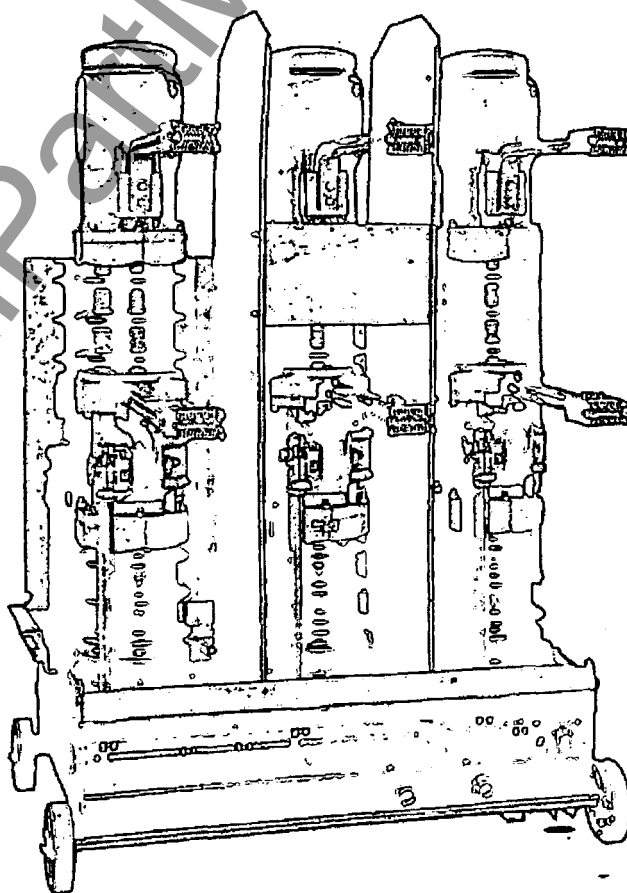


Instructions for . . .

TYPE IC HIGH VOLTAGE CIRCUIT BREAKER

RECEIVING
INSTALLATION
INSPECTION
CONNECTION
TEST



LITHO IN USA A.C.

ALLIS-CHALMERS



MILWAUKEE, WISCONSIN
53201

18 X 2124

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DESCRIPTION

Application

IC breaker is a three-pole low-oil content column-type circuit breaker.

Breaker is closed by a stored energy, spring operated under-carriage mechanism, whose springs are reset immediately after closing so breaker is ready for closing immediately after tripping. Springs resetting is accomplished automatically with an electric motor. If operating voltage missing, set spring accumulator manually, and open or close circuit breaker with foot lever. Opening springs set when breaker is closing.

Construction

Cross sectional drawing (Fig. 3) shows breaker in closed position. On under-carriage 129 (Fig. 4) accommodating operating mechanism is seated on support insulator 29 (covers insulation towards ground). It carries light metal pole center 22 accommodating operating mechanism. On top is bushing-type insulator 11 minimum distance between live points and ground. In bushing-type insulator is arc extinguishing chamber 7, fixed at interrupter head 5, made of light metal. Interrupter head 5 is closed by valve cover 2 and cover 1. Bushing-type insulator 11 and interrupter head 5 are filled with oil, level of which should be at middle of inspection glass with breaker opened.

Current path runs from upper connection 33 at interrupter head 5 through housing of arc extinguishing chamber 7, contact holder 67 (see Fig. 5), contact (contact tulip) 51, contact rod tip 68, contact rod 34 (Fig. 3), laminated collar contact 36 in guide piece 12 to lower connection 37 of pole center 22.

Manual Setting of Closing Springs

(Fig. 6 shows operating mechanism with spring accumulator 91 set and breaker closed.)

If spring accumulator 91 relaxes, lever 120 rotates shaft 99 through rod 94 and lever 93, so rocker arm 103 resets against stop 101. Lever 113 is lifted by rod 115, and blocking wheel released. Worm shaft 109 with detachable crank 108 is rotated clockwise so worm 116 takes along worm wheel 117 and cam plate 95 seat on same shaft 98 in arrow direction. Lever 120 provided with roll 118 is lifted by cam plate 95. Shaft 119 rotates and setting spring assembly 91 engages lever 121. As soon as roll 118 reaches extreme point of cam plate 95, lever 135 latches against pawl 137 of making lock 139. At end of setting process, pawl 96 seated on cam plate 95 leans toward lever 97. This lever rotates shaft 99 in such a way rocker arm 103 under effect of pressure spring 102 jumps toward stop 100. Rod 115 moves downwards pressing lever 113 toward blocking wheel 112. Worm shaft 109 cannot be turned further. Setting of spring accumulator is finished and sign 156 "Ready for Closing" appears.

Gear is blocked against turn back with set springs by pawl 111 engaging toothed rim 110 of worm shaft 109. In case of manual setting of closing springs observe following:

- Crank is slipped on manually for setting of closing springs.
- When springs are set manually, detach crank.
- Closing springs are set uninterruptedly until stop is reached.

- If circuit breaker equipped with motor-wound spring-operated mechanism, exercise care in case of manual setting, motor for winding is stopped.

Setting of Closing Springs by Motor (see Fig. 6)

Electric Motor

In case of relaxed spring accumulator 91, shaft 99 is rotating. This shaft takes along shaft 154 through rod 114 and lever 153. Lever 150 of shaft 154 closes auxiliary switch 149 for motor 106. Motor rotates worm wheel 104 through worm shaft 105. Pawl 111 of 104 engages toothed rim 110 of worm shaft 109. Setting process is same as case of manual setting. At end of setting process rocker arm 103 jumps towards stop 100. Shaft 154 rotates through rod 114 and lever 153. Auxiliary switch 149 opens, and setting motor 106, stops.

Spring setting gear setting time is about 25 seconds. Rated output of motor is 0.55 kw. For special design, setting time is about 12 seconds with motor output of 1.1 kw. With motor output of 0.3 kw, setting time is 48 seconds.

Safe motor operating range is -25 percent to +10 percent of rated voltage. Suitably protect motor with an inverse time-lag overcurrent device.

Closing (see Fig. 6)

- With foot switch ON (160) at operating mechanism.
- With impulse given to shunt trip coil ON (158).

Re (a) with breaker open and closing spring accumulator 91 set, rod 145 rotates shaft 122 through lever 146. Cam 124 on disc 123 unlatches tripping rod 125, placing cam 124 before loop 142 at anchor of release 158. With foot switch 160, shaft 138 in hollow shaft 136 rotates. Lever 140 presses loop 142 towards tripping rod 125 closing lock 139 with rod 141. Connection between lock pawl 137 and lever 135 unlatches. Closing springs 91 relax and turns shaft 119. Movement of shaft is transmitted to operating shaft 88 through rod 87 and lever 81. Operating shaft 88 leads contact rod 34 into closing position with lever 90, insulating rod 89, operating lever 41 (see Fig. 3) and lugs 17. During operation, opening springs 92 set and movement of contact rod absorbs smoothly at end by means of attenuation piston 39.

Re (b) When shunt trip coil ON (158) operates, loop 142 takes along rod 125, unlatching lock 139. Following process is same as described under (a).

Protection against damages at opening lock (see illustration)

Due to mechanical breakdown, Pawl 79 can't hold opening lock 80 in position opening lock 80 when spring accumulator 91 starts setting and operating shaft 88 moving in OFF direction. During procedure cam 74a takes along pawl 75a. Pawl 75a turns shaft 75 with lever 75b. Lever 82 of shaft 75 unlatches lock. Springs 92 relax leading contact rods into OFF position with normal opening speed.

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Opening (see Fig. 6)

- (a) With foot switch OFF (159) at operating mechanism.
- (b) With impulse given to shunt trip coil OFF (83).

Re (a) With foot switch 159 shaft 75 with tripping lever 82 operates through hollow shaft 136, lever 134 and rod 133. Tripping lever 82 unlatches opening lock 80 and connection of lock pawl 78 with holding pawl 79 fixed at frame of truck. Opening springs 91 relax and turn operating shaft 88 clockwise. Movement transmitted by lever 90 and rods 89 to operating levers 41, (see Fig. 3) and from there to contact rods 34 of three breaker poles through lugs 17. Opening lock 80 freely rotates on operating shaft 88 following movement of lock lever 74. Return spring 77 causes lock 80 to move faster than lock lever 74 coupled with movement of circuit breaker. Both latch again with bolt 76 before lock lever reaches OFF position. Bolt levers 81 rotating on shaft 88 reset before latch locks 80.

If lock 80 releases before closing springs 91 fully set, lock 80 runs after lever 81 while closing springs 91 set. It engages lock lever 74 when it reaches it.

Re (b) When OFF shunt trip coil (83) operates, shaft 75 rotates by rod 85. Lever 82 of shaft 75 releases lock 80. Following procedure is described under (a).

Closing Interlock (see Fig. 6)

Closing lock 139 cannot release:

- (a) With breaker closed and closing spring accumulator set (no-load operation of operating mechanism is prevented),
- (b) With closing spring accumulator not or not completely set.

Re (a) Together with closing movement operating shaft 88 rotates hollow shaft 122 with disc 123 through rod 145 and lever 146. Cam 124 seated on disc 123 lifts tripping rod 125. Latter cannot be caught by loop 142 if closing order is given by foot switch 160 or release 158.

Re (b) As cam plate 95 starts rotating to set spring accumulator 91, toggle lever 164 gets free and rotates by a spring until it finds a stop in its steady position. Shaft 147 rotates through rod 165 and lever 148. End of shaft 147 arranged as hook, lifts tripping rod 125 so rod cannot be caught by loop 142 if closing impulse given. Only toward end of setting process toggle lever 164 is lifted by bolt 163 protruding from one side of cam plate. Hook 126 disengages tripping rod 125 if not lifted by cam 124 with breaker closed.

Auxiliary Switches

Auxiliary switch 157 indicates switch positions ON and OFF respectively. Operating shaft 88 through rod 145, lever 146, shaft 122, lever 144 and rod 143 control auxiliary switch.

Auxiliary switch 132 interrupts auxiliary lead. When foot switches 159 and 160 respectively operate, auxiliary switch opens cams 130 of hollow shaft 136 or cams 131 of shaft 138.

PROCESSES IN CREVICED-RING

ARC-EXTINGUISHED CHAMBER (see Figs. 3 and 5)

If during opening, contact rod tip 68 leaves fixed contact 51 (see Fig. 5) arc produced gasifies part of sur-

rounding oil. This causes pressure rise in space (a) of arc extinguishing chamber affecting lower surface (b) of differential piston 47. Piston starts moving upwards and forces extinguishing liquid of space (c) through openings (d)—closed by annular spring 44—into belt canal (e). As contact rod tip 68 disengages creviced ring 70, arc supplied with oil from all sides is extinguished normally, at next current zero.

Discharge valves 48 and valve 66 (see Fig. 2) at bottom of differential piston protect arc extinguishing chamber against high pressures.

Switching gases pass through valves 48 and 66 into pole head 5; from there through openings into oil separator 4. Oil dragged along by switching gases is condensed at high breaking capacities and returns to oil space through drill hole at bottom. Gases leaving oil separator escapes through two small openings in valve cover 2. Only in case of high pressures discharge valves 3 opens, so switching gases directly reach space under cover 1.

Cover with rubber washers 30a presses with spacer bolts 30b to valve cover 2. Pressure of gas lifts cover 1 so through opening between cover 1 and valve cover 2 switching gases escape.

When differential piston 47 runs back, there is under-pressure in space (c). Valves 43 opens, and space (c) is refilled with fresh oil. After filling, rest of gas in space (c), and belt canal (e) escapes through vent valves 59 or 58 into air space in pole head 5.

Guide tube 23 for contact rod 34 closes with piston of dashpot 18. Oil in contact rod presses into arc extinguishing chamber through drill hole 69 in contact rod tip 68 during opening. Oil supply to arc is independent of breaking current causing early extinction of small current flows which do not produce sufficient pressure in arc extinguishing chamber. Besides, speed of contact rod is controlled by piston when opening takes place.

Contact rod 34 has check valve 34a beneath contact rod tip 68. This valve closes when circuit breaker is closing, so through open valve in piston of dashpot 18 and drill holes 27 in guide tube 23, fresh oil only from pole center 22 is sucked into hollow space of contact rod 34.

ERECTION AND PUTTING INTO SERVICE

Completely assembled circuit breaker is brought to place of erection on rollers. If lifting cannot be avoided, use only four eye hooks at undercarriage 129. Do not use other parts of circuit breaker for fixing supporting cables.

Before putting into service breaker poles should be filled with oil through drill hole for filling screw 31 so level is between two marks of oil inspection glass. After oil filling make manual test. Check oil level again and refill oil if necessary. According to adjustment of travel of contact rod 34, indicator at switching lever 38 in case of closing has to point to sign ON at rib on bearing cap of shaft 40.

If manual operations executed, spring accumulator is set by motor. After test operations, breaker is put into service.

Power input of motor was indicated earlier. Consumption of shunt trip coils ON/OFF in case of windings for dc is 115 watts and for ac about 126 va.

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MAINTENANCE

General

Ground and make dead breaker for all work at circuit breaker. To carry out work at operating mechanism without danger, turn off operating and other live circuits. Switching order OFF/ON/OFF is given by means of foot switches 159 and 160 at operating mechanism. Closing and opening springs relax to initial assembly stress, and are not set again. For work at contacts and arc extinguishing chambers described in following paragraphs, special tools listed on last page and supplied with breaker should be used.

Check oil level after regulator, intervals of one or two months and after short circuit connections. If oil level is not in middle of inspection glass 6, oil should be refilled. Checking may be executed any time breaker is in service position. Only refilling of oil makes necessary to shut off and ground breaker.

Checking of Contacts and Arc Extinguishing Chamber

Yearly and after heavy short circuiting it is suitable to control contacts and check breaker oil. For following checking, breaker should be dead and closed as described, so only opening springs are set.

Checking of fixed contact (contact tulip) in arc extinguishing chamber (see Figs. 3 and 5)

Dismantle arc extinguishing chamber as follows. It is not necessary to drain oil.

- Screw off cover 1 and valve cover 2 from pole head 5 with special key A.
- Loosen nuts 32 and carefully pull out arc extinguishing chamber 7 with auxiliary handle B screwed into head of upper part 56 of arc extinguishing chamber.
- Loosen threaded pin 71 and screw off seal 72 with hook key C.
- Take off inserts 53, 54, 54a, 54b, 55a and 55 as well as lower part 56a of arc extinguishing chamber. Mark to ascertain replacing in correct order.

Replacing fixed contacts (see Fig. 5a)

Fixed contacts 51 are heat treated at places where burn marks occur. As soon as burn marks are larger than 0.157 in., fixed contacts should be replaced.

Do as follows: Loosen threaded pin 57 and screw off upper part 56 of chamber including differential piston 47 with special key A. After loosening eight fixing screws, contact holder 67 should be taken off. Before replacing fixed contacts 51, loosen four screws 49 and remove contact protective tube 50. Exercise care so contact pressure springs 52 and sleeves do not get lost.

Replacing of contact rod tip 68 (see Fig. 5a)

Check contact rod tips 68 especially if condition of fixed contact 51 indicates contact rod tip should be replaced too. Screw off with socket wrench D (largest burn marks 0.276 in.) and replace. It is not necessary to drain oil. New tips inserted by same key is retained by pressure spring 73 put into bore hole of contact rod 34.

ATTENTION! With contact rod tip 68 dismantled, contact rod 34 should not be moved in direction of OFF position, as oil flow from contact rod washes out ball

of check valve 34a and diaphragm and spring mounted between ball and contact rod tip.

With diaphragm missing, correct extinction of arc is endangered. For this reason, some test operations should be made before circuit breaker is put into service. While closing speed is same with or without diagram, after first third in case of correct opening a slower movement of insulating rod 89 and thus of contact rod can clearly be observed. If in case of opening no attenuation and delay movement respectively can be seen, circuit breaker should by no means be put into service.

Checking of differential piston 47

Upper part 56 of arc extinguishing chamber should be erected upside down and checked by pressing down differential piston 47. It may move easily in upper part 56 of arc extinguishing chamber, and it may return safely into final position by means of return spring 46. Piston rings 45 and 65 must easily turn in guideway and have enough tension. Otherwise, replace as follows:

- Slightly press down piston, and remove holding ring 65a (see Fig. 2). The relaxing return spring 46 presses piston out of guideway and therefore should be retained.
- Insert new piston rings with piston ring tongs.

Checking of Valves 3 and Oil Separator 4

After loosening screws 30 and nuts at spacer bolts 30b, cover 1 and intermediary plate 1a can be removed from valve cover 2. Then valves and oil separator are accessible, for checking and cleaning. Spring of valve 3 is set in factory to a fixed operating value. *Tightening nut should not be adjusted* when cleaning valve as operating value will change.

Assembly of Contacts and Arc Extinguishing Chamber (see Figs. 3 and 4)

Before assembling arc extinguishing chamber all *metal parts* should be cleaned with suitable cleaner. *Plastic parts*, especially plexiglass parts (parts 53, 54, and 55a) should not be cleaned by these agents. These parts are preferably cleaned with pure breaker oil. If bore hole of arc extinguishing ring 53 is burnt from 1.18 to 1.30 in. in case of 1200 A breaker and from 1.38 to 1.50 in. in case of 2000 A breaker respectively—even if burning occurred on one side only—ring 53 must be exchanged. Same is true in case of other inserts.

- Screw fixed contacts 51 to contact holder, insert contact pressure springs 52 with sleeves, put on protective tube 50 and fix with screws 49.
- Check discharge valves 48 for perfect fitting on seats. If necessary they can be screwed off and on with special key E.
- Screw contact holder 67 to chamber housing.
- Differential piston 47 with valve 66 and return spring 46 should carefully be led into upper part 56 of chamber and pressed down to allow holding ring 65a (see Fig. 2) to be inserted. Check by pressing down and releasing whether piston can be moved in guideway without arresting.
- Screw upper part 56 of arc extinguishing chamber housing until it reaches seat. Protect against loosening by tightening threaded pin 57.

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- Insert lower part 56a of chamber with shorted lug (f) into opening of chamber housing while longer lug (g) takes extinguishing ring 53. Insert other parts in following order: 54, 54a, 54b, 55a, and 55. Screw seal 72 on and protect against loosening by tightening threaded pin 71.

Incorporation of Arc Extinguishing Chamber

Clean with a wire brush contact surfaces of arc extinguishing chamber flange and pole head 5. Incorporate and slightly lubricate with noncorrosive vaseline. With circuit breaker closed, insert arc extinguishing chamber in correct position in insulator 11 through pole head 5. If flange of arc extinguishing chamber fits well, nuts 32 should be tightened evenly.

Replacing of Contact Rod (see Fig. 3)

In order to check contact rod 34 and guide tube 23 in case of complete overhaul, drain oil of circuit breaker in OFF position according to instructions given previously. An air-tight hose end reaches the bottom of support insulator 29. Slip over drain valve 24 and open valve to extreme position.

Dismantle contact rod as follows:

- Loosen nuts 16. Lift pole head 5 with bushing-type insulator 11 from center 22.
- Loosen nuts 13. Dismantle guide piece 12.
- Open cover 20. Loosen clamping screw 19a and adjusting screw protecting rod 34 in clamping device 19 against distortion.

Mark screwing depth before contact rod 34 is turned out of clamp 19, so it will have the same position when assembly takes place. Check contact rod 34 and guide tube 23 and clean oil intake openings. Remove oil residues soiled by copper grit at bottom of pole center 22. Wash container with a suitable cleaning solvent. Screw contact rod 34 into clamp 19 until it reaches marked position. Take care when tightening adjusting screw, so it engages slot provided in contact rod 34.

Tighten screw 19a at clamp thoroughly. Screw on guide piece 12 whose contact surfaces has been cleaned with a wire brush. When bushing-type insulator 11 with pole head 5 is put on, contact surfaces as well as intermediate gasket must be undamaged, clean and dry. (This refers also to contact surfaces and gaskets between pole head 5 and bushing 11 as well as between pole center 22 and support insulator 29.

Loosen coupling between rod head 42 and operating lever 41, in order to check whether contact rod and attenuation piston 39 moves easily. Then, some operations may be made manually. After examinations, reassemble all parts and put on cover 20 with a well fitting gasket 21. Fill poles with oil as described in part 4, and re-establish connections.

After correct trial connections by hand and motor put circuit breaker into service.

Lubricating and Greasing

Lubricate bearings, parts of locks, rollers and sliding surfaces in workshops. After 1000 operations point marked by dots on lubricating plan (Fig. 7) should be greased again. Grease these points as well as all other lubricating points after one year whether breaker operates only few times or not at all.

Lubrication lubricant of gear suffices for at least 10,000 operations. Old grease should be removed and housing cleaned with suitable solvent. Before cover is attached to housing again, clean contact surfaces carefully, and paint with an antileak agent. Screw cover evenly and tightly to housing. Refill housing with about 28 oz. of ESSO grease Ladex I or II by means of force-feed oiler put on grease nipple.

Remove ON and OFF lock at least every two years. Clean and grease lock.

Painting

Take care with bearings, sliding and contact surfaces, insulating parts and springs in case of repainting or repair of painting.

RECOMMENDED SERVICE PARTS

Instruction Book Item Number	Description	Number Required per 3-pole Brk.
2a	Gasket for parts 2 and 5	3
6	Oil level indicator	3
21	Gasket for parts 20 and 22	3
24a	Gasket for part 24	3
31a	Gasket for part 31	3
50	Contact, protective tube	3
51	Fixed contact (contact tulip)	18
52	Pressure spring with sleeve	18
53	Arc extinguishing ring	3
54-55	Inserts for part 7	3
68	Contact rod tip	3

Recommend one 3-pole set of service parts be available for each group of five breakers in service.

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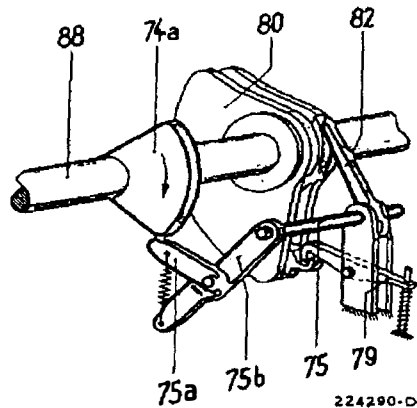


Fig. 1

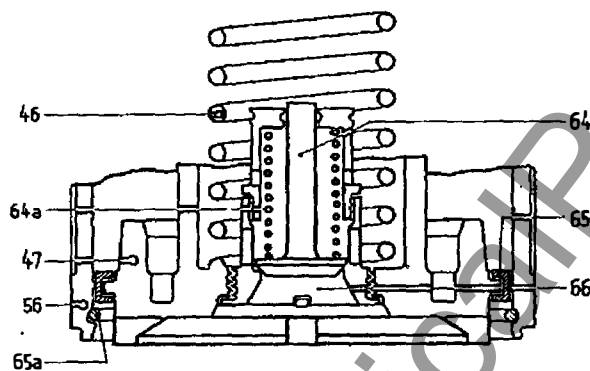


Fig. 2

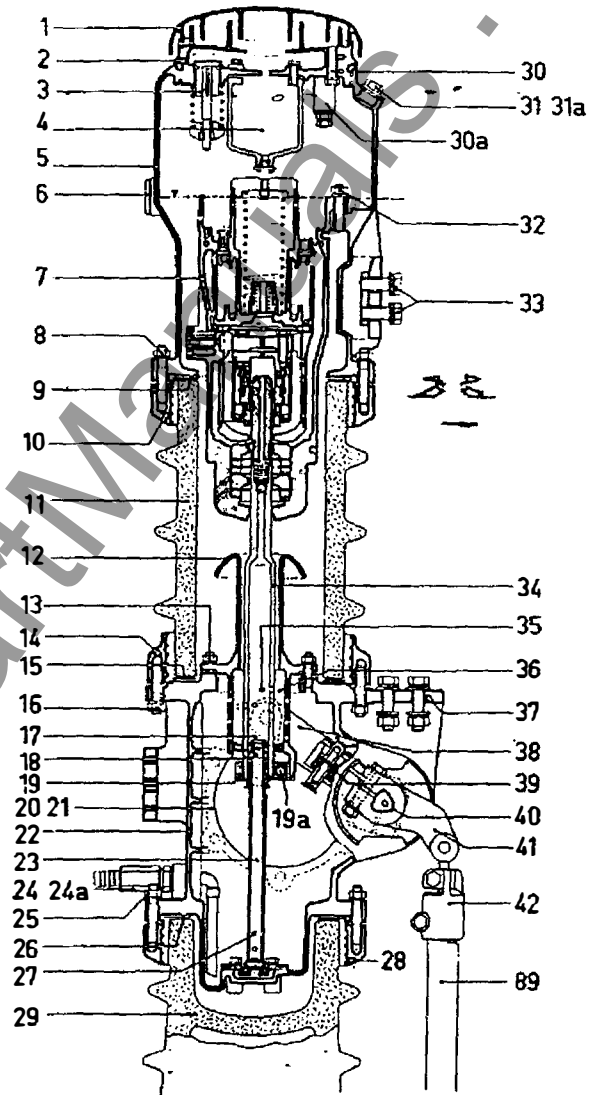
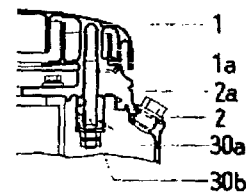


Fig. 3—Cross section of the breaker pole.

Figure 3

- | | | |
|---|--------------------------------|-----------------------------|
| 1 Cover | 16 Spacer bolt with nut | *30a Rubber washer |
| 1a Intermediary plate | 17 Lugs | 30b Spacer bolt |
| 2 Valve cover | 18 Dashpot | 31 Oil filling screw |
| *2a Gasket for parts 2 and 3 | 19 Clamp for part 34 | *31a Gasket for part 31 |
| 3 Discharge valves | 19a Clamping screw for part 19 | 32 Fixing nuts for part 7 |
| 4 Oil separator | 20 Cover for part 22 | 33 Upper connection |
| 5 Pole head | *21 Gasket for parts 20 and 22 | 34 Contact rod |
| *6 Oil level indicator | 22 Pole center | 34a Check valve |
| *7 Differential arc extinguishing chamber | 23 Guide tube for part 34 | 35 Drill holes in part 34 |
| 8 Spacer bolt with nut | 24 Oil drain valve | 36 Laminated collar contact |
| *9 Gasket for parts 5 and 11 | *24a Gasket for part 24 | 37 Lower connection |
| 10 Upper flange for part 11 | 25 Spacer bolt with nut | 38 Switching lever |
| 11 Bushing-type insulator | *26 Gasket for parts 22 and 29 | 39 Attenuation piston |
| 12 Guide piece for part 34 | 27 Drill holes in part 23 | 40 Shaft |
| 13 Fixing nuts for part 12 | 28 Upper flange for part 29 | 41 Operating lever |
| 14 Lower flange for part 11 | 29 Support insulator | 42 Rod head for part 89 |
| *15 Gasket for parts 11 and 22 | 30 Fixing screws for part 1a | |

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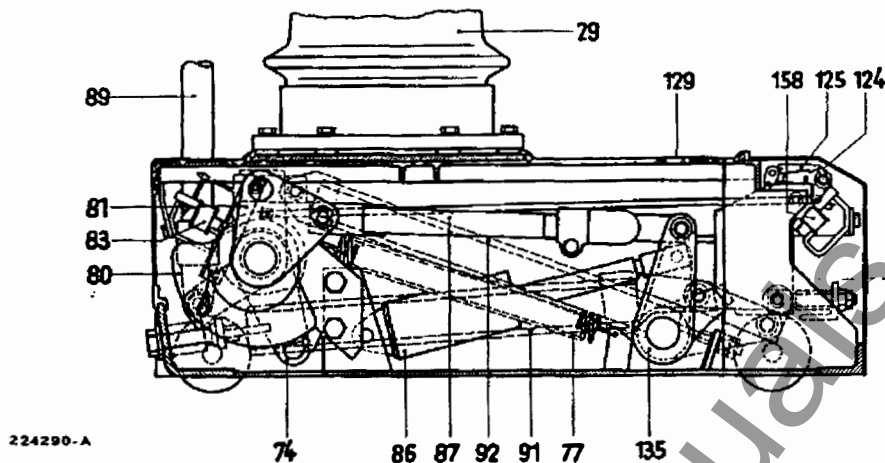


Fig. 4—Undercarriage with operating mechanism.

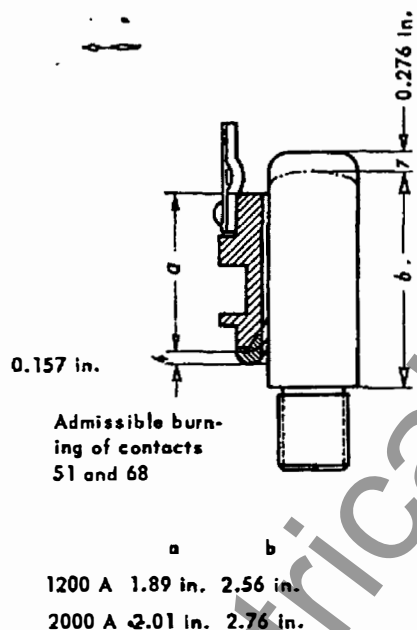


Fig. 5a

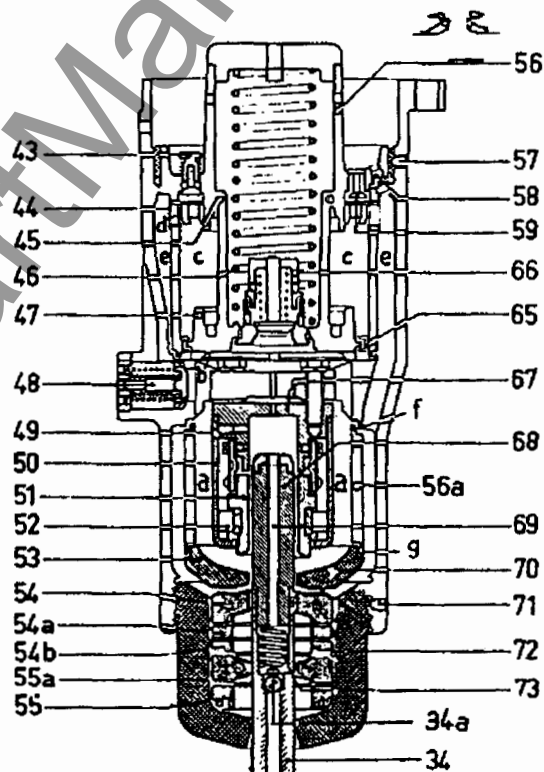


Figure 5

Fig. 5—Cross section of the arc extinguishing chamber.

- 43 Filling valves
- 44 Annular spring
- *45 Piston rings for part 47
- 46 Return spring for part 47
- 47 Differential piston
- 48 Discharge valves
- 49 Fixing screws for part 50
- *50 Contact protective tube
- *51 Fixed contact (contact tulip)
- *52 Pressure spring with sleeve
- *53 Arc extinguishing ring
- *54)

- *54a) Inserts for part 7
- *54b) Inserts for part 7
- *55)
- *55a) Upper part of chamber
- 56 Lower part of chamber
- 57 Threaded pin
- 58 Vent valve
- 59 Vent valve
- 60
- 61
- 62

- 63 Valve cone
- 64 Spring for part 64
- 64a Spring for part 64
- *65 Piston ring for part 47
- 65a Holding ring
- 66 Valve
- 67 Contact holder
- *68 Contact rod tip
- 69 Drill hole in part 68
- 70 Grooved ring
- 71 Threaded pin
- *72 Seal for part 7
- 73 Pressure spring for part 68

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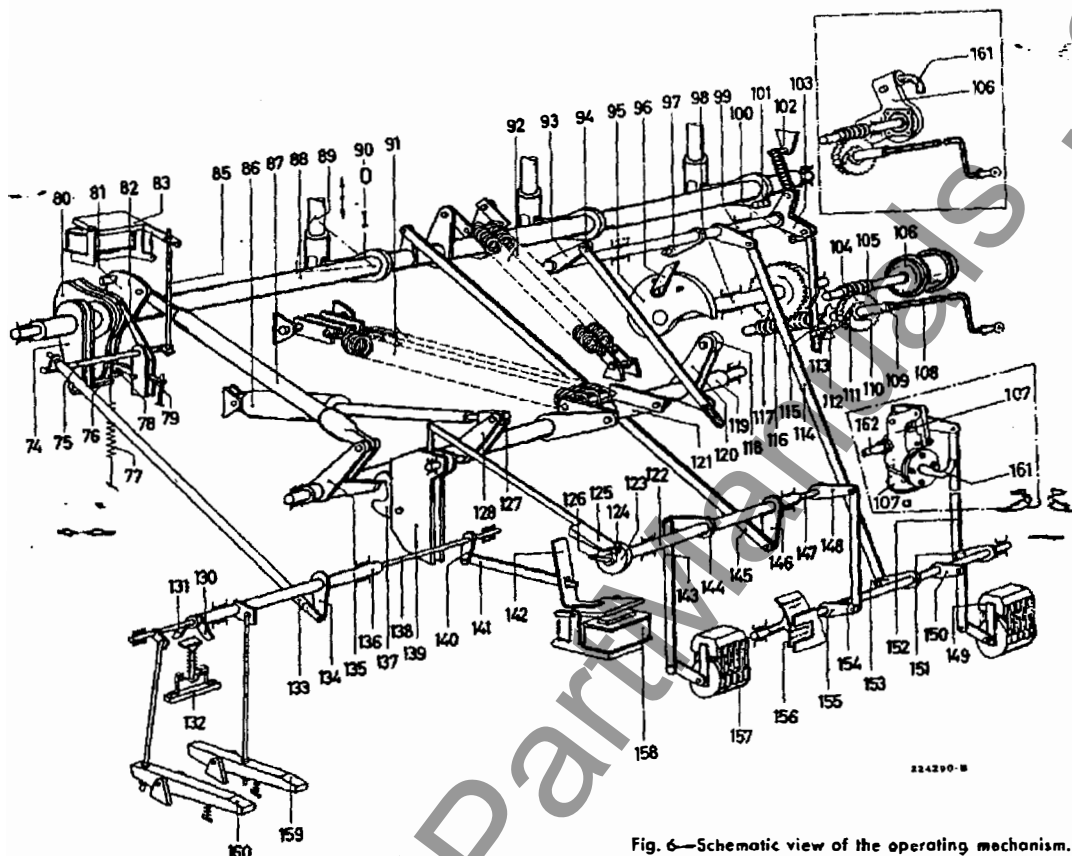


Fig. 6—Schematic view of the operating mechanism.
(Breaker closed, closing springs set.)

Figure 6

- | | | |
|------------------------------|----------------------------------|---|
| 74 Lock lever | *106 Electromotor and compressed | 136 Hollow shaft |
| 75 Operating shaft | air motor respectively | 137 Lock pawl for part 139 |
| 76 Bolts for part 74 | 107 Control valve | 138 Shaft |
| 77 Return spring for part 80 | 107a Lubricating device | 139 Lock |
| 78 Pawl | 108 Crank | 140 Lever for part 138 |
| 79 Pawl | 109 Worm shaft | 141 Rod |
| 80 OFF lock | 110 Toothed rim | 142 Loop for part 158 |
| 81 Coupling lever | 111 Pawl | 143 Rod |
| 82 Tripping lever | 112 Blocking wheel | 144 Lever |
| 83 Shunt trip coil OF | 113 Blocking lever | 145 Rod |
| *83a Winding for part 83 | 114 Rod | 146 Lever |
| 84 | 115 Rod | 147 Shaft |
| 85 Tripping rod | 116 Worm | 148 Lever for part 147 |
| 86 Dashpot | 117 Worm wheel | 149 Auxiliary switch |
| 87 Rod | 118 Roll for part 120 | 150 Lever |
| 88 Operating shaft | 119 Shaft | 151 Lever |
| 89 Insulating rod | 120 Lever for part 91 | 152 Rod |
| 90 Switching lever | 121 Lever for part 91 | 153 Lever |
| 91 Closing springs | 122 Hollow shaft | 154 Shaft |
| 92 Opening springs | 123 Disc for part 122 | 155 Lever |
| 93 Lever | 124 Cams for part 123 | 156 Indicator "Ready for closing/
Spring accumulator released" |
| 94 Rod | 125 Tripping rod | 157 Auxiliary switch ON/OFF |
| 95 Com plate | 126 Hooks for part 147 | 158 Shunt trip coil ON |
| 96 Pawl | 127 Rod head for part 86 | *158a Winding for part 158 |
| 97 Lever | 128 Lever | 159 Foot switch OFF |
| 98 Operating shaft | 129 Undercarriage with operating | 160 Foot switch ON |
| 99 Control shaft | mechanism (see Fig. 4) | 162 Compressed-air feeder |
| 100 Stop for part 103 | 130 Cams for part 136 | 161 Compressed-air pipe |
| 101 Stop for part 103 | 131 Cams for part 138 | for part 106/107 |
| 102 Pressure spring | 132 Auxiliary switch | 163 Bolt |
| 103 Rocker arm | 133 Tripping rod | 164 Toggle lever |
| 104 Worm wheel | 134 Lever for part 136 | 165 Rod |
| 105 Worm shaft | 135 Lever for part 119 | |

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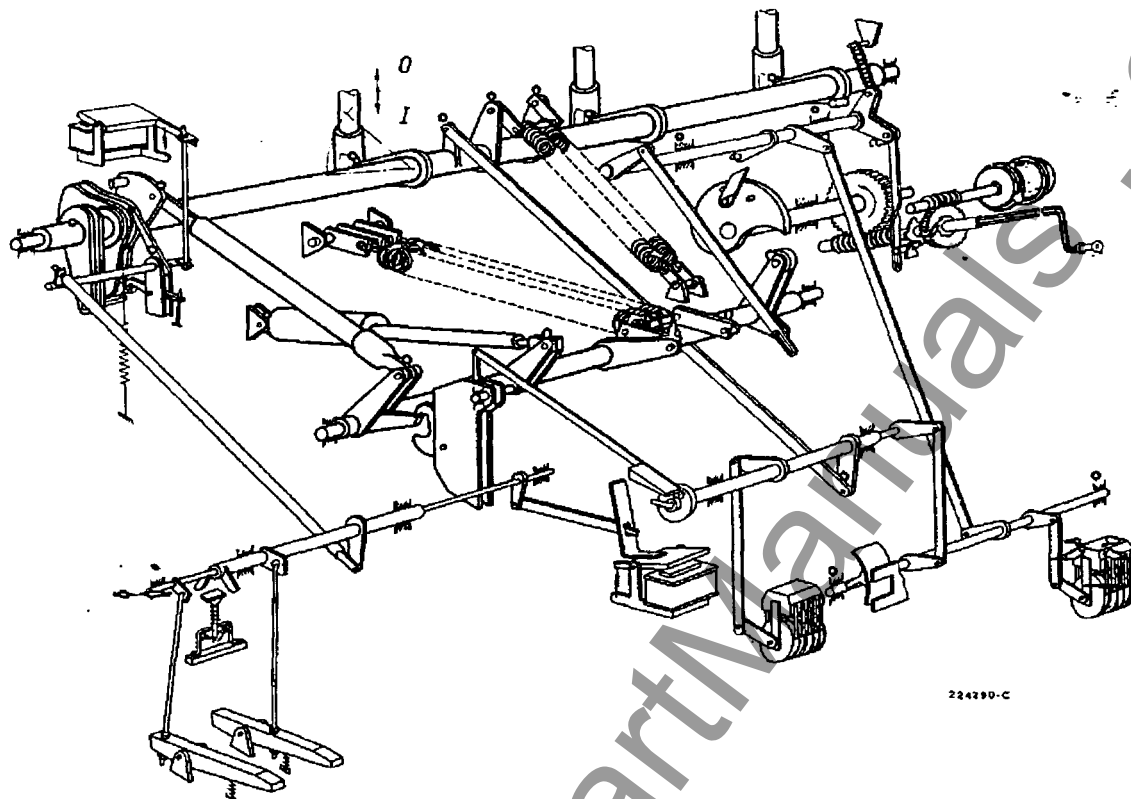


Fig. 7—Lubricating plan for low-oil content circuit breaker.

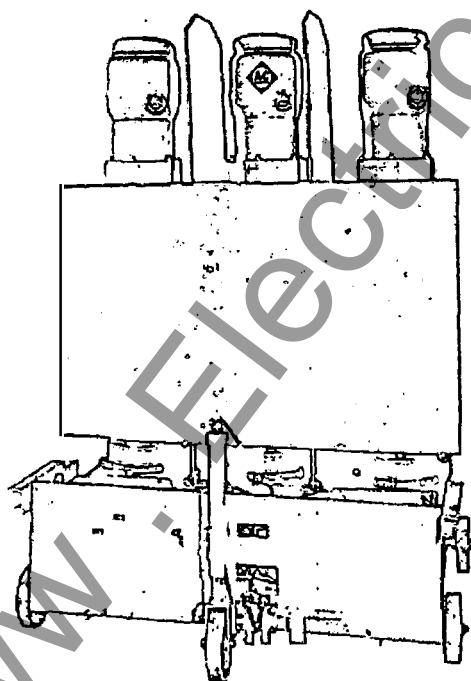


Fig. 8—Front view of breaker.

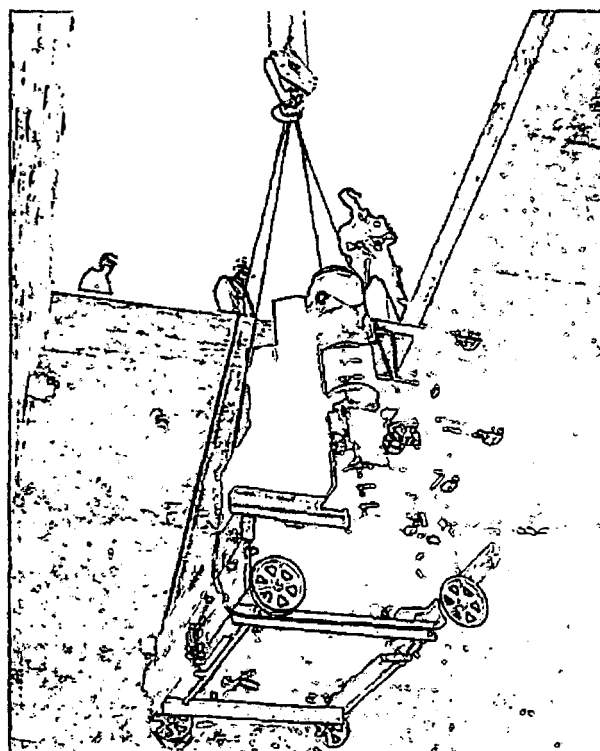
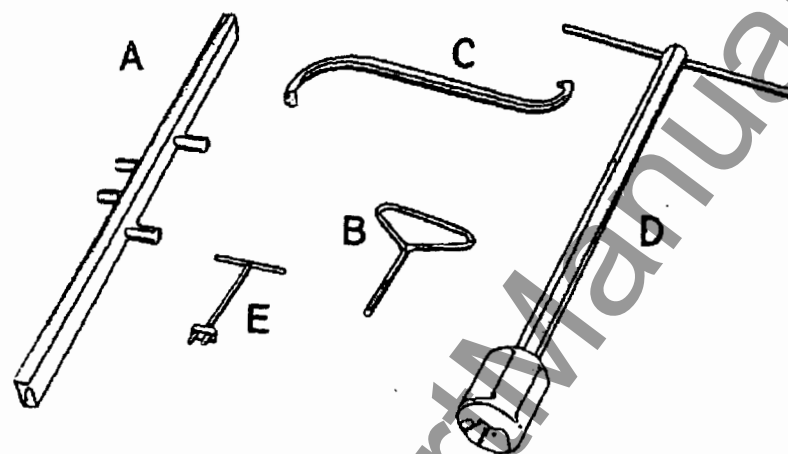


Fig. 9—Approved method of lowering breaker with a crane.

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Fig. 10 - Special tools.

- A = Tool to open cover 1 and screw off upper part 56 from the arc extinguishing chamber 7.
- B = Auxiliary handle to lift chamber 7.
- C = Hooked wrench to screw off seal 72.
- D = Socket wrench to screw off contact rod tip 68.
- E = Key for discharge valves 48.

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