Nov. 17, 1959 F. E. MYERS 2,913,542

TWO POLE CIRCUIT BREAKER

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FIG. 1.

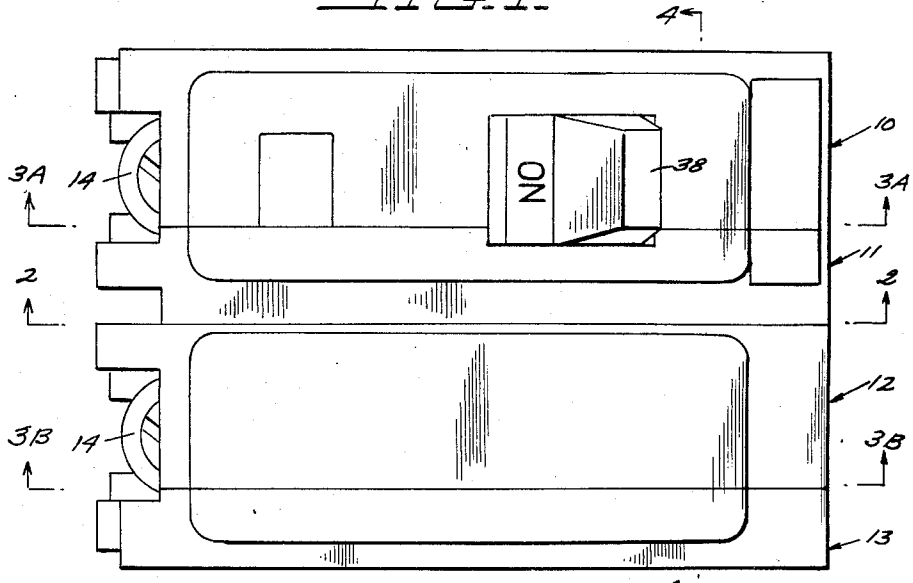

FIG. 2.

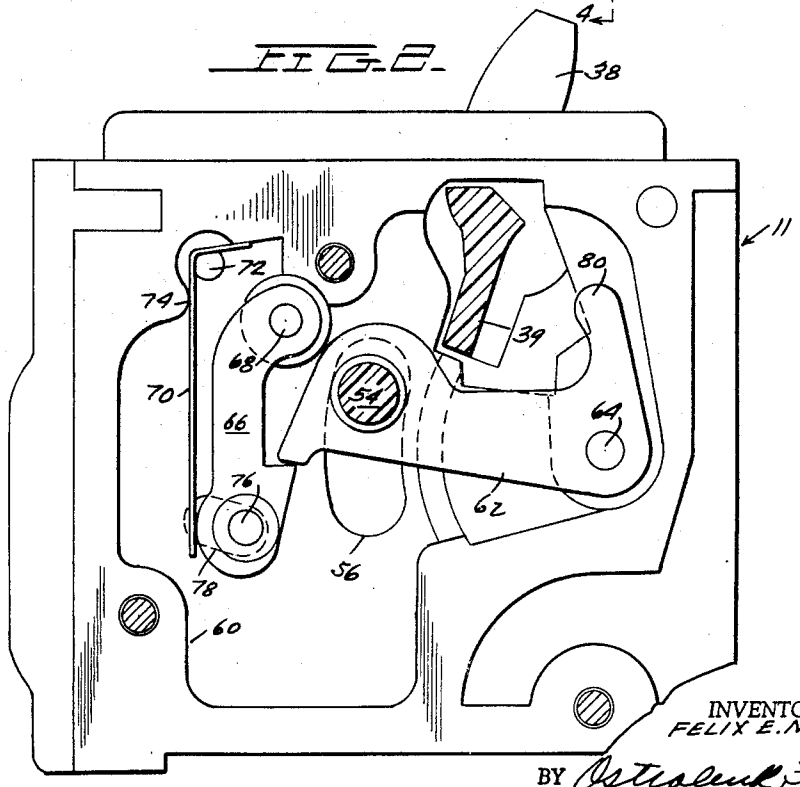

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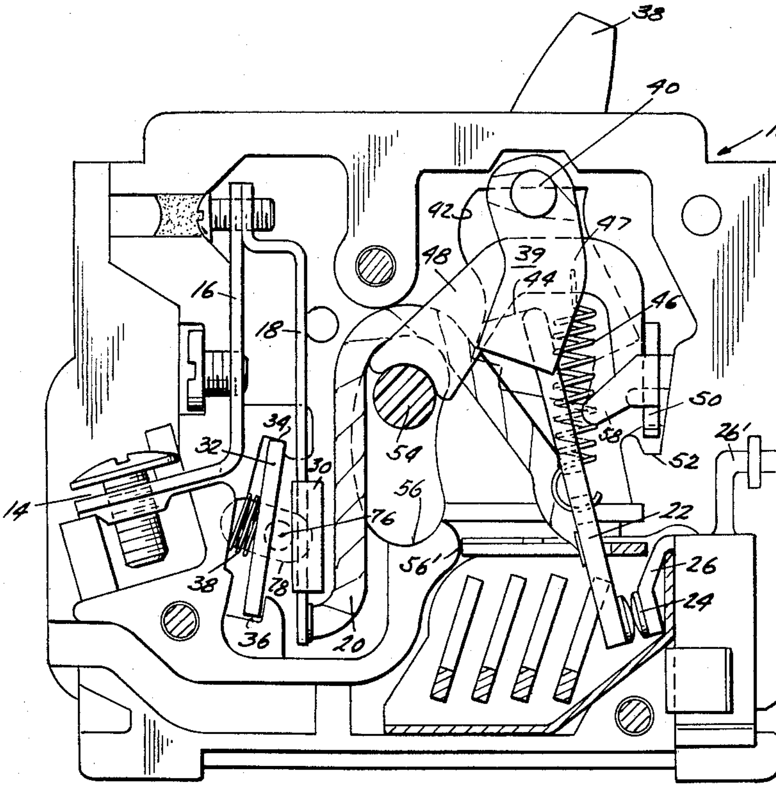
FIG. 3



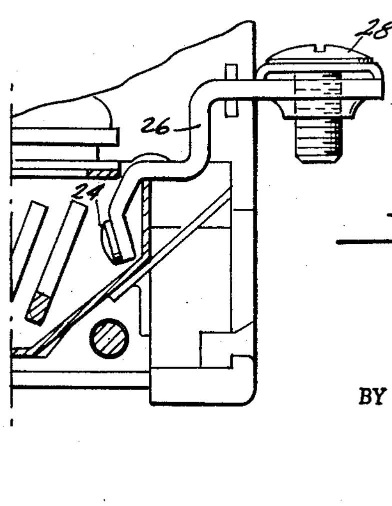


FIG. 3a

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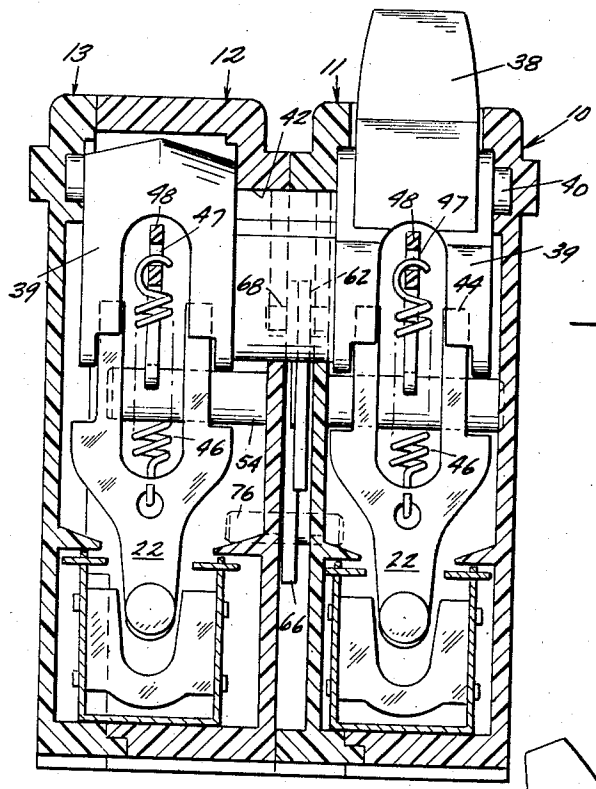

FIG. 4

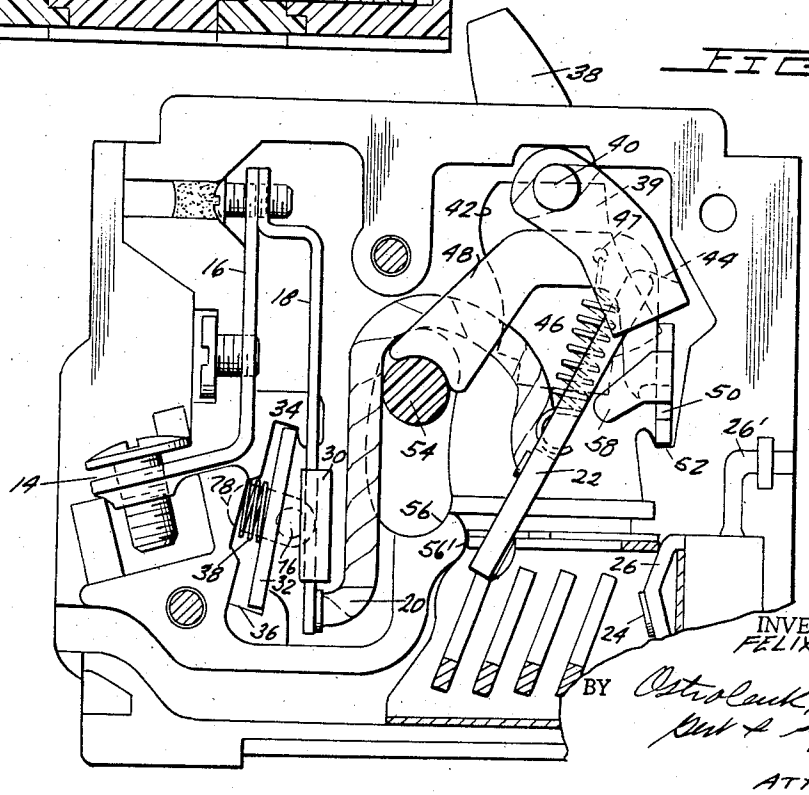

FIG. 5

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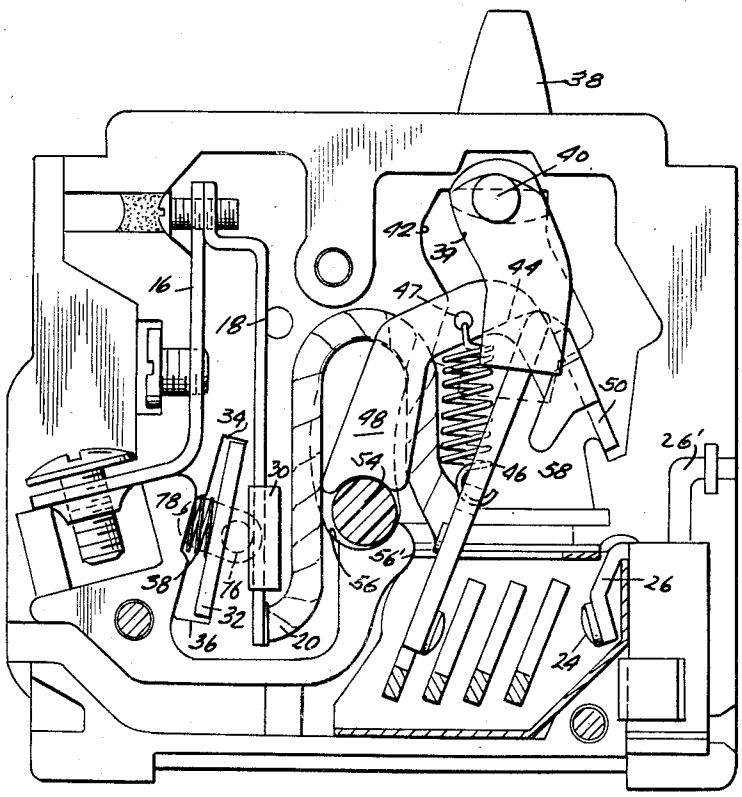
FIG. 6.



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2,913,542

TWO POLE CIRCUIT BREAKER

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Application October 23, 1957, Serial No. 691,867
3 Claims. (Cl. 200—5)

My invention relates to a novel two pole circuit breaker wherein a latching mechanism operable from a trip mechanism associated with each pole is positioned between two poles and controls the automatic motion of the cooperable contacts of each pole.

In the past, two pole circuit breakers have been provided wherein each pole is completely encased in a molded housing. The trip latch has been then maintained in at least one of the two poles, and the force transmitting means from the manual handle has been maintained in at least one of the two poles. There is then provided a common connector between the poles whereby movement of, for example, one bimetal will remove the latch of the bimetal in the other pole.

However, with these prior art devices, it is difficult to obtain uniform trip characteristics for the two poles since the bimetal of one pole may act directly on the latch, whereas the other bimetal in the other pole must function through a common bar which is in turn connected to the first latch.

The essence of my invention is to provide a latch means which is positioned between the housings of each pole wherein the tripping mechanism, such as the bimetals of each pole, each operate on the latching means in an identical manner.

Accordingly, each of the poles are mechanically balanced and have a coordinated operation whereby an equal force is needed for each pole.

In a preferred embodiment of my invention, each of the poles are mounted within separate housings with the adjacent surfaces of these housings having a depression to form a third housing for mounting the latch mechanism.

The latch mechanism then cooperates with the operating mechanism of the cooperable contacts of each pole as well as the tripping mechanism of each pole whereby operation of the tripping mechanism of either pole will operate the latch means to thereby release the cooperable contacts of each pole for motion from an engaged position to a disengaged position.

Accordingly, the primary object of my invention is to provide a novel two pole circuit breaker wherein each pole has similar tripping characteristics.

Another object of my invention is to provide a novel two pole circuit breaker wherein the latching mechanism is positioned between the first and second pole housings.

A further object of my invention is to provide a latching means for a two pole circuit breaker which is positioned within a depression formed in the adjacent walls of the first and second housing of a two pole circuit breaker.

Still another object of my invention is to provide a novel latch mechanism for two pole circuit breakers which is positioned between each of the poles and is operable by the trip mechanism of either pole in an identical manner.

A still further object of my invention is to provide a latch mechanism for a two pole circuit breaker wherein each of the poles is mounted in an individual housing and the latch mechanism is mounted between the two housings and is operable in an identical manner by the trip mechanism of either pole.

These and other objects of my invention will become

apparent from the following description when taken in conjunction with the drawings, in which:

Figure 1 shows a top plan view of the two pole circuit breaker of my invention.

Figure 2 shows a side cross-sectional view of Figure 1 taken across the lines 2—2 and particularly illustrates my novel latch mechanism in the latched position.

Figure 3 is aside cross-sectional view of Figure 1 taken across the lines 3A—3A as well as 3B—3B with the circuit breaker contacts engaged to illustrate the identical internal construction of each of the circuit breaker poles. This figure illustrates the plug-in type terminal at the left.

Figure 3A is a partial view of the terminal structure of the device of Figure 3 where the terminal is of the wire type.

Figure 4 is an end cross-sectional view across lines 4—4 of Figure 1.

Figure 5 is similar to Figure 3 with the circuit breaker contacts manually moved to the off position by the operating handle.

Figure 6 is similar to Figure 3 with the circuit breaker contacts automatically moved to the off position by defeat of the latch means of Figure 2.

Referring now to Figures 1, 3 and 4, my novel circuit breaker is comprised of a first pole **10** and a second pole **12**, which are mounted within individual moulded housings and are, as may be seen from Figure 3 of substantially identical construction.

Each of the poles, as best seen in Figure 3 forms a current path including terminal **14**, conductor **16**, bimetal **18**, pigtail **20**, movable contact arm **22** terminated by a movable contact, stationary contact **24**, conductor **26**, and terminal **28**. Note that while Figure 3 shows terminal **28** as being of the plug-in type, that terminal **28** could be of the wire connected type as shown in Figure 3A. The various current members are removably carried by the moulded housing associated therewith to facilitate assembly and maintenance of the poles.

Bimetal **18** has a magnetic armature **30** riveted thereto by a round head rivet **31** in Figure 3 which cooperates with a relatively stationary magnetic structure **32** which is slidably mounted within moulding depressions **34** and **36** and is outwardly biased by spring **38**.

Accordingly, bimetal **18** will deflect to the left responsive to heating thereof by a prolonged overload, or by interaction between armature **30** and magnetic structure **32** during short circuit current conditions. This leftward motion of bimetal **18** of either pole will, as will be seen hereinafter, initiate automatic interruption of both circuit breaker poles.

It is to be noted that the round head rivet protrudes to the left and will engage armature **32** in a single point contact to thereby prevent the establishment of a welding current which could flow from the bimetal to the armature **32**, and back to the bimetal. This novel one rivet structure overcomes the requirement of insulating the face of armature **32**.

The operating mechanism for each of the poles includes a single operating handle **38** protruding from the housing of pole **10**. The lower portion **39** of operating handle is pivotally mounted on pivot **40** which, as seen in Figure 4 extends through apertures in the adjacent housing walls such as aperture **42** of Figure 3 and seats in depressions **41** and **43** of walls **10** and **13** respectively. Operating handle portion **39** further has a depression **44** in the base thereof for seating the top of the movable contact arm **22** of each of the poles.

Movable contact arms **22** are urged into depressions **44** of the lower portion **39** of the moulded operating handle by means of individual toggle springs **46** which have one end thereof connected to a central portion of

their respective contact arm 22 and their other end connected to a point 47 on cradle 48.

Cradle 48 is then pivotally supported at end 50 in moulding depression 52 while its other end is supported by a latchable connector bar 54 which is common to each pole and extends through apertures such as aperture 56 (Figure 3) in the adjacent housing walls. It is to be noted that cradle 48 has an integral kicker member 58 fastened thereto at end 50. The operation of kicker member 58 will be more fully discussed hereinafter.

When the operating handle 10 is in the right hand position of Figure 3, the toggle linkage comprised of cradle 48, contact arm 22 and spring 46 will be overcentered to force the movable contact portion of arm 22 into engagement with stationary contact 24.

If the operating handle 10 is manually moved to the left and to an "off" position, the upper pivotal point of engagement between depression 44 and contact arm 22 will move to the right (see Figure 5) until this pivot point is to the right of a line connecting point 47 on cradle 48 and the point at which spring 46 is fastened to arm 22. The toggle linkage will then be overcenter in the opposite direction and the contact arm 22 will then quickly snap to a disengage position limited by moulded housing portion 56' as is best seen in Figure 5.

Accordingly, the contacts of each circuit breaker pole may be manually operated through identical operating mechanisms by a single operating handle 38.

For automatic operation of the cooperable contacts of each pole, the connecting member 54 which is normally latched in the upper position of Figure 3 will be unlatched by my novel latch mechanism to be described hereinafter whereby connector 54 can move downwardly.

Since, as best seen in Figure 4, the connector 54 supports the ends of cradles 48 of each of the poles, when connector bar 54 is unlatched, the biasing force of springs 46 will cause cradles 48 to move counter-clockwise about their pivots 52. This motion will bring point 47 to the left of a line formed by pivot point 44 and the point at which spring 46 connects to contact arm 22 whereby the contact arm will be snapped to its disengaged position as shown in Figure 6.

During this operation, it will be noted that kicker member 58 will hit the contact arm 22 if the contacts do not disengage, thus assuring rapid contact disengagement of the contacts even though they may be lightly welded. Furthermore, the handle 38 will show a tripped position since spring 46 will pull the contact arm to urge the bottom of the operating handle to engage extension 80 of cradle 62.

In order to reclose the breaker, the operating handle is first moved to the off position where the latch mechanism is reset as described hereinafter and then to the on position.

My novel latch structure may be best seen in Figure 2 as being carried within a depression 60 in the side wall of the housing of pole 10 which is sealed by the adjacent side wall of pole 12 to thereby form a third housing interposed between the two pole housings.

The latching unit consists of a latching cradle 62 which is pivotally mounted to the moulded housing by pin 64 and cooperates with a latch lever 66 which is pivotally mounted to the housing by pin 68. A latch return spring 70 bears against latch lever 66 and biases it in a counter-clockwise direction. The latch return spring is mounted within the moulded body by a moulded pin 72 and a moulded fulcrum point 74.

The lower end of latch lever 66 has a trip rod 76 which extends through apertures in the adjacent housing walls such as aperture 78 and into an engageable position with respect to the thermal-magnetic responsive unit 18 of each of the poles (Figure 3).

Thus, either of the bimetals 18 may engage the trip rod 76 in an identical manner responsive to deflection of either bimetal.

The above described connector member 54 is shown in Figure 2 to be staked to the latch cradle 62. So long as latch lever 66 latches latch cradle 62, connector member 54 will be held in the position of Figures 2 and 3 and the circuit breaker contacts will be maintained in the engaged position. If, however, either of the thermal-magnetic units 18 are deflected to the left (in Figure 3), the deflected unit will engage trip rod 76 to rotate latch lever clockwise against the biasing force of spring 70. This motion will eventually cause defeat of the latch engagement between cooperating latch members 66 and 62. Member 62 will rotate counter-clockwise and connector bar 54 will drop to allow automatic disengagement of the contacts of each pole.

It is essential to note that the tripping characteristic of the two pole unit is independent of which pole initiates the tripping since the latch mechanism is interposed between the poles and is connected in an identical manner to each pole.

To reset the breaker, the operating handle 38 is moved first to the off position. This motion will cause bottom portion 39 of the breaker handle to pick up extension 80 of latch member 62 (which has rotated counter-clockwise during the automatic operation) and rotate it clockwise until to latch mechanism to reset in the position of Figure 2. The breaker may thereafter be operated to its on position through operating handle 38.

In the foregoing, I have described my invention only in connection with preferred embodiments thereof. Many inventions 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 two pole circuit breaker comprising a first and second pair of cooperable contacts and respective first and second trip mechanism therefor; a first and second respective operating mechanism operatively connected to said first and second pair of cooperable contacts for controlling the motion of said first and second pair of cooperable contacts between an engaged and disengaged position; a single latch means operatively connected to said first and second operating mechanisms to maintain said operating mechanism in their said engaged position; said latch means being operatively connected to each of said first and second trip mechanisms in an identical and symmetric manner to be unlatched responsive to operation of either of said first or second trip mechanisms; each of said first and second pair of cooperable contacts respectively, first and second trip mechanisms respectively, and first and second operating mechanisms respectively being contained within a first and second housing respectively, said latch means being contained within a third housing formed by depressions in the adjacent walls of said first and second housings; said first and second housings having a greater width than said third housing; said third housing being independent of contact mechanism.

2. A two pole circuit breaker comprising a first and second pair of cooperable contacts and respective first and second trip mechanism therefor; a first and second respective operating mechanism operatively connected to said first and second pair of cooperable contacts for controlling the motion of said first and second pair of cooperable contacts between an engaged and disengaged position; a single latch means operatively connected to said first and second operating mechanisms in an identical manner to maintain said operating mechanisms in their said engaged position; a single manual operating handle operatively connected to said first and second operating mechanisms for manually operating said mechanisms independently of said latch means; said latch means being operatively connected to each of said first and second trip mechanisms in an identical and symmetric manner to be unlatched responsive to operation of either of

said first or second trip mechanisms; each of said first and second pair of cooperable contacts respectively, first and second trip mechanisms respectively, and first and second operating mechanisms respectively being contained within a first and second housing respectively, said latch means being contained within a third housing formed by depressions in the adjacent walls of said first and second housings; said first and second housings having a greater width than said third housing; said third housing being independent of contact mechanism.

3. A two pole circuit breaker comprising a first circuit breaker mounted within a first housing and a second circuit breaker mounted within a second housing, said first and second housings being positioned adjacent to one another, said first and second circuit breakers having a

common latch means, said common latch means being mounted externally of each of said first and second housing and between the adjacent walls of said first and second circuit breaker in a third housing formed by a depression in at least one of said adjacent walls; said first and second housings having a greater width than said third housing; said third housing being independent of contact mechanism.

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