IB-2807-51B

METAL-CLAD SWITCHGEAR

INSTRUCTIONS

5 KV POWER CIRCUIT BREAKERS
TYPE 5HK75, 5HK150, 5HK250 AND 5HK350

I-T-E CIRCUIT BREAKER COMPANY

CONTENTS

COVER PHOTO B34753

INSTRUCTIONS FOR 5 KV POWER CIRCUIT BREAKERS TYPE 5HK75, 5HK150, 5HK250 AND 5HK350

NOTE: READ THESE INSTRUCTIONS THOROUGHLY AND CAREFULLY BEFORE INSTALLING OR ATTEMPTING TO OPERATE THE POWER CIRCUIT BREAKERS. BY FOLLOWING THESE INSTRUCTIONS, AN OPERATOR CAN PROLONG THE LIFE AND USEFULNESS OF THIS EQUIPMENT.

I. INTRODUCTION

A. GENERAL

The circuit breakers as described herein are three pole, electrically operated and designed for use in drawout switchboard installations. Each circuit breaker consists of current carrying parts, arc chutes, frame, operating mechanism, racking mechanism and required auxiliary devices.

B. RATINGS

The rating of each circuit breaker is stamped on a nameplate which is attached to the lower front panel. The circuit breakers are designed for applications on A-C voltages in ratings listed in table below.

TYPE	CURRENT RATING AMPERES	INTERRUPTING RATING MVA (SYMMETRICAL)	VOLTAGE RATING KV	
			MIN.	MAX.
5HK75	1200	75	3.5	4.76
5HK150	1200	150	3.5	4.76
5HK250	1200	250	3.85	4.76
5HK250	2000	250	3.85	4.76
5HK350	1200	350	4.0	4.76
5HK350	2000	350	4.0	4.76
5HK350	3000	350	4.0	4.76

C. RECEIVING

Immediately upon receipt of the circuit breakers examine the cartons to determine if any damage or loss was sustained during transit. If injury or rough handling is evident, file a damage claim at once with the carrier and promptly notify the I-T-E Circuit Breaker Company. The I-T-E Circuit Breaker Company is not responsible for damage of goods after delivery to the carrier. However, the I-T-E Circuit Breaker Company will lend assistance if notified of claims.

D. HANDLING

Unpack the circuit breakers as soon as possible after receipt. If unpacking is delayed, difficulty may be experienced in making a claim for damages not evident upon receipt. Use care in unpacking, in order to avoid damaging any of the circuit breaker parts. Check the contents of each carton against the packing list before discarding any packing material. If any shortage of material is discovered, promptly notify the nearest representative of the I-T-E Circuit Breaker Company. Information specifying the purchase number, carton number, and part numbers of the damaged or missing parts should accompany the claim.

E. STORAGE

Circuit breakers should be installed in their permanent location and placed in service as soon as possible. If this is not possible, then they may be stored in their original cartons to prevent the infiltration of dirt. In either condition, if they cannot be placed in service, condensation must be avoided and space heaters are definitely recommended for prolonged storage.

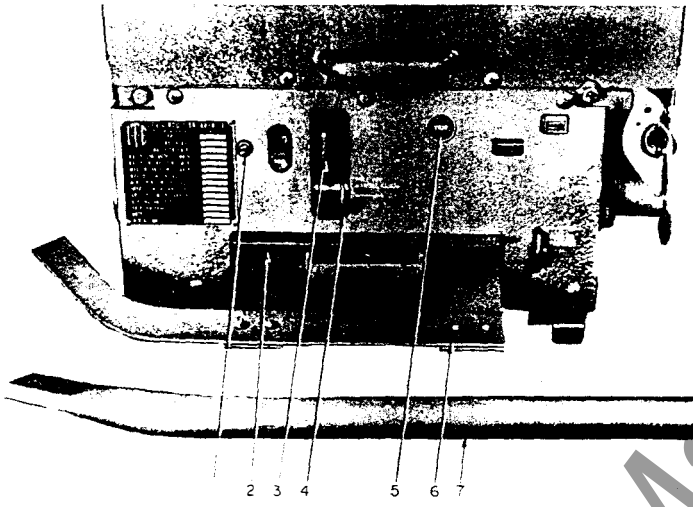

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Fig. 1—Front View of Control Panel

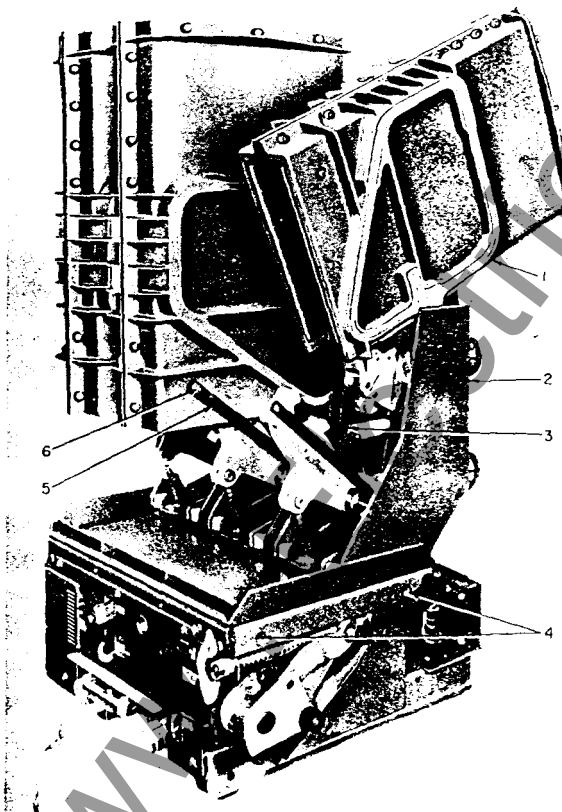

Fig. 2—View Showing Arc Chute and Contact Structure

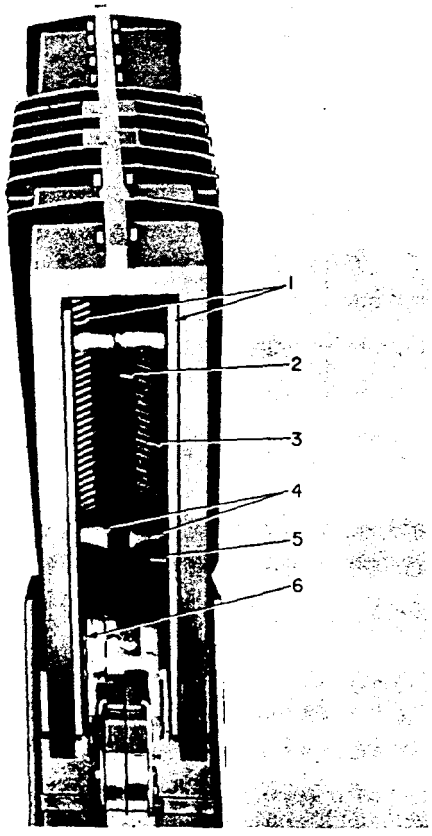

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Fig. 3—View Showing Interior of Arc Chute

II. CIRCUIT BREAKER INSTALLATION

A. GENERAL

The following procedure should be observed when installing the circuit breaker into the switchboard.

CAUTION: To insure closing springs are discharged and that the circuit breaker is in open position:

(See Fig. 1)

1. Turn power control switch (1) "OFF".
2. Pull the manual close lever (4).
3. Push the manual trip button (5).

The circuit breaker may be raised by means of a lifting yoke fastened at points (4, Fig. 2) located on each side of the base frame.

B. INSTALLATION INSPECTION

Before installing the circuit breaker for the first time, inspect the breaker for condition of the arc chutes, contacts and electrical connections.

A test jack may be used to connect the circuit breaker to a control voltage source for electrical operation when removed from compartment. The test jack should be inserted into the secondary contacts located at the lower right side of the circuit breaker when viewed from the rear.

1. Manual Slow Close to Check Contact Pressure (See Fig. 1)

a. Engage the manual charge handle (7) with the charging lever (3). Pump charging lever until the breaker closing springs are heard to snap into the charged position.

b. Insert **both** tangs (2) of the spring retainer bracket (6) into the holes provided in the closing spring tubes.

c. Pull the manual close lever (4) to discharge closing springs on to the tangs (2) of the spring retainer bracket (6).

d. Engage manual charge handle (7) with the charging lever (3) and pump to slow close the breaker contacts. Check contact pressure as given on page 8.

e. Push the manual trip button (5) to trip breaker.

f. To remove spring retainer bracket (6), continue pumping until closing springs are again heard to snap into the charged position.

g. Remove spring retainer bracket (6) from circuit breaker.

h. The circuit breaker is now charged and ready to be closed.

i. To discharge springs, pull manual close lever (4) and push manual trip button (5).

2. Insulation Check

Use a 500 volt megger to check the insulation resistance as follows:

a. Close the circuit breaker.

b. Ground the frame.

c. Connect the megger between upper current studs of each pole and ground. Megger should register at least 5000 megohms with relative humidity 70% or below.

d. Open the circuit breaker.

e. Ground the lower terminal current studs.

f. Connect the megger between the upper current studs of each pole and ground. Megger should register at least 5000 megohms, with relative humidity 70% or below.

3. Arc Chute Examination (See Fig. 3)

Inspect arc chutes for the following:

a. Breakage to liner plates (1) and arc chute plates (3).

b. Check for presence of foreign particles such as chips of ceramic and metal.

c. Check jump gap area for any fallen matter.

d. Inspect exterior of arc chute for any damage or deformation.

4. Cleaning

a. Remove any foreign bodies or objects.

b. Wipe all metal parts with a dry cloth to remove dirt or dust accumulation.

c. Wipe all insulated parts as well as terminal bushings with a cloth saturated with an oil free solvent to remove any oil film.

5. Installing Arc Chutes (See Fig. 2)

Each arc chute weighs approximately 65 pounds, and may be easily handled by one man. Do not drop or subject the arc chute to severe shock as the ceramic and molded parts are breakable.

a. Position arc chute (1) on its rear pivot pin and lower slowly into position. NOTE: Securely fasten front return connection bar (5) by its nut (6).

6. Installing Barrier

a. Lift barrier when sliding onto breaker and allow its retainer bracket to drop behind the arc chutes.

b. Secure front sheet of barrier by two retaining screws.

C. RACKING CIRCUIT BREAKER TO "DISCONNECT" POSITION (See Fig. 4)

1. Engage racking crank (2), push racking unlocking lever (1) clockwise and rotate racking screw counterclockwise as far as possible.

2. By means of the fifth wheel (6), guide and push circuit breaker into compartment as far as possible.

3. Engage racking crank (2) and rotate clockwise until racking mechanism automatically stops in "DISCONNECT" position. (The breaker is now held captive in the compartment.)

D. RACKING CIRCUIT BREAKER TO "TEST" POSITION (See Fig. 4)

1. Push racking unlocking lever (1) clockwise and rotate the racking crank (2) clockwise approximately 1/4 turn and release unlocking lever. Continue cranking until the racking mechanism automatically stops at "TEST" position.

E. CHECKING CIRCUIT BREAKER OPERATION IN "TEST" POSITION (See Fig. 4)

1. Turn charging power switch (5) to "ON" position and springs will automatically charge.

2. Close circuit breaker by means of local close button (4) and trip by local trip button (3), if available.

3. Close and trip circuit breaker by means of the remote control switch.

F. RACKING CIRCUIT BREAKER TO "CONNECTED" POSITION (See Fig. 5)

1. Close compartment door (1) and open sliding panel (2).

2. Rotate unlocking lever (3) clockwise and rotate the racking crank (4) clockwise approximately 1/4 turn and release unlocking lever. Continue cranking until the racking mechanism automatically stops at "CONNECTED" position.

3. The circuit breaker may now be closed or tripped by the remote control switches.

G. MANUAL CLOSING OPERATION (See Fig. 5)

The following manual closing procedures are recommended:

1. Observe the circuit breaker condition through the sliding panel (2) opening or by opening the compartment door (1).

2. Circuit Breaker Conditions (See Fig. 1).

a. To completely uncharge circuit breaker, manually charge closing springs by means of the manual charge lever (3) and pull the manual close lever (4) by means of a lanyard from a safe distance.

b. For charged springs, pull the manual close lever (4) by means of a lanyard from a safe distance.

c. For partially charged closing springs, should closing not occur upon pulling the manual close lever, continue charging until closing springs are completely charged (heard to snap); then pull manual close lever (4) by means of a lanyard from a safe distance.

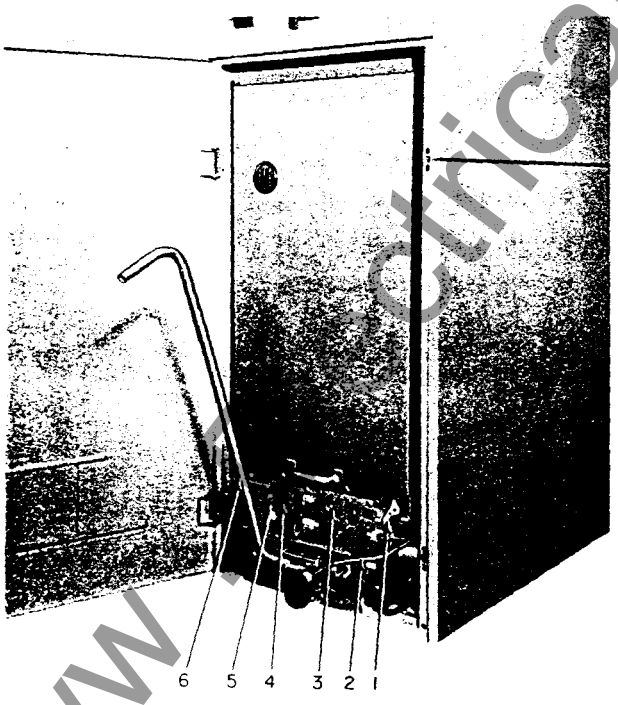

Fig. 4—Method of Insertion of Circuit Breaker into Compartment

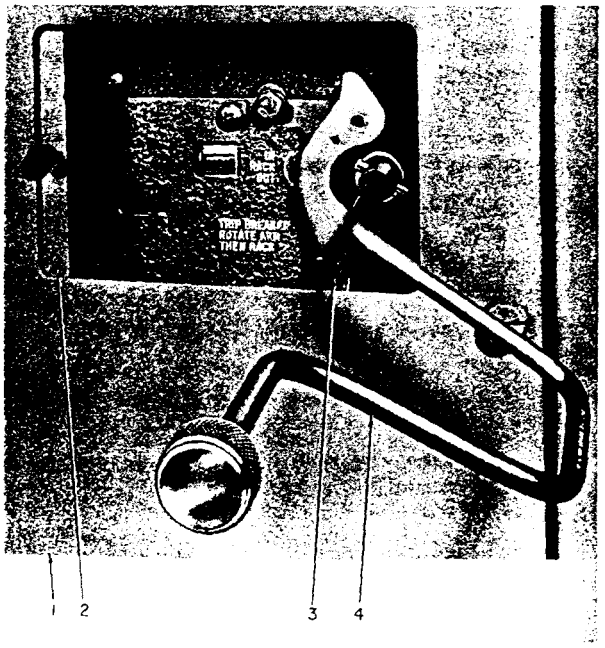

Fig. 5—Method of Racking Circuit Breaker

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III. CIRCUIT BREAKER REMOVAL

A. REMOVING CIRCUIT BREAKER (See Fig. 5)

To remove the circuit breaker from the compartment when in the "CONNECTED" position proceed as follows:

1. Trip the circuit breaker by means of the remote control switch.

2. Open the sliding door (2) in the front compartment door (1).

3. Engage the racking crank (4), push the unlocking lever (3) clockwise and rotate the racking crank (4) counterclockwise approximately 1/4 turn, then release unlocking lever. Continue cranking until the racking mechanism automatically stops at "TEST" position.

4. Repeat step 3 to rack circuit breaker to "DISCONNECT" position.

5. Repeat step 3 to rack circuit breaker to the "OUT" position.

NOTE: A charged circuit breaker will automatically be discharged during this step.

6. Open compartment door and withdraw circuit breaker out of compartment.

IV. MAINTENANCE INSPECTION

A. GENERAL

These circuit breakers are designed to require minimum maintenance. However, it is recommended that a maintenance program be established that will provide for an inspection of the circuit breaker at least once every six months or after every 1000 operations whichever occurs first, and as soon as possible after a fault operation.

An inspection should be made to determine the condition of the contacts, arc chute and electrical connections.

B. INSULATION STRUCTURE

Insulating parts should be cleaned with a cloth saturated with an oil free solvent during each inspection.

C. REMOVING BARRIER

1. Remove two front sheet screws.

2. Grasp handle and lift barrier up sufficiently to allow rear retainer bracket to clear arc chutes and then slide forward.

D. REMOVING ARC CHUTES (See Fig. 2)

1. Remove nut (6) to disconnect return connection bar (5).

2. Grasp the arc chute (1) from the front and top and tilt on its pivot towards the rear of the breaker until it rests on the lead support (2).

3. If necessary, arc chute may be raised out of its retaining guide slots and removed from the circuit breaker.

E. ARC CHUTE EXAMINATION

When inspecting the arc chutes, the following conditions should be considered.

(See Fig. 3)

1. Check liner sheets and arc plate assemblies for breakage or excessive erosion or deterioration.

2. Check jump gap area for deterioration or breakage. Closely observe that there is no erosion or pitting of the rear horn spacers (4), warped or cracked jump gap plates (5) and eroded disconnect end pin bushings (6).

3. Check for erosion or distortion to the front runner (2).

4. Check the interrupting assemblies for presence of foreign particles such as chips of ceramic and metal.

5. Inspect arc chute exterior for any damage or deformation.

F. CONTACTS

1. Remove dirt or grease on contacts with cloth saturated with an oil free solvent.

2. Discoloration of the main contacts does not necessarily indicate damage. However, this condition may be removed by opening and closing the circuit breaker under no-load conditions. Should the main contacts show slight pitting, check the contact pressure after referring to Paragraph V.B. To manual slow close to check contact pressure, refer to Paragraph II.B.1.

3. A moderate amount of pitting will not interfere with the operation of the arcing contacts. Should it be necessary to dress the arcing contacts to remove small burrs, cover the puffer nozzle (3, Fig. 2) with a cloth to prevent entrance of filings. Follow the contour of the contacts with light wipes of a fine file, and do not attempt to eliminate pitting entirely. When finished, remove cloth and wipe off any dirt or filings.

V. ADJUSTMENTS

A. GENERAL

The circuit breakers are adjusted, tested and inspected before leaving the factory. Rough handling during transit or abnormal usage after installation may upon inspection indicate some change required in the contact sequence or mechanism adjustments. It is recommended that circuit breakers installed in switchboards be withdrawn and moved to a suitable test area.

The following shows these adjustments, check points and adjustment procedures for current carrying parts, operating mechanism and racking mechanism.

B. CONTACT PRESSURE AND BRIDGE PIVOT PRESSURE

1. Contact Pressure (See Fig. 6)

With the bridge (1) closed, the stationary main contact (4) deflection should be 1/8 inch, plus or minus 1/32 inch measured at "A".

To adjust, proceed as follows:

a. Loosen set screw (2) on left pole.

b. Close circuit breaker.

c. Adjust left pole by turning adjusting stud (3) in or out as required.

d. Proper adjustment can be checked by using a 1/8 inch drill at "A".

e. Secure adjusting screw (3) by tightening set screw (2).

f. Trip breaker open and partially slow close breaker until left pole arcing contacts just touch.

g. Adjust center and right pole so that their moving arcing contacts touch at the same time the left pole arcing contacts touch.

h. Secure adjusting screw (3) by tightening set screw (2).

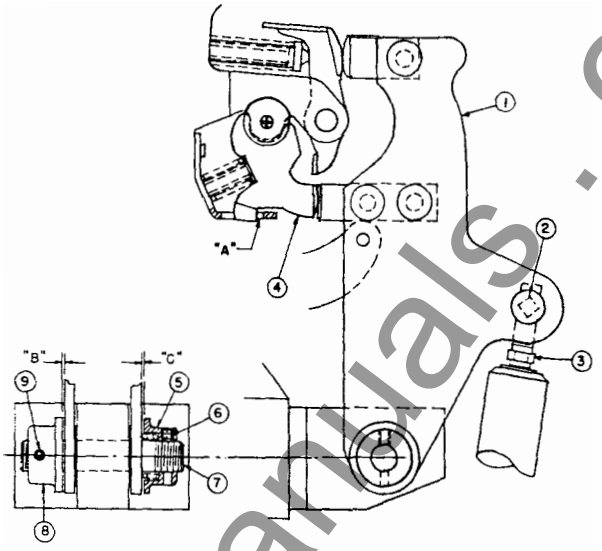

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Fig. 6—Contact Pressure and Bridge Pivot Pressure

i. Check center and right pole to insure that they have at least 1/8 inch deflection. This can be done by following "d" above.

2. Bridge Pivot Pressure (See Fig. 6)

Total clearance of "B" plus "C" should be .008 plus or minus .003 inch. It is permissible to have .000 inch clearance on one side and a total clearance of .011 on the other side.

To adjust, proceed as follows:

With one pivot nut (5) locked to pivot stud (7) by its set screw (6), turn the opposite pivot nut (8) in tight; then back off approximately 1/8 to 1/4 turn. Recheck tolerances as above, then tighten set screw (9).

C. OPERATING MECHANISM

The circuit breaker operating mechanism is adjusted at the factory for correct operation.

Adjustment is required for the following condition:

Breaker does not close electrically on reclosing duty, caused when Latch Check Switch is not actuated. Breaker should not close before trip latch (5, Fig. 7) has reset.

See Fig. 7 and adjust as follows:

a. With latch (5) against reset stop pin (4), run adjusting screw (1) in until contacts of switch (2) "break" (as indicated by an audible click or check with bell ringer).

b. Retract adjusting screw (1) until switch contacts "make", then rotate adjusting screw one turn further. Adjusting screw is self locking.

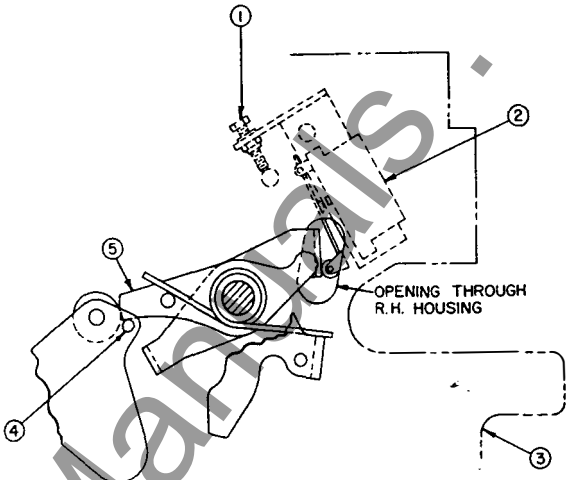

Fig. 7—Latch Check Switch

D. RACKING MECHANISM

The circuit breaker racking mechanism is adjusted at the factory for correct operation.

If it is possible to close the breaker during a racking operation, the possible trouble may be that interlocked blocking members are not positioned properly. To correct this condition, see Fig. 8 and adjust as follows:

With breaker closed, make adjustments by regulating the length of connecting rod (3), so that there is approximately 1/32 inch clearance at "A" between the trip link (5) and blocking lever (4) with the racking lock lever (2) held against racking lock bracket (1) at "B".

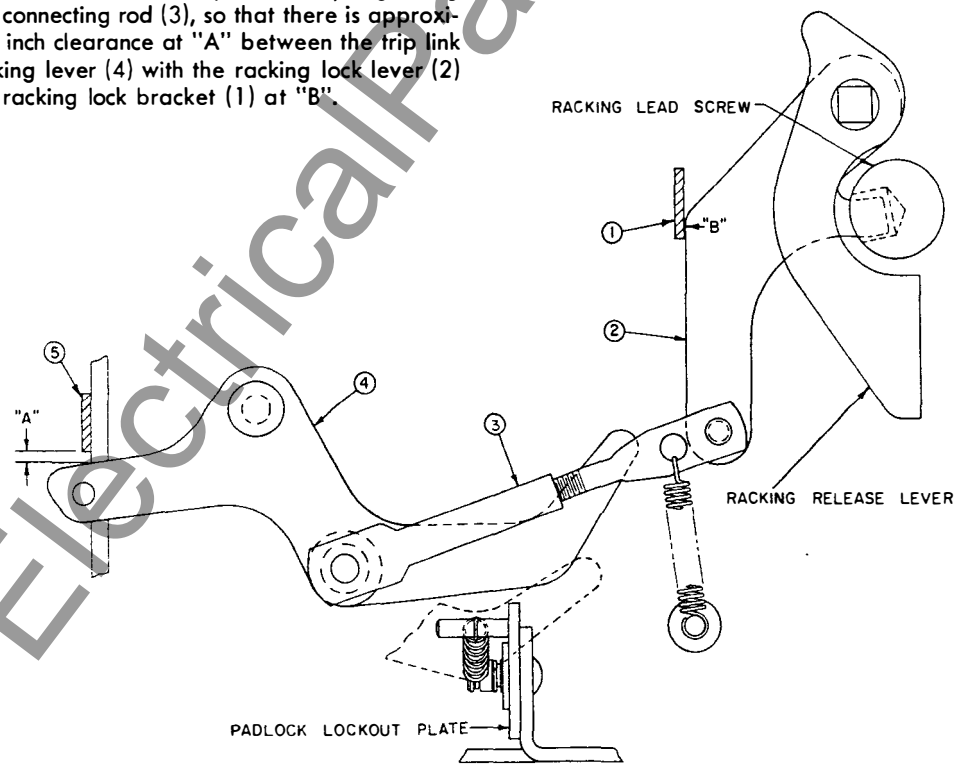

Fig. 8—Racking Mechanism

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VI. ELECTRICAL OPERATING SEQUENCE

Please refer to the specific schematic diagrams and other operational information furnished with your order.

VII. RENEWAL PARTS

It is recommended that sufficient renewal parts be stocked to facilitate proper maintenance and replacement of parts. The quantity of parts and items carried in stock should be based on the number of circuit breakers in service and previous operating experience.

When ordering renewal parts, address the nearest Sales Office of the I-T-E Circuit Breaker Company. Specify the type and serial number of the circuit breaker, description of part and quantity required.

A copy of the applicable Renewal Parts Bulletin will be furnished on request.

Consult Our Sales Offices

The I-T-E Circuit Breaker Company is represented in all principal cities of the United States and Canada. These representatives are experienced and are competent to make correct applications, as well as give complete information and prices. We suggest you consult the representative nearest you.

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