Westinghouse

Type FO-22 Oil Circuit-Breakers

INSTALLATION AND MAINTENANCE

INSTRUCTION BOOK

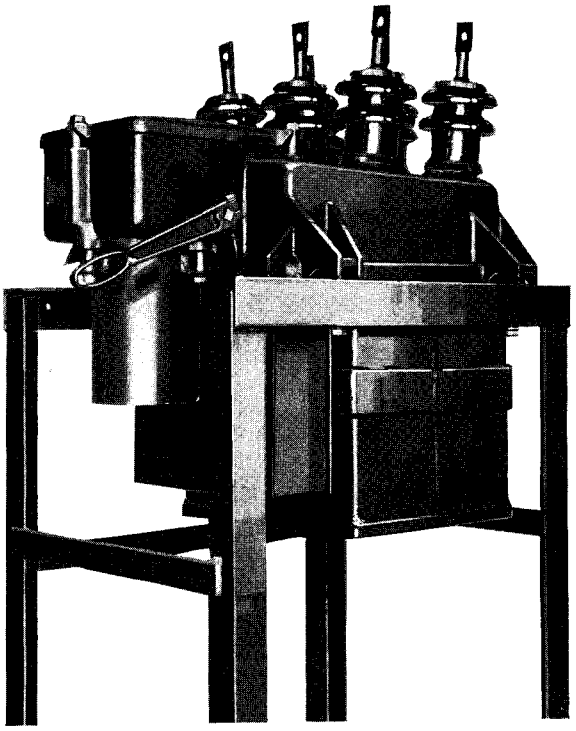

FIG. 1—TYPE FO-22 OIL CIRCUIT-BREAKER COMPLETE (FRAME MOUNTED)

Westinghouse Electric & Manufacturing Company

East Pittsburgh Works East Pittsburgh, Pa.

I. B. 5540

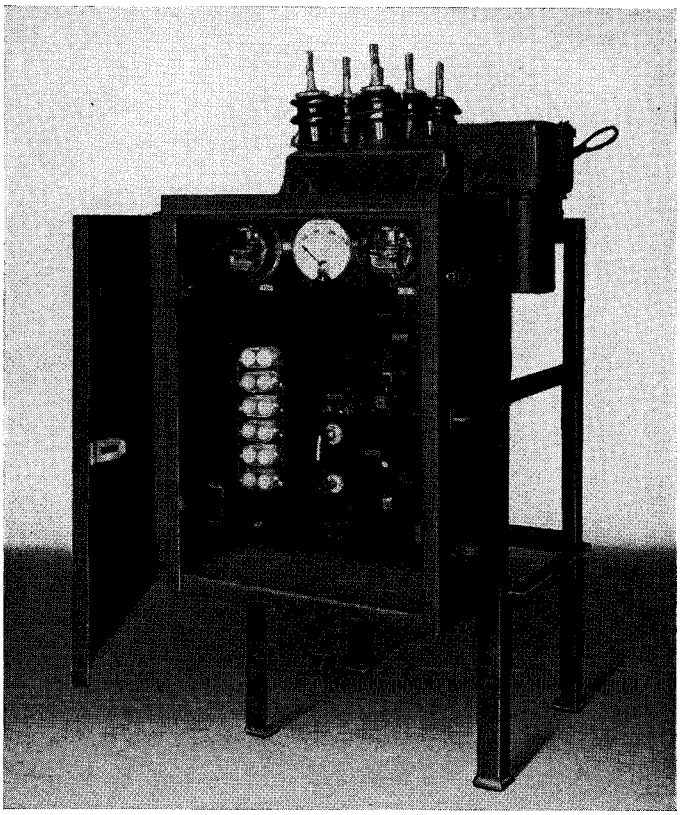

FIG. 2—CONTROL HOUSING AND EQUIPMENT FOR A-C. OPERATION (MOUNTED ON BREAKER FRAME)

Westinghouse
Type FO-22 Oil Circuit-Breakers

GENERAL INFORMATION

The safety of the attendant, and of the station and line equipment, depends largely upon the successful operation of the oil breaker. An understanding of the installation, involving its maintenance, is at all times essential.

Checking

Upon receipt of the breakers, all boxes, barrels, packages and loose pieces should be checked with the shipping list to make certain that all parts have been received.

Claims

If, either before or after unpacking the breaker any shortage or breakage is discovered, claim should be made to the carrier immediately, as it will be difficult to get any adjustment if the claim is delayed. The Westinghouse Company will assist in any way possible.

Handling

It is necessary to give proper consideration to the manner of handling, lifting, and moving the breaker and its parts. Considerable damage may result to the breaker and its operation be impaired, by improper handling. Do not attempt to lift the breaker or its mechanism by the levers or studs nor move the attachments around by catching hold of the coil leads. In handling the breaker, operating mechanism, or attachments, always take hold of the frame, which is rugged and is built to withstand handling. Do not allow crane slings to strike the bushing as any strain on these may cause them to crack or break. Do not lash the breaker down to a truck or car by the terminals when transporting it.

The breaker should not be removed from the frame skids, the boxing taken from the insulators or the tie wires removed from the mechanism until after it has reached its permanent location.

Storage

When an oil circuit-breaker can be set-up immediately in its permanent location, it is advisable to do so, even though it will not be placed in service for some time.

In event the breakers are not to be installed immediately, but are to be placed in storage awaiting installation, it is recommended that they be stored in the original shipping packages and containers. This serves to protect the breakers from dust, dirt and breakage. Do not store the breakers in the immediate vicinity of construction work, as material might be piled on the breakers that would endanger the porcelains and other parts.

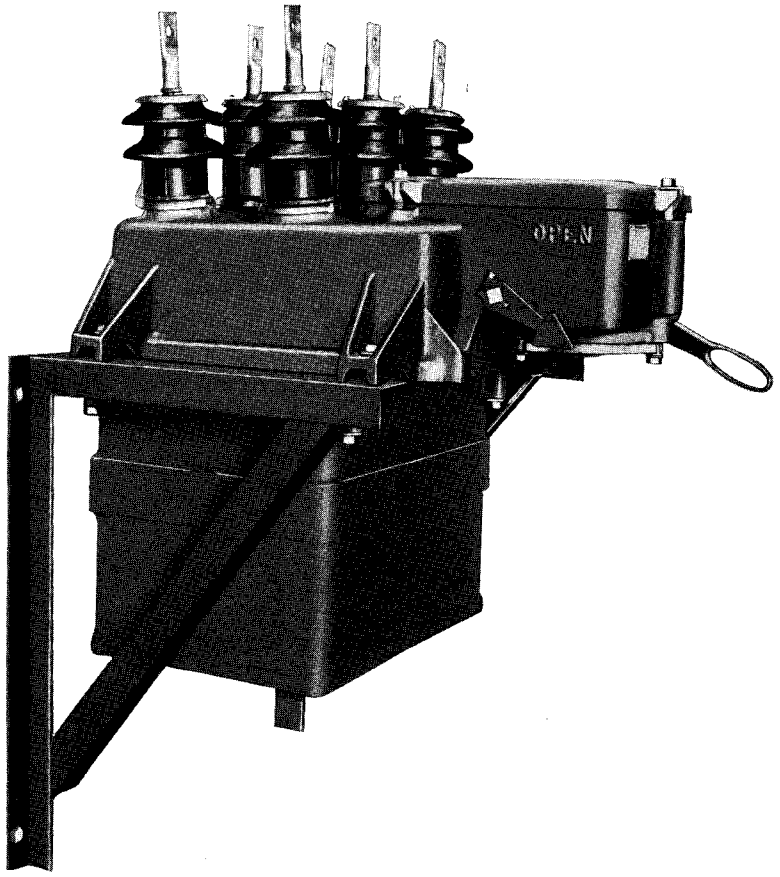

FIG. 3—TYPE FO-22 OIL CIRCUIT-BREAKER (WALL MOUNTING)

If the breakers are to be stored for any length of time, the machined surfaces of the manual and solenoid operating mechanisms should be slushed and inspected periodically to make sure that rusting has not started.

Unpacking

It is essential that care be used in unpacking the breaker, otherwise porcelains may be fractured or contact surfaces disturbed or injured, which would result in unnecessary repair expense before installation is made. After the boxing has been removed from the breaker, all excelsior packing, paper and other foreign matter should be removed from off and about the breaker parts. Remove the mechanism covers and check to see that all packing blocks and tie wires are removed from the mechanism. Examine the mechanism parts for breakage, distortion, sticky or gummy bearings, or anything else that might cause improper operation. If any of the parts have been lost or damaged, they should be replaced or repaired before placing the breaker in service. The tank lining should be examined for signs of mechanical injury, or damage by moisture. Be certain there is no foreign matter in the tank that might float or dissolve in the

oil. The operating mechanism, especially, should be gone over to remove all particles of dirt from the cores and auxiliaries, and to see that they are in proper operating condition. Excelsior or dirt around or between the cores of overload, undervoltage, or direct-trip mechanisms will render them in-operative. Special care should be taken to see that all such dirt is removed.

Inspect all insulated wires to see that the insulation has not been damaged during shipment or installation.

Tanks or covers should not be lowered in wet weather without provision for keeping rain out of them and off the internal parts of the breaker.

INSTALLATION

Mounting

The breaker should be located so that it will be readily accessible for cleaning and inspection. Sufficient space must be provided for the easy removal of the covers and tanks, and for the operation of the hand closing lever. The breaker foundation should be sufficiently high so that flood conditions will not cause water to enter any control housing that may be mounted on the supporting frame.

The foundation should be level so that all feet of the breaker frame rest solidly.

The four foundation bolts should be left loose to permit the frame to be properly plumbed and leveled by inserting shims under the feet where necessary. After this has been done, the foundation bolts should be tightened and the frame thus securely fastened to its foundation.

If the supporting frame for the breaker unit is to be fabricated in the field, the horizontal members supporting the breaker unit must be either 1¼" pipe, or 2, 2½ or 3" angle, depending upon the span. The tank lifter is designed for use with the above structural steel members only, and cannot be used with other sections.

A standard ½" washer (1⅜" O.D.) must be placed under the heads of the breaker unit mounting bolts. The washer prevents the breaker unit from slipping sidewise on the horizontal supports by wedging in the supporting lug vee.

Conduit Connections

Run the control wires separately and remote from the high voltage or power leads. Do not place the control wires in the same duct or even run parallel to the high tension leads unless the distance between the two is sufficient to prevent any communication between them as a result of short circuits etc.

Install the control wiring so that trouble to any one breaker cannot possibly be communicated to the control wiring of any other breaker.

Conduits should be run to the mechanism, and to the control housing and coil housing, if supplied, and the external circuit connected to the proper points, as indicated in the diagram supplied. These breakers have one 1⅜" hole for 1" conduit in the bottom of the top casting. In making the conduit connections to the control and coil housings, be sure that the connections are so arranged that the tank can be removed without interference.

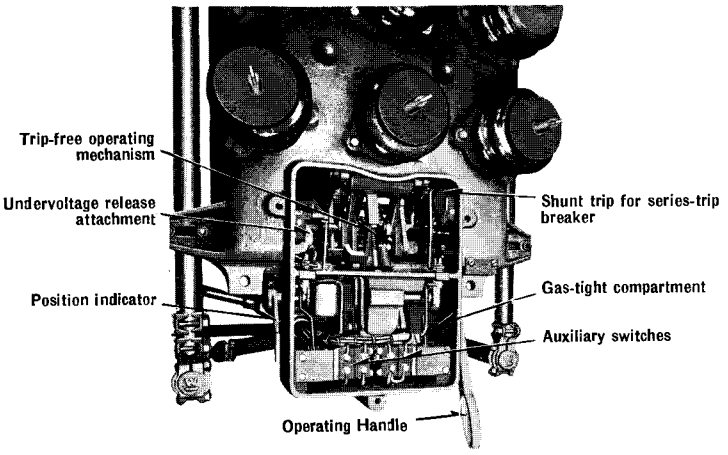

FIG. 4—TYPE FO-22 OIL CIRCUIT-BREAKER, TOP VIEW SHOWING HOUSING, WITH COVER REMOVED, WHICH CONTAINS ATTACHMENTS AS DESIGNATED

Control Leads to Electric Operating Mechanism

In connecting the electric operating mechanism to the power, it should be borne in mind that the operating mechanism is designed to operate on a given voltage at the mechanism. When the mechanism is located a considerable distance from the battery or transformer, allowance should be made for the voltage drop between the battery or transformer and the terminals of the operating coil. If the proper allowance is not made for this drop, it is difficult to make the breaker operate at the minimum operating voltage.

Control Relay

The time of the control relay cut-off can be adjusted by varying the auxiliary switch linkage so that the switch makes contact either earlier or later in the closing stroke. Adjusting the time of relay cut-off serves to increase or decrease the minimum closing voltage.

Attachments

All attachments are mounted on the main breaker parts before shipment from the factory. All attachments should be given a preliminary trial before putting the breaker in service to make sure that they will fulfill their respective functions in a reliable manner. Separate instruction cards cover the installation and maintenance of the various attachments, unless mentioned in this instruction book.

Line Connections

Having performed all of the foregoing operations, the circuit-breaker should next be connected to the line. The cross sectional area of the main conductor should be in accordance with the requirements of the National Electric Code. Cables should be carefully soldered into the cable terminals. Tube terminals are not supplied with these breakers. The following sizes are ordinarily used.

Breaker Capacity	I.D. of Tube Terminal	No. Req. Per Stud
400	0.918	1
600	1.280	1
800	0.918	2

All contact surfaces should be cleaned and should be free from dents or burrs. Dangerous heating of the breaker may result otherwise. If copper straps are used, the straps should be grained and the bolts drawn down firmly. In fitting copper to a breaker, always bend the copper to exact shape, so that when it is bolted to the breaker there will be no tendency for it to spring the stationary contacts out of alignment. The studs are not designed to carry excessive cable or bus bar strains, and if necessary, intermediate supports should be installed between the breaker and the line. An excessive strain, which at first may have no apparent effect, will eventually loosen the porcelain weather casing and permit moisture to enter the breaker. In bolting the copper to the stationary contacts of the breaker, it is very important to see that the studs of the breaker are not turned when tightening the bolts. Any turning of the studs will destroy the contact alignment and make recontacting of the breaker necessary. There is also danger of cracking the porcelain insulators. Always remove the tanks when making the main line connections.

As a safety measure, the frame should be grounded.

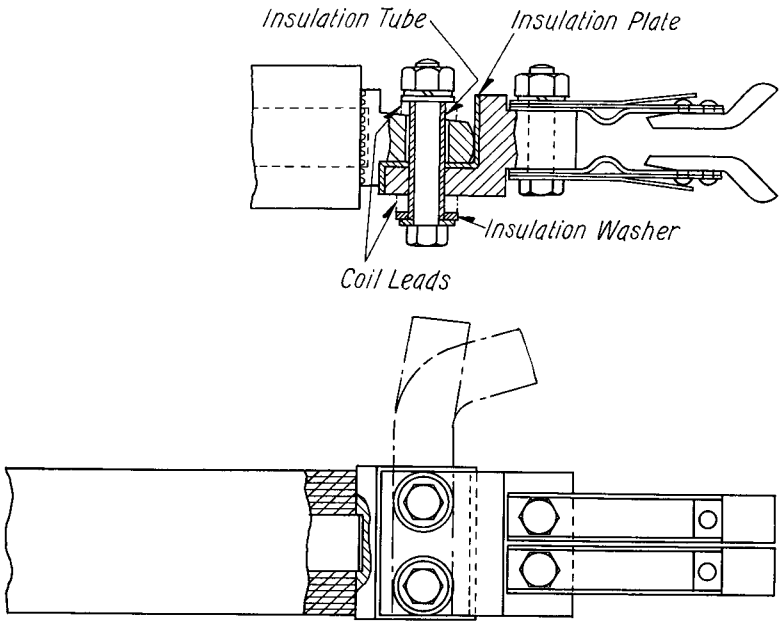

FIG. 5—STATIONARY CONTACT WITH SERIES TRIP COIL

Contact Adjustment

Before placing the breaker in service, the Oxide film which forms on the copper contact surfaces during shipment and while in storage should be removed by means of sand paper or a fine file. This Oxide causes the contacts to become dark in color; complete removal of the oxide is indicated when the contact shows a bright red copper color all over. Do not use emery cloth for this purpose. The particles of emery are electrical conductors and any such material remaining in the breaker, from the cleaning of the contacts, serves to lower the insulating value of the oil.

Oil the contacts before operating the breaker to secure the normal wiping action.

If the adjustment of the breaker has not been disturbed since leaving the factory, the contacts should now be making satisfactory contact without further adjustment. It is essential however, that the contacts be inspected. The contacts are properly adjusted when the full current carrying surfaces of the fingers are in contact, with the moving wedge, and the bottoms of the current carrying surfaces of the fingers are approximately even with the bottom of the moving wedge, when the breaker is in the closed position.

It is impossible to secure vertical adjustment of either the moving or stationary contacts. This setting is properly made at the factory and will not vary, except due to breakage.

The fingers are self aligning lengthwise, but not sidewise. If it is found that the fingers are not making correct

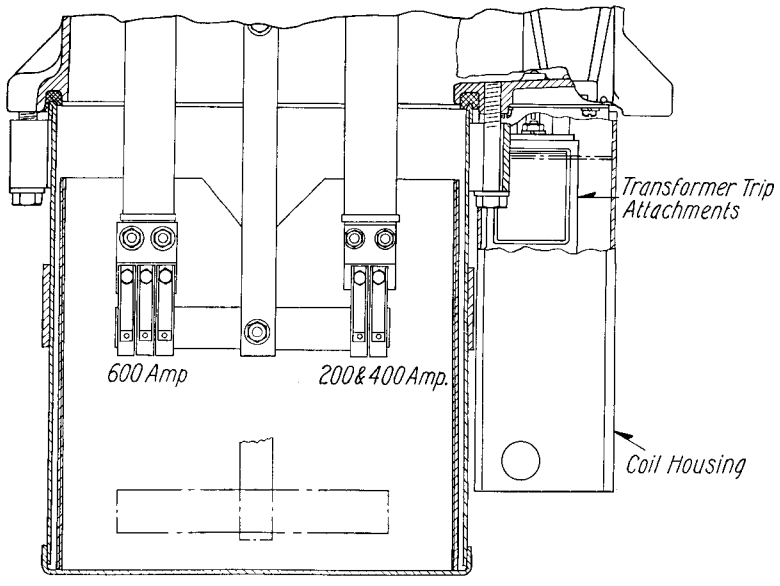

FIG. 6—BREAKER UNIT WITH TRANSFORMER TRIP COILS

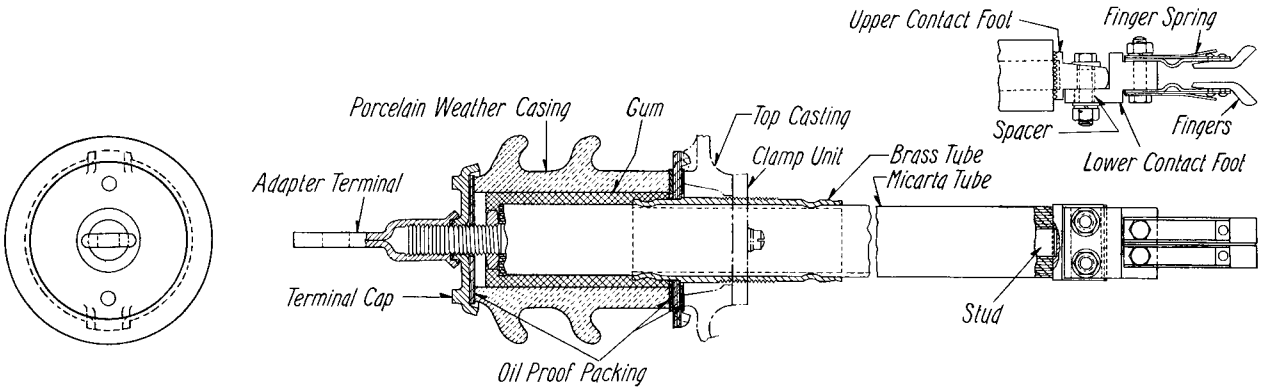

FIG. 7—STATIONARY CONTACT WITHOUT SERIES TRIP COIL

contact on one side, it will be necessary to twist them, with pliers, into the correct position. The area of contact secured can be determined by the imprint of the finger on the wedge.

A limited amount of horizontal adjustment of the stationary contact can be secured by manipulating the three clamp flange bolts on the top of the pole unit casting. The manipulation consists of loosening one or two bolts and tightening the remaining bolts. The bolts loosened should be checked for tightness after the adjustment is used.

The stationary contact fingers can be rotated by loosening the adapter terminal and terminal cap. Be sure to tighten after adjusting.

Do not try to adjust the contact by changing the toggle adjustment. The toggle of the breaker is set at the factory and should never be disturbed for any purpose, unless it has accidentally been disturbed.

Testing

After the breaker has been wired according to the wiring diagram, and all attachments have been connected, it should be operated a number of times at normal voltage, minimum voltage, and if possible, an operating voltage slightly above normal to see that it acts properly. If the breaker has been carefully set up, it should be in good operating condition and should not require further investigation. If the operation is satisfactory, the tanks should be thoroughly wiped out and filled with Wemco "C" oil according to the instruction plate on the breaker. The Westinghouse Electric & Manufacturing Company assumes the responsibility of breaker operation only when the insulating oil employed is in accordance

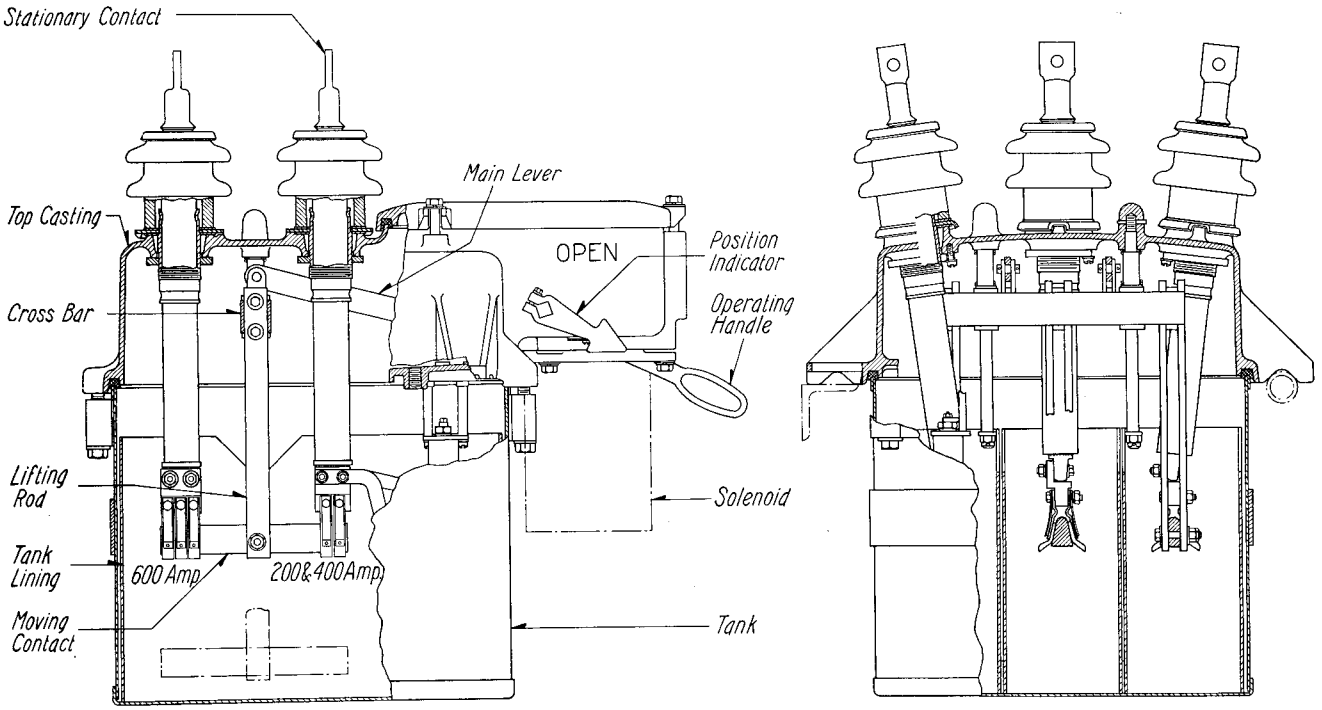

FIG. 8—BREAKER UNIT WITH SERIES TRIP COILS

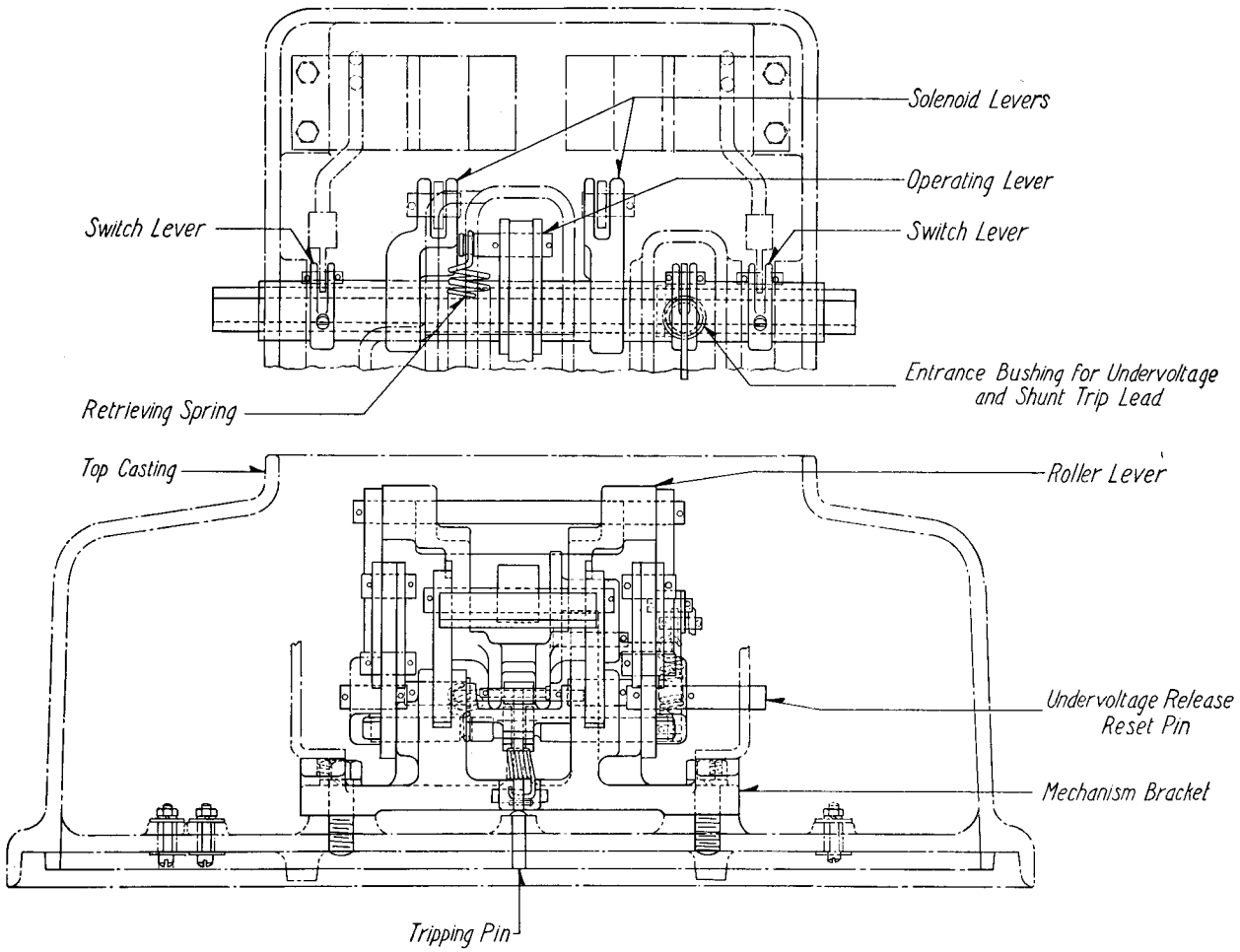

FIG. 9—MECHANISM OPERATING LEVERS (TOP AND REAR VIEWS)

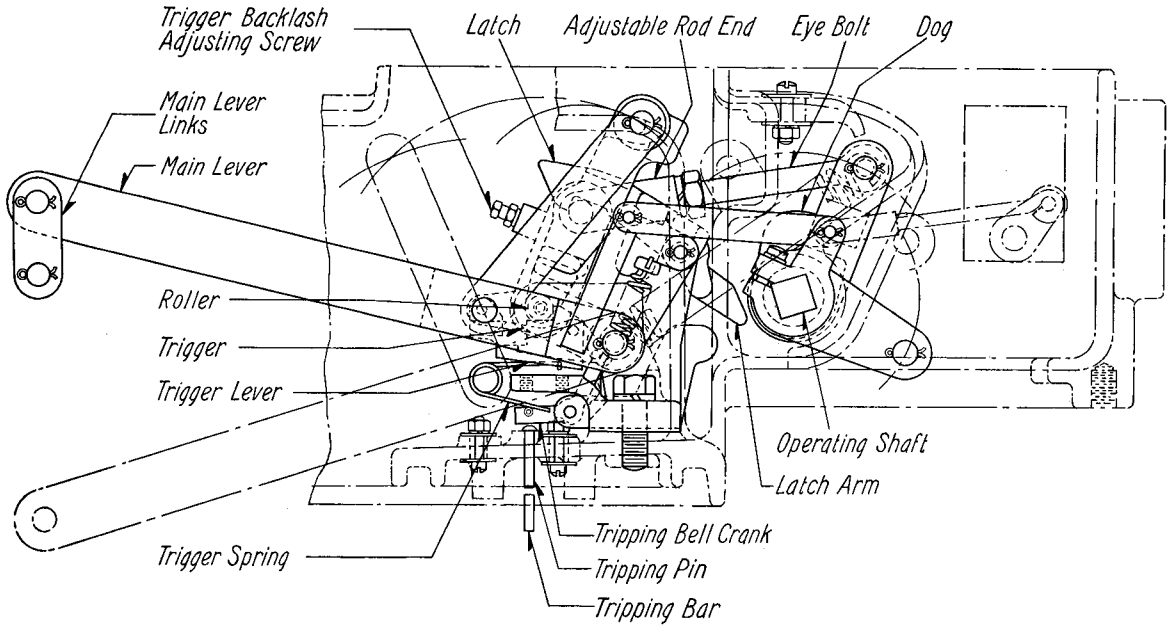

FIG. 10—MECHANISM OPERATING LEVERS (SIDE VIEW)

with its recommendations. The breaker should be examined to see that all parts are functioning properly before bolting the tanks in place. All tools, system wire, copper fillings, and other remnants from the installation should be removed, after which the breaker should be given a high potential test before being put into operation. This high potential test usually consists of subjecting the insulation to a voltage equal to 2¼ times the rated voltage of the breaker plus 2000 volts. Control wiring should be tested at 1200 to 1500 volts. After this has been done, the breaker is ready to go into operation.

Warning

The operating handle is drawn downward with considerable force by the closing solenoid on electrically-operated breakers. Insofar as the operating handle projects slightly beyond the breaker casting and supporting frame, extreme care must be exercised to avoid injury from this source.

Mechanism

When the operating shaft is rotated to the closed position, by either the solenoid or the operating handle, the dog engages with the operating lever, which is connected to the trip free mechanism by an eye-bolt and an adjustable rod end, and closes the breaker. The breaker is held in the closed position by the latch. The breaker is tripped manually by raising the operating handle to its highest position; the tripping occurs when the dog strikes the latch arm and rotates the latch out of engagement with the roller lever pin. When the breaker trips automatically the tripping bars strikes the tripping pin, which in turn strikes the tripping bell crank, the tripping bell crank is disengaged from the trigger lever which drops and permits the roller lever to rotate upward and open the breaker. During the last part of the roller lever rotation, it strikes the latch and allows the trip free mechanism to retrieve.

The only adjustment possible on the mechanism is that for securing the proper setting of the trigger back-lash (distance between roller and latching surface). The trigger back-lash should be approximately 1/32". This is secured by means of the trigger back-lash adjusting screw.

Care should be used to see that the operating lever does not strike the web of the top casting when in the closed position.

D-C. Operation

The solenoid pot bolts directly to the top casting and is connected to the mechanism through the solenoid levers on the operating shaft. When installing the solenoid, it is necessary to remove the cast cover supplied with manually operated breakers. It is necessary only to observe that the clamp casting rests firmly on the brass tube and coil and that the clamp casting is placed against the proper grooves in the top casting. The solenoid must operate without friction and the solenoid plunger must strike the stationary core when the latch has $\frac{1}{16}$" back-lash. This latch requirement is secured by lengthening or shortening the eye-bolt and adjustable rod end linkage connecting between the operating shaft and the mechanism.

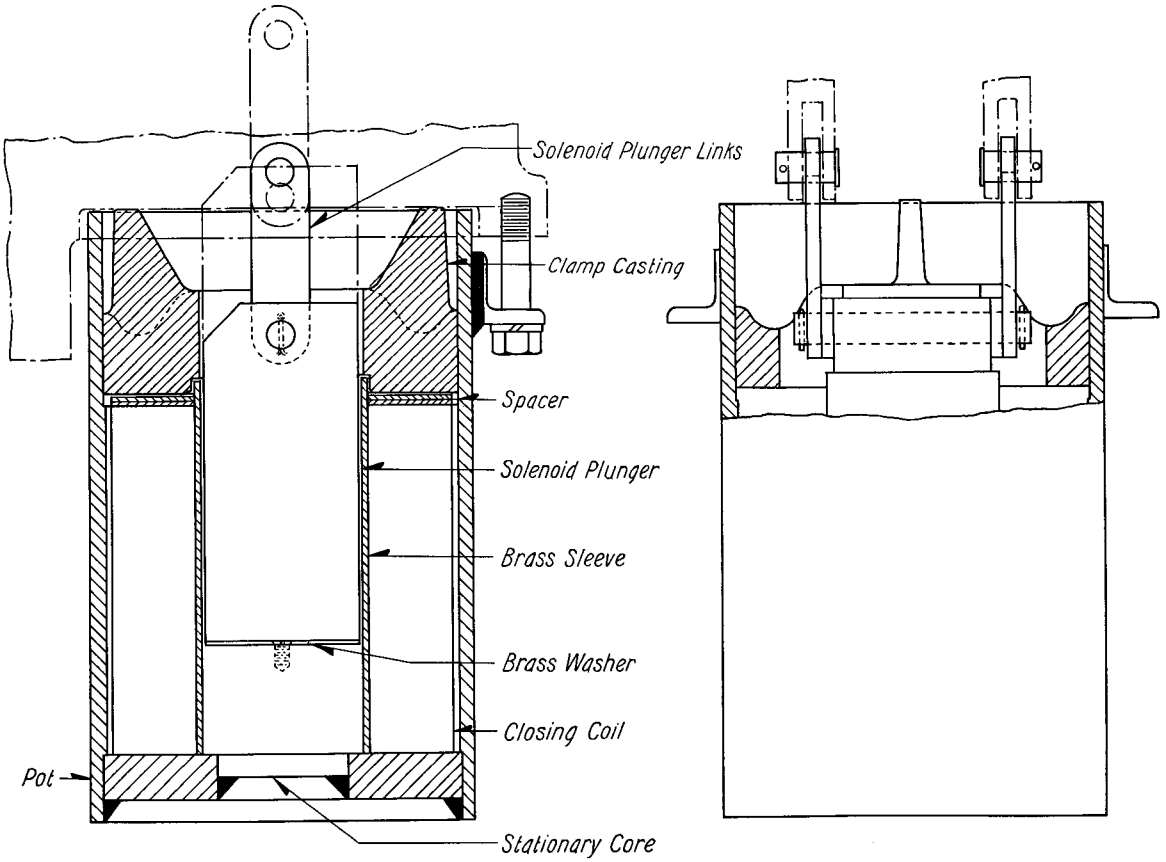

FIG. 11—SOLENOID OPERATING MECHANISM

A-C. Operation

Rectox unit should be mounted as closely as possible to the breaker for the reason indicated under "Contol lead to Electric Operating Mechanism".

Complete information regarding the care and use of Rectox units may be secured from I.L. 1782.

Undervoltage Release Attachment

Refer to Fig. 15.

Remove line voltage before installing.

The attachment is mounted in the left side of the top casting (facing mechanism end) by means of the two mounting bolts indicated. Operation is secured by means of the operating pin included as part of the mechanism. Be sure that the set-up is rigid and agrees with the illustration.

Connect leads from the external circuit to the terminals on the undervoltage coil. The undervoltage coil should be connected directly across the line, but should be protected by fuses. No attention need be paid to correct connection as regards polarity. The undervoltage coils should be connected to the line side of the breaker. Check the control voltage stamped on the nameplate to make sure that it agrees with that on which the attachment is to be used.

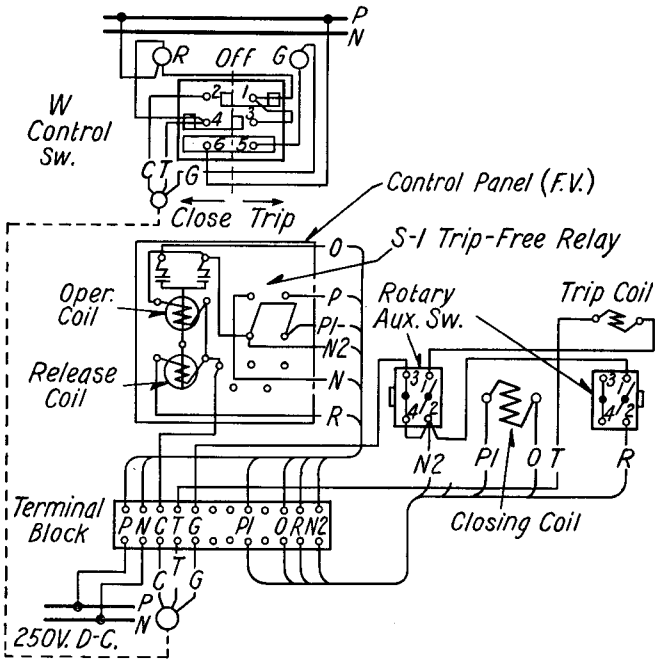

FIG. 12—WIRING DIAGRAM FOR D-C. OPERATION

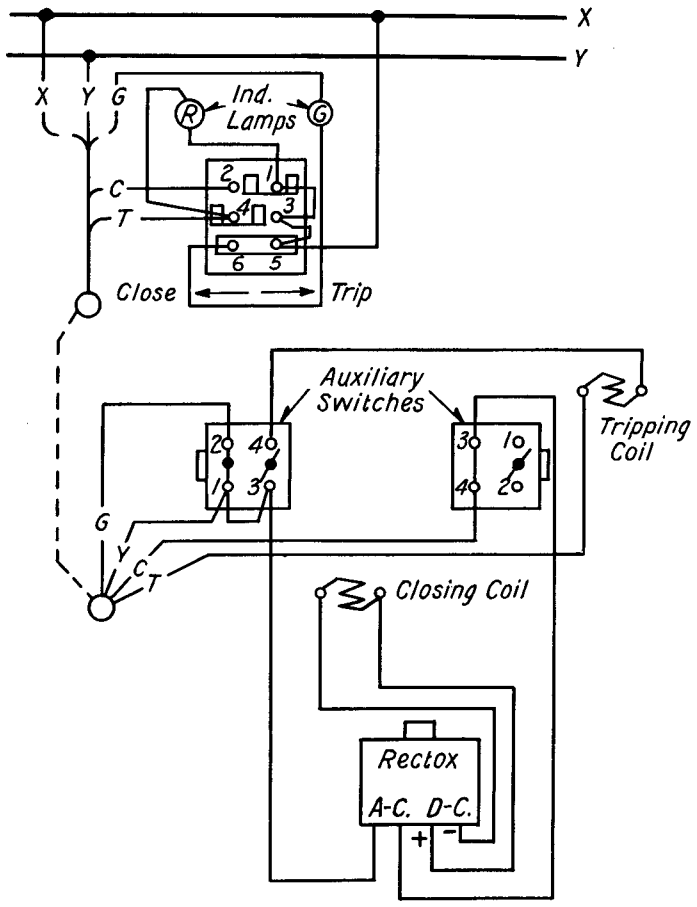

FIG. 13—WIRING DIAGRAM FOR A-C. OPERATION

Do not run the coil circuit through an auxiliary switch as this will result in "pumping".

Operate the breaker slowly, without voltage on the under-voltage coil, to observe the action of the attachment.

Make sure that the tripping link strikes the tripping bar with sufficient force to trip the breaker as soon as the holding dog releases the armature.

Make sure that the retrieving spring retrieves the armature to within $\frac{1}{16}$" of the stationary core with the breaker in the open position. The low voltage coil is not a pickup coil and consequently is not capable of picking up the low voltage release armature when the distance exceeds this amount. If normal voltage is applied after this dimension is exceeded, the coil will burn out.

Apply normal control voltage and close the breaker. Remove control voltage suddenly. The attachment should then drop out and trip the breaker.

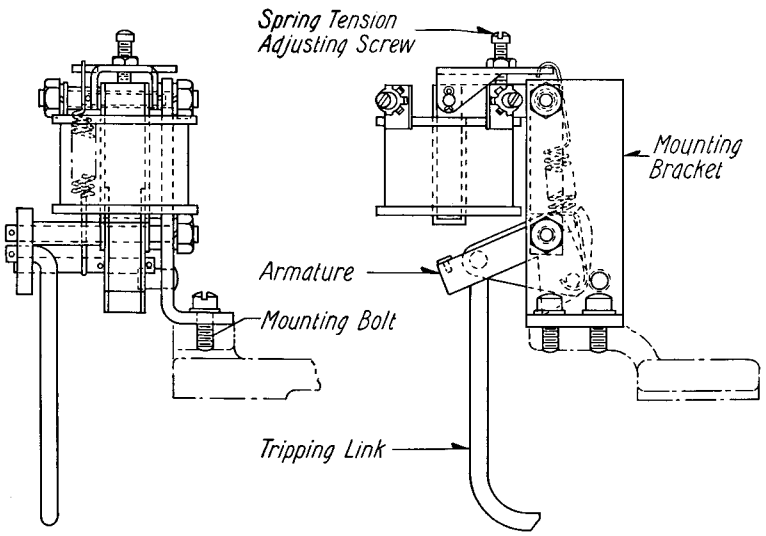

FIG. 14—SHUNT TRIP ATTACHMENT FOR SERIES TRIP BREAKERS

Apply 90 percent of control voltage and check to see that the armature picks up with this applied voltage. The armature should definitely pick up at 90 percent of normal control voltage.

Reduce the control voltage slowly to determine the drop-out point. The undervoltage armature should drop out and trip the breaker between 35 and 60 percent of normal voltage. The drop-out point can be varied at will by adjusting the spring tension adjustment screw.

If noise develops, the faces of the armature and stationary core should be examined to see that a good clean seat is obtained when they are together. If necessary to clean these faces, be sure to leave them bearing over their entire area.

The attachment should be inspected periodically to make sure that all parts are rigidly assembled and functioning properly.

Shunt Trip Attachment

The shunt trip attachment for use with series trip breakers is mounted in the right side of the top casting (facing mechanism end) by the two mounting bolts indicated. Refer to figure 14.

Be sure that the set-up is rigid and agrees with the illustration.

Connect lead from the external circuit to the terminals on the shunt trip coil. No attention need be paid to the correct connection as regards polarity. Check the control voltage on the nameplate to make sure that it agrees with that on which the attachment is to be used.

The shunt trip circuit should be run through an auxiliary switch to break the tripping current when the breaker opens.

Check to see that the attachment trips the breaker at approximately 70 percent of normal control voltage.

The shunt trip attachment for use with transformer trip or non-automatic breakers is mounted on the transformer trip coil mounting plate in the coil housing, as shown in figure 18.

Series Trip Attachment

The series trip attachment mounts on the series trip coil mounting plate, is connected to the series trip mechanism and to the stationary contact as indicated in figures 16 and 17.

The oil entrapped between the moving and stationary cores retard the upward motion of the moving core by a varying amount, depends upon the setting of the valve screw. The valve screw is not calibrated and the correct setting must be determined by test. The reset ball is for the purpose of allowing the moving core to reset with reasonable speed. During the downward motion of the moving core, the reset ball is forced from its seat and allows the oil to flow rapidly into the chamber between the moving and stationary cores.

The push rod adjusting nut is used to adjust the distance between the moving and stationary cores so that the various coils will pick up and trip the breaker at the same time. It is sometimes necessary to file the tops of the push rod so that the breaker trips during the last $\frac{1}{16}$" of the moving core travel, as the greatest power is developed when the moving and stationary cores are close together. When the coils are mounted at the factory, this adjustment is properly made and should not be disturbed.

The series coils should be set to trip at the proper time by removing the calibration rod cap, loosening the calibration rod clamp and screwing the calibration rod up or down until the proper marking is flush with the top of the calibration rod clamp. Be sure to tighten the clamp after adjustment. If a setting in between the actual markings is required, the actual markings can be interpolated with reasonable accuracy.

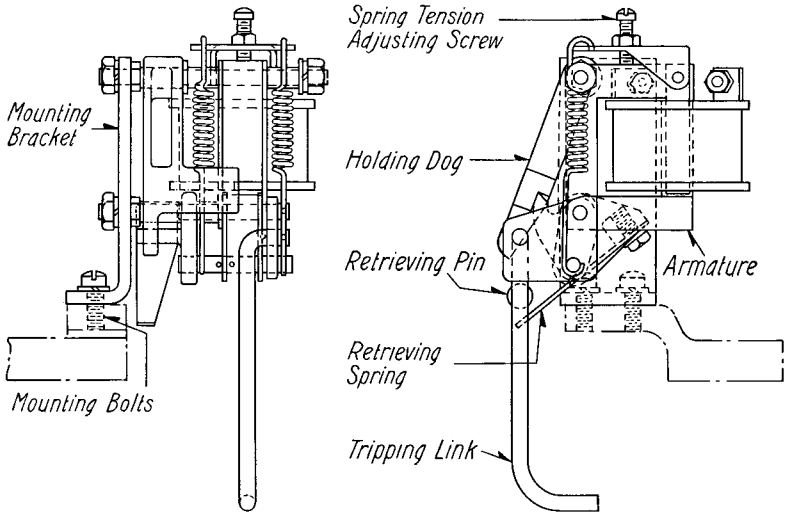

FIG. 15—UNDER VOLTAGE RELEASE ATTACHMENT

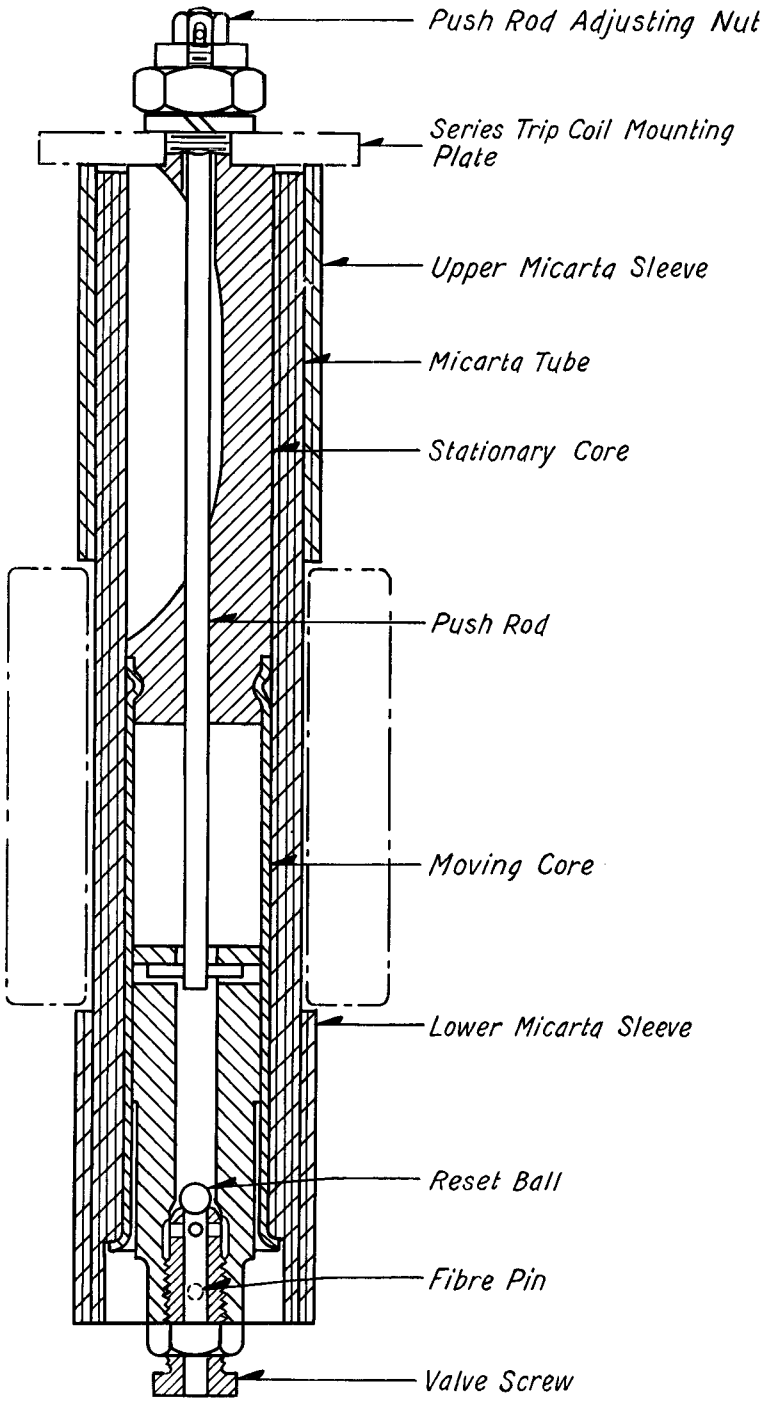

FIG. 16—SERIES TRIP ATTACHMENT

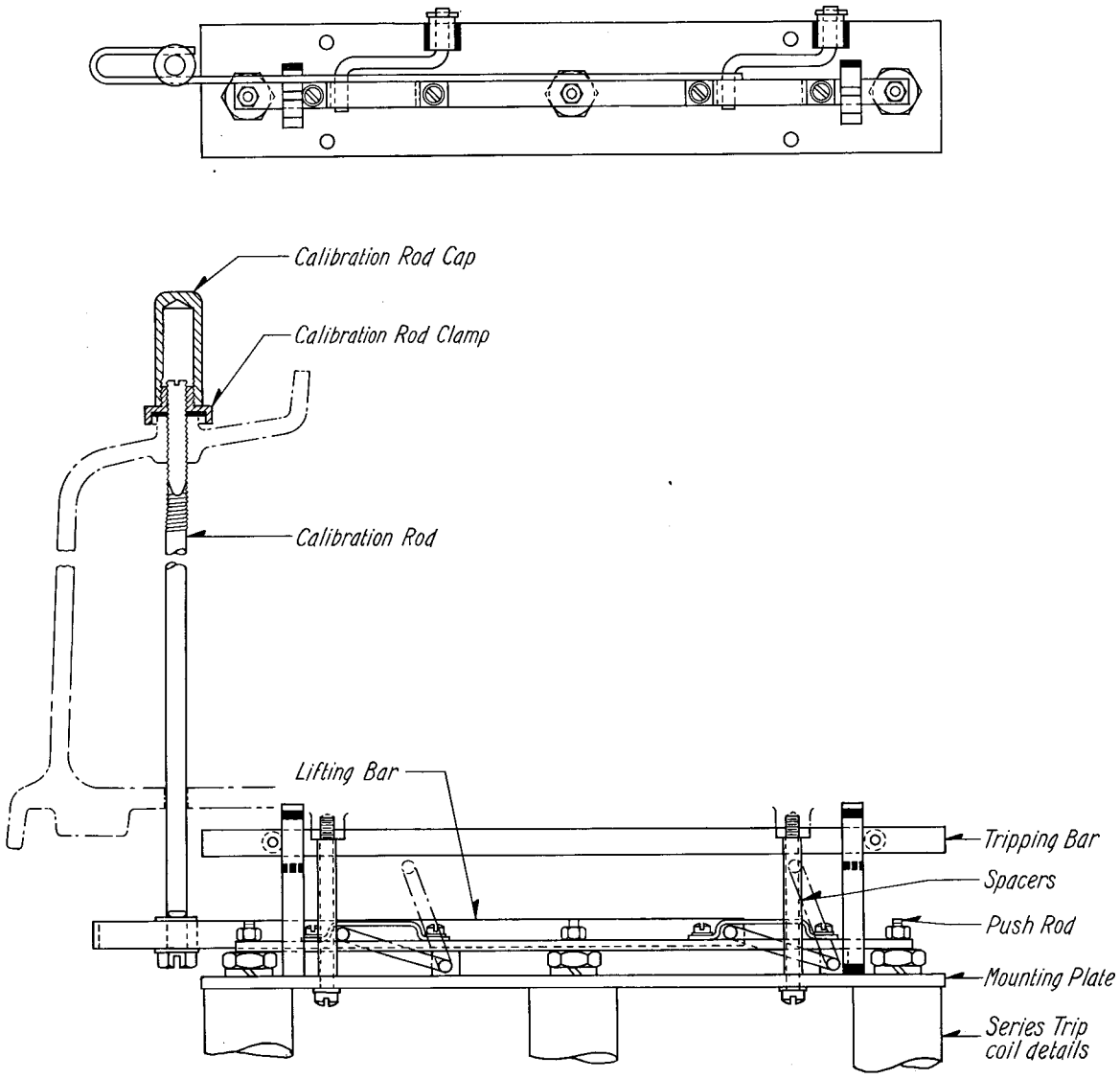

FIG. 17—SERIES TRIP ATTACHMENT AND MOUNTING PLATE

When installing a coil, it is necessary to remove the standard bolts and spacers from the involved contact feet, and to assemble the special bolts, insulating details and coil leads as shown in figure 5. Be sure that the contact surfaces are clean as described under "line connections" and "contact adjustments".

Transformer Trip Attachments

The mounting is illustrated in figure 18. The attachments are calibrated at the factory and need only to be mounted, the calibration adjustments set at the proper value and the attachments given a preliminary trial.

Auxiliary Switches

The auxiliary switch is mounted in the top casting and connected to the switch lever on the operating shaft as indicated in figure 20.

The contact and the time of make and break can be varied by lengthening or shortening the adjustable switch link. The contact segment can further be varied in 15° steps by removing the castellated nut and shifting the segment one or more notches on the moulded insulation.

Veeder Counter

The Veeder counter is shown in figure 19. It is only necessary to observe that the counter adds one unit for each operation of the breaker.

Tank Lifter

Refer to Figs. 21, 22 & 23

The tank lifter can be mounted on either the right or left hand side of the breaker, and can be used with either the small or the large tank.

As received, the lifter will be assembled for use on the left hand side of the breaker, and with the cable arranged for use with the large tank.

The lifter is mounted on the supporting frame-work as indicated in the above illustrations. The two mounting brack-

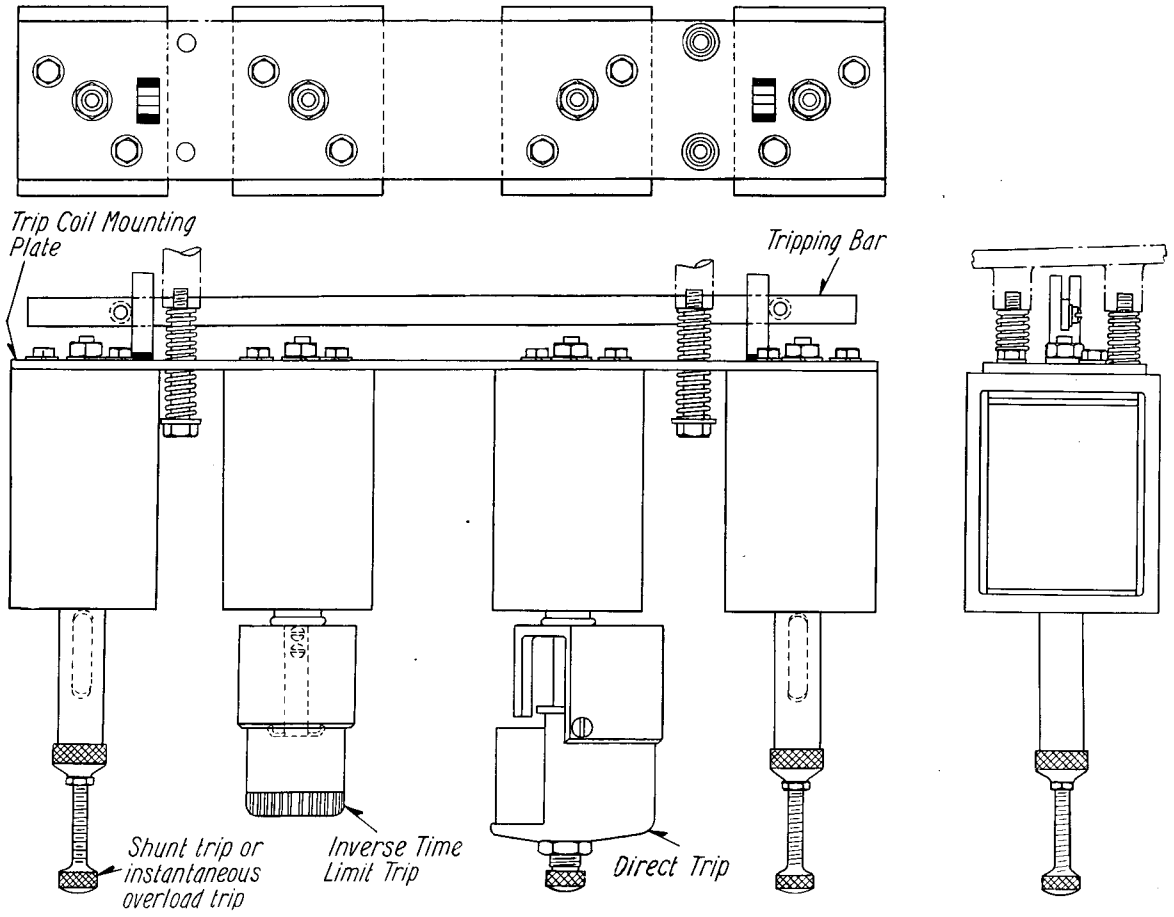

FIG. 18—TRANSFORMER TRIP ATTACHMENTS AND MOUNTING PLATE

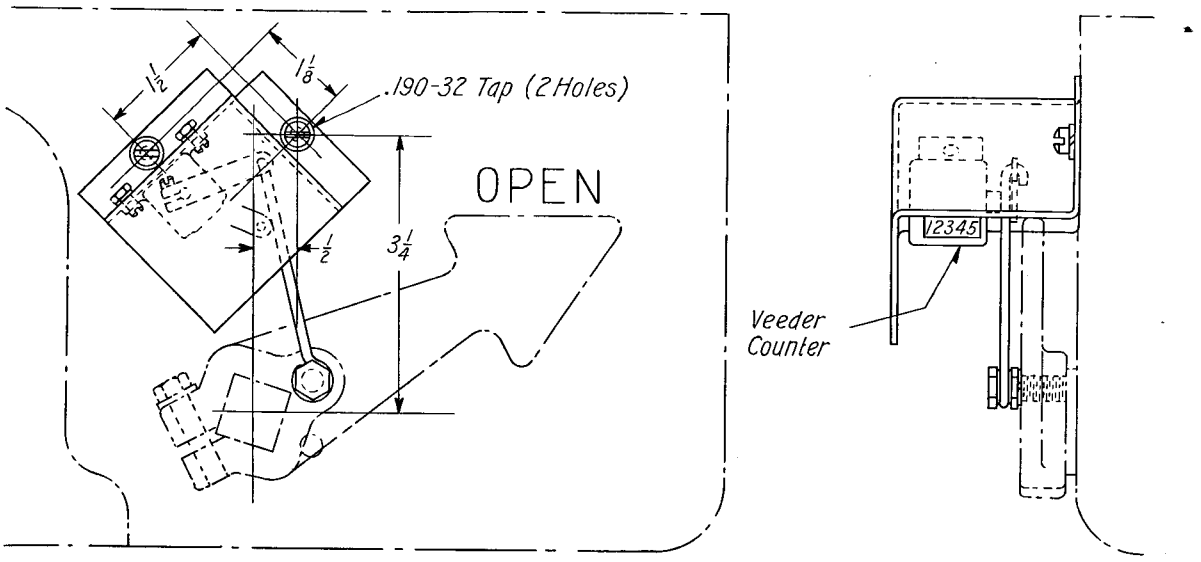

FIG. 19—VEEDER COUNTER

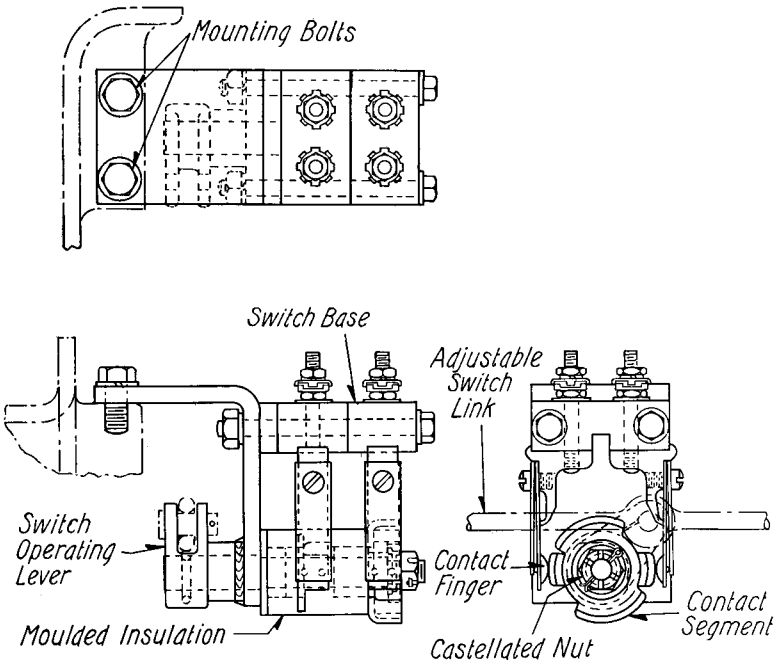

FIG. 20—AUXILIARY SWITCH

ets are to be located between the top casting mounting lugs and the swivel bracket extended behind the breaker unit to the opposite tank lug, into which the swivel bracket tang fits. It is necessary to remove the two tank bolts before using the lifter, as the lifting lugs fit into the tank lugs in place of the mounting bolts. The remaining two tank bolts can then be removed or replaced, depending upon whether the tank is being raised or lowered. The centerline of the lifting lug must be parallel to the tank side, as indicated in the above references.

The tank lifter can be shifted sidewise on the supporting framework to eliminate any minor interferences that may exist.

If the tank lifter is to be mounted on the right hand side of the breaker, remove the mounting bracket bolts and rotate the mounting brackets 180 degrees. The cable position should be as indicated in the following:

1. Lifter on left hand side—Large tank—Cable run at "a", over pulley 1 and down to tank.
2. Lifter on left hand side—Small tank—Cable run at "a", around pulley 1, to "b", over pulley 2 and down to tank.
3. Lifter on right hand side—Large tank—Cable run under pulley 2 to "b", over pulley 1 and down to tank.
4. Lifter on right hand side—Small tank—Cable run at "a", around pulley 1, to "c", over pulley 2 and down to tank.

The operating handle should always rotate in a clockwise direction, when raising the tank, in order that the dog may function properly.

The swivel bracket can be adjusted to the proper length by screwing it in or out on the pipe threads.

All bearing surfaces, gearing and cable should be kept well oiled.

General Maintenance

It is vitally important that the breaker be inspected periodically, at which time the mechanism, contacts and attachments should be examined carefully.

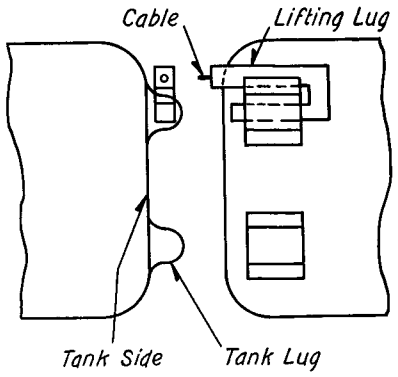

FIG. 22—METHOD OF ENGAGING TANK AND LIFTING LUGS.

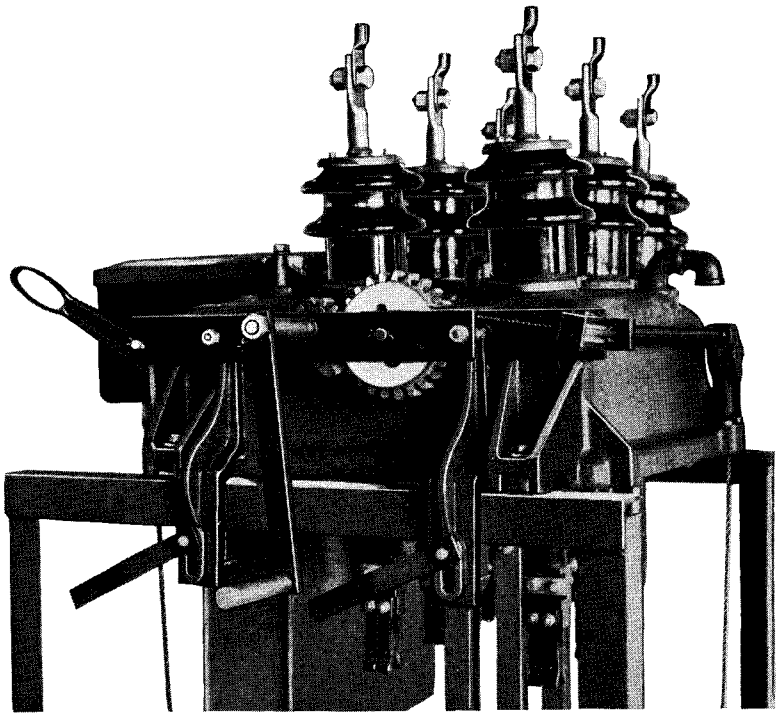

FIG. 21—TANK LIFTER IN POSITION

Any hesitation in the operation of, or excessive looseness in the mechanism or attachments should be immediately adjusted. Any pitting of the contacts should be cleaned off, or, if badly burned, they should be replaced.

Remove all oil and thoroughly clean the tanks, bushings, guides, operating rods, etc. at least once a year.

Inspect the oil after heavy short circuits and generally every three months. The dielectric strength of the oil should not be allowed to drop below 18,000 volts measured between 1" discs placed .1" apart. I.B. 5336 contains complete information regarding the care and use of insulating oil.

Keep the bearing surfaces of the mechanism and breaker units adequately oiled as the breaker cannot operate properly with "sticky" bearings.

Keep the breaker and attachments reasonably clean, particularly when the breaker and attachments are subjected to corrosive fumes.

Be sure that the breaker is disconnected from the line before removing the tanks and inspecting or repairing.

RENEWAL PARTS DATA

Ordering Instructions

Cases of trouble with this apparatus should be taken up at once with the nearest Westinghouse Service Shop. A list of these Service Shops appear on the inside back cover of this book. When ordering renewal parts, the following information should always be given:

1. A description of the part.
2. Complete nameplate reading of the breaker unit and mechanism nameplate.
3. Normal voltage and frequency of all coils.
4. Refer to the parts by name as given in the illustrations in this book.

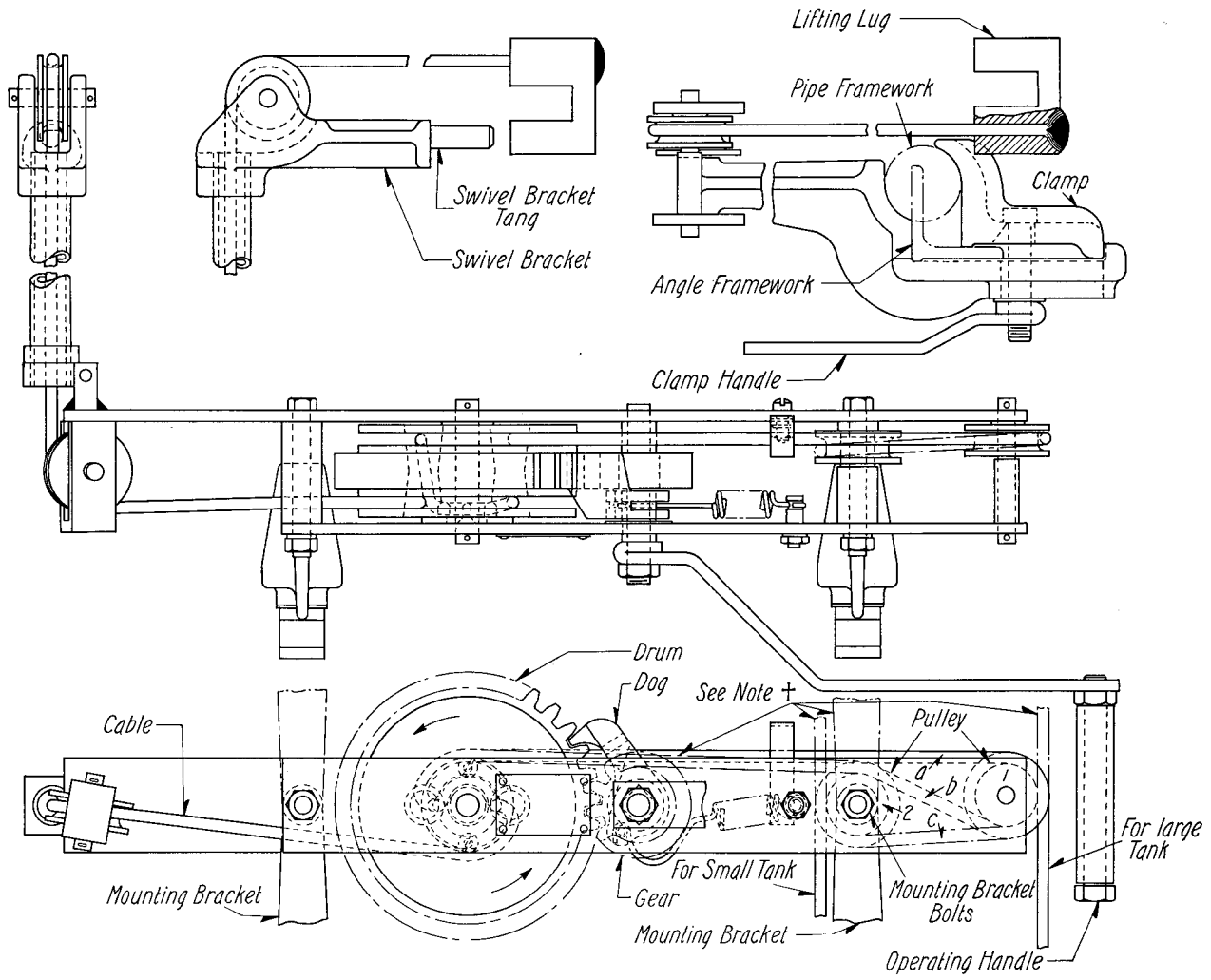

FIG. 23—TANK LIFTER ASSEMBLY

†Cable and brackets to be as shown in dot and dash lines when tank lifter is used on opposite side of breaker.

RENEWAL PARTS DATA—Continued

Type FO-22 Oil Circuit-Breaker 200, 400, 600 and 800 Amperes—7500 Volts Recommended Stock of Renewal Parts for Breaker and Mechanism

The following is a list of renewal parts and the minimum quantities of each that should be carried in stock. These are the parts most subject to wear in ordinary operation, and to damage or breakage due to possible abnormal conditions. The maintenance of such stock will minimize service interruptions caused by breakdowns.

Total Number of Circuit Breakers up to and Including	Two Poles				Three Poles			
	No. Per Bkr.	2	5 Recommended for Stock	15	No. Per Bkr.	2	5 Recommended for Stock	15
Breaker Unit Complete	1	0	0	0	1	0	0	0
Lifting Rod	4	1	2	4	6	2	4	6
Moving Contact	2	0	1	2	3	1	2	3
Condenser Bushing	4	0	1	2	6	1	2	3
Contact Foot	4	0	1	2	6	1	2	3
Contact Finger	16	32	48	64	24	48	72	96
Contact Finger Spring	16	4	8	16	24	8	16	24
Tank	1	0	0	0	1	0	0	0
Tank Liner	2	0	1	2	3	1	2	3
Electrically Operated Mechanism	1	0	0	0	1	0	0	0
Auxiliary Switch—2 Pole	1	0	0	0	1	0	0	0
Moving Contact	2	0	1	1	2	0	1	1
Contact Finger	4	1	2	4	4	1	2	4
Auxiliary Switch—10 Pole	1	0	0	0	1	0	0	0
Moving Contact	10	2	4	6	10	2	4	6
Contact Finger	20	5	10	20	20	5	10	20
Holding Latch	1	0	0	1	1	0	0	1
Latch Spring	1	0	0	1	1	0	0	1
Retrieving Spring	2	0	1	1	2	0	1	1
Trigger	1	0	0	1	1	0	0	1
Trigger Spring	1	0	0	1	1	0	0	1
Accelerating Spring	1	0	0	1	1	0	0	1
Closing Coil	1	0	0	1	1	0	0	1
Trip Coil	1	0	0	1	1	0	0	1

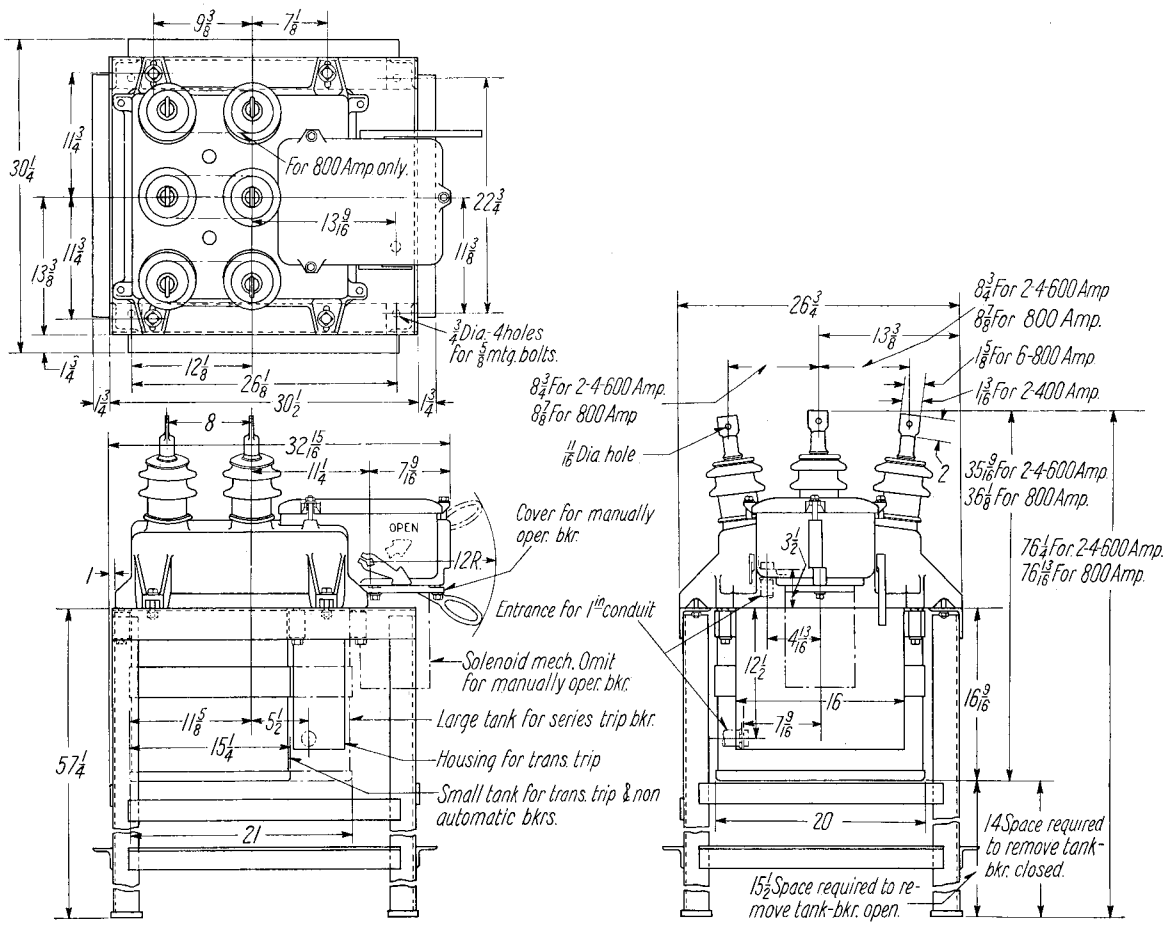

FIG. 24—OUTLINE DIMENSIONS OF TYPE FO-22 OIL CIRCUIT-BREAKER