Sept. 2, 1958 A. S. CASWELL 2,850,603

SECONDARY CONTROL DISCONNECT CONTACTS

Filed Dec. 12, 1955 3 Sheets-Sheet 1

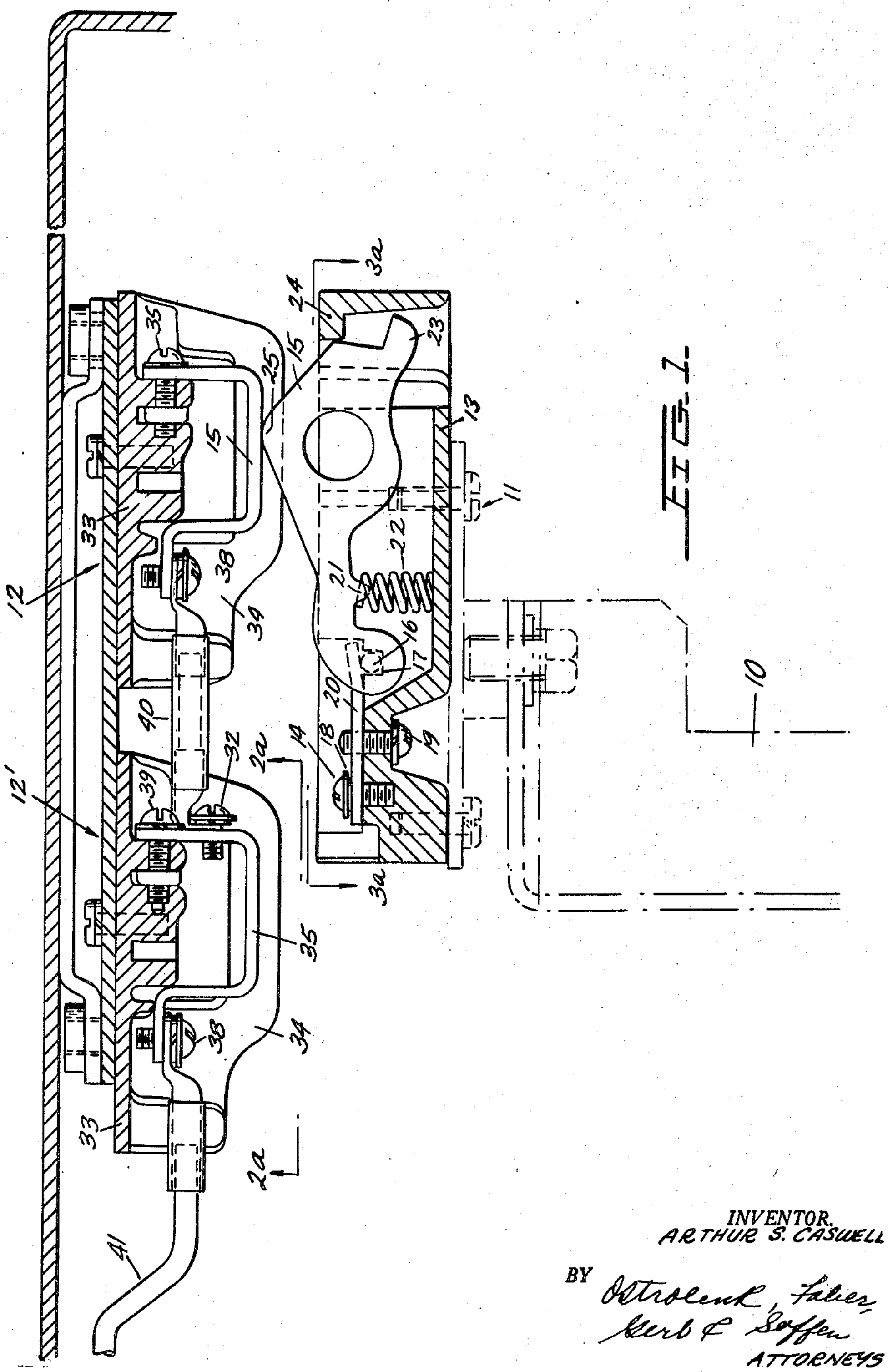

FIG. 1

INVENTOR.
ARTHUR S. CASWELL

BY Ostrolenk, Faber, Gerb & Soffen
ATTORNEYS

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Filed Dec. 12, 1955 3 Sheets-Sheet 2

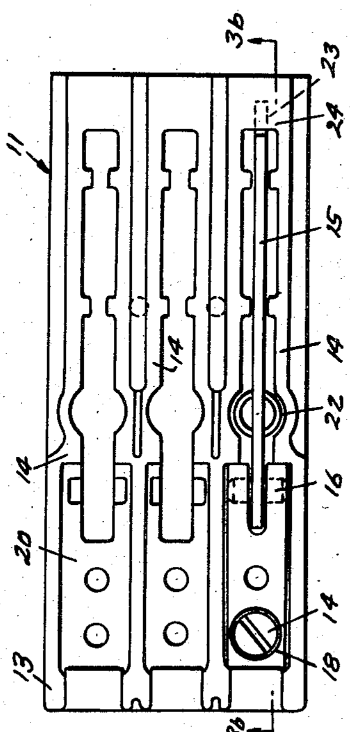

FIG. 3a.

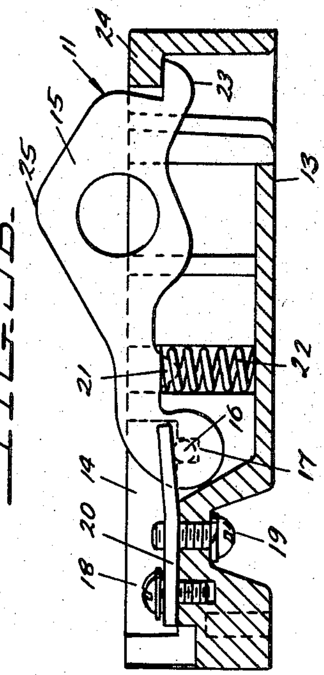

FIG. 3b.

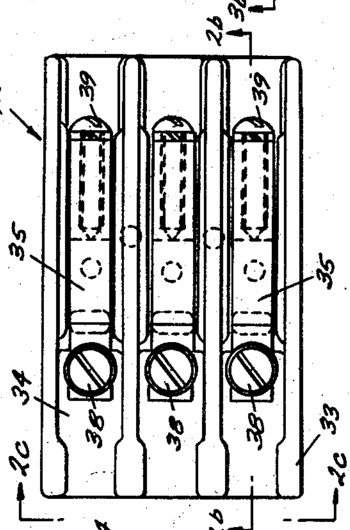

FIG. 2a.

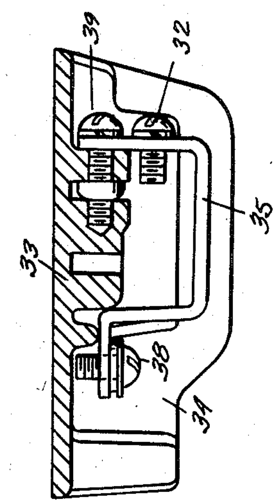

FIG. 2b.

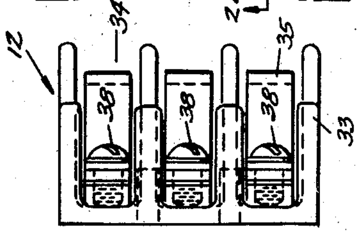

FIG. 2c.

INVENTOR.
ARTHUR S. CASWELL

BY Ostrolenk, Faber, Gerb & Soffen
ATTORNEYS

Sept. 2, 1958 A. S. CASWELL 2,850,603

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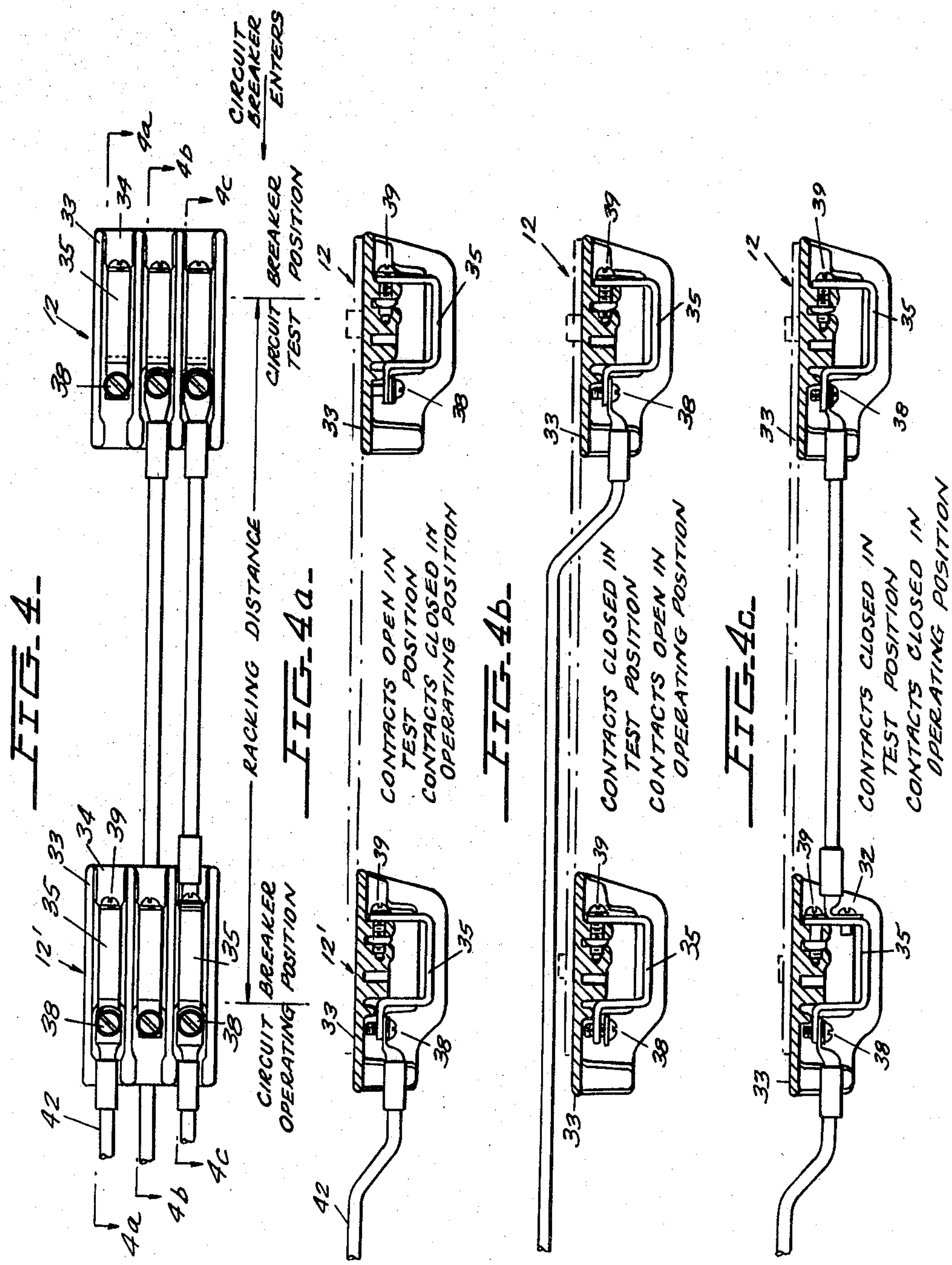
Filed Dec. 12, 1955 3 Sheets-Sheet 3



INVENTOR.
ARTHUR S. CASWELL

BY Ostrolenk, Faber, Gerb & Soffen

ATTORNEYS

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1

2,850,603

SECONDARY CONTROL DISCONNECT CONTACTS

Arthur S. Caswell, Philadelphia, Pa., assignor to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

Application December 12, 1955, Serial No. 552,407

4 Claims. (Cl. 200—168)

My invention relates to secondary control disconnect contacts for circuit interrupting equipment wherein the requirement for pigtail connections are eliminated and stationary test contacts and stationary operating contacts are separate structural units to permit various spacing combinations to be obtained with ease and uniformity.

My novel secondary disconnect contact provides a compact molding for each sub-unit to serve as a guide and positioning means for the contact finger. In the prior art arrangement, it has been customary to provide a common stationary conducting strip with which the secondary disconnect contacts of the circuit breaker would engage during both the test and operating position of the circuit breaker. However, this prior art arrangement does not permit variations of combinations with ease and uniformity. In my novel secondary disconnect contact arrangement, I have provided a standard sub-unit which can serve as a stationary test position contact or stationary operating position contact. Thus, if for a given switch gear installation the distance is large, it is merely necessary to position the two sub-units at a distance from each other equal to the racking distance if it is desired to have closed contacts when the circuit breaker is in both the test and operating position. Thus, with this arrangement it is merely necessary to provide a simple wire conductor between the two sub-units. Hence, the stationary contacts are readily adaptable for any racking distance of the circuit breaker. In the event that it is not required to have electrical contact when the circuit breaker is in either the test or operating position, it is merely necessary to eliminate the electrical components or hardware from the molding to achieve this condition. Thus economies are gained by omitting parts where the circuit is not required.

The movable secondary disconnect contact of my invention is provided with a thin contact and a compact molding wherein the molding serves as a guide and positioning means for the finger contact as well as providing a housing for the biasing means. By providing the stationary secondary disconnect contacts with relatively wide contacts it is possible to compensate for misalignment in both the horizontal and vertical direction and decrease the space required per secondary disconnect contact to thereby increase the disconnect units in any given space.

Accordingly, a primary object of my invention is to provide a secondary control disconnect contact arrangement which eliminates the necessity for a pigtail, for example in construction and requires relatively few parts.

Another object of my invention is to provide a secondary control disconnect contact arrangement wherein separate sub-units are utilized for the stationary test contacts and stationary operating contacts so that various required combinations are easily obtained, as well as to permit the economies which are gained by omitting parts where circuits are not required.

A still further object of my invention is to provide a secondary disconnect contact wherein a compact molding is utilized for the movable contacts in which the molding serves as guide and positioning means for finger contact as well as biasing means.

2

These and other objects of my invention will be apparent when taken in connection with the drawings in which:

Figure 1 is a side cross-sectional view of the combination of stationary and movable secondary control disconnect contacts showing the movable secondary contact in electrical engagement with one of the stationary contacts.

Figure 2*a* is a view taken in the direction of the arrows 2*a*—2*a* of Figure 1 and illustrates a top view of a typical stationary contact of my novel secondary disconnect contact arrangement.

Figure 2*b* is a view taken in the direction of the arrows 2*b*—2*b* of Figure 2*a* and illustrates a side cross-sectional view of the stationary contacts.

Figure 2*c* is a view taken in the direction of the arrows 2*c*—2*c* of Figure 2*a* and illustrates the end view of the stationary contact.

Figure 3*a* is a view taken in the direction of the arrows 3*a*—3*a* of Figure 1 and illustrates a top view of the movable secondary disconnect contact of my invention.

Figure 3*b* is a view taken in the direction of the arrows 3*b*—3*b* of Figure 3*a* and illustrates a side cross-sectional view of the movable contact arrangement.

Figure 4 is a top view of a typical installation of the stationary secondary disconnect contacts of my invention.

Figure 4*a* is a view taken in the direction of the arrows 4*a*—4*a* of Figure 4 and illustrates the arrangement that could be used when it is desired to have the contacts open in test position and closed in operating position for the circuit breaker.

Figure 4*b* is a view taken in the direction of the arrows 4*b*—4*b* of Figure 4 and illustrates the connection of the stationary contacts when it is desired to have the contacts closed in the test position and open in the operating position for the circuit breaker.

Figure 4*c* is a view taken in the direction of the arrows 4*c*—4*c* of Figure 4 and illustrates electrical connection of stationary contacts when it is desired to have the secondary disconnect contact closed in both the test and the operating position of the circuit breaker.

As it is well known in the circuit breaker art, it is desirable to provide circuit interrupting equipment with both primary and secondary disconnect contacts so that it can be selectively positioned in both an operating and test position. In my copending application Serial No. 552,614 filed Dec. 12, 1955, I have shown an improved type of primary disconnect contact for circuit interrupters. The instant invention is specifically directed to secondary disconnect contacts for circuit interrupters.

Typical applications for secondary disconnect contacts when the circuit breaker is in either the test or operating position provide an energizing circuit for opening or tripping the circuit breaker, or lights to indicate the operating position of the circuit breaker or to provide adequate interlock circuit break. That is, two secondary disconnect contacts are utilized for all circuitry other than the main circuit or system being protected by the circuit interrupter. Thus, in each installation there is a movable contact associated usually with the circuit interrupter which selectively engages the stationary contacts depending on position of the circuit interrupter.

In Figure 1 I have shown a combination of a contact assembly **11** in electrical engagement with a stationary contact assembly **12**. In the illustration shown, it is assumed that the position of the stationary contact **12** corresponds to the test position of the circuit interrupter and the position of the stationary contact **12'** is the operating position of the circuit interrupter. The movable contact 11 is secured to the movable circuit interrupter 10 in any desirable position and this circuit interrupter can be racked to the position of the stationary contact assembly 12 or stationary assembly 12'. The movable contact assembly 11 is comprised of a molding 13, a housing, a plurality of longitudinal openings 14, equal in number to the number of circuits to be controlled by that particular unit. In addition to the compact molding 13, the movable contact assembly is comprised of a plurality of finger contacts 15 which are associated with each of the longitudinal openings 14.

In the illustration of Figure 3*a* I have shown a finger contact 15 associated only with the lower most opening 14 and the contact finger removed from the other two openings. The finger contact 15 is a substantially flat member and is provided with a pin 16 extending transverse thereto to be received within the slot 17 of the molding 13. A conducting member 20 positioned on top of the pin 16, to serve as a retaining means therefore and providing a substantially fixed pivot for the finger contact 15 is secured to the molding by means of the screw 18. The screw 19 making electrical engagement with the conductor 20 and functions as a terminal means for the finger contact 15. That is, electrical connection to the finger contact 15 is made through the screw or terminal 19. The finger contact 15 has a contour to provide an extension 21 to receive one end of a coil biasing spring 22. The coil biasing spring 22 biases finger contact 15 in a counterclockwise direction about pivot 16 toward stationary contact assembly. It will be noted that there is a protrusion 23 at one end of the finger contact 15 which is lodged below portion 24 of the molding 13. The section 24 of the molding 13 serves as a stop means to limit counterclockwise rotation of the finger contact 15. It will be noted that if the compact molding 13 is to be utilized to control three circuits that there will be a finger contact assembly of the nature described in Figure 3*b* in each of the longitudinal openings 14 described in Figure 3*a*. The finger contact 15 is provided with a slanting surface on each side of its contact point 25 to facilitate mechanical operation of the stationary contact when moved toward the operating position and away from the operating position.

Since the finger contact 15 is a relatively thin member, it is possible to provide a compact molding 13 to house the assembly as illustrated in the figures, three separate finger contacts for the control of three separate circuits. Thus there is a substantial decrease in space requirements for each movable contact assembly so that there can be an increase of units for control circuit in any given space.

In Figures 1, 2*a*, 2*b* and 2*c*, I have illustrated a typical stationary contact assembly. It will be noted that the stationary contact asembly utilized for the operating and test positions is substantially identical in construction. The assembly is comprised of a molding 33, which like the movable contact assembly, is provided with a plurality of longitudinal openings 34. The conducting member 35 is secured to the molding 12' by means of screw 39. The screw 33 serves as the first terminal connector to conductor 35, and at the other end of conductor 35 the screw 38 serves as the second terminal connector.

Thus, as best seen in Figure 1, when the circuit interrupter 10 is moved from the right to the left toward the test position, the thin finger contact 15 will engage the relatively wide stationary contact 35 and be displaced thereby against the action of biasing spring 22. In view of the relative shapes of these two units and action of the biasing means, the unit will automatically compensate for any misalignment in both the horizontal and vertical direction.

As heretofore noted, I have provided a unitary stationary assembly which can be used either in the test or operating position. Thus for example, as seen in Figure 1, the stationary contact assembly 12 placed in a test position, can be electrically connected to the stationary contact 12' by the electrical conductor 40, which is connected between the terminals 38 of stationary contact assembly 12 and terminal 32 of stationary contact assembly 12'. The conductor 41 which goes to one portion of the circuit energized by the stationary contacts illustrated is connected to terminal 38; the other conductor of the circuit of Figure 1 would be controlled through the assembly 11 by means of the terminal 19.

As heretofore noted, my novel arrangement has a large degree of flexibility in that various combinations for control are easily and economically obtained. In Figure 4 I have illustrated a typical installation of stationary contacts wherein the stationary contacts 12 are in a circuit breaker test position and the contacts 12' are in a circuit breaker operating position. These are positioned from each other by a distance equal to the racking distance of the circuit breaker. As heretofore noted, the movable secondary disconnect contacts, which are selectively engaged with stationary contacts 12, are mounted on circuit interrupter 10 and are not illustrated in Figures 4, 4*a*, 4*b* or 4*c*. However, this circuit interrupter would move from right to left to go from the test to the operating position.

If there are no electrical connections in the three stages (one block), the stationary contact 12 would be omitted.

In Figure 4*a* I have shown a typical arrangement wherein it is desired to have the secondary disconnect contacts open when the circuit breaker is in the test position and the disconnect contacts closed when the circuit breaker is in the operating position. That is, there is an electrical connection between stationary contact 12' by means of conductor 42, but there is no electrical connection between the stationary contacts of the test and operating positions.

Figure 4*b* shows the electrical connection when it is desired to have the secondary disconnect contacts closed in the test position but to have secondary disconnect contacts open in the operating position.

Figure 4*c* illustrates the electrical connection when it is desired to have the secondary disconnect contacts closed in both test and operating positions. It is therefore apparent that various combinations are easily and economically obtained and with great simplicity in wiring the flexible spacing achieved for any one of a multiple of combinations is permitted with my novel arrangement.

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

I claim:

1. A secondary control disconnect contact for a circuit interrupter being comprised of a stationary contact assembly for the test position, a stationary contact assembly for the operating position and a movable contact assembly for the circuit interrupter movable in a path between said stationary contact assemblies, said movable contact assembly being comprised of a compact molding and a finger contact, an opening in said molding to receive said finger contacts and a biasing means, said biasing means being positioned within said molding to bias said movable contact in a direction toward said stationary contacts, said molding providing journaling means for said biasing means and also providing journaling means to limit movement of said finger contact transverse to said path.

2. A secondary control disconnect contact for a circuit interrupter being comprised of a stationary contact assembly for the test position, a stationary contact assembly for the operating position and a movable contact assembly for the circuit interrupter movable in a path between said stationary contact assemblies, said movable contact assembly being comprised of a compact molding and a plate like finger contact, an opening in said molding to receive said finger contact and a biasing means, said

biasing means being positioned within said molding to bias said movable contact in a direction toward said stationary contacts, means to electrically interconnect said stationary contact assemblies, said finger contact, when in a first position along said path being in physical contact with one of said stationary contact assemblies and, when in a second position along said path, being in physical contact with the other of said stationary contact assemblies; said finger contact being physically and electrically disengaged, when between said first and said second positions, from both of said secondary contact assemblies.

3. A secondary control disconnect contact for a circuit interrupter being comprised of a stationary contact assembly for the test position, a stationary contact assembly for the operating position and a movable contact assembly for the circuit interrupter movable in a path between said stationary contact assemblies, said movable contact assembly being comprised of a compact molding and a finger contact, an opening in said molding to receive said finger contacts and a biasing means, said biasing means being positioned within said molding to bias said movable contact in a direction toward said stationary contact assemblies, said compact molding having a surface to limit the movement of said finger contact toward said stationary contact assemblies, means to electrically interconnect said stationary contact assemblies, said finger contact, when in a first position along said path being in physical contact with one of said stationary contact assemblies and, when in a second position along said path, being in physical contact with the other of said stationary contact assemblies; said finger contact being physically and electrically disengaged, when between said first and said second positions, from both of said secondary contact assemblies because of the engagement of said finger contact with said surface.

4. A secondary control disconnect contact for a circuit interrupter being comprised of a stationary contact assembly for the test position, a stationary contact assembly for the operating position and a movable contact assembly for the circuit interrupter movable in a path between said stationary contact assemblies, said movable contact assembly being comprised of a compact molding and a finger contact, an opening in said molding to receive said finger contacts and a biasing means, said biasing means being positioned within said molding to bias said movable contact in a direction toward said stationary contacts, said compact molding having a surface to limit the movement of said finger contact toward said stationary contact assemblies, means to electrically interconnect said stationary contact assemblies, each of said stationary contact assemblies being comprised of a molding and a contact, said molding being provided with openings to receive said contacts, means to secure said contacts within said openings of said moldings, said finger contact of said movable contact assembly being selectively positioned along said path into electrical engagement with said contact of said test position stationary contact and said operating position stationary contact, said molding providing journaling means for said biasing means and also providing journaling means to limit movement of said finger contact transverse to said path.

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