I. B. 33-600-3

DESCRIPTION • INSTALLATION • MAINTENANCE

INSTRUCTIONS

Type B-28-B

OIL CIRCUIT-BREAKERS

600, 1,200 and 2,000 Amperes, 13,800 Volts

ELECTRICALLY OPERATED

Lift-up, Cell or Frame Mounted

WESTINGHOUSE ELECTRIC CORPORATION
SWITCHGEAR DIVISION
EAST PITTSBURGH PLANT — EAST PITTSBURGH, PA.
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PART ONE

DESCRIPTION AND INSTALLATION

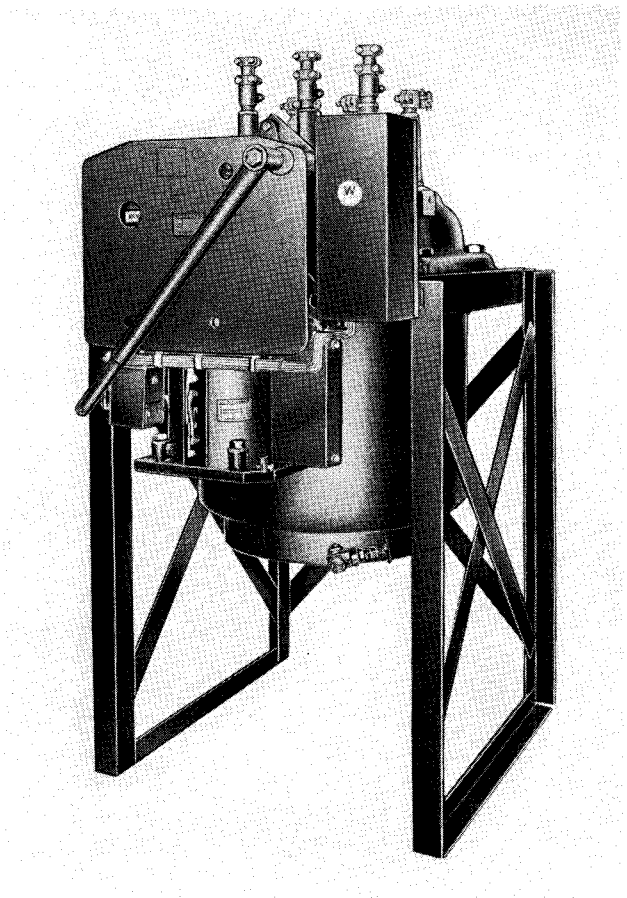


FIG. 1. Type B-28-B Oil Circuit-Breaker, Solenoid Operated

The Type B-28-B oil circuit-breakers are 3-pole single-throw breakers of non-oil-throwing design, with all poles contained in a single round tank. They are designed for a maximum of 15,000-volt service in 600-, 1,200- and 2,000-ampere sizes.

These breakers may be mounted in cells, on steel frames or as lift-up units.

Electrical operation may be by solenoid, when direct-current is available or by solenoid plus Rectox when alternating-current is available. The breaker may also be operated manually.

These breakers are equipped with Type F "De-ion Grid" Contacts, Fig. 5. The arc interruption takes place in the "De-ion Grid" chambers supported from the terminals. This chamber consists of a series of insulating plates having interspersed plates of magnetic material, all so disposed and vented that the arc is moved laterally into oil pockets where it vaporizes the oil. The resultant gases are then forced transversely through the conducting gases of the arc stream in such a manner as to de-ionize them and extinguish the arc.

The contact fingers and arcing horn are tipped with a special arc resisting tungsten alloy to insure long life.

SHIPMENT

The breaker is shipped in the following manner:

1. Breaker and operating mechanism are assembled as a complete switching unit with the breaker tied in the closed position.

2. For remote control, the breaker and operating mechanism will be crated separately.

INSTALLATION

1. Attach the breaker to the supporting structure, first making sure that the structure is level.

2. Remove the tank and examine the inside for evidence of moisture and foreign matter. Flush with benzine.

3. Remove the wire which holds the breaker in the closed position and allow the breaker to open slowly.

4. When the mechanism is mounted separately from the breaker, connect the breaker and operating mechanism, making sure that full contact is secured and that the breaker rests on the bumpers when open.

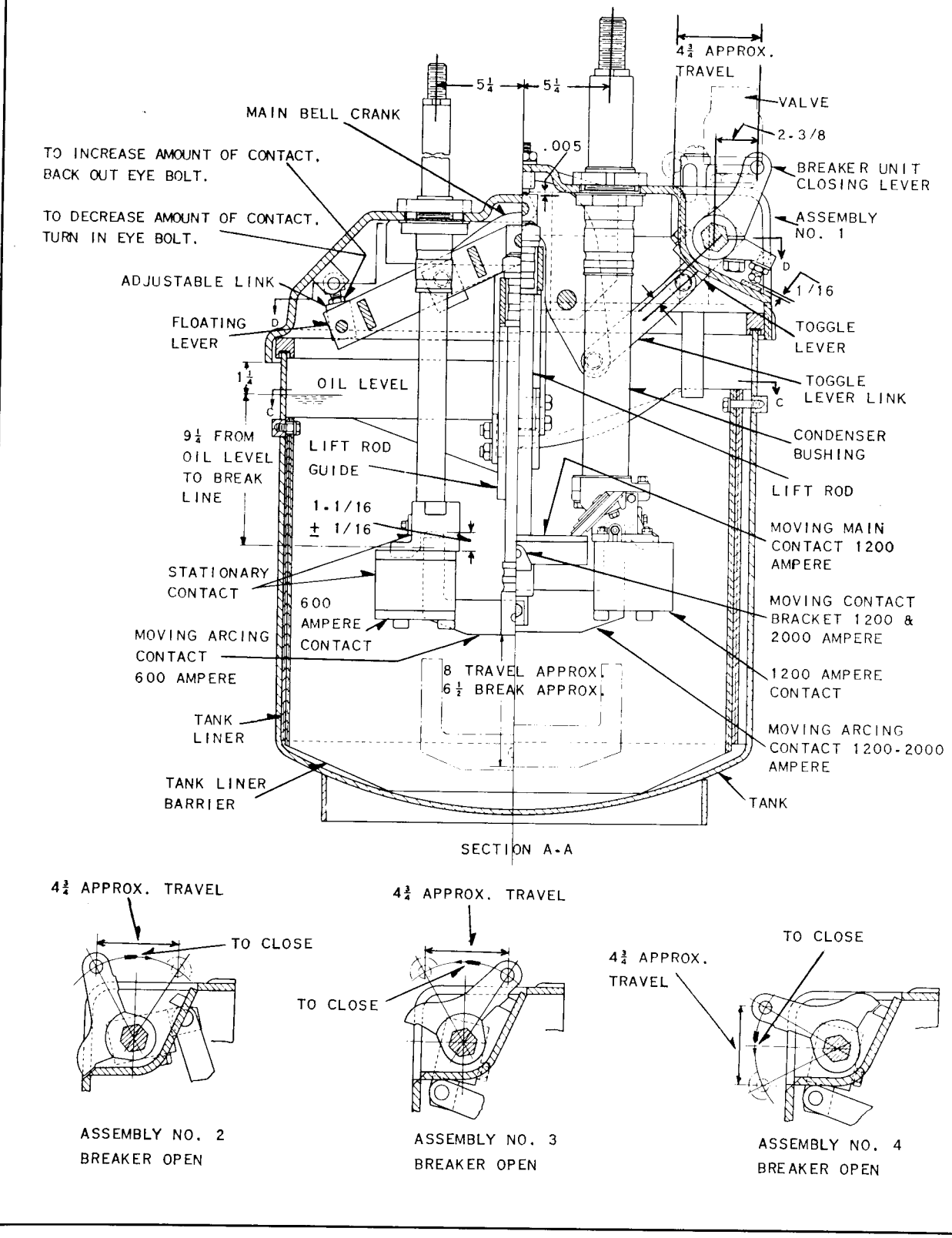
5. Examine the contacts and note that they are clean and in alignment. For adjustment, see section covering Adjustment.

6. Operate the circuit-breaker by hand several times, watching each pole and the operating mechanism to be sure that all parts move freely.

7. Install connections to the breaker studs.

8. Insulate the connections with varnished cambric and non-elastic webbing in accordance with Westinghouse Standards for the various operating potentials. See Fig. 8.

9. Connect the vent pipe to the top of the venting valve. This pipe should be connected to the main venting header pipe, or outside the cell in which the breaker is mounted. It should be so arranged that it will not be possible for rain or condensation to enter the piping. The piping should also be free of any pockets which would retard the drainage



Cross Section of Type B-28-B Oil Circuit-Breaker Showing Various Arrangements of Toggle Lever and Link Assembly

FIG. 2. 600 Amperes

FIG. 3. 1,200-2,000 Amperes

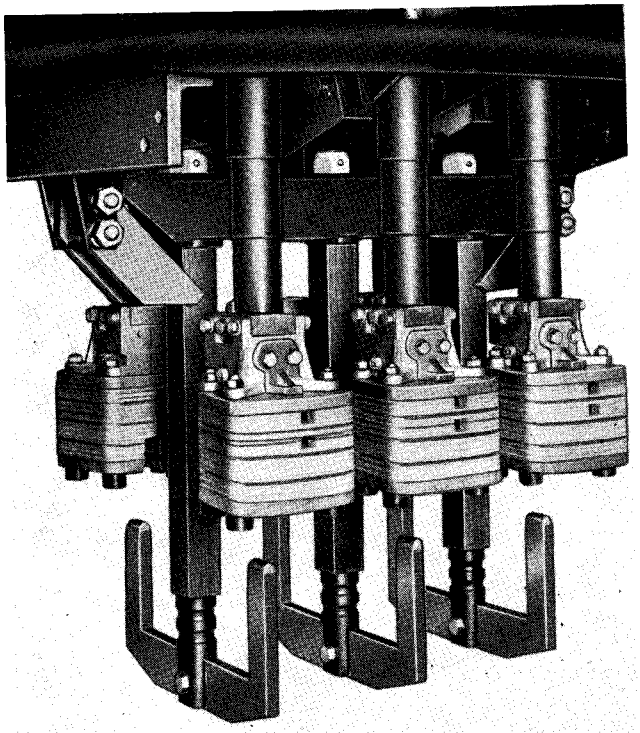


FIG. 4. Type B-28-B, 600 Ampere, 13,800-Volt Breaker Contact Assembly with "De-ion Grids"

of any oil that might be discharged, back to the circuit-breaker.

10. With the tank removed, fill it with oil in accordance with nameplate instructions, or if more desirable, the oil can be added through the filling plug located in the breaker top after the tank has been bolted in place. **Be sure and replace filling plug and see that tank is drawn up even and tight all around, otherwise oil may leak or be forced out.**

11. Remove the small plug in the top of the oil gauge and move the oil float indicator up and down to see that it is free to move. The red cap at the top of the float should show in the center of the glass for the proper oil level.

12. Connect the breaker frame through one of the mounting bolts to ground. The National Electric Code requires grounding cable to have one-fifth of the main circuit capacity, except that it must never be smaller than No. 8 and need not be larger than No. 0, B. & S. gauge.

13. Check the operation of the breaker by operating it electrically in accordance with the instructions covering the mechanism used.

ADJUSTMENTS

Breaker Mechanism. The main operating lever is provided with an adjusting screw for setting the toggle, which is set at the factory and should not be disturbed. The setting is such that with the breaker in the closed position the toggle will be 1/2 inch ± 1/16 inch with 1/16 inch clearance between the head of the adjusting screw and the breaker frame. See Fig. 2.

Caution: Do not interchange links, levers or cross bars between breakers of different ampere-capacities, as certain parts are made of non-magnetic material. To interchange these parts may result in excessive heating.

The hydraulic bumper action is secured by reaction of the moving cross bar on two hydraulic stops — one on each end of the cross bar guides. This action is non-adjustable and requires no attention. Do not operate the breaker excessively without oil.

Contacts. The contact arrangement for the 600-ampere breaker is shown in Figs. 2-5. Adjustment is provided by means of adjustable links located in the breaker top at the rear. To increase the amount of contact, the complete moving contact must be raised up. This is accomplished by making the links longer. To decrease the amount of contact, the links should be made shorter. For full contact, the distance between top of the "De-ion Grid" top plate and the top of the moving contact should be 1 1/16 inch ± 1/16 inch, with the breaker closed. This dimension is only for new parts. Some allowance must of course be made when contacts burn.

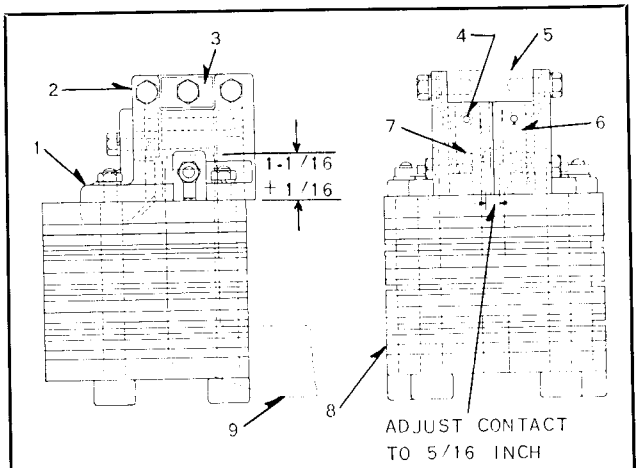


FIG. 5. "De-ion Grid" and Contact Assembly, 600-Ampere

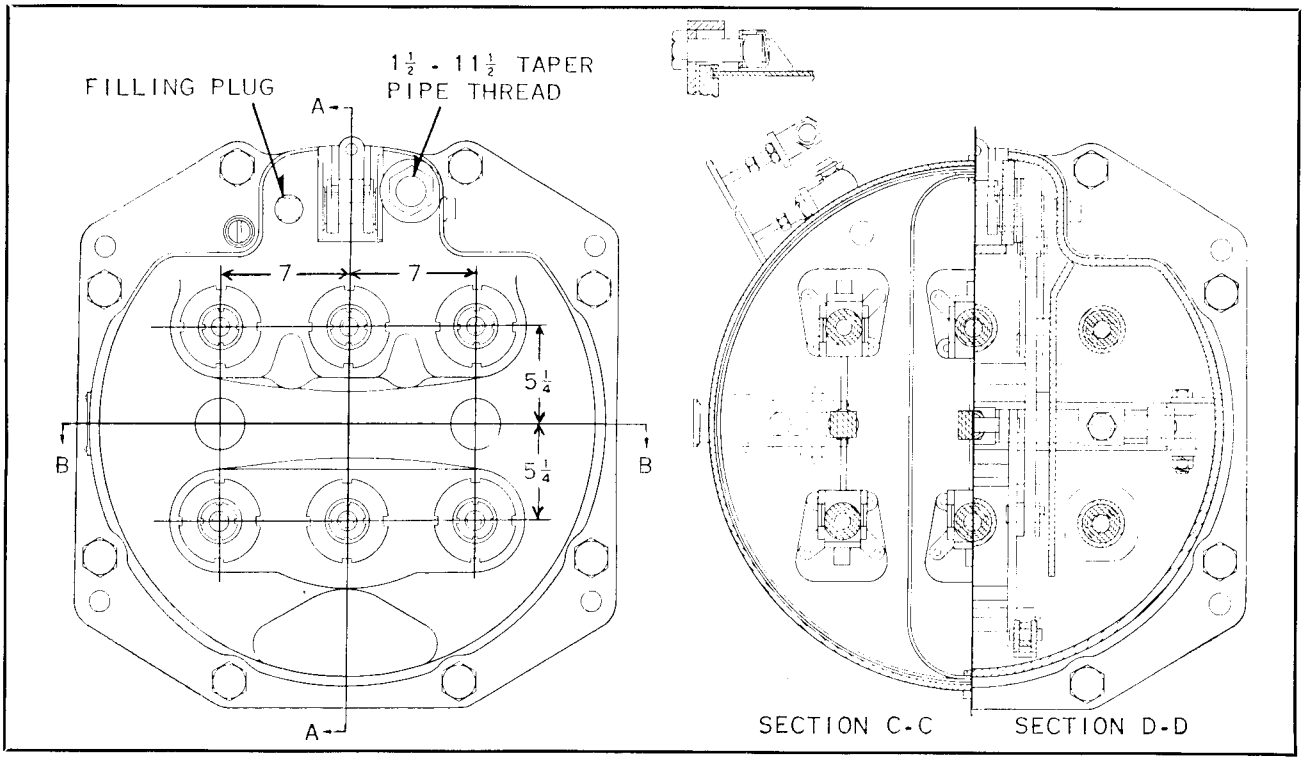


FIG. 6. Top and Sectional Views for Type B-28-B Circuit-Breakers

Caution: After adjustment has been made, be sure that the adjusting screw is securely locked in place with the lock nut.

When fitting new stationary contact fingers the adjustment should be so made that the distance between the fingers is 5/16 inch. See Fig. 5. These fingers should also be adjusted symmetrically with respect to the slot in the grids.

Adjustment of the 1,200 and 2,000-ampere arcing contacts is the same as the 600-ampere contacts.

The main contacts of the 1,200 and 2,000-ampere capacity breaker shown in Figs. 9-10 may be adjusted by turning the moving contact supporting bracket up or down on the lift rod, using a half turn or full turn as required. When properly set it should be possible to insert a ".0015 feeler under the heel of the brush after closing the breaker by hand. When closed electrically it will be found in practically all cases that the heel will be tight.

Caution: Before closing the breaker electrically make sure that a clearance of ".005 minimum, ".007 maximum is maintained between the stops in the breaker top which control the overtravel of the moving contacts.

These contacts make silver-to-silver contact and it is unnecessary to use an abrasive to keep them bright.

The moving arcing contacts which engage with the contact fingers are tipped with a special arc resisting tungsten alloy to insure long life.

"De-ion Grid" Stacks. It is important that the arrangement of the plates in the "De-ion Grids" be correct. Should it be necessary to renew parts of the stacks, it is recommended that they be returned to the factory for repair or complete new assembled stacks supplied.

In assembling new stacks on the breaker, care should be taken to see that the contact is free and does not rub on the sides of the stack when opening or closing the breaker.

Connections to Operating Mechanisms. When the breaker unit and its operating mechanism are shipped separately, it is important that the operating rod between the two units be properly adjusted. The adjustment should be made, so that there is a full 1/16 inch clearance between the operating lever and the breaker top, when the breaker is fully closed and latched. See Fig. 2.

The adjustment should also be made so that the opening shock is absorbed on the bumpers and not on the operating mechanism.

Terminal Bushings. The surface of the bushing insulation should be smooth and well varnished. If the varnished surface is damaged or questionable, it should be smoothed off with fine sand paper and revarnished with three coats of good quality, clear, air drying Spar varnish. Each coat should be allowed to dry for 24 hours.

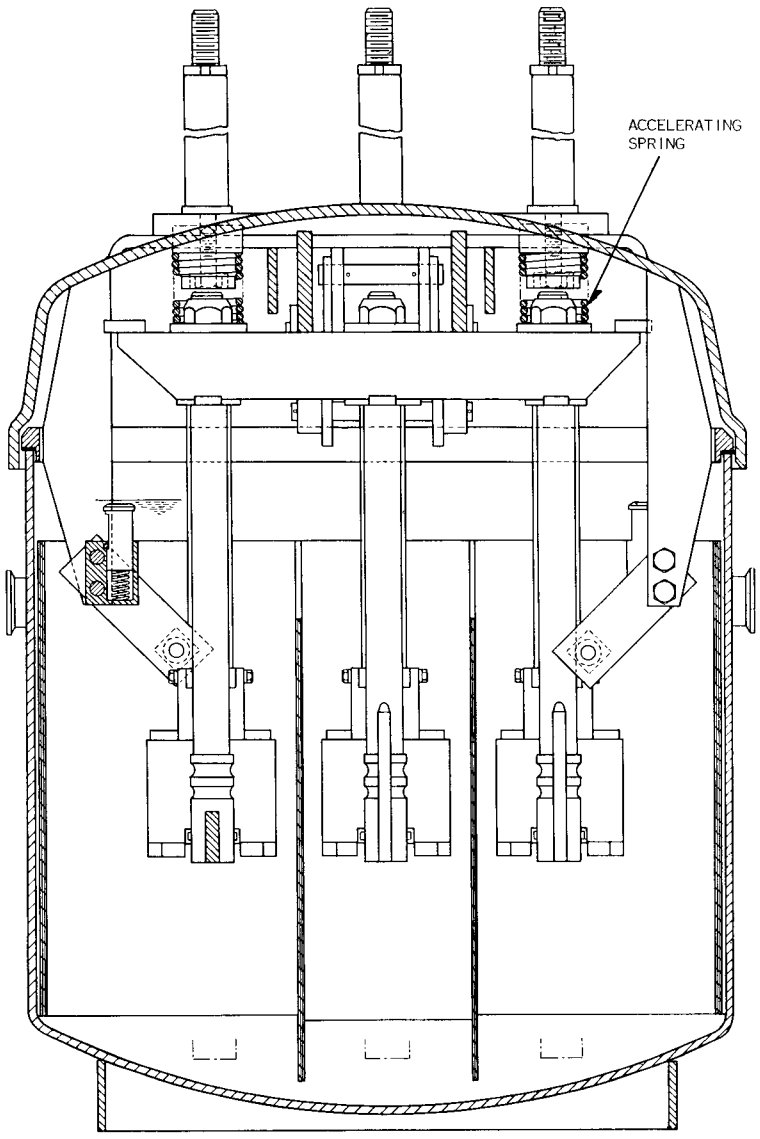


FIG. 7. Cross Sectional View of Type B-28-B Circuit-Breakers

The following instructions should be followed in taping all main connections:

For maximum safety of the equipment do not fail to complete taping before putting in service.

Wrap with half-lapped layers of .010 in. V. C. tape (W. E. Corp. No. 1266 tan treated fabric) applying as many layers as given in the table below. Apply a coat of No. 3395 insulating varnish between layers.

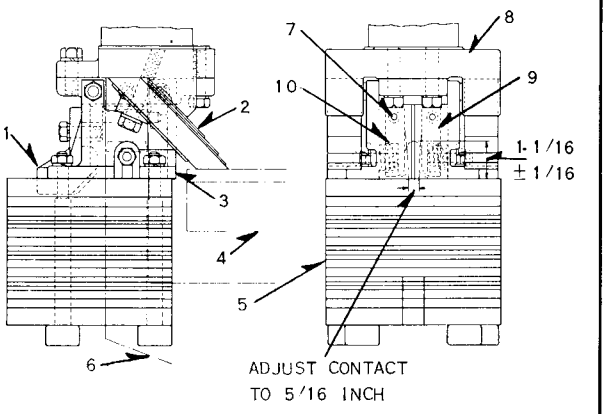
Tape over the above with one layer of .007 in. cotton tape 7560-1 and wrap the ends with cord to keep them in place. Finish with one coat of black shellac 1133-2 and one coat of black insulating enamel 7260-4.

LAYERS OF HALF-LAPPED V.C. TAPE (SEE TABLE)

FINISHED LAYER
HALF-LAPPED COTTON TAPE CORD OR SEW ENDS TAPING FOR PERMANENT FASTENING OR TAPE WITH FRICTION TAPE

SERVICE VOLTAGE	LAYERS OF V.C. TAPE	"A" CREEPAGE MIN.
750	3	1
5000	8	1½
15000	22	2

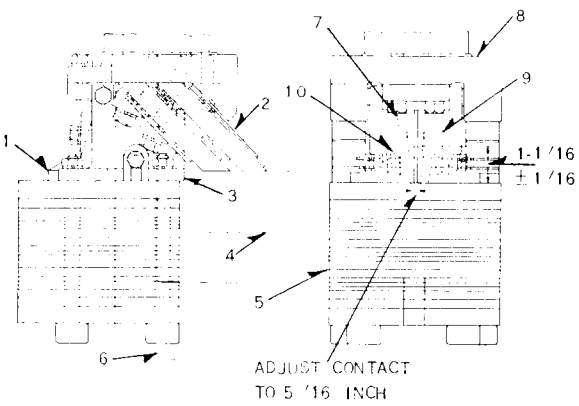
FIG. 8. Instructions for Taping Connections



LEGEND

1. STATIONARY ARCING HORN
2. STATIONARY MAIN CONTACT
3. STATIONARY CONTACT BRACKET
4. MOVING MAIN CONTACT
5. DE-ION GRID STACK
6. MOVING ARCING CONTACT, 1200 AMPERE
7. PIN
8. STUD AND BLOCK
9. STATIONARY CONTACT FINGER
10. STATIONARY CONTACT FINGER SPRING

FIG. 9. "De-ion Grid" Contact Assembly, 1,200-Ampere



LEGEND

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7. PIN
8. STUD AND BLOCK
9. STATIONARY CONTACT FINGER
10. STATIONARY CONTACT FINGER SPRING

FIG. 10. "De-ion Grid" Contact Assembly, 2,000-Ampere

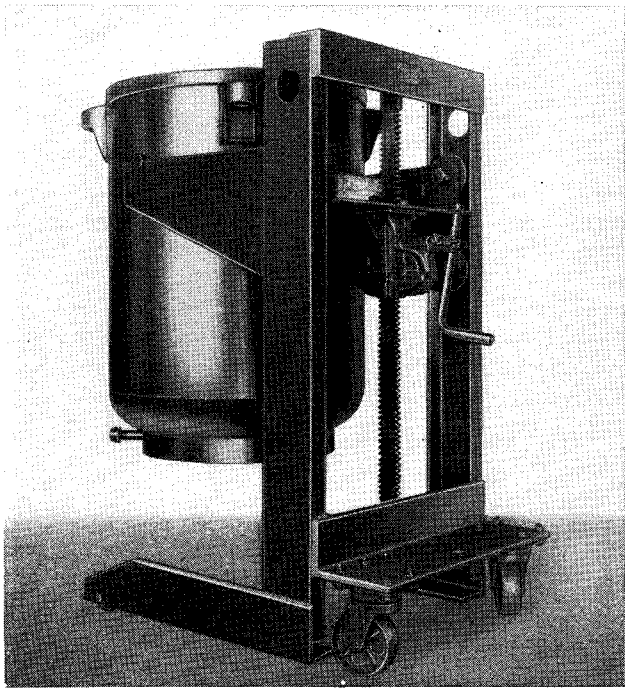

FIG. 11. Truck-Type Tank Lifter

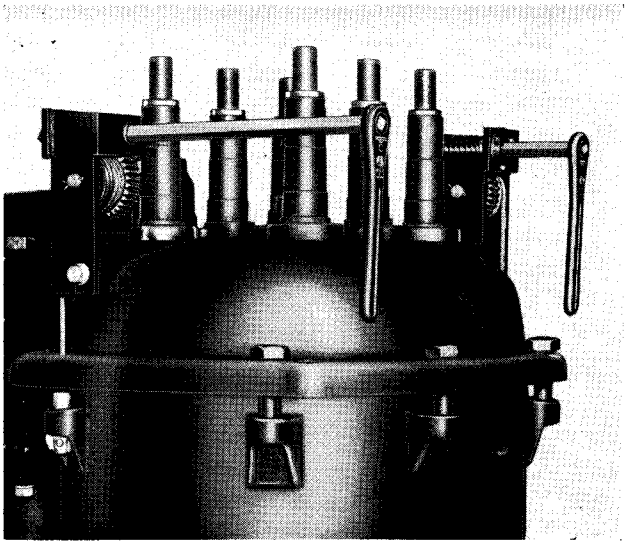

FIG. 12. Windlass Type Tank Lifter

PART TWO

MAINTENANCE

Points to be Observed in Operating.

1. Before making any adjustment to any oil circuit-breaker, make sure that all lines leading to it are electrically dead.

2. Be sure that the breaker frame is grounded.

3. Do not operate the breaker excessively by the operating mechanism when the oil tanks are removed.

4. Examine all contacts frequently especially after severe short-circuits. See that the contacts are aligned properly. Remove any slight burns with a file. Replace contacts when burns penetrate more than 1/16 inch.

5. After making any adjustments, operate the apparatus carefully by hand to make sure that it operates smoothly and correctly.

6. When testing, coat the contacts with a thin film of vaseline.

7. Inspect the oil regularly and after severe short-circuits. If it shows signs of moisture, carbonization or dirt, filter and retest it before replacing it in service. See that the oil level in the tanks is maintained at the proper height. See Fig. 2.

8. Remove all oil and thoroughly clean the tanks, tank liner, lift rod, terminal bushings, etc., at least once a year.

9. Occasionally inspect and tighten clamping nuts around the bushing on top the breaker.

10. Arrange for regular inspection to see that the apparatus is in adjustment as explained.

Insulating Oil. The care of the insulating oil in circuit breakers is of the utmost importance in their successful operation. Contamination by dirt, moisture, metallic particles, lint, etc., all reduce the dielectric strength upon which the operation and current interrupting ability largely depend. Consequently, the most careful attention should be given to keeping the oil clean, not only in filling the tanks originally but in later maintenance or other work on the breakers which might involve opening the tanks.

Only the highest grade such as Wemco C or other approved oil should be used in the breakers. The oil should be new or at least thoroughly reconditioned by means of a filter press or centrifuge. In any case, before using, it should be given a dielectric test which should show a minimum of 22,000 volts (preferably 25,000 to 30,000) measured between 1 inch diameter discs spaced .1 inch apart. Oil should be replaced if found to test below 17,000 volts at the time of any inspection or maintenance.

Before filling, the tanks should be thoroughly cleaned and flushed out with insulating oil. The same treatment should be given the inside of the top of the breaker and the operating linkage and contact system. In doing this, rags which will leave lint should not be used as this absorbs and holds moisture.

The same care should be used during inspection or maintenance work on the breaker. If the oil is to be reconditioned following operation of the breaker under short circuit, the tank, and entire inside of the breaker should be cleaned before the oil is returned to the tank. If the work merely involves lowering or removal of the tank, care should be taken to keep the tank covered until it is replaced so that dirt, dust, metallic particles, etc., cannot fall into the oil.

A little more than ordinary care in oil handling will be well repaid in the reliable and dependable operation for which the breaker is designed and built.

For instructions as to the care and testing of insulating oil, see Instruction Book 44-820-1.

Operating Mechanisms. For instructions covering the SAF-4 solenoid mechanism, see Instruction Book 33-700-4.

CORRESPONDENCE

Always give the complete nameplate reading in any correspondence regarding the apparatus. This makes it possible to refer to the files at the factory which list the assembly drawings and gives the identity of each part used in the assembly.

RENEWAL PARTS

When ordering renewal parts always specify the name of the part as given in this instruction book and give the type of the breaker and the Serial—S.O.—Style Number from the nameplate.

To avoid delays and misunderstandings:

1. Send all correspondence to the nearest Westinghouse Electric Corporation Sales Office.

2. State method of shipment desired. In absence of instructions, parts will be shipped in the most economical manner.

3. Small orders should be combined as minimum billing is $5.00.