower as said operating handle is moving into said first position to the time it disengages therefrom after said operating handle is out of said first position.

5. The circuit breaker of claim **4**, wherein said cam surface is secured to said operating handle.

6. In the circuit breaker of claim **4**, said circuit breaker being supported on a frame on which all the other circuit breaker components are supported;

said hold-open latch being pivotally mounted on said frame to pivot between the position where it latches and the position where it releases said one contact;

said hold-open latch having a biasing means therewith connected for normally biasing said hold-open latch into position to engage said one contact; said cam surface engaging said cam follower and pivoting said latch away from the position for latching said one contact.

7. In the circuit breaker of claim **6**, said one contact being mounted on a movable contact arm, which is the structure that is engaged by said hold-open latch.

8. In the circuit breaker of claim **6**, said cam surface being secured to said operating handle.

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BERNARD A. GILHEANY, Primary Examiner

H. BROOME, Assistant Examiner