I.B. 33-600-1

DESCRIPTION • INSTALLATION • OPERATION

INSTRUCTIONS

Types B-20-B, B-22-B1 and 138-B-250

OIL CIRCUIT BREAKERS

600 and 1200 Amperes, 13,800 Volts

WESTINGHOUSE ELECTRIC CORPORATION
SWITCHGEAR DIVISION

EAST PITTSBURGH PLANT
SUPERSEDES I.B. 5660-C

EAST PITTSBURGH, PA.
JULY, 1955
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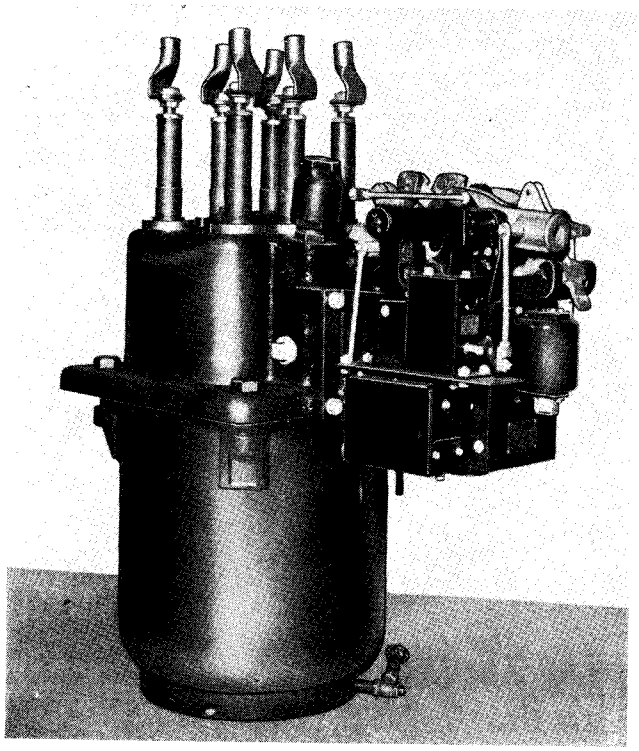


FIG. 1. Types B-20-B, and 138-B-250 Oil Circuit-Breakers, 13,800 Volts, 600 Amperes, Solenoid-Operated

GENERAL DESCRIPTION

The Types B-20-B, B-22-B and 138-B-250 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 15000-volt service in both the 600- and 1200-ampere sizes.

These breakers may be mounted in cells or trucks, on steel or pipe 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 "De-ion Grid" Contacts, Fig. 4. 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-ionized them and extinguish the arc.

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 cotton tape in accordance with Westinghouse Standards for the various operating potentials. See Fig. 7.

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

10. With the tank removed, fill it with oil to within two inches of the top, 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, Fig. 5. **Be sure to 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 top 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.

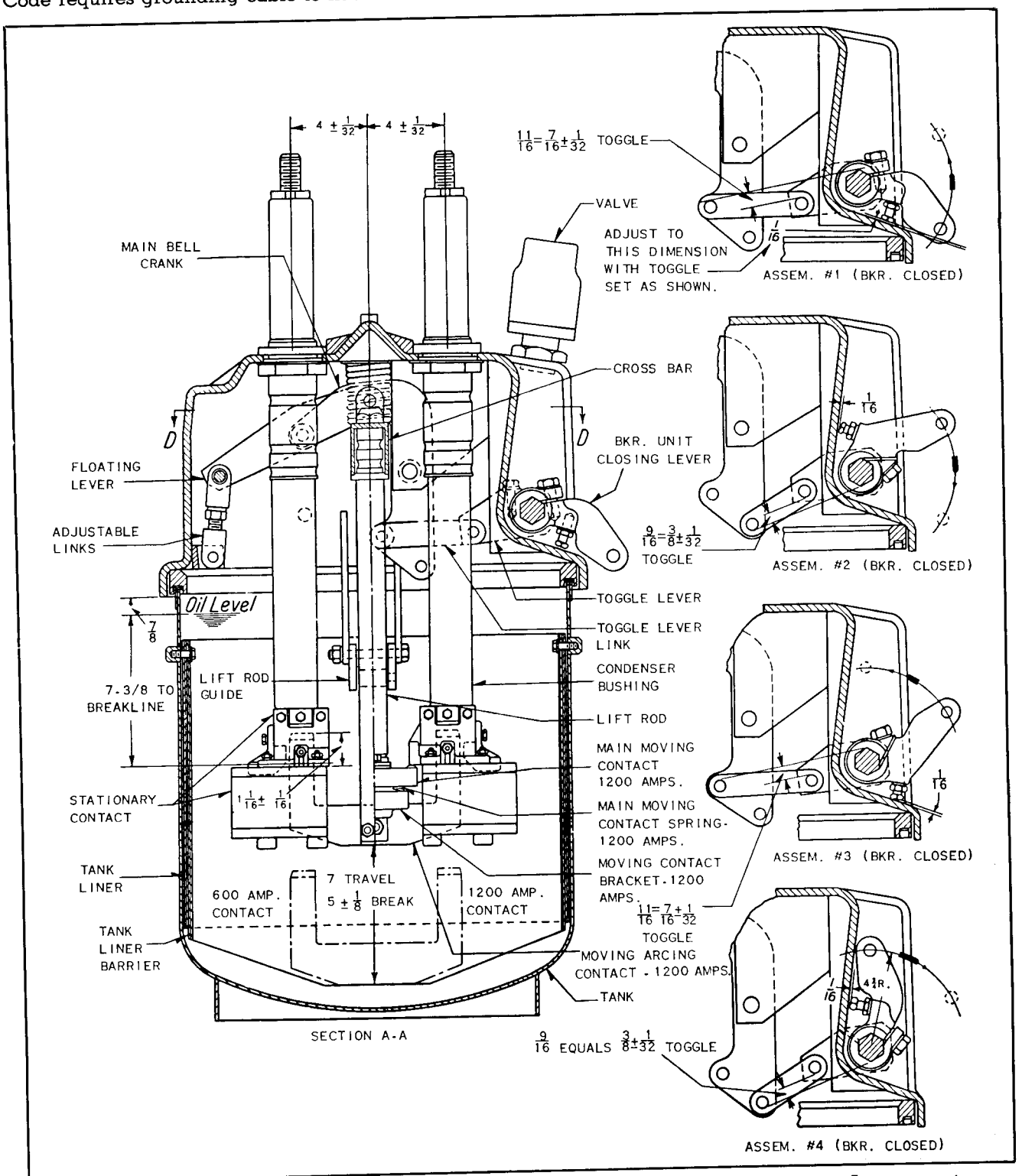


FIG. 2. Cross Section of Types B-20-B and 138-B-250 Oil Circuit-Breakers Showing Various Arrangements of Toggle Lever and Link Assembly

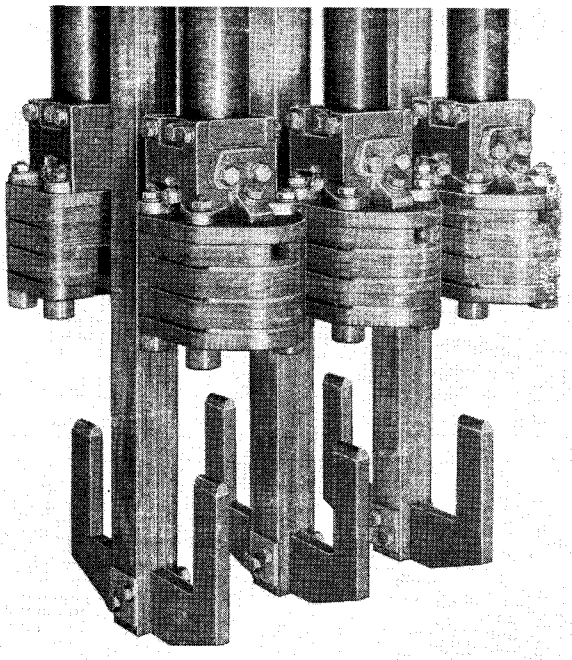


FIG. 3. Type B-22-B 600-Ampere, 13,800 Volt Breaker Contact Assembly with "De-ion Grids"

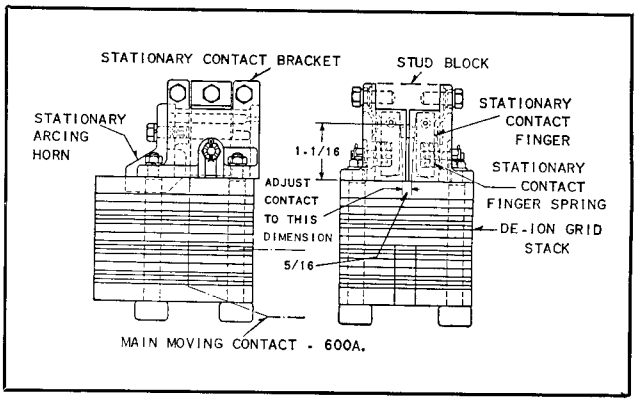


FIG. 4. De-ion Grid Assembly

ADJUSTMENTS

Breaker Mechanism. The toggle mechanism is designed for reversible operation, so that the direction of operation can be changed by a simple change in the location of the toggle pin which is located in the toggle lever. No adjustment is required on the toggle setting as this is set at the factory. This setting is such that with the breaker in the closed position there is a clearance of 1/16 inch between the operating lever set screw and the breaker top. The toggle is set 3/8 inch off center. See Fig. 2.

Changing the Direction of Operation. To change the direction of operation, use a shorter link and interchange toggle pin with the holes in the toggle lever.

Caution: Do not interchange links, levers or cross bars between breakers of different amperes-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 Fig. 4. 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

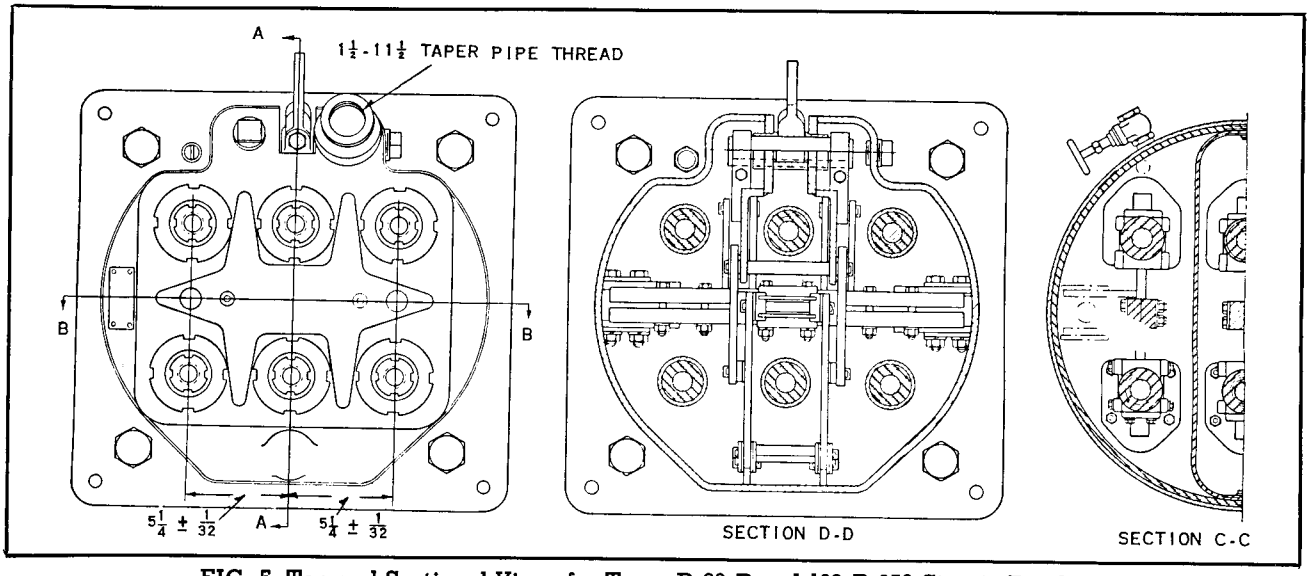


FIG. 5. Top and Sectional Views for Types B-20-B and 138-B-250 Circuit-Breakers

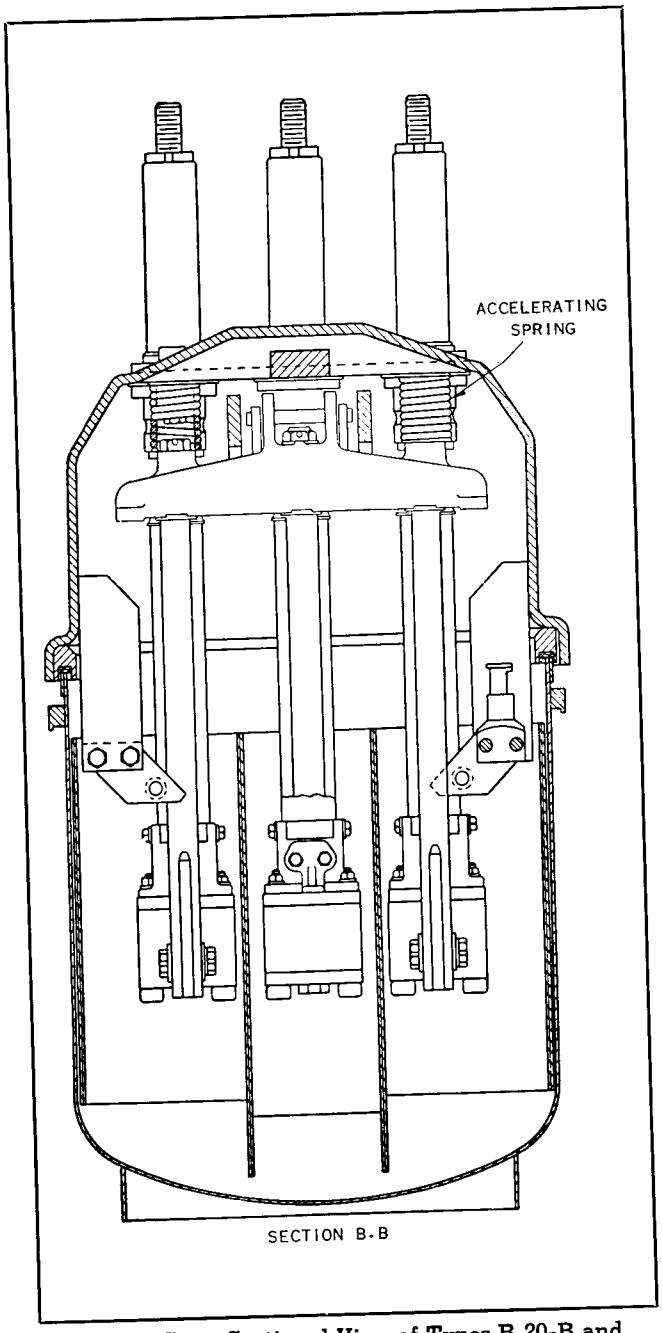


FIG. 6. Cross Sectional View of Types B-20-B and 138-B-250 Circuit-Breakers

raised up. This is accomplished by making the links shorter. To decrease the amount of contact, the links should be made longer. 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 inches ± 1/16 inch, with the breaker closed. This dimension is only for new parts. Some allowance must of course be made when contacts burn.

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. 4. These fingers should also be adjusted symmetrically with respect to the slot in the grids.

The main contacts of the 1200-ampere capacity breaker (Figure 2) are adjustable by turning the bracket up or down on the lift rod. With the breaker in the closed position the distance between the contact cross bar and cross bar bracket should be 1/8 to 5/32 inch. It is important that this dimension be maintained.

These contacts make silver-to-silver contact and it is unnecessary to use an abrasive to keep them bright. In fitting new contacts it is not necessary that perfect line contact be obtained. With the soft material (silver) good contact is obtained after a few operations. If it is necessary to renew the silves surfaces, return the parts to the factory as the blockr of silver are put on with special solder.

The moving contacts are tipped with a special arc-resisting tungsten alloy to insure long life. This can only be replaced at the factory.

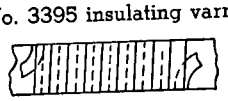
"De-ion Grid" Stacks. It is important that the arrangement of the plates in the "De-ion Grids" be correct. Should it be necessary to renew parts of the stacks, it is recommended that they be returned to the factory for repair or complete new assembled stacks supplied.

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.



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

FIG. 7. Instructions for Taping Connections

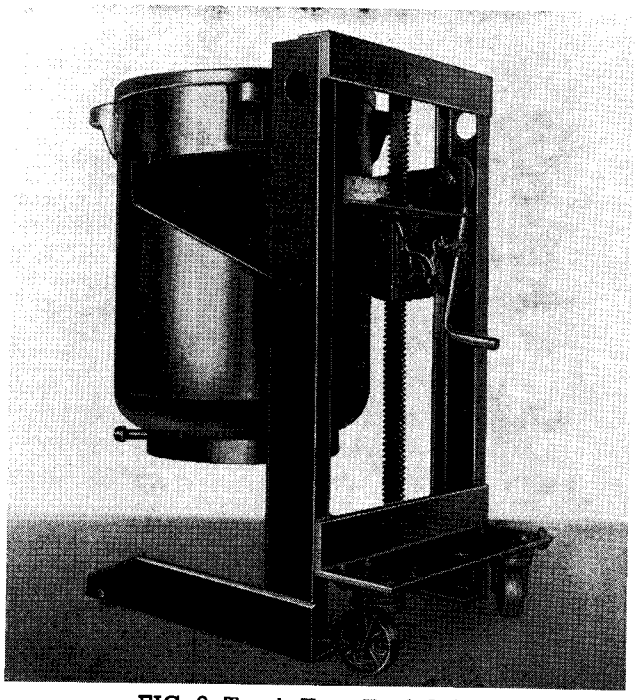


FIG. 8. Truck-Type Tank Lifter

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 block 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.

OPERATION

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.

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. Dielectric tests of the oil should be made every three months, to show if it is reasonably good for circuit-breaker work. Samples should not be taken until the oil has remained undisturbed for at least four hours. In testing for indication of water, take the sample from the bottom through the tank drain. If for indication of carbon, and after a heavy short-circuit, take the sample from the surface

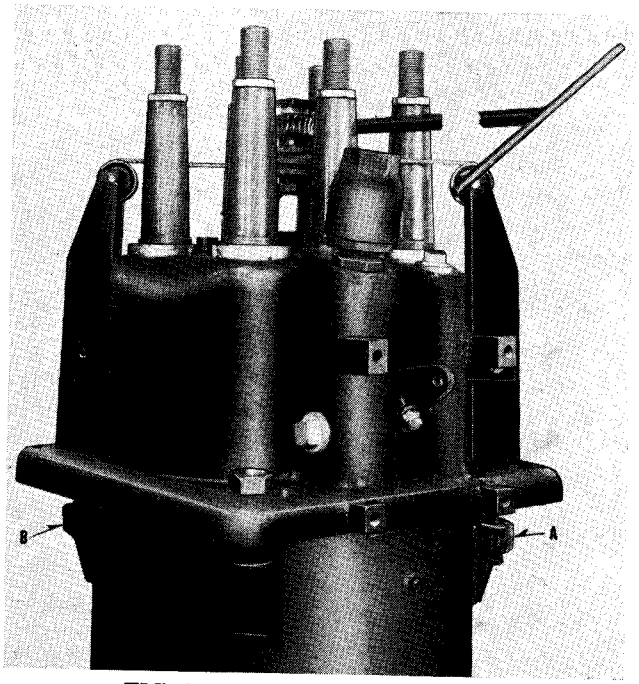


FIG. 9. Windlass Type Tank Lifter

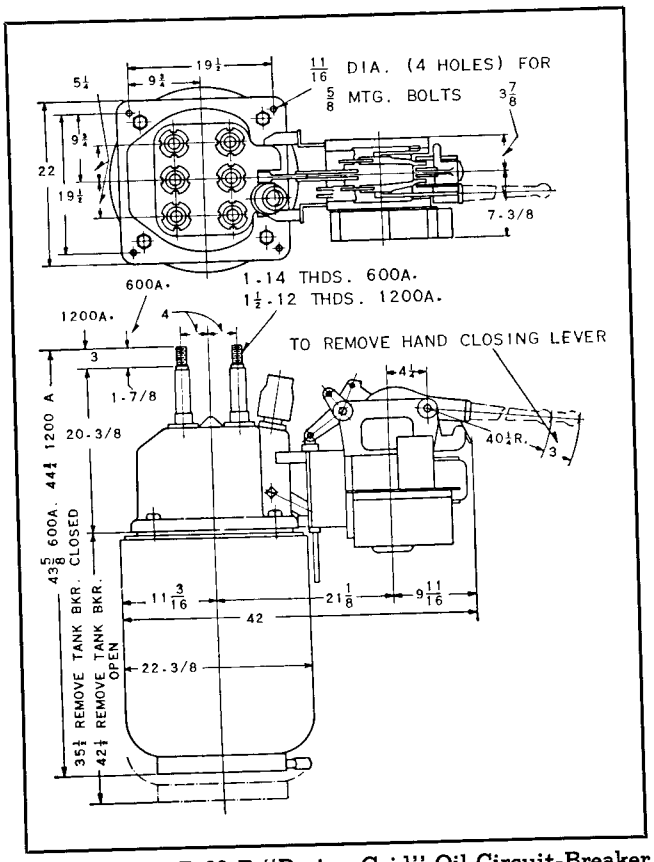


Fig. 10. Type B-22-B "De-ion Grid" Oil Circuit-Breaker

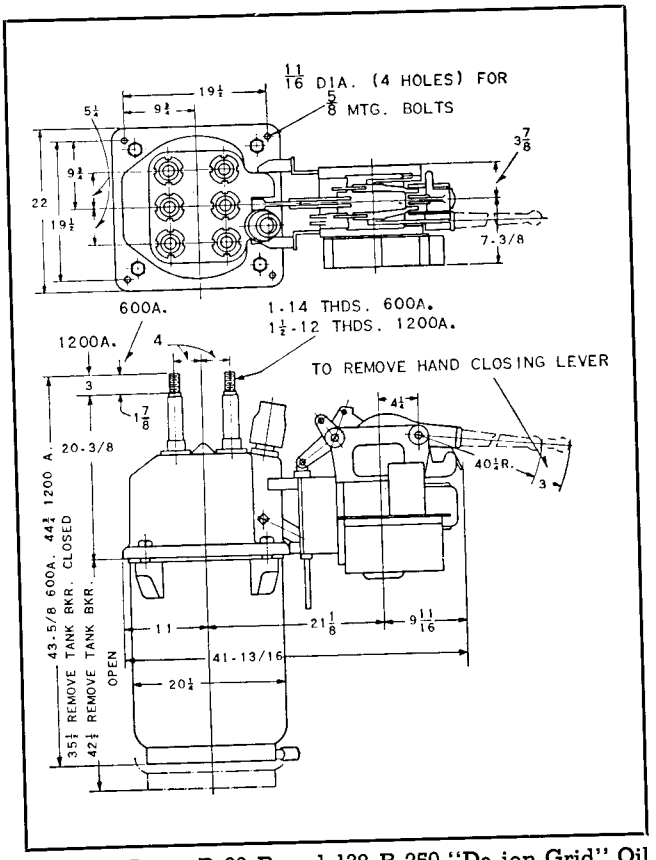


FIG. 11. Types B-20-B and 138-B-250 "De-ion Grid" Oil Circuit-Breakers

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

Operating Mechanisms. For instructions covering the Type SA-3 Solenoid Mechanism, see Instruction Book 33-600-2.

WINDLASS TYPE TANK LIFTER—Fig. 9

To operate the windlass type tank lifter it must be first bolted in place as shown. Tank bolts A and B must be removed, and the cable inserted through the pulley supports, the supports should be then placed in the tank bolt holes, taking care to assemble support with clip in hole A. The swivel ends should be then screwed into the lugs on the tank and all slack in the cable taken up, using care to not unduly strain the cable. The two remaining tank bolts can be then removed and the tank lowered. The worm and worm wheel construction will permit the tank to hang in all positions without blocking. The lifter may be operated from the front or rear of the breaker.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I.B. 33-600-1

DESCRIPTION • INSTALLATION • OPERATION

INSTRUCTIONS

Types B-20-B, B-22-B1 and 138-B-250

OIL CIRCUIT BREAKERS

600 and 1200 Amperes, 13,800 Volts

WESTINGHOUSE ELECTRIC CORPORATION
SWITCHGEAR DIVISION

EAST PITTSBURGH PLANT
SUPERSEDES I.B. 5660-C

EAST PITTSBURGH, PA.
JULY, 1955
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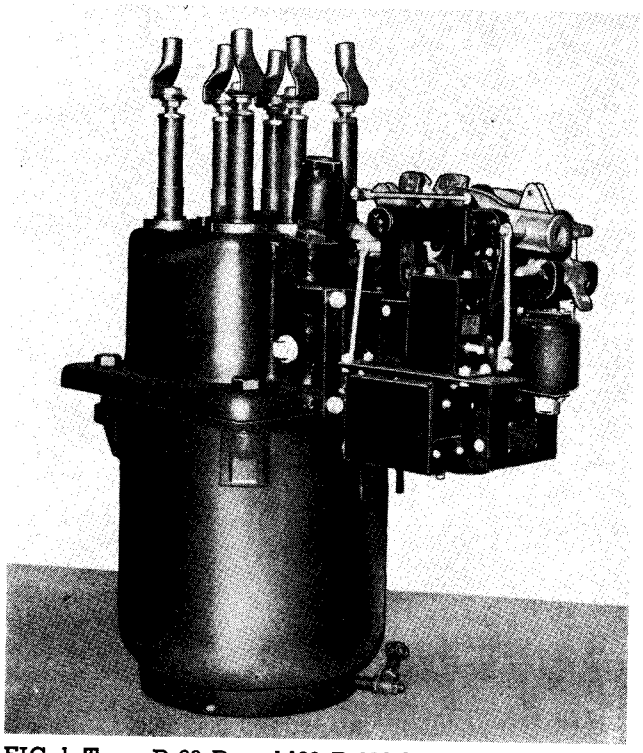

FIG. 1. Types B-20-B, and 138-B-250 Oil Circuit-Breakers, 13,800 Volts, 600 Amperes, Solenoid-Operated

GENERAL DESCRIPTION

The Types B-20-B, B-22-B and 138-B-250 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 15000-volt service in both the 600- and 1200-ampere sizes.

These breakers may be mounted in cells or trucks, on steel or pipe 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 "De-ion Grid" Contacts, Fig. 4. 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-ionized them and extinguish the arc.

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 cotton tape in accordance with Westinghouse Standards for the various operating potentials. See Fig. 7.

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

10. With the tank removed, fill it with oil to within two inches of the top, 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, Fig. 5. **Be sure to 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 top 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.

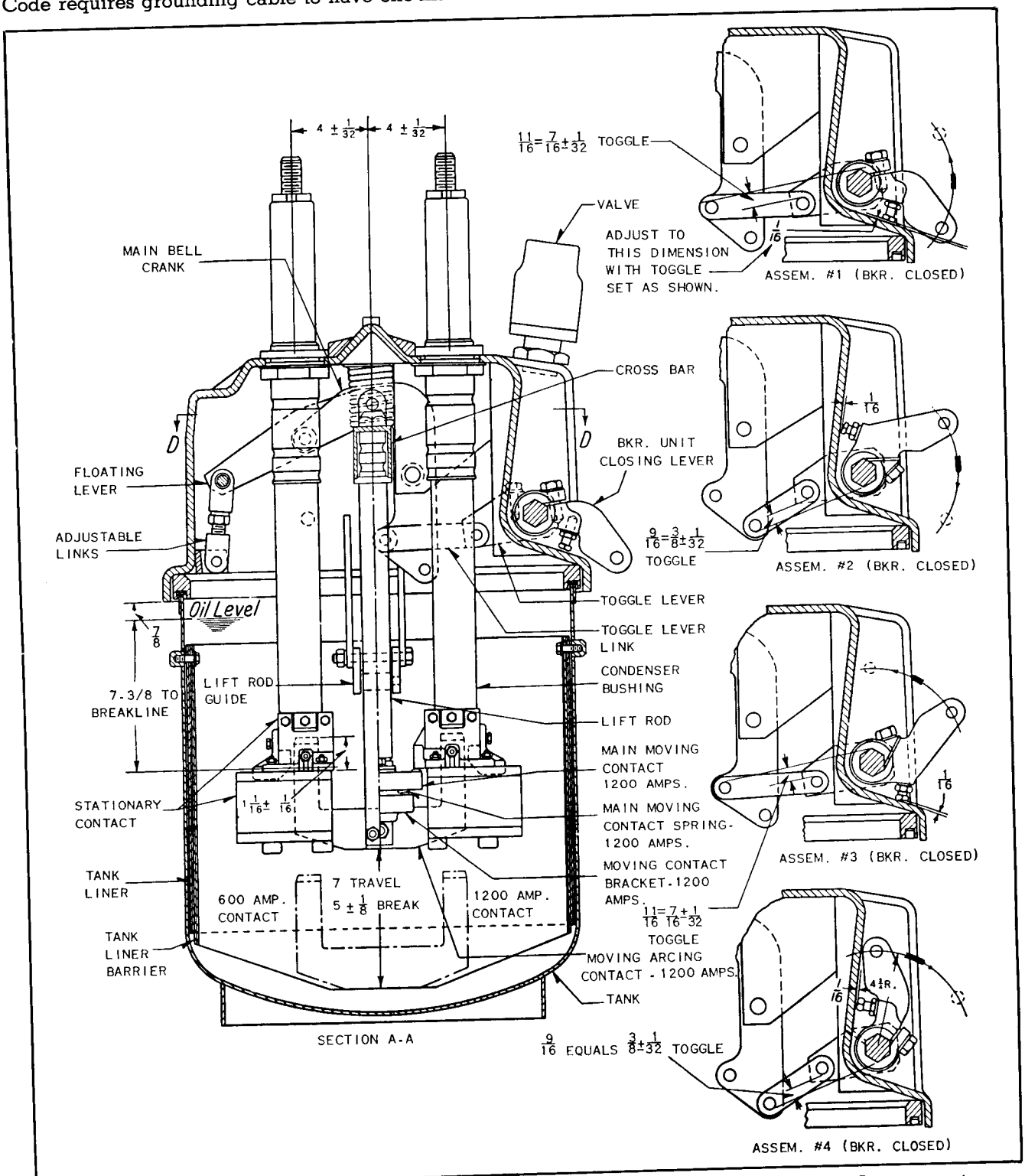

FIG. 2. Cross Section of Types B-20-B and 138-B-250 Oil Circuit-Breakers Showing Various Arrangements of Toggle Lever and Link Assembly

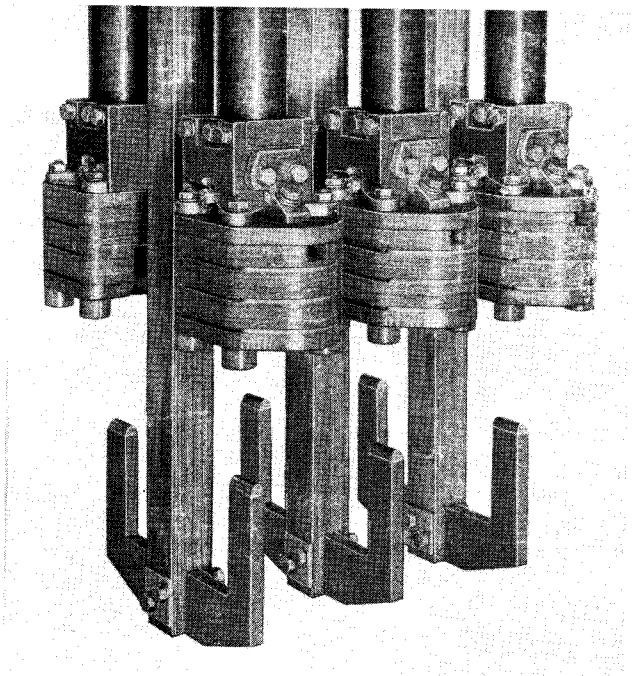

FIG. 3. Type B-22-B 600-Ampere, 13,800 Volt Breaker Contact Assembly with "De-ion Grids"

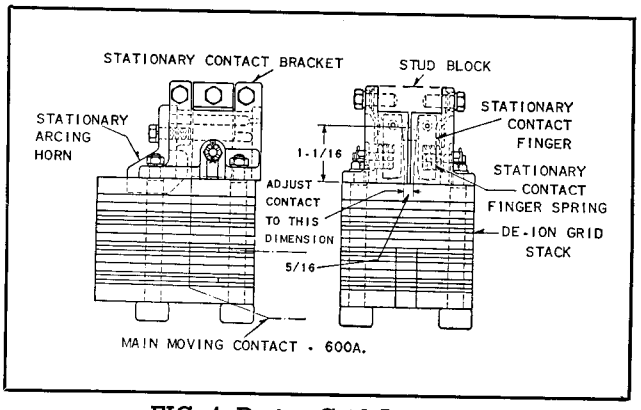

FIG. 4. De-ion Grid Assembly

ADJUSTMENTS

Breaker Mechanism. The toggle mechanism is designed for reversible operation, so that the direction of operation can be changed by a simple change in the location of the toggle pin which is located in the toggle lever. No adjustment is required on the toggle setting as this is set at the factory. This setting is such that with the breaker in the closed position there is a clearance of 1/16 inch between the operating lever set screw and the breaker top. The toggle is set 3/8 inch off center. See Fig. 2.

Changing the Direction of Operation. To change the direction of operation, use a shorter link and interchange toggle pin with the holes in the toggle lever.

Caution: Do not interchange links, levers or cross bars between breakers of different amperes-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 Fig. 4. 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

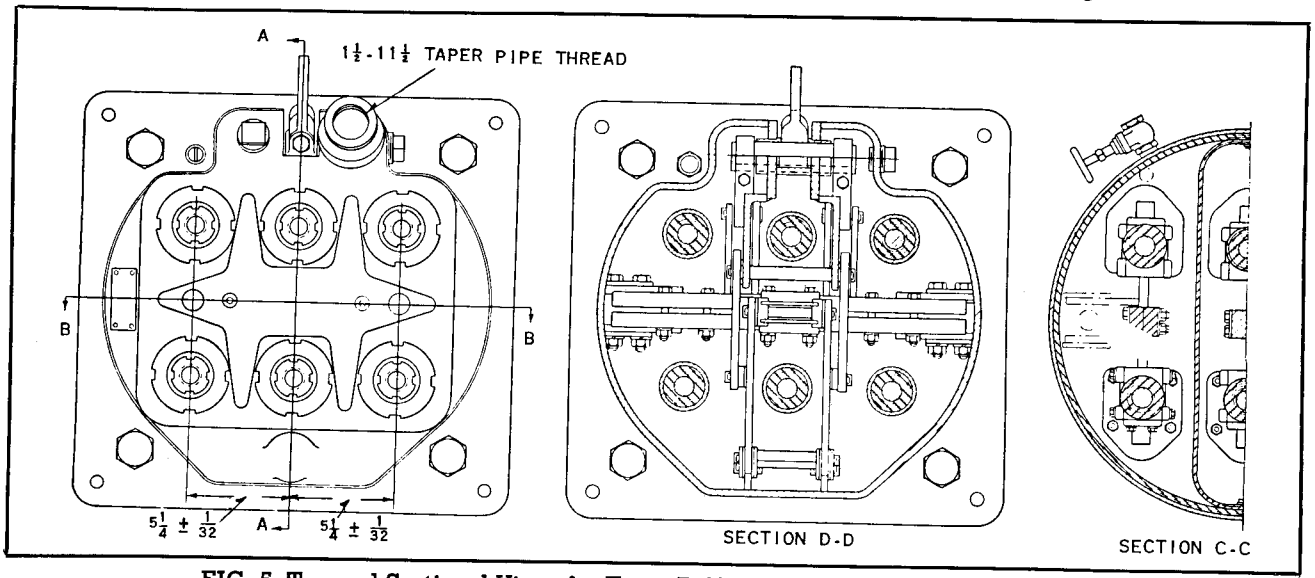

FIG. 5. Top and Sectional Views for Types B-20-B and 138-B-250 Circuit-Breakers

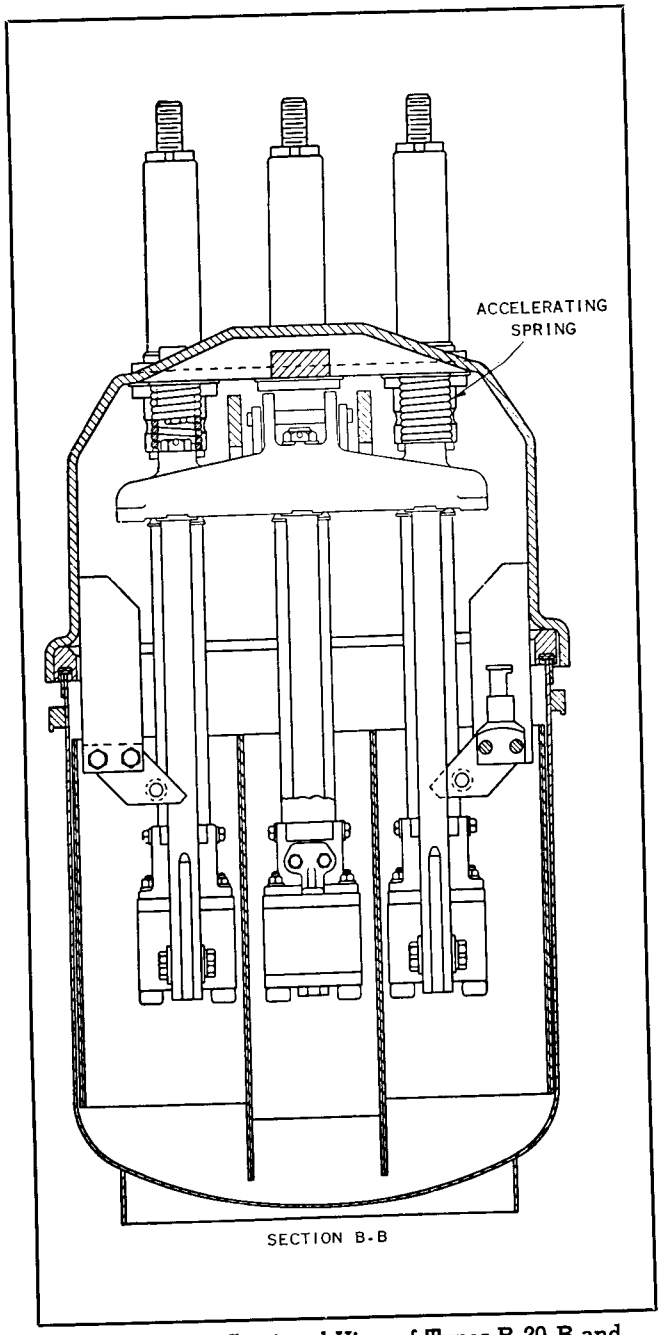

FIG. 6. Cross Sectional View of Types B-20-B and 138-B-250 Circuit-Breakers

raised up. This is accomplished by making the links shorter. To decrease the amount of contact, the links should be made longer. 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 inches ± 1/16 inch, with the breaker closed. This dimension is only for new parts. Some allowance must of course be made when contacts burn.

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. 4. These fingers should also be adjusted symmetrically with respect to the slot in the grids.

The main contacts of the 1200-ampere capacity breaker (Figure 2) are adjustable by turning the bracket up or down on the lift rod. With the breaker in the closed position the distance between the contact cross bar and cross bar bracket should be 1/8 to 5/32 inch. It is important that this dimension be maintained.

These contacts make silver-to-silver contact and it is unnecessary to use an abrasive to keep them bright. In fitting new contacts it is not necessary that perfect line contact be obtained. With the soft material (silver) good contact is obtained after a few operations. If it is necessary to renew the silves surfaces, return the parts to the factory as the blockr of silver are put on with special solder.

The moving contacts are tipped with a special arc-resisting tungsten alloy to insure long life. This can only be replaced at the factory.

"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.

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. 7. Instructions for Taping Connections

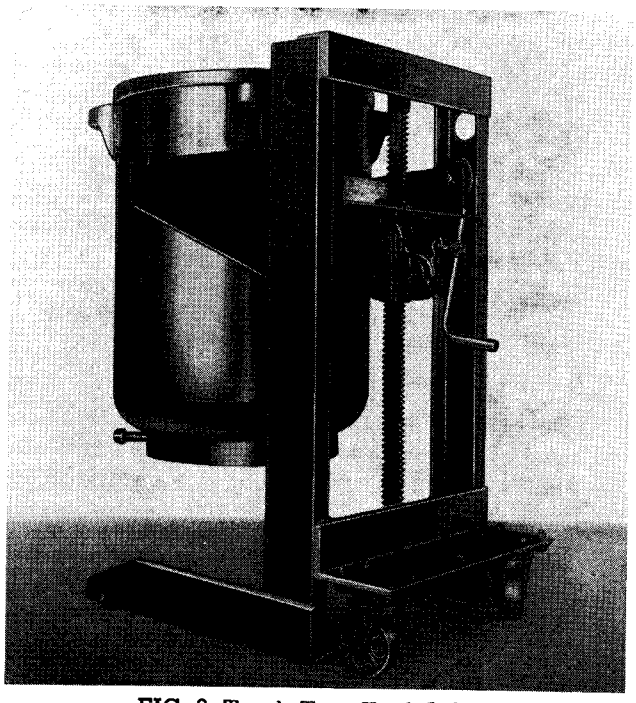

FIG. 8. Truck-Type Tank Lifter

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 block 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.

OPERATION

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.

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. Dielectric tests of the oil should be made every three months, to show if it is reasonably good for circuit-breaker work. Samples should not be taken until the oil has remained undisturbed for at least four hours. In testing for indication of water, take the sample from the bottom through the tank drain. If for indication of carbon, and after a heavy short-circuit, take the sample from the surface

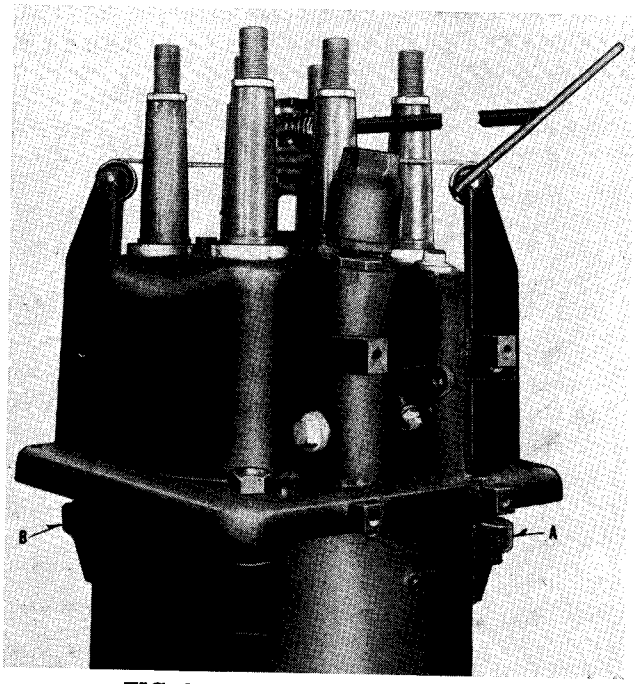

FIG. 9. Windlass Type Tank Lifter

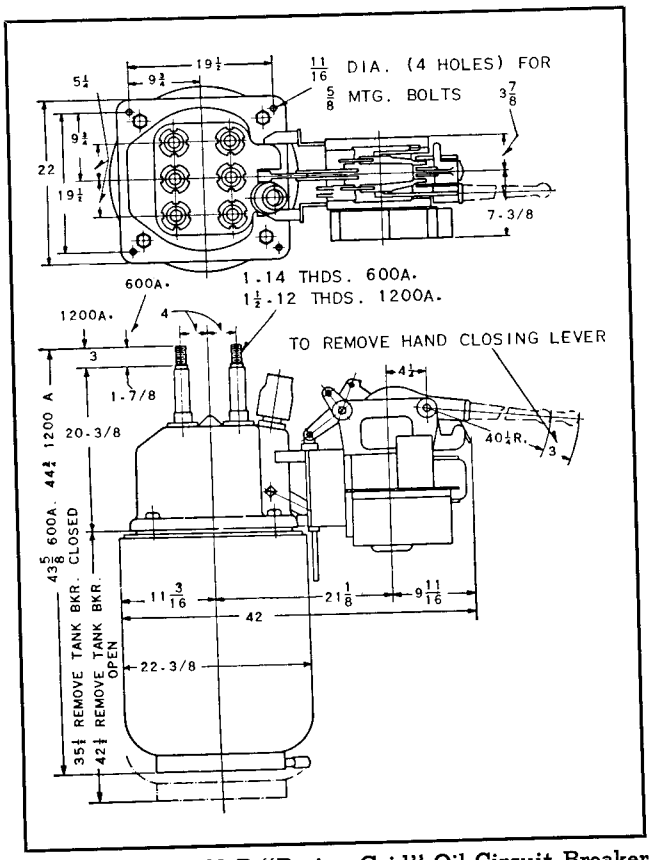

Fig. 10. Type B-22-B "De-ion Grid" Oil Circuit-Breaker

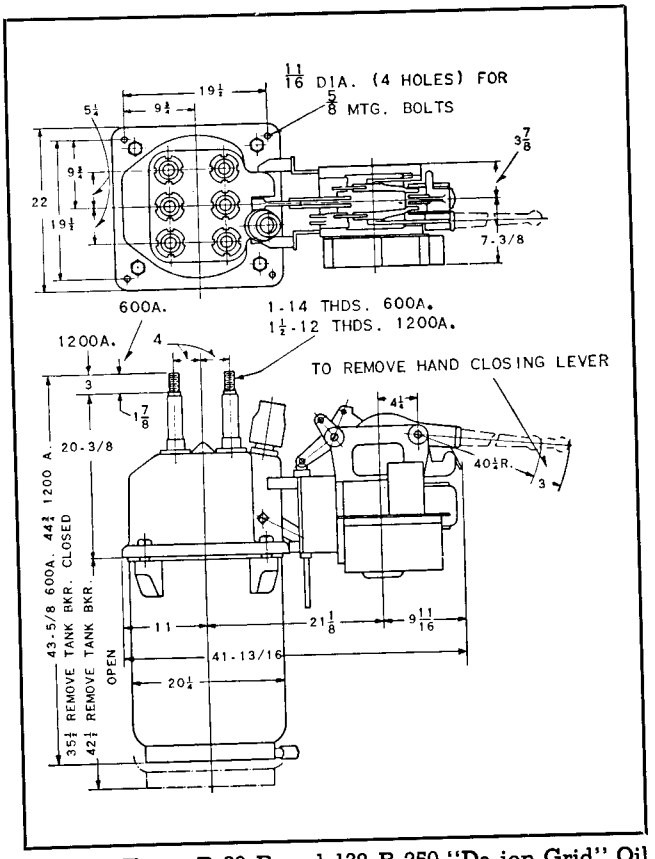

FIG. 11. Types B-20-B and 138-B-250 "De-ion Grid" Oil Circuit-Breakers

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

Operating Mechanisms. For instructions covering the Type SA-3 Solenoid Mechanism, see Instruction Book 33-600-2.

WINDLASS TYPE TANK LIFTER—Fig. 9

To operate the windlass type tank lifter it must be first bolted in place as shown. Tank bolts A and B must be removed, and the cable inserted through the pulley supports, the supports should be then placed in the tank bolt holes, taking care to assemble support with clip in hole A. The swivel ends should be then screwed into the lugs on the tank and all slack in the cable taken up, using care to not unduly strain the cable. The two remaining tank bolts can be then removed and the tank lowered. The worm and worm wheel construction will permit the tank to hang in all positions without blocking. The lifter may be operated from the front or rear of the breaker.


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