

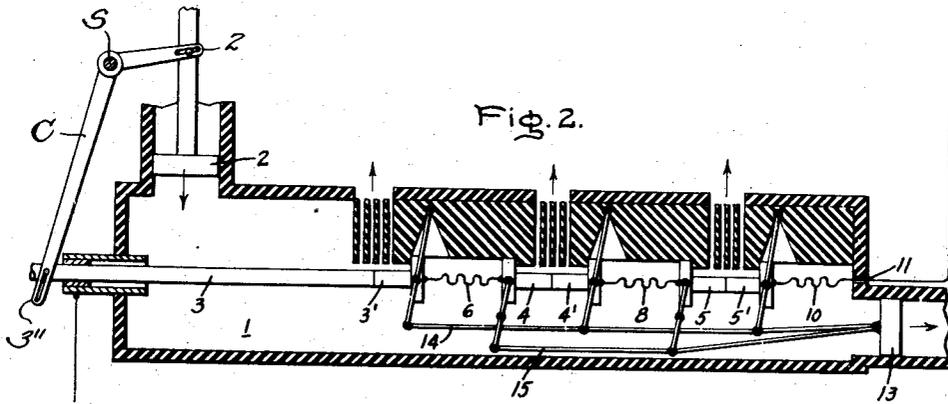
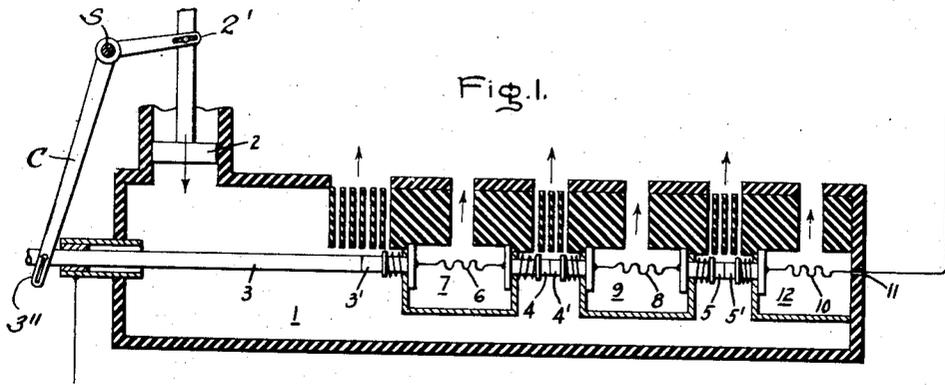
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MULTIBREAK HIGH VOLTAGE CIRCUIT BREAKER

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MULTIBREAK HIGH VOLTAGE CIRCUIT
BREAKERCedric Harold Flurscheim, Fleet, England, assign-
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8 Claims. (Cl. 200—150)

This invention relates to multi-break oil circuit breakers and particularly to high voltage circuit breakers, and has for its object to provide an improved arrangement whereby a rapid initial movement apart of the contacts is obtained on breaking.

According to the invention one or more of the breaks is effected by a pair of co-acting contacts, one or both of which is biased to the closed position, and during breaking moved apart against the bias by oil pressure in the contact chamber acting either directly in a longitudinal direction upon said contact or contacts, or acting upon a plunger or the equivalent operatively connected with said contact or contacts.

According to one form of the invention a circuit breaker is constituted by a plurality of such pair of contacts all arranged electrically in series whilst a mechanically operated contact may be arranged in series either with a single oil operated contact or with a series of oil operated contacts. It will be appreciated that the oil actuation of the contacts possesses advantages in that a very rapid initial break is obtained, and furthermore, that in the case of extra high tension apparatus the problem of insulating the actuating gear is eliminated.

It is of course necessary that the opposite faces of the oil operated contacts should be screened from the contact chamber to enable a pressure difference on the opposite faces of contact to be reduced, and accordingly the opposite faces of the oil operated contacts preferably communicate with a chamber open to atmosphere.

In order that the invention may be more clearly understood reference will now be made to the accompanying drawing which shows partly diagrammatically two embodiments of the invention.

Fig. 1 is an elevational sectional view showing an arrangement in which the contacts are actuated by oil pressure acting directly upon them and Fig. 2 is a similar view showing an arrangement wherein the oil pressure acts upon a plunger operatively connected with the contacts.

Referring first to Figure 1, the reference 1 indicates the contact chamber, the oil pressure in the chamber during breaking being produced by a piston 2 suitably operated. The circuit breaker comprises a mechanically operated contact 3 co-operating with an oil actuated contact 3', whilst in series with the contacts 3, 3' are a pair of oil operated contacts 4, 4' and a second pair of oil operated contacts 5, 5'. It will be observed that the contacts 3', 4 are slidably mounted and are interconnected electrically by a lead 6, and the

end faces which are opposite to those exposed to the oil pressure slide into a chamber 7 which is in communication with the atmosphere. Similarly, the contacts 4' and 5 are interconnected by a lead 8 and slide into a chamber 9, whilst the end contact 5 is connected by a lead 10 with the terminal 11 and its opposite end face is located in an air chamber 12. Suitable oil cross-jet passages are located adjacent the breaks. All the oil operated contacts are biased to the position shown by means of springs, as illustrated.

It will be appreciated that the piston 2 and the contact 3 are operated by a common actuating or control mechanism so that during breaking the oil pressure in the contact chamber 1 is produced at the same time that the mechanically operated contact 3 is moved to the left; thus the breaks will all be produced substantially at the same time. A simple mechanical arrangement for operatively interconnecting the piston 2 and the rod contact 3, illustrated merely by way of example, comprises a main operating shaft S to which is secured a bell crank C. The arms of the crank C are suitably connected, as through pin and slot connections, 2' and 3'', to the piston 2 and contact 3 respectively for operating the circuit breaker in the desired manner. The operating shaft S can obviously be rotated to open and close the breaker by any suitable motive device.

In the alternative arrangement shown in Fig. 2 the oil operated contacts instead of being actuated by oil pressure acting directly upon them are connected through linkage with a piston 13, which piston is displaced by the oil pressure so as to move the contacts apart during breaking. It will be observed that the piston 13 is connected through a linkage 14 with the contacts 3', 4' and 5', and through a link 15 with the contacts 4 and 5.

In both arrangements shown by Figs. 1 and 2, the exteriorly operable contact 3 is independent of the liquid pressure operated contacts to form in effect an isolating gap in the oil in series with the interrupting breaks at 4—4' and 5—5'. When the circuit is interrupted at these breaks by the pressure impulse, the pressure operated contacts are again biased closed but the circuit is maintained open at the isolating gap.

I claim:

1. A high voltage circuit breaker of the multi-break liquid type comprising a casing containing an arc extinguishing and insulating liquid, relatively movable contacts arranged to form a plurality of breaks in series in said liquid, at least 55

one of said contacts being mechanically operable exteriorly of said casing and other of said contacts being subject to liquid pressure in said casing for forming said breaks, and a piston operable exteriorly of said casing for creating pressure in said liquid substantially coincident with opening of said mechanically operated contact.

2. A high voltage circuit breaker of the multi-break liquid type comprising a casing containing an arc extinguishing and insulating liquid, a plurality of pairs of contacts arranged to form a plurality of breaks in series in said liquid, one pair of said contacts including operating means exteriorly of said casing for separating said contacts, other pairs of said contacts being operable only in response to liquid pressure in said casing, and a piston operable exteriorly of said casing for creating pressure in said liquid substantially coincident with opening of said exteriorly operated contact whereby an isolating gap is formed in said liquid in series with a plurality of pressure created gaps.

3. A high voltage circuit breaker of the multi-break liquid blast type comprising a casing containing an arc extinguishing and insulating liquid, a plurality of pairs of contacts immersed in said liquid and arranged to form therein a plurality of breaks in series, one of said contacts being operable exteriorly of said casing to form an isolating gap in said liquid, other pairs of said contacts being operable by liquid pressure in said casing to form a plurality of interrupting breaks in series with said isolating gap, means for resiliently biasing said liquid pressure operated contacts toward closed circuit positions, and a piston operable exteriorly of said casing for creating pressure in said liquid substantially coincident with the opening of said exteriorly operated contact.

4. A high voltage circuit breaker of the multi-break liquid blast type comprising a casing containing an arc extinguishing and insulating liquid, a plurality of pairs of contacts arranged to form a plurality of breaks in series in said liquid, at least one of said breaks being opposite a liquid exhaust passage in said casing, one of said contacts being operable exteriorly of said casing to form an isolating gap in said liquid, other of said contacts being subject to pressure in said liquid to form a plurality of interrupting breaks coincident with an arc extinguishing blast of liquid at said exhaust passage, means for biasing said pressure operated contacts toward closed circuit position, means communicating with atmosphere for establishing a pressure differential at said pressure operated contacts, and a piston operable exteriorly of said casing for creating pressure in said liquid substantially coincident with opening of said exteriorly operated contact.

5. A high voltage circuit breaker of the multi-break liquid blast type comprising a casing containing an arc extinguishing and insulating liquid, a plurality of pairs of contacts arranged to form a plurality breaks in series in said liquid, one of said contacts being operable exteriorly of said casing to form an isolating gap in said liquid, a

piston operable by pressure in said liquid, other of said contacts being mechanically connected to said piston for opening in unison to form a plurality of interrupting breaks in series with said isolating gap, exhaust passages in said casing adjacent at least one of said interrupting breaks for directing an arc extinguishing liquid blast through said break in response to said pressure, and a second piston operable exteriorly of said casing for creating pressure in said liquid substantially coincident with opening of said exteriorly operated contact.

6. A high voltage circuit breaker of the multi-break type comprising a casing containing an arc extinguishing liquid, relatively movable contacts arranged to form a plurality of breaks in series in the circuit, means controlled exteriorly of said casing for mechanically operating one of said contacts to form one of said breaks, means operable in response to pressure in said liquid and related to other of said contacts to form series breaks in said liquid, and means for creating pressure in said liquid independently of the arc pressure, said pressure-creating means being operatively related to said exteriorly controlled means for controlling in a predetermined manner the formation of the pressure created breaks and the mechanically formed break, said mechanically formed break being sufficient to maintain the circuit open.

7. A high voltage circuit breaker of the multi-break type comprising a casing containing an arc extinguishing and insulating liquid, relatively movable contacts arranged to form a plurality of breaks in series in said liquid, means controlled exteriorly of said casing for mechanically operating one of said contacts to form a break in said circuit, means operable in response to pressure in said liquid and related to other of said contacts to form series breaks in said liquid, means forming pressure relief openings adjacent to said series breaks, and means for creating pressure in said liquid independently of the arc pressure for causing separation of said pressure responsive contacts and a blast of said liquid through each of said openings to extinguish the arcs thereat, said pressure-creating means being related to said exteriorly controlled means for controlling in a predetermined manner the opening of said pressure responsive contacts and said mechanically controlled contact.

8. A high voltage circuit breaker of the multi-break type comprising relatively movable contacts arranged to form a plurality of breaks in series, means for mechanically operating at least one of said contacts independently to form an isolating break, means responsive to fluid pressure and related to other of said contacts to form at least one interrupting break in series with said isolating break, a piston for creating said fluid pressure, and means operatively relating said piston and mechanical operating means for controlling in a predetermined manner the formation of the pressure created break and said isolating break.

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