3,392,249
SINGLE BREAK OIL CIRCUIT BREAKER STRUCTURE

9 Claims. (Cl. 200—150)

This application is a division of our application Ser. No. 412,662 filed Nov. 20, 1964, now Patent No. 3,313,901 issued Apr. 11, 1967, and assigned to the assignee of the instant application.

This invention relates to oil circuit breakers, and more specifically relates to a novel group of features for an improved single break oil circuit breaker interrupter and resistor structure thereafter.

Interrupters for oil circuit breakers are well known to those skilled in the art. Such interrupters are generally shown in copending application Ser. No. 67,125, filed Nov. 3, 1960, now abandoned, entitled “Tank Structure for Oil Circuit Breaker” in the name of James R. McCloud and assigned to the assignee of the present invention, and include an interrupter structure which is immersed in oil and which has a stationary contact therein which is engaged by a movable rod-type contact. As the movable contact is moved to a disengaged position, the arc drawn within the interrupter chamber is extinguished by the flow of gaseous arc products and clean oil through the arc and out through exhaust ports in the interrupter chamber. In order to aid in the interruption of the arc, it is common practice to connect a resistor in parallel with the main contacts. This resistor circuit must be opened when the main movable contact moves to its fully disengaged position so that the current flow through the resistor will be interrupted.

A feature of the present invention is directed to a novel pump structure for causing oil flow during low power arc interruption wherein a novel check-valve arrangement is provided which normally permits circulation of oil through the pump piston and into the interrupter. This novel valve arrangement includes a first annular valve disk carried by the main piston which is moveable into sealing engagement with a series of openings in the main piston. Thus, during low arc current interruption, the novel annular valve closes off the ports in the cylinder so that the pump can properly operate. Under normal conditions, however, oil flow can easily take place through this series of openings so that improved cooling of the interrupter is achieved.

Moreover, during high current arcging conditions, the pressure generated within the interrupter container serves immediately to force a second check valve disk upwardly to seal off channels between the piston and interrupter to prevent the application of excessive pressure to the piston.

Accordingly, an important object of the present invention is to provide a novel pump arrangement for an oil immersed interrupter structure.

Another object of the invention is to provide a novel means for permitting circulation of oil through an interrupter structure, and to automatically seal the oil passages in the piston during interruption conditions.

Another object of this invention is to provide a novel piston arrangement which is automatically operated under spring biasing means when a movable contact of an interrupter is moved to a disengaged position.

A still further object of this invention is to provide a novel oil check-valve arrangement.

The present invention further provides a novel valve for the exhaust ports of the interrupter structure. That is to say, valves are often used which are in communication with the venting ports of an interrupter chamber wherein the valves seal the ports until a sufficient pressure build-up is provided for an oil piston or by other means. The present invention provides a novel valve structure which is of low mass and provides large area venting with short travel. Moreover, the novel valve structure of the invention is inexpensive, easily assembled and easily replaced.

Each of the ports associated with the valve structure of the invention form two paths leading to two ports in the interrupter container. The ports are flared out to permit easy expansion of gases and other arc products passing through the ports. The two passages then join in a common passageway located internally of the interrupter, this passageway receiving the novel valve of the invention which is of triangular form so that it can block the passage between the common channel and the two outlet channels. If desired, the valve may be metallic or non-metallic, and is biased into sealing engagement with the main channel by a metallic or non-metallic biasing spring.

The seal ports, as previously indicated, are enlarged openings and preferably are positioned to direct the flow of emitted oil and gas in directions away from the nearest point of the tank which contains the interrupters and the oil in which the interrupters are immersed.

Accordingly, another important object of this invention is to provide a novel sealing valve for the port of an interrupter which provides large area venting with short travel.

Another object of this invention is to provide a novel valve for the ports of an interrupter structure which are of low mass.

A still further object of this invention is to provide a novel valve for the ports of an interrupter structure which is inexpensive, easy to assemble and easily replaced.

A still further object of this invention is to provide a novel valve for the ports of an interrupter structure wherein the ports increase in area as they approach the outside of the confining tube.

As a still further feature of the invention and in order to insure that pressure can be built up within the interior of the interrupter chamber, a novel seal is further provided around the moving contact rod to prevent loss of oil and oil pressure during opening operation of the interrupter. The novel seal of the invention is so arranged that it fits snugly around the movable contact rod, but is laterally movable within the bottom plug of the interrupter. Accordingly, the opening in the bottom of the tube will be sealed about the movable contact rod although the movable contact rod is permitted to have lateral motion to allow for misalignment between the contact rod and the opening in the bottom of the interrupter tube.

Thus, another important object of the invention is to provide a novel seal about the movable contact rod of an interrupter structure to prevent pressure build-up within the interrupter during interrupting conditions.

Another object of this invention is to provide a novel seal for the movable contact of an interrupter structure which permits lateral movement of the rod.

As indicated in the foregoing, resisters are commonly provided in parallel with the main contacts of an interrupter structure. A further feature of the novel invention provides a novel mounting structure and assembly for a resistor to be connected in parallel with an interrupter structure. More specifically, the novel resistor structure includes a pair of floating members at either end of the resistor tube which are held assembled by a snap-ring arrangement at the ends of the tube. The floating contacts are further formed of hollow members.
to permit circulation of oil through the resistor for the cooling thereof.

Accordingly, another important object of this invention is to provide a novel arrangement for mounting the resistor to be connected in parallel with the main contacts of an oil circuit breaker interrupter.

Another object of this invention is to provide a novel construction for the resistor of an oil circuit breaker interrupter.

A still further object of the invention is to provide a novel floating contact arrangement which is held in place by snap-rings for the easy assembly of a complete resistor.

As is well known, and as previously indicated, there is usually misalignment between the movable contact which is carried from a lift-rod and cross-bar assembly in the well-known manner and the opening at the bottom of the interrupter. The present invention further provides a novel structure for securing the movable contact rod to its cross-bar so that the contact may be adjusted on the cross-bar with respect to the opening in the interrupter.

This novel arrangement includes a locking means for the adjustably positioned contact rod and a carrying block for receiving the contact rod.

Accordingly, a still further object of this invention is to provide a novel connection between the contact rod of an oil circuit breaker and the cross-bar.

A further object of this invention is to provide a novel locking means for adjustably connecting a lift-rod to a cross-bar assembly and the contact rods to the ends of the cross-bar assembly.

These and other objects of this invention will become apparent from the following description when taken in connection with the drawings, in which:

FIGURE 1 is a side cross-sectional view of an interrupter structure constructed in accordance with the present invention.

FIGURE 2 is a top plan view of FIGURE 1 seen from lines 2—2 of FIGURE 1.

FIGURE 3 is a cross-sectional view of FIGURE 1 across lines 3—3 in FIGURE 1.

FIGURE 4 is a cross-sectional view of FIGURE 1 across lines 4—4 in FIGURE 1.

FIGURE 5 is a cross-sectional view of FIGURE 1 across the lines 50—50 in FIGURE 1 for the upper half of FIGURE 5 and across the lines 55—55 in FIGURE 1 for the lower half of FIGURE 5.

FIGURE 6 is an exploded perspective view of the port valve structure.

FIGURE 7 is a partial front plan view of the interrupter container of FIGURE 1 to illustrate the ports in the container.

FIGURE 8 is a cross-sectional view of FIGURE 1 taken across the lines 8—8 in FIGURE 1.

FIGURE 9 is a partial cross-sectional view of the resistor support cap taken across the lines 9—9 in FIGURE 2.

FIGURE 10 is a cross-sectional view of the resistor lower support structure taken across the lines 10—10 in FIGURE 4.

FIGURE 11 is an exploded perspective view of the resistor contact structure.

Referring now to the figures, an interrupter structure is shown for an oil circuit breaker of the type shown in co-pending application Ser. No. 67,125, where the interrupter structure of the figures will be immersed in oil within an oil filled tank (not shown) and will be carried from suitable insulator bushings which enter the tank. Thus, the interrupter, as shown in FIGURES 1 and 2, is provided with an upper conductive cap assembly 20 which is securable to a suitable adapter structure 21 shown in dotted lines in FIGURE 1, which is, in turn, connected to the end of an insulator bushing. Note that the upper portion of cap 20 has a smooth circular opening 22 which is best suited for high voltage purposes.

The cap 20 which is cast of a suitable metallic material serves as the support for the interrupter structure generally shown by numeral 23 in FIGURE 1 which contains the various components of the interrupter equipment.

The interrupter structure 23 more specifically includes an insulator container 24 which may be formed of any suitable material such as fiber glass which has an enlarged upper section 25 (FIGURE 1) that receives a mounting ring 26. The mounting ring 26 then has a plurality of bolt holes therein which receive respective bolts such as bolt 27 in FIGURE 1, and bolts 30 through 34 in FIGURE 3, which extend upwardly through a conductive pressure pad 28 and into suitably tapped openings in the bottom of cap 20. The member 28 and the bottom of cap 20 further serve to receive the stationary contact structure generally indicated by numeral 34 in FIGURE 1. More specifically, the stationary contact structure includes a conductive hub 35 which carries a plurality of spring biased contact fingers about its periphery. FIGURE 1 shows two of these contact fingers 36 and 41, while the left-hand side of FIGURE 5 shows the manner in which similar contact fingers 37 through 40 surround and are carried by the contact hub 35. The contact finger 41 of FIGURE 1 is longer than the other of the contact fingers and serves as the arcing contact.

Each of the various contact fingers are carried from the hub 35, as shown in FIGURE 1, by conductive straps such as straps 42 and 43 for contacts 36 and 41 respectively which are secured to the contact hub by screws 44—45 and 46—47 respectively which are threaded to suitably tapped openings in the hub 35.

Each of the contact fingers are also biased inwardly by suitable biasing leaf springs such as leaf springs 48 and 49 in FIGURE 1 which bear upon insulator button 50 and 51—52 for contacts 36 and 41 respectively. These insulation buttons prevent the formation of a conductive path through the biasing springs so that the springs will not be heated by the conduction of current therethrough.

The contact hub 35 along with the various contacts assembled thereto then has a central opening therein which receives a threaded bolt 53 which passes through through-type openings in the top of hub 35 and in plate 28 and into threaded engagement with a suitably threaded opening 54 in cap 20.

The stationary contact structure receives a cooperating movable contact rod 60 which may have an arcing tip 61 of suitable arc-resistant material secured to the conductive lower body of the rod 60. The rod 60 is then secured to a cross-bar 62 which is carried, in turn, from a lift-rod in a usual manner, and as shown, for example, in co-pending application Ser. No. 67,125, and as will be described more fully hereinafter.

The cross-bars 62 are movable from a lower position at which the contact tip 61 is completely removed from the interrupter to the position shown in FIGURE 1 where the contact rod 60 is in engagement with the stationary contact structure. During movement of contact rod 60 to the disengaged position, an arc will be drawn directly from tip 61 to arcing contact finger 41. In order to extinguish this arc, the interrupter container 24 has therein a series of plates. More specifically, the interrupter container 24 has contained therein a spacing cylinder 70, the upper end of which is engaged by plate 28 through the gasket 70a.

The lower end of cylinder 70, which may be of any suitable phenolic-type material, then is snapped in and compresses the stack of plates 71 through 77 against another spacing cylinder 78. The cylinder 78 then seats upon bottom plate 79 which is placed atop the throat bushing 80 which is captured in the necked-down portion 81 of the container 24.

Each of plates 72, 73 and 77 have the arrangement shown in FIGURE 1a and have a central opening 60a for receiving the contact rod 60 and an opening 91a for receiving rod 91. They also have keying openings 72a and
72b for receiving keying pins and through holes 82a and 
82b for receiving alignment rods such as rod 82.
The upper plate 71 has the shape shown in FIGURE 1b 
and includes rod opening 91b for receiving rod 91 and a 
keyhole opening 60b for receiving contact rod 60 and con-
tact finger 41. Alignment rod openings 82a and 82b are 
also provided for alignment rods 82. It will also be noted 
that two oil passages 74a and 74b also pass through plate 
71.

The plates 71 through 77, plate 79 and throat bushing 
80 are then aligned with respect to one another by suitable 
alignment rods such as rod 82 (FIGURE 1 and the right-
hand plate of FIGURE 5) and a similar rod 93 (left-hand 
side of FIGURE 5). The plates 71 through 77 also con-
tain aligned openings therein which receive an insulation 
tube 90 through which an insulation rod 91 passes. The 
insulation rod 91 is terminated at its top and bottom by 
suitable fittings 92 and 93, the rod 91 being axially mov-
able within insulation tube 90. The lower fitting 92 is then 
engaged by an operating rod 94 which is connected to the 
cross-bar 62, while the upper fitting 93 engages the lower 
end of a piston 95.

More particularly, rod 91 is formed of a densified wood. 
The fittings 92 and 93 are of steel and are secured to rod 
91 over a tapered surface by a suitable cement. Sockets 
anchors are formed in the cemented joint by placing grooves 
such as groove 91a around the tapered wood ends and 
filling them with epoxy before connecting the fittings 
to the rod 91. Preferably, escape openings such as open-
ings 92a and 93a are formed in fittings 92 and 93 respec-
tively to permit escape of excess glue.
The piston 95 is then movable within a cylinder 96, as 
shown in FIGURES 1 and 4. The lower portion of piston 
95 then carries a movable disk-shaped check-valve 110 
(FIGURE 1) which is movable into sealing engagement 
with respect to the openings such as openings 100 through 
109 in piston 95. The check-valve 110 is retained on piston 
95 by a suitable sleeve 111 which is threaded on to the 
threads 112 on the bottom of piston 95. Once member 111 
is in place, the threads 112 are preferably stacked to pre-
vent movement of member 111.

Concentric compression springs 113 and 114, as shown 
in FIGURE 1, are then connected between the interior of 
piston 95 and surface 115 formed within cap 20 to nor-
mally bias piston 95 downwardly. This movement is re-
strained by rods 91 and 94 when the cross-bar 62 is in the 
position shown.

The piston 95 serves as a pump for providing high pres-
sure within the interior of the shank of each interrupter 
derived from low current interrupting conditions. To this end, it should be 
memorized that the volume beneath piston 95 is filled with 
oil. A plurality of channels 120 and 121 communicate with the 
volume beneath piston 95 and the internal vol-
ume of the interrupter. Other similar channels 122 through 
125 are shown in FIGURE 4. Notice that a further channel 128 (FIGURE 1) permits the introduction of oil 
into the interrupter structure from the area external thereto.

A second check-valve 126 is then formed on a reduced 
diameter portion of contact hub 35, as shown in FIGURE 
1, check-valve 126 being movable into sealing engage-
ment with openings 120 through 125 in plate 28 when the pressure within the interrupter chamber exceeds the pres-
sure below piston 95.

As previously indicated, it is necessary that there be 
provided with the walls of container 24 through which gas 
and oil may be ejected during interrupting conditions. More-
ever, it is desirable to provide a valve in such ports so 
that venting will not occur until some predetermined pres-
sure is built up within the container (for low current 
switching).

To this end, plates 74 and 76, which are each arranged 
as illustrated in FIGURES 1, 5 and 6, are provided with a 
V-shaped notch 140 which communicates with channel 
141 which, in turn, communicates with the interior oil-

containing volume 142 of each of the plates. The V-shaped 
notch 140 in each of plates 74 and 76 then receives an 
insert such as insert 150 which defines first and second 
channels 151 and 152 respectively in each of plates 74 and 
76. A similar insert 153 is shown in FIGURE 1 for the 
plate 76. The inserts 150 and 153 are then held in place 
by suitable pins such as pins 160 and 161 in FIGURE 3 
which enter into plates 75 and 77 respectively.

For purposes of pre-alignment of the various plates, a 
similar pin arrangement keys plates 72 and 73 with respect 
to one another so that they are automatically properly 
aligned.

Each of inserts 150 and 153 are then provided with a 
suitable notch such as notch 165 which receives compres-
sion springs such as springs 166 and 167 for inserts 150 
and 153 respectively. Each of springs 166 and 167 are 
then secured to a V-shaped, preferably non-metallic, valve 
such as valves 168 and 169 respectively. These valves are 
then biased into engagement with the main channel of 
their respective interrupter, as shown for the engagement 
between valve 168 in the channel 141 in FIGURE 3. Note 
that the adjacent plates 73 and 75 serve to seal the upper 
and lower portions of channel 141 in FIGURE 3 by over-
lapping the notch opening 14 at the point where valve 
168 is positioned.

The channels 151 and 152 then communicate with 
ports 170 and 171 respectively in container 24 (FIGURE 
7) and are normally isolated from main channel 141. A 
similar port arrangement including ports 170a and 171a 
(FIGURE 7) will, of course, be found for plate 66 with 
its two respective channels and two respective ports being 
normally isolated from the interior of container 24.

Moreover, it will be noted from FIGURE 5 that the ports 
170 and 171 in container 24 flare outwardly so that the 
port area increases as the outer diameter of container 
24 is approached. By using a dual port arrangement, the 
direction of gas blast through channels such as channels 
151 and 152 may be directed toward those portions of the 
main tank which are furthest removed from the inter-
rupter structure.

In order to maintain internal pressure within container 
24 during line switching or low current interrupting con-
ditions, it has been further found desirable to provide a 
seal about the movable contact rod 60. This seal has 
previously been avoided because of unavoidable misalign-
ment between the contact rod and the center of the 
interrupter container.

In accordance with the present invention, however, a 
shel 190 (FIGURE 1) is provided in the throat bushing 
80 which receives an internal gasket ring 191. The in-
diameter of ring 191 forms a snug fit on rod 60 which 
permits axial motion of rod 60, yet forms a good pressure 
seal to the rod 60. Moreover, the outer diameter of ring 
191 has smaller diameter than the diameter of shank 190. Accordingly, lateral movement of ring 191 along with contact rod 60 is permissible. The upper and lower 
surfaces of ring 191 are then confined between the 
bottom of this shank 190 and the upper disk 192. Note 
particularly that ring 191, which may be of any suitable 
(phenoic) material, has a conically shaped inner sur-
face 193 which permits the "camming" of the ring to a 
proper central position as the tip 61 of contact rod 60 is 
brought through the central opening in throat bushing 80.

As previously indicated, it is desirable to provide a 
resistant path in parallel with the main contacts during 
interruption conditions. Clearly, auxiliary contact means 
are necessary to interrupt the current path after the interrupter has successfully operated.

In accordance with the present invention, a novel res-
sistor arrangement is provided which includes two par-
allel connected resistors 200 and 201 (FIGURES 1, 2, 4 
and 8). Resistors 200 and 201 are identical and their 
structure is shown in cross-section in FIGURE 1 for resis-
tor 200.

Referring now to FIGURES 1 and 2, the resistor 200
is mounted between an upper mounting assembly which includes a conductive cap 202 (FIGURE 9) and a lower insulation support structure 203 (FIGURES 4 and 10). The upper support structure 202 is bolted to the upper end of cap 20 as by bolts such as bolt 204. Each of resistors 200 and 201 are then received in openings 205 and 205a respectively in cap 202. A similar arrangement is provided for lower support 203 where the support 203 is suitably secured to contact 24 as by suitable bolts 210 and 211, shown in FIGURE 4, which are threaded into the throat bushing 80.

Each of the resistors such as resistor 200 are then formed of an insulation tube 212 which has therein a stack of resistor elements such as resistor elements 213, 214 and 215. These resistor elements may be of any desired type well known to those skilled in the art, and are stacked to a desired height and are of a diameter to meet particular operating characteristics required.

The ends of the stack of resistor elements terminate in conductive washers 216 and 217 respectively which receive compression spring 218 and 219 respectively. The compression springs 218 and 219 are then contained by floating hollow contacts 220 and 221 respectively. The floating contacts 220 and 221 each have flanges 222 and 223 respectively which, after assembly of all of the various elements of the resistor within the tube 212, are captured by snap-rings 224 and 225 respectively. The floating contact 220 is biased into engagement with conductive support 202 to form one terminal connection for the resistor, while the lower floating contact 221 is biased toward engagement with contact strip 230 (FIGURES 1 and 4) which is captured within insulation support 203.

It is to be noted that in the mounting arrangement shown, the resistor 212 is directly received. It is, however, possible to form contacts 220 and 221 with lug-shaped ends so they may serve as both the mechanical support and electrical terminal for the resistor. The lower end of the resistors 200 and 201 are connected to the contact 246 as shown in FIGURES 9 and 11. The resistors 200 and 201 are connected in parallel by virtue of their common connection at the top through conductive support 202 and at the bottom through conductive strip 230 carried in insulation support 203 (FIGURE 10).

The conductive strip 230, as shown in FIGURE 8, is electrically connected to a conductor 240 which is, in turn, connected to a conductive bolt 241 which is threaded into throat bushing 80. The bolt 241 terminates in a conductive block 242 and pulls block 242 into engagement with a conductive shunt jumper 243. The conductive jumper 243 has a U-shape, as shown, and its opposite ends terminate on movable contact members 244 and 245 respectively, as shown in FIGURES 1 and 4.

The central opening in the throat bushing 80 which receives conductive blocks 244 and 245 also receives insert 245a which has cut-out sections 246 and 247 for blocks 244 and 245 respectively which limit the motion of conductive blocks or contacts 244 and 245 toward and away from one another. Biasing springs 248 and 249 are then captured in the contacts 244 and 245 respectively with the opposite ends of springs 248 and 249 bearing against the internal walls of the opening in throat bushing 80. Thus, the contacts 244 and 245 are biased toward engagement with contact rod 60, thereby connecting the bottom of resistors 200 and 201 to the contact rod 60.

Note that when the contact rod 60 is moved to its disengaged position and withdrawn from the bottom of the throat bushing 80, the inward motion of contacts 244 and 245 is limited by the stop configuration of sections 246 and 247, as well as by the projecting section of member 242.

From the foregoing it is believed clear that the resistors are now connected in parallel with the main contacts where, for example, the upper end of resistors 200 and 201 are connected to contact hub 35 through the cap 20 and conductive support 202, while the bottom of the resistors is connected to the contact rod 60 by the circuit previously described.

During operation of the circuit interrupter to the disengaged position, it is believed further clear that the resistors 200 and 201 remain connected in parallel with the main interrupting contacts until, after interruption is successfully accomplished and tip 61 of contact rod 60 leaves throat bushing 80, the current path through the resistors will be interrupted at contacts 244 and 245.

As a further feature of the invention, I have provided a novel manner for the adjustable connection between contact rod 60 and the cross rod 62. Moreover, a similar type connection may be made between the lift-rod and the cross-bar 62.

More particularly, and as shown in FIGURES 1, 1c, and 1d, conductive cross-bars 300 and 301 have key ways 302 and 303 therein which receive keys 304 and 305 extending from block 306. Block 306 is slotted by slot 307 and has threaded openings 308 and 309 therein for receiving the threaded ends of rods 60 and 94. The rod height of rods 60 and 94 are then adjusted by threading and a pair of bolts 310 and 311 are then passed through openings 312 and 313 respectively, and lock rods 60 and 94 into place by squeezing slot 307 in a closing direction. Moreover, the key way connection between the block 306 and cross-bars 300 and 301 permits a limited lateral adjustment before locking by bolts 310 and 311.

The manner in which the novel interrupter operates is described in the following with the novel interrupter broken into various sections, as indicated.

(A) Oil check-valve arrangement

In order to operate the circuit interrupter of FIGURE 12 to the disengaged position from the engaged position shown, the cross-bar 62 is pulled downward motion, the contact rod 60 moves out of engagement with the various contacts carried from contact hub 35, and an arc is drawn from arc contact finger 41.

It is necessary now to generate sufficient pressure within the interior of the container 24 so that arc products and oil will be caused to flow through the arc and out of the various ports such as ports 170 and 171 in the container wall.

When interrupting ares of low power, insufficient pressure may be generated to effectively interrupt the arc. Accordingly, and particularly for the interruption of such low power ares, the piston 95 serves as a pump to generate the pressures required to move oil and arc products through it and out of the vents ports. Thus, when the cross-bar 62 is moved downwardly, the operating rod 94 and rod 91 are also moved downwardly, thereby permitting powerful compression springs 113 and 114 to drive pistons 95 downwardly.

As the pressure beneath piston 95 increases, the check-valve 110 moves into sealing engagement with the openings 109 through 109 in piston 95 whereby oil is forced from the volume beneath piston 95 through openings 120 through 125 and into the interior of container 24. This high pressure oil is then used to extinguish low current ares.

In the event that a high current arc is drawn, then very high pressures are generated within container 24. This normally tends to force oil back through openings 120 through 124, thereby forcing piston 95 upward.

In order to prevent this action which could damage piston 95, the novel check-valve arrangement includes the further check-valve 126 which is forced upwardly by high pressure oil within the interrupter container 24 created by high current ares, thereby closing off openings 120 through 125 and thus sealing the volume beneath piston 95 from the interrupter tube.

Note, however, that during normal operating conditions, both check-valves 111 and 126 will be open. Accordingly, a path is formed for the natural flow of oil.
through the interrupter, for example, due to convection so that continuous cooling by convection can occur.

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

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. In an oil circuit breaker interrupter; an interrupter containing a plate therein, said plate having a central opening therein for moving a contact rod first and a second outlet channel each extending from said central opening to the edge of said plate; said interrupter containing a first and second plate wherein each plate is a moveable plate wherein one another; the ends of said first and second plates being located at said first and second plates respectively; said first and second plates having a larger circumferential length than that of said first and second plates respectively a single valve means; said single valve means having a first and second surface engageable with the surfaces of said first and second plates respectively at the beginning of said channel.

2. An interrupter structure comprising a container having a first and second angularly disposed port in the wall thereof and a plurality of plates positioned in said container having aligned openings for the reception of a moveable contact rod; at least one of said plates having a first and second channel and a common channel therein; said common channel connecting said first and second channels to said opening in the said plate; and valve means for sealing said common channel; said valve means including a movable member having a first and second valve surface engageable with surfaces of said first and second channels leading to said common channel, and spring biasing means for biasing said movable member into engagement with said surfaces of said first and second channels.

3. The device substantially as set forth in claim 2 wherein said valve means is a triangular member.

4. The device substantially as set forth in claim 2 wherein plates of said plurality of plates adjacent either surface of said plate having said channels therein enclose the top and bottom surface of said channels.

5. The device substantially as set forth in claim 2 wherein said plate having said channels therein is comprised of a plate having a generally V-shaped notch therein, and a V-shaped insert spaced from the end of said V-shaped notch for forming said first and second channels.

6. The device substantially as set forth in claim 5 wherein plates of said plurality of plates adjacent either surface of said plate having said channels therein enclose the top and bottom surface of said channels.

7. The device substantially as set forth in claim 6 wherein said spring biasing means is captured between said movable member and said V-shaped insert.

8. A circular interrupter structure plate comprising a first plate section having a generally V-shaped notch therein and generally V-shaped insert portion positioned within said V-shaped notch; the opposing surfaces of said V-shaped notch and said V-shaped insert being spaced from one another to define a first and second channel; said first plate section having a centrally located opening therein; the bottom of said V-shaped notch having a passage therein communicating with said centrally located opening; a valve member having a V-shaped engaging surface; said valve member being positioned adjacent the bottom of said V-shaped notch and being movable to a position wherein said V-shaped engaging surface engages the bottom of said V-shaped notch wherein the central opening of said plate is isolated from said first and second channels.

9. The device substantially as set forth in claim 8 which includes spring biasing means connected between said
valve member and said insert for biasing said valve member to an engaging position.

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ROBERT S. MACON, Primary Examiner.