

ALLIS-CHALMERS

**INSTRUCTION
BOOK**

OIL CIRCUIT BREAKER

Types DZ-60B & 100B

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INSTRUCTION BOOK NO. CB-5290-4
INSTRUCTIONS FOR INSTALLATIONS AND OPERATION OF THE
TYPES DZ-60B AND DZ-100B OIL CIRCUIT BREAKERS

GENERAL

1. The oil circuit breaker is shipped completely assembled and before leaving the factory has been carefully inspected and packed by workmen experienced in the proper handling of electrical equipment.
2. Upon receipt of oil circuit breaker, remove all packing traces and examine breaker carefully to see that it has not been damaged in transit. If any injury is disclosed, a claim for damages should be filed at once with the transportation company.

STORAGE

3. If the oil circuit breaker can be set up immediately in its permanent position and filled with oil, it is advisable to do so, even though it will not be placed in service for some time.
4. If it cannot be installed in the proper location immediately and it is necessary to store the equipment, it should be kept in a clean, dry place where it will not be exposed to dirt, to the action of corrosive gasses from coal combustion, etc., or to possible mechanical injury.
5. Machined parts of operating mechanism, etc. should be covered with grease to prevent rusting. Particular care should be taken to protect insulating parts which might absorb moisture.

INSTALLATION

6. The oil circuit breaker should be installed in a clean, dry place, free from the destructive action of acids, alkalis, or gases from coal combustion, etc. and where good ventilation can be secure.
7. The oil circuit breaker should be located that it will be readily accessible for cleaning and inspection. Sufficient space must be provided for the easy removal of the oil tanks.
8. Place the oil circuit breaker in position and mount in accordance with approved arrangement drawing. Remove tank and make thorough inspection to see that packing braces used to hold moving parts during shipment are taken out. **CAUTION: BREAKER IS BLOCKED IN CLOSED POSITION SO CARE MUST BE EXERCISED IN REMOVING BRACES.**

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OPERATION AND ADJUSTMENTS

General

9. All adjustments have been made at the factory before shipping and generally no change is required. Before making any adjustments, clean the bushings and other insulating parts. See that all contact surfaces are clean bright and smooth, and that current carrying members are in good condition mechanically. (Do not dress silver-plated surfaces). Then operate the breaker carefully by hand, using hand operating bar, to check the mechanism adjustments. DO NOT OPERATE ELECTRICALLY UNLESS ALL ADJUSTMENTS ARE CORRECT.

10. CAUTION: AS THE INTERNAL HYDRAULIC SHOCK ABSORBERS ARE EFFECTIVE ONLY WHEN UNDER OIL, THE OIL CIRCUIT BREAKER SHOULD BE TRIPPED AS LITTLE AS POSSIBLE BEFORE TANKS WITH OIL ARE IN PLACE TO AVOID POSSIBILITY OF DAMAGE TO THE APPARATUS.

Operating Mechanism

11. For instructions for operating mechanism, refer to its separate instruction book attached.

Breaker Mechanism (Refer to Fig. 1)

12. Essentially the breaker mechanism consists of a radius bar (23), pivoted at (49) and carrying on one end, through links (52), the crosshead, lift rod and bridging member. The radius bar is operated from the external crank (31) through a toggle linkage (24 and 53) which provides the necessary translation of motion and mechanical advantage. Toggle linkage (24 and 53) is shown in the correct position (breaker closed) with the center point (48) of the toggle approx. 5/16" off center.

13. The proper toggle adjustment is a very vital factor in the smooth and easy operation of the breaker mechanism, particularly on breakers having high current carrying ratings. Its adjustment affects the ease of closing, the tripping characteristics and the opening speed of the breaker. A breaker with its toggle linkage too far off center will close very hard because the proper mechanical advantage is not obtained. In this condition the breaker may also fail to trip due to the excessive pressure on the trip latches in the operating mechanism. On the other hand, if the toggle linkage is permitted to go over-center, the breaker will close easily, but will lock in the closed position so that it cannot be opened at all by the usual means.

14. Toggle stop bolt (84) has been set at the factory to prevent linkage (24 and 53) from going past the proper adjustment in the over-center direction. When the breaker is latched in the closed position and pressure removed from the hand closing bar, there should be approximately 1/54" to 1/32" clearance between the end of the toggle stop screw (84) and the face of the casting. If the clearance is greater than this amount, the rod connecting the breaker mechanism to the operator should be shortened by turning the clevis until adjustment is correct. On the other hand, care must be taken to see that at least 1/64" clearance is provided to allow for a slight overtravel.

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Overtravel Stops

15. Overtravel stops (82) are provided to prevent the breaker mechanism from overtraveling sufficiently to cause damage.

16. With the breaker in the closed position, adjust each overtravel stop until it strikes the crosshead (22), then turn stop backward one-half turn and lock with checknut. CAUTION: BREAKER MUST NOT BE OPERATED ELECTRICALLY WITHOUT THE OVERTRAVEL STOPS BACK IN PLACE AND SECURELY LOCKED.

RUPTORS, BAYONETS AND WEDGE CONTACTS

17. The Ruptors, bayonets and main current carrying contacts should require no adjustment. All contact adjustments should be checked, however.

Finger Contacts (600 ampere only) Refer to Fig. 1.

18. The finger contacts (33) have been carefully adjusted at the factory to be in correct position when toggle linkage (24 and 53) is in adjustment and usually require no further adjustment. Finger contacts should have approximately equal pressure and make contact approximately on the center of the contact surfaces on the movable bridge. Adjustment may be made by removing the auxiliary bridge (34), loosening the main bridge clamp screws and raising or lowering the main bridge (20) the necessary amount.

Brushes (1200 amperes only) Refer to Fig. 1.

19. Brushes have been carefully adjusted at the factory to be in correct position when toggle linkage (24 and 53) is in adjustment and usually require no further adjustment. When brushes are in proper adjustment each individual lamina makes contact with the main bridge. (See Fig. 3). Adjustment may be made by removing the auxiliary bridge (34), loosening the main bridge clamp screws and raising or lowering the main bridge (20) the necessary amount. Care should be taken not to overflex the brushes by undue pressure as in Fig. 5, Fig. 4 shows too little pressure. Just enough pressure is required as will secure good contact on the heel of the brush.

Bayonets

20. Check to see that all bayonets are centered in the openings in the Ruptors, break contact together and slide sufficiently into stationary arcing contacts to make full contact but not enough to strike hood. This may be done without removing the Ruptor shell by proceeding as follows:

- (A) Close the breaker slowly by hand and check to see that each bayonet enters its Ruptor shell centrally. If adjustment appears necessary turn the Ruptors slightly on the bushing studs, taking care to see that the main contact adjustment is not affected appreciably.

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- (B) Close the breaker fully by hand and check to see that the top end of the bayonets is level with the top surfaces of the stationary arcing contacts. The position of the bayonet contacts may be observed through the slots between the contact shunts of the Ruptors. Adjustment, if required, is made by screwing the bayonets up or down in the bridge. With proper adjustment, the bayonet penetration into the stationary arcing contacts is approximately $1\frac{1}{2}$ ".
- (C) See that with the breaker closed, the stationary arcing contact assembly can be moved slightly in all directions in a horizontal plane, thus insuring that proper centering of the contacts has been obtained. Also check to see that the stationary arcing contact assembly can be moved freely in the horizontal plane when the breaker is open. Check to see that the bridging member does not strike the bottom of the Ruptor shell.

CONTACT CLEANING

21. Before putting the tank in place, wipe all contact surfaces clean with a cloth soaked in high test gasoline or carbon tetrachloride. After the breaker has been in service for a period of time, a file or sandpaper may be required to dress the arcing contacts. Abrasives, however, should never be used on the silver-plated contact surfaces of the current carrying parts. Unlike copper, these contact surfaces are good electrical conductors, even when oxidized.

TANKS

22. Make sure that the tanks are clean and dry with tank linings in place and then install on breaker and fill with A.C. Universal #3 oil, as shipped with the oil circuit breaker, to the mark on the oil gauge. This may be done by removing oil and gas separator, or by removing the fill plug when provided. Tank bolts should be tightened evenly.

OIL AND GAS SEPARATOR

23. The oil and gas separator is provided to facilitate escape of gases incident to circuit interruption and to prevent oil throw.

24. It consists of a specially shaped chamber incorporating a check valve which provides a restricted passage leading from the interior of the top casting to the air.

25. During circuit interruption, gases are liberated which rise through the oil to the expansion chamber and then escapes through the oil and gas separator. Oil particles that may be mixed with the gases are separated, due to

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the enforced changes in direction of gas flow and are returned to the breaker tank.

26. The check valve, normally opens only to relieve pressure from within the tank, consequently moisture laden air cannot enter the breaker through the oil and gas separator.

27. The exhaust opening of the oil and gas separator is provided with a standard pipe thread. If feasible the oil and gas separator should be piped to a header which exhausts outdoors. Where this is not feasible it should be piped to a point away from live parts where there is free ventilation. Oil circuit breakers should not be permitted to vent into bus structure or into a closed cell or other space where gases may collect with possibility of becoming ignited. If no other provision is feasible, the exhaust should be piped down to a point 12 to 18 inches from the floor.

28. No adjustment of the oil and gas separator is necessary.

OIL

29. In general, each Aflie-Chalmers oil circuit breaker is shipped, with sufficient oil to fill tank to the required level. The Oil furnished is of special grade carefully selected for this service, known, as A.C. Universal #3. It has a high flash point, low freezing point, high resistance to carbonization and will not readily retain moisture in suspension.

30. As satisfactory operation of the oil circuit breaker depends on the use of suitable oil, properly maintained, it is advisable to use only oil, furnished with the breaker or recommended by the breaker manufacturer.

31. The dielectric strength of the oil when shipped is at least 22,000 volts when tested with 1" dia. discs, spaced 1/10" apart. If the oil tests less than 22,000 volts, it should be filtered before placing in the oil circuit breaker tanks.

CONNECTIONS

32. Before making any electrical connections, every precaution must be taken to see that all leads to be connected to the oil circuit breaker are dead.

33. All terminals must be fastened securely to the leads and tightly clamped to the connection studs. If the joints are not made correctly, dangerous heating of the oil circuit breaker may result.

34. To avoid heating, the connecting leads must have adequate current carrying capacity in accordance with standard practice and in any event at least equal to that of the current carrying parts of the oil circuit breaker.

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Ground Connections

35. The frame of the oil circuit breaker should be permanently grounded. A good permanent low resistance ground is essential for adequate protection. A poor ground may be worse than no ground at all, as it tends to give a false feeling of safety to those working around the equipment and may result in ultimate loss of life or damage to the apparatus.

FINAL INSTALLING INSPECTION

36. Make sure that the oil circuit breaker is properly set up and leveled on its supporting structure.

37. See that all bearing surfaces of the operating and breaker mechanisms have been lubricated with a light, non-gumming lubricating oil.

38. Inspect all insulated wiring and see that no damage has resulted during the process of installing breaker.

39. Test the wiring for possible grounds or short circuits.

40. Make sure that all current carrying parts outside the oil circuit breaker have adequate current carrying capacity and are correctly insulated in accordance with standard practice.

41. Make sure that all joints are made correctly whether they be bolted joints of copper bars, soldered joints, or clamped joints made with wires or cables.

MAINTENANCE

42. Upon the proper operation of the oil circuit breaker depends the safety of the operators and the successful functioning of the connected apparatus; therefore, the circuit breaker must have regular systematic and thorough inspection. The following points require special attention.

43. Be sure that the breaker and its operating mechanism is disconnected from all electric power before inspecting or repairing.

44. It is recommended that the breaker be inspected mechanically and electrically at least once every six months.

45. Inspect the operating and breaker mechanisms periodically and lubricate all bearing surfaces regularly with a good quality light, non-gumming lubricating oil.

46. Contacts should be examined frequently, depending on severity of service. With the breaker closed, see that they are aligned and that contact surfaces bear with firm and uniform pressure. Replace badly pitted or burnt

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arcing contacts before they are damaged to such an extent as to cause improper operation of the apparatus. If the arcing contact surfaces are only roughened, they may be smoothed down with a fine file.

47. The contact surfaces of all oil circuit breakers must be kept clean to insure maximum operating efficiency. It has been found by experience that operating the breaker several times each month will reduce the accumulation of oxidized oil on the contacts and insure continued free operation of mechanical parts. It is recommended that this practice be followed by all users of oil circuit breakers.

48. The oil should be tested periodically depending upon the amount of service. It is recommended that if the average test value of five samples taken from the bottom of the tank tests less than 17,500 volts per 1/10" gap with 1" dia. discs, the oil be filtered or reconditioned. It is recommended that the oil be changed or filtered and carbon cleaned from bushings, lift rods and other parts once a year or more often, depending upon the severity of the service. The oil should be filtered after successive openings under load, short circuit, etc.

SUPPLY PARTS

How to Order

49. When ordering supply parts, refer to Figs. 1 and 2 and the following parts list. Specify quantity, reference number, catalog number, description of part required, and type, amperage, voltage, and serial number of the breaker on which the part is to be used. EXAMPLE: 4 - Ref. No. 13, brush for Type DZ-60B, 1200 ampere, 15,000 volt serial No. 231072 oil circuit breaker.

50. It is recommended that sufficient parts be kept in stock to enable operators of circuit breakers to replace without delay worn, broken, or damaged parts. In the last two columns of the following parts lists is given the quantities of parts which should be kept in stock.

51. ♦ The minimum charge on any order will be one dollar.

INSTALLATION OF REPLACEMENT PARTS

52. Before removing part to be replaced, observe its function and adjustment. By so doing it is usually possible to avoid any appreciable amount of adjustment work after installation of the replacement part.

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Contacts

53. Stationary arcing contacts can be readily replaced by removing the Ruptor shell and then the contact retaining plate underneath the Ruptor hood casting. If desired, the bridge carrying the bayonet contacts may be removed by removing the auxiliary bridge screws without disturbing the main contact adjustment. The method of replacement of the other contacts is obvious. Instructions for contact adjustment are given under "Ruptors", bayonets, and wedge contacts Par. (17-21).

Ruptor Hood Castings and Contact Blocks

54. To replace a Ruptor hood casting the three cap screws holding the Ruptor to the contact block are removed after which the Ruptor may be disassembled to remove the Ruptor hood casting. In order to replace a contact block, the adjacent Ruptor must first be removed. (This is done to allow the contact block which is to be removed, to be turned on its stud). The checknut (37) is now loosened and the contact block unscrewed from its stud.

55. In replacing the contact stud, care should be taken to see that the new contact block is screwed up on the stud the proper amount so that it is on the same level with other contact blocks. The Ruptor may now be placed in position and the three cap screws tightened. The checknut on the stud may be tightened and the contacts adjusted according to Paragraphs (17-21).

56. For identification of contact blocks for the type DZ-90B and DZ-100B, see Fig. 6.

Lift Rods

57. To replace a lift rod, remove the two pins (51) which attach links (52) to the crosshead. Then remove the dashpot (39) and remove the three lift rods and the crosshead (22) as a unit. Remove the screws which fasten the auxiliary bridge (34) to the main bridge. Loosen the main bridge clamp screws (60) and unscrew the main bridge from the lift rod. Then remove the locknut (68) at the upper end of the lift rod and unscrew the lift rod from the crosshead (22).

58. Screw the new lift rod into the crosshead (22) and lock in place with locknut (68). Care should be taken to see that the main bridge (20) is screwed up on the new lift rod the proper amount. Final adjustment of the contacts should be made according to Paragraphs (17-21).

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SUPPLY PARTS FOR THE TYPES
DZ-50B AND DZ-100B
OIL CIRCUIT BREAKERS
600 AND 1200 AMPERES
(REF. TO FIG. 1, 8A & 8B)

REF. NO.	DESCRIPTION	No. Recommended for Stock	
		1 Breaker	10 Breakers
1	Contact block (see also Fig. 6)		
	(a) 600 amp.	1	1
	(b) 1200 amp.	1	1
2	Contact block (see also Fig. 6)		
	(a) 600 amp.	1	1
	(b) 1200 amp.	1	1
3	Contact block (see also Fig. 6)		
	(a) 600 amp.	1	1
	(b) 1200 amp.	1	1
7	Bushing (DZ-60B & 100B)		
	(a) 600 amp.	1	2
	(b) 1200 amp.	1	2
9	Bushing (DZ-60B & 100B Verti-lift)*		
	(a) 600 amp.	1	2
	(b) 1200 amp.	1	2
	Bushing (DZ-50B & 100B Verti-lift)**		
	(c) 600 amp.	1	2
	(d) 1200 amp.		
10	Tank Lifter		
12	Bolt (1200 amp.)		
13	Brush (1200 amp.)	4	12
14	Lift Rod	1	3
15	Bolt (600 amp.)		
20	Bridge (600 amp.)		1
21	Bridge (1200 amp.)		1
22	Crosshead		
26	Terminal (600 amp.)		
33	Contact (600 amp.)	4	12
34	Bridge		1
35	Nut		
	600 amp.		
	1200 amp.		
37	Nut		
	600 amp.		
	1200 amp.		
47	Plunger (bayonet) (DZ-50B)	5	18
47	Plunger (bayonet) (DZ-100B)	6	18

*Top end of bushing stud "Threaded" as shown in Figure 8A.

**Top end of bushing stud "Plain" as shown in Figure 8B.

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RUPTOR SUPPLY PARTS FOR THE TYPE

DZ-60B OIL CIRCUIT BREAKER

600 AND 1200 AMPERES

Ref. to Fig. 7 (DZ-60B)

Ref. No.	Description	No. Recommended for Stock	
		1 Breaker	10 Breakers
1	7/16"-14x3-3/4 lg. Hex. Hd. Cap Screw		
2	Washer		
3	Hood		
4	1/4"-20x1/2" Fl. Hd. Mach. Scr.-Brass		
5	Plate		
6	Washer		
7	Contact assembly	5	18
8	Ring		
9	Tube		
10	Shell		
11	Plug		

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RUPTOR SUPPLY PARTS FOR THE TYPE

DZ-100B OIL CIRCUIT BREAKERS

500 AND 1200 AMPERES

(Ref. to Fig. 2 (DZ-100B))

Ref. No.	Description	No. Recommended for Stock	
		1 Breaker	10 Breakers
1	Contact Assembly	9	18
2	Hood		
3	Shell		
4	Plate		
5	Tube		
6	Filler		
7	Stud		
8	Washer		
9	1/4"-20x5/8" Lg. Fl. Hd. Mach. Screw		
10	Washer		
11	1/2"-13 Hex. C.P. Nut		

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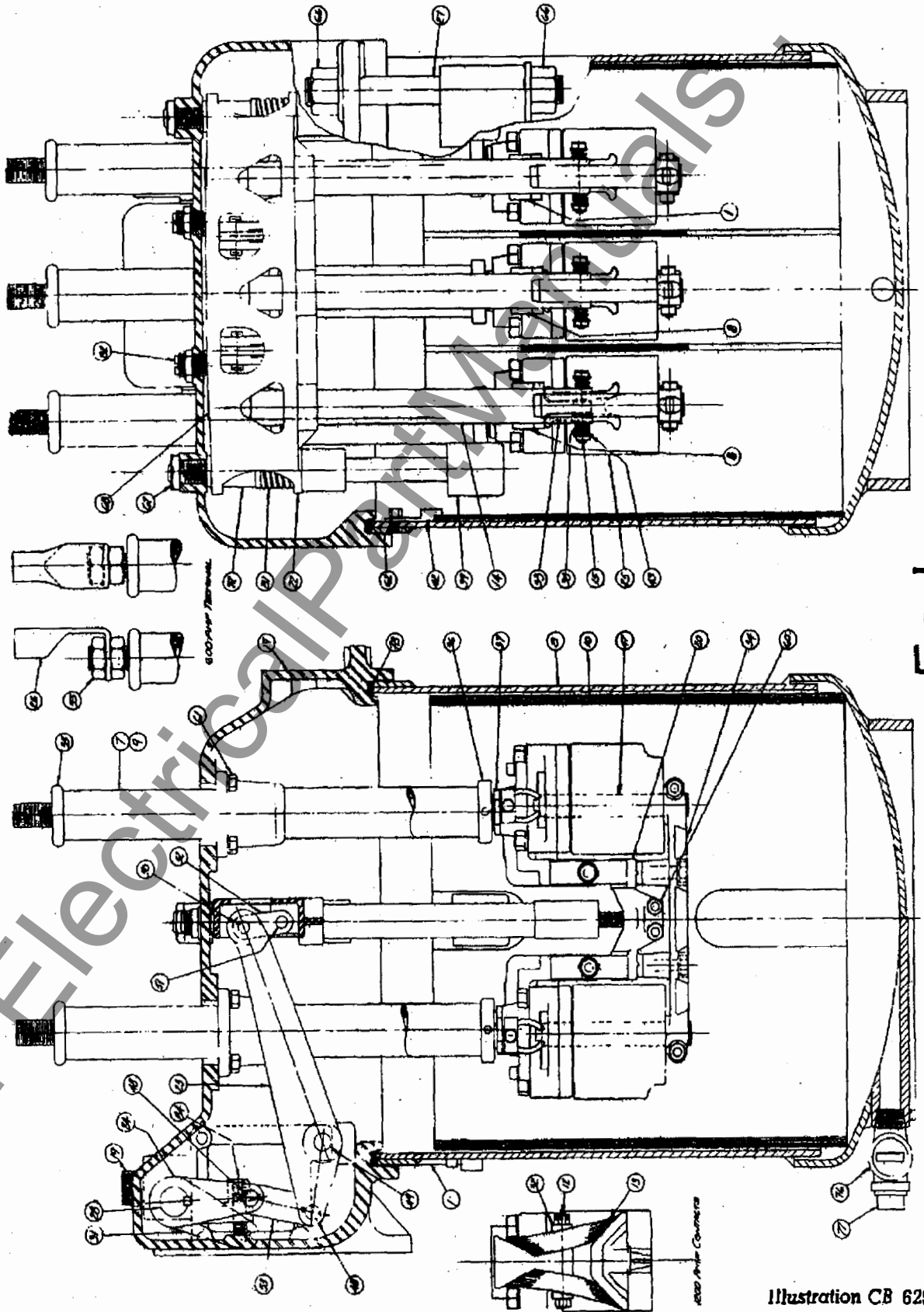


FIG. 1

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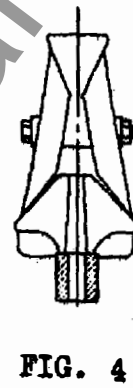
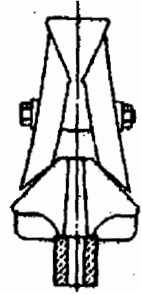
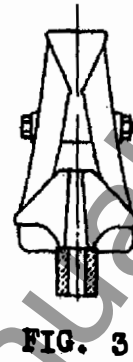
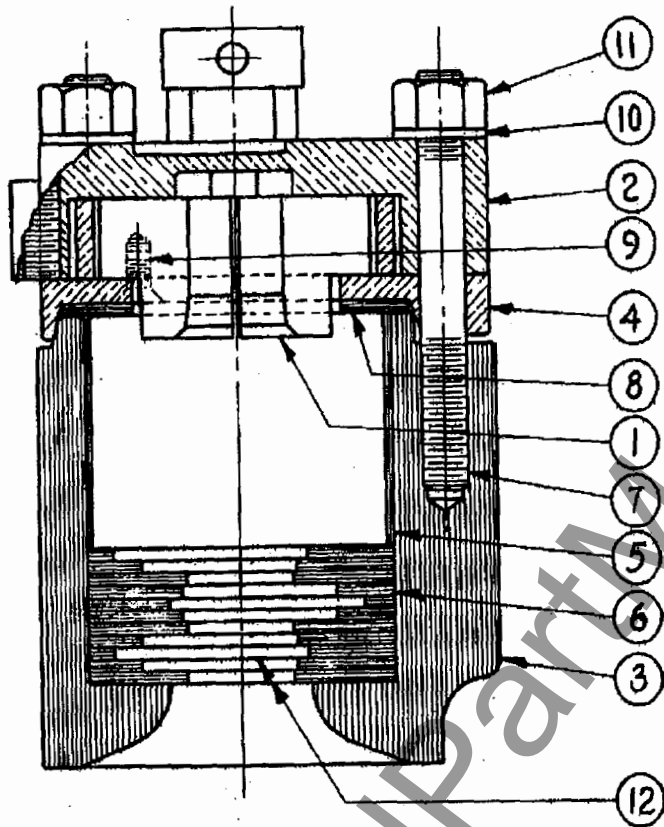


FIG. 2

FIG. 4

FIG. 5

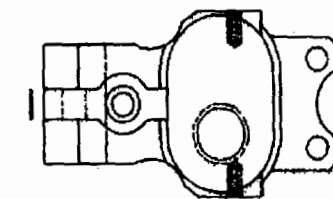
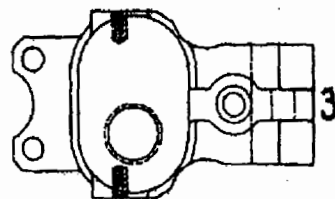
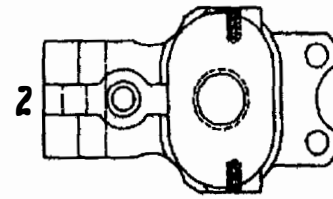
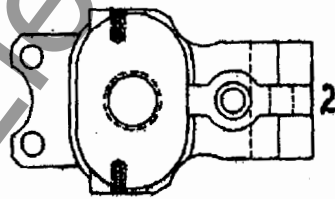
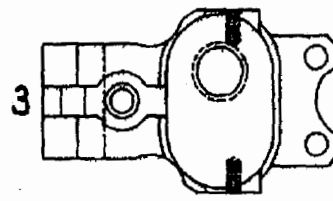
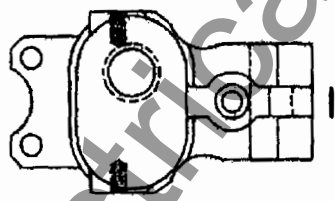


FIG. 6

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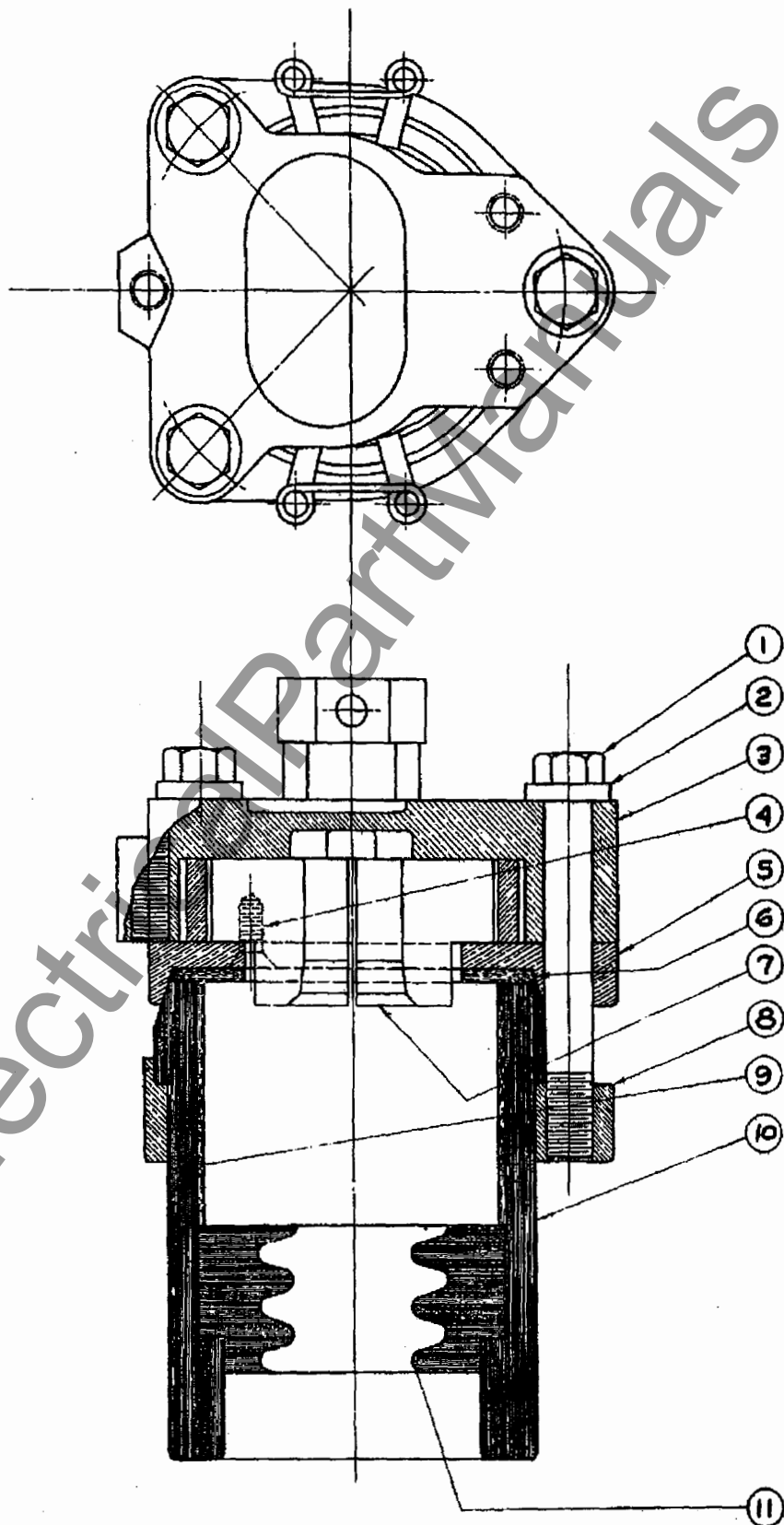


FIG. 7

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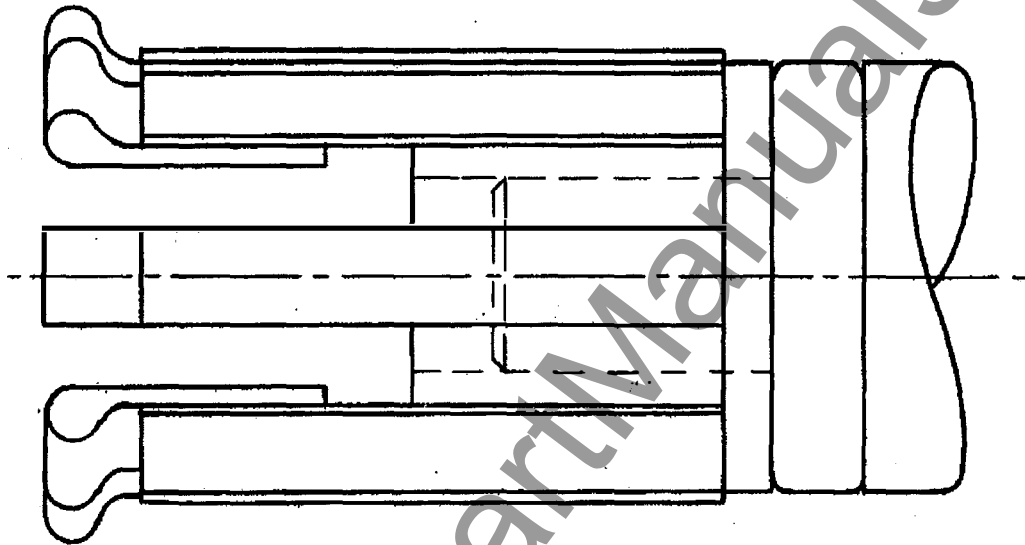


FIG. 8A

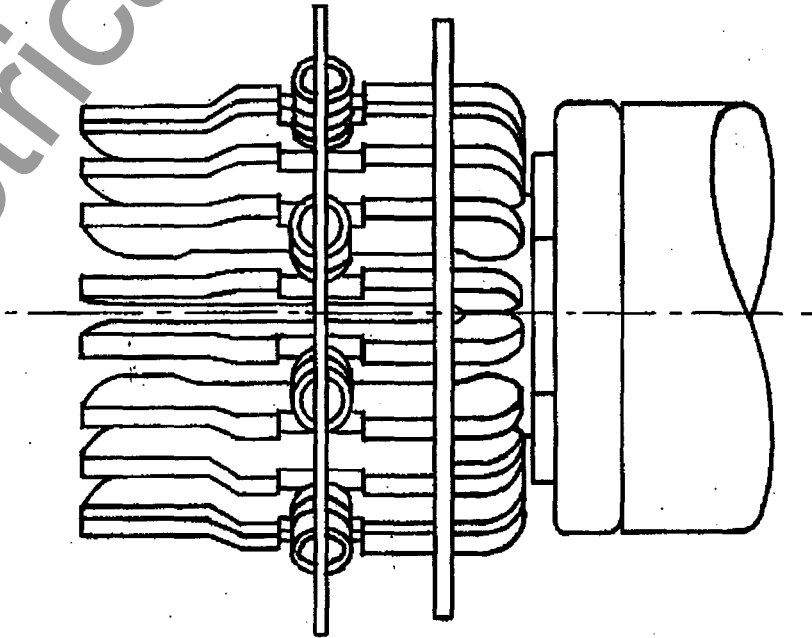


FIG. 8B

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