INSTRUCTIONS

for the Installation, Care and Operation of Circuit Breakers and Accessories

TYPE "D" MOVABLE PORTION
MA-75/150B
MUPTAIR MAGNETIC
POWER CIRCUIT BREAKER
AND AUXILIARY EQUIPMENT

(SOLENOID OPERATOR)

BOOK BML-6631

These instructions are not intended to cover all details or variations that may be encountered in connection with the installation, operation, and maintenance of this equipment.
Should additional information be desired contact the Allis-Chalmers Mfg. Company.

ALLIS-CHALMERS MFG. CO.

ALLIS-CHALMERS MANUFACTURING COMPANY

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FOR
INSTRUCTION BOOK BWX-6631

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SECTION - S

CAUTIONS TO BE OBSERVED IN THE INSTALLATION, OPERATION, AND MAINTENANCE OF AIR MAGNETIC CIRCUIT BREAKERS

1. Examine breaker when delivered and report any SHIPPING DAMAGE.
2. Breaker shipped TIED in CLOSED POSITION.
3. Remove SHIPPING BRACES and FASTENINGS.
4. Hoist breaker only with SPREADER - avoid SHORT HITCHES.
5. Store to keep breaker and barrier stacks CLEAN and DRY.
6. Operating power LEADS must be large enough to avoid VOLTAGE DROP.
7. Before adjusting or repairing, disconnect breaker from all sources of POWER and see that breaker is OPEN.
8. Unbolt ARC RUNNERS AND ARC CHUTE SUPPORT before tilting arc chutes.
9. Barrier stacks require SPECIAL HANDLING to avoid damage.
10. Avoid CLEANING FLUIDS detrimental to insulation or paint.
11. Keep GRAPHITE off insulation under penalty of replacement.
12. Do not dress Silver Contact Surfaces.
13. Do not close energized breaker with MANUAL CLOSING DEVICE.
14. Reconnect ARC RUNNERS AND ARC CHUTE SUPPORT before ENERGIZING breaker.

PART 1 - INTRODUCTION

1.1 GENERAL

Allis-Chalmers power circuit breakers are the products of advanced research and design. They are precision electrical equipment, tested to current ASA, EEI, and NEMA Standards, and manufactured in accordance with highest standards.

1.2 PROPER CARE IS ESSENTIAL TO GOOD SERVICE

The successful operation of this circuit breaker depends on proper installation and maintenance as a complement to quality design and fabrication.

The information and instructions included in this book are to aid you in installing and maintaining these units so that you will obtain the highly satisfactory service of which they are capable.

The following numbering system has been adopted for ready reference in this instruction book:

1.2 - Refers to Section #2 of Part 1

4-220 - Refers to Item #220 on illustration marked Figure 4

Please pass this information along to your engineers, erection personnel, and servicemen who will then be better able to aid you in realizing the best service from this equipment.

1.3 INSPECTION AND SHIPPING

During assembly and when circuit breakers are completed, they are subjected to a series of tests and inspections. Packing is expertly done to assure maximum protection during shipment.

1.4 RECEIPT

Upon receipt of the circuit breaker remove all packing traces and examine the breaker and auxiliary equipment carefully to see that no damage has occurred during transit. If any injury is disclosed, a claim for damages should be filed at once with the transportation company and the Allis-Chalmers Manufacturing Company notified.

1.5 STORAGE

If the breaker cannot be set up immediately in its permanent location, and it is necessary to store the equipment, it should be kept in a clean dry place and protected from dust, the action of corrosive gases, from coal combustion products, etc., and from mechanical injury.

1.6 REMOVE SHIPPING SUPPORTS

This circuit breaker has been shipped locked in the closed position. Packing braces that were installed to hold moving parts stationary in transit, must be removed. Fastenings installed to hold moving components of auxiliaries in closed position during transit must be removed.

1.7 HANDLING

In moving a circuit breaker after shipping crates or supports have been removed, and in handling the breaker with a crane or hoist, hooks should be attached only to special supports provided for the purpose and a spreader used where necessary to prevent distortion of frame members. Avoid short hitches which could place too much strain on parts of the breaker such as bushings, insulating parts, fittings, etc., which are not designed primarily for structural strength.

1.8 PRE-INSTALLING SERVICE

Circuit breakers are completely set up, adjusted, and tested at the factory. However, since there are possibilities that adjustments or fastenings may have become loosened during shipment, storage, and installation, they should be checked thoroughly and corrected where necessary as described hereinafter before energization. The breaker should be operated several times manually at first, and then electrically, prior to and after installation in position before the breaker is ready for service.

Bushings and other insulating parts should be clean and dry. All contact surfaces should be inspected to see if they are clean and smooth. (Do not dress silver surfaces.)

PART 2 - INSTALLATION

2.1 GENERAL

Although the circuit breaker was completely adjusted, tested and packed for maximum protection in transit, it is necessary that adequate steps be taken to prepare the unit for installation.

2.2 REMOVE SHIPPING BRACES

Breaker is shipped in closed position. Remove all shipping braces and fastenings used to hold trip latch (4-27)* and other moving parts of breaker and auxiliaries.

2.3 PREPARE BREAKER FOR INSPECTION

Prepare breaker for installation inspection and servicing outside of cubicle. Remove phase barriers (see Section 6.3a) and tilt back arc chutes to expose interior of breaker (see Section 6.3b).

2.4 INSPECT AND CHECK BREAKER

Examine for any moisture, dirt and other foreign material, which could impair optimum breaker performance.

Close breaker with maintenance closing handle (see photos). Watch operation of operator linkages and contacts carefully. Contacts should mate properly but need not make at same time on all phases. Trip manually (1-43).

Operate breaker several times electrically to check for smooth operation.

Tilt arc chutes to upright position (see Section 6.3b) and replace barriers (see Section 6.3a). Make certain the six blowout coil leads are reconnected and the three arc chute supports are fastened to the breaker frame (see Section 6.3b).

2.5 INSERTION MECHANISM

The breaker insertion mechanism should be checked and lubricated if necessary for proper operation to prevent jamming during insertion. The breaker should be moved into position so that it can be rolled straight into the cubicle with a minimum of friction on the wheels and guides in the cubicle.

*Numbering system is explained in Section 1.2

2.6 GROUNDING CONTACTS

Check to see that grounding fingers (1-12) on bottom of breaker will make proper contact with stationary ground bar in cubicle. Check for proper grounding contact when breaker is moved into cubicle.

2.7 MECHANICAL INTERLOCKS

Test mechanical interlock plunger (1-18) and make sure that it operates freely and has no binds nor interference.

2.8 POSITION IN CUBICLE

Move the breaker into each of its three positions in the cubicle; disconnected position, test position, and operating position. Test to make sure that breaker can be closed electrically only in its test position and in its operating position. When a switchboard has more than one of this type of the same size and rating of circuit breaker, each circuit breaker should be tried in each of the three positions in several cubicles to assure interchangeability.

2.9 OPERATE IN TEST POSITION

The breaker should be operated several times electrically in its test position to see that all parts work correctly in final preparation for its operating position. Make sure that secondary contacts of breaker are in alignment with secondary contacts in the cubicle.

Move the breaker slowly to its operating position. Check alignment of all six breaker contacts for proper engagement with the cubicle primary studs. The alignment of breaker and cubicle primary contacts should be close enough so that the contact finers on the breaker will mesh with the studs in the cubicle without jamming. In the operating position in its cubicle, the Allis-Chalmers RUPTAIR air magnetic circuit breaker is ready for energization and operation within its rating.

PART 3 - BREAKER OPERATION

3.1 GENERAL (Fig. 4)

A solenoid operator is an integral part of this type of breaker unit. (For breakers equipped with the stored energy closer, see separate instruction book.) It is mounted in the lower section of breaker and is contained within the breaker frame. The operator is furnished with a mechanically trip-free mechanism consisting of a toggle linkage so designed as to provide quick and positive tripping at any position of the closing stroke. The operator mechanism is of low inertia, capable of quick acceleration, and it is equipped with a low energy trip device and opening coil designed to provide high speed release of the trip mechanism upon energization of the trip coil.

3.2 CLOSING (Fig. 13)

Figure 13 shows the mechanism of the operator in the open position. Points "B", "F", "G", and "H" are fixed centers about which crank arms (2) and (3), link (6), trip latch (9), and prop latch (10) rotate respectively. Center "E" is a temporarily fixed center, being restrained by stop (11) and latch (9) as long as latch (9) is in position.

The closing force is applied at the toggle roll (D) by means of armature (12). The toggle linkage (4) and (5) moves towards the on-center or in-line position, thus rotating crank arms (2) and (3) counterclockwise about center "B". Movement of crank arm (2) closes the breaker and compresses the breaker opening springs (7). When links (4) and (5) reach their final position, prop latch (10) drops behind center "D" to lock the mechanism in the closed position as shown in Fig. 14. After closing the breaker, armature (12) returns to its normal position. Manual closing is as described except that armature (12) is actuated manually through the manual closing device.

3.3 OPENING (Fig. 15)

Opening of the breaker is accomplished either manually or electrically. Manually, the breaker is tripped by pushing on the trip button which in turn causes trip pin (13) to move downward, thus rotating trip latch (9) in a clockwise direction. Temporarily fixed center "E" is thereby released, enabling link (6) to rotate clockwise about center "F". Since the restraining force on opening springs (7) is now released, they act to rapidly open the breaker contacts. Reset spring (8) then acts to return the mechanism to the normal open position shown in Fig. 13. Electrical tripping is as above except that trip pin (13) is actuated by trip coil (14).

The tripping action described above can take place at any time during a closing operation, either manual or electrical, and regardless of whether or not the armature is energized. Thus the mechanism is electrically and mechanically trip-free in any position.

PART 4 - ADJUSTMENTS

4.1 GENERAL

The breaker has been completely set up, adjusted and tested at the factory. However, adjustments or fastenings may be changed or become loosened during shipment, storage or installation and should be checked and corrected, if necessary, before breaker is operated electrically. Manual operation (use maintenance closing device) of breaker should be used for preliminary operation to see that all parts are free and work smoothly. The bushings and other insulating parts should be clean and dry. All contact surfaces should be inspected to see that they are clean and smooth. (Do not dress silver surfaces). Removal of all phase barriers and removal or raising of arc chute assemblies gives access to breaker for checking adjustments.

CAUTION: NOTE THAT THE MAINTENANCE CLOSING DEVICE IS NOT SUITABLE FOR ACTUATING THE BREAKER ON ENERGIZED CIRCUIT.

The paragraphs immediately following give the proper adjustments and methods of making same on the Allis-Chalmers RUPTAIR Air Magnetic Power Circuit Breaker. Adjustment values are all listed in Appendix B attached. Note reference method - Appendix B-1 indicates item #1 in Appendix B.

4.2 TOGGLE SETTING (Fig. 4)

With the breaker closed and armature (4-4) held with maintenance closing device against pole head (4-72), the armature must push the toggle roll (4-15) to a point which will provide a clearance of $1/32 \pm 1/64$ with the prop latch (4-97), and $1/16 \pm 1/32$ clearance to stop (4-59).

4.3 OPERATOR MECHANISM MAIN LATCH AND PROP LATCH (Fig. 4)

The main operator latch (4-27) is in proper adjustment when the latch roll (4-15-A) engages it at a point $3/16 \pm 0$, $-1/16$ from the bottom edge of the latch face (4-27). Changes in adjustment are made by positioning stop screw (4-65). The latch roll stop screw (4-75) should be positioned such that the latch roll will have a clearance of $1/32 \pm 1/64$ between the latch roll and the latch face. The prop latch (4-97) is normally adjusted such that it engages the toggle roll (4-15) at a point 1/8 to 3/16 from the bottom edge of the latch. Adjustment is made by using spacers (4-99). Latch adjustments, once properly made, are permanent in nature and will not normally require readjustment in service.

4.4 AUXILIARY SWITCH (Fig. 11)

The auxiliary switch (1-15) has been adjusted at the factory and should normally not require further adjustment. However, before the breaker is placed in service a check should be made to see that the crank arm (11-10) throws approximately equal distances on either side of a vertical center line. The adjustment for throw of crank arm is made by positioning the clevis on the auxiliary switch connecting rod. After correct adjustment is made, make sure all fastenings and locknuts are secure. Each rotor (11-3) can be adjusted individually in steps of 15 degrees merely by pressing the contact to one side against the spring and rotating it within its insulated rotor housing until it

snaps into the desired position.

4.5 LIMIT SWITCH (Fig. 4)

The limit switch (4-18) is located on the front of the operator frame and contains both the "a-a" and "b-b" stages of limit switch contacts. The switch has been adjusted before leaving the factory and should require no further adjustment.

4.6 LATCH CHECK SWITCH (Fig. 4)

The latch check switch (4-1) is mounted on the bottom of the operator frame. Proper adjustment has been made and should require no change.

4.7 INTERLOCK PLUNGER (Fig. 1)

The foot lever (1-20) operates the interlock plunger (1-18) as well as the trip latch. Depressing the lever trips the breaker and raises plunger (1-18) sufficiently to release the breaker allowing it to be moved in the cubicle. The interlock is in proper adjustment when the plunger (1-18) is positioned to 1-3/4±1/16 above the floor line, and causes tripping of breaker contacts when it is raised to a level not more than 2-1/16 above the floor line. The latch tripping rod associated with the foot lever should be clear of the trip latch (4-27) by 1/32 to 1/16.

4.8 TRIPPING SOLENOID

The tripping solenoid (4-17) has been adjusted in the factory and should require no further adjustment. The travel of the trip armature should be such that slow manual actuation will trip the breaker and have 1/16" to 3/32" aftertravel. Adjustment is made by shimming the trip solenoid with washers on the mounting screws. With the coil de-energized, there should be 3/32" clearance between the trip pin and latch (4-27).

4.9 ARCING CONTACT HINGE JOINT (Fig. 3)

The arcing contact joint is in proper adjustment when each spring washer is deflected approximately 0.015 inches.

This adjustment is obtained by tightening nut (3-4) until all parts are snug fit; then tighten the nut 3/4 to 1 turn more.

4.10 CONTACT PRESSURE OF HINGE JOINT (Fig. 3)

When the hinge joint contact pressure is in proper adjustment, a pull of from 5 to 7 lbs is required to move the disconnect toward the open position. This pull is measured as follows:

Remove pin (1-46) and detach link (1-47) from the disconnect arms (3-18) and (3-19). Move the disconnect to a position just short of "contact make".

Attach a spring scale to the disconnect 10-1/2 inches above screw (3-24) and in a direction perpendicular to the longest edge of the disconnect arm. A pull of from 5 to 7 lbs should be required to move the disconnect toward the open position.

Adjustment is made by tightening (or loosening) nut (3-14).

Before attaching link (1-47) to disconnect arms (3-18) and (3-19), check contact alignment (section 4.11) and contact lead (section 4.12).

4.11 CONTACT ALIGNMENT (Fig. 3)

The horizontal pairs of main contact fingers should "make" with the moving contact simultaneously. (Note: Contacts on different phases should not necessarily "make" simultaneously).

If not already detached, remove pin (1-46) and detach link (1-47) from disconnect arms (3-18) and (3-19).

Detach arcing contact (3-10) from yoke (3-2) by removing pin (3-26). Move the disconnect toward the closed position until it just touches a main contact finger (see Fig. 3, View A-A, main contacts engaging). Dimension c should then be no greater than .020 inches.

Adjustment is made by loosening two nuts (3-22) and rotating the contact assembly. Alignment (dimension c) should be checked after tightening nuts (3-22).

Alignment is checked and adjusted on each phase separately. Be sure there are no binds between contacts (3-11) preventing proper wiping action with the disconnect arms.

Attach arcing contact (3-10) to yoke (3-2), but check contact lead (section 4.12) before attaching link (1-47) to disconnect arms (3-18) and (3-19).

4.12 CONTACT LEAD (Fig. 3)*

The arcing contacts (3-9) and (3-10) should "make" before the main contacts. Measure and adjust each phase separately as follows:

If not already detached, remove pin (1-46) to detach link (1-47) from disconnect arms (3-18) and (3-19). Move the disconnect toward the closed position until the arcing contacts (3-9) and (3-10) just touch (see Fig. 3, View A-A, arcing contacts engaging).

The shortest gap between the bottom contact fingers (3-11) and the disconnect arms (3-18) and (3-19) should be 1/4 inch plus 0, -1/32. (Dimension b in view A-A of Fig. 3). Adjustment is made by loosening or tightening nut (3-1).

Reconnect link (1-47) to disconnect arms (3-18) and (3-19) using pin (1-46).

4.13 CONTACT STROKE (Fig. 3)

Contact stroke should be checked and adjusted only when the contacts are in proper alignment (See Section 4.10).

In order to insure proper wiping action and contact pressure, the stroke of the disconnect must be maintained in proper adjustment. Check and adjust as follows:

With breaker in closed position, dimension a (View A-A of Fig. 3) on the top pair of fingers should be 1/16 plus 3/64 -0. Adjustment is made with the breaker in the open position by increasing or decreasing the effective length of link (1-47) by means of nuts (1-10). Each phase is adjusted individually.

After making the above adjustments, on all three phases, trip the breaker open and check to see that dimension d is 6 inches plus or minus 1/8 on all three phases. (On breakers with more than four contacts per phase, dimension d is still measured to the second from top contact.)

Adjustment for dimension d is made by first removing pin (1-33) on each puffer. After loosening nut (1-42), increase (or decrease) effective length of rod end (1-40) by screwing (or unscrewing) it into piston (1-44). Adjust rod ends (1-40) on both puffers the same amount. Tighten nuts (1-42), replace pin (1-33) and check dimension d.

*Contact lead should be checked and adjusted only when the contacts are in alignment (See Section 4.11).

PART 5 - MAINTENANCE

5.1 GENERAL

Safety of the operator and continuity of electric service of loads connected to circuit breakers are dependent upon proper operation of the breakers. In order to keep circuit breakers in proper order, it is recommended that a routine service inspection should be made at six month or 2000 operation intervals, whichever comes first. The actual service interval and the amount of servicing required will usually be determined by the particular conditions at the installation and will be influenced by such things as the number of operations, number of fault interruptions, cleanliness of the equipment and past experience with the equipment.

Servicing is usually intended to cover adjusting, cleaning, lubricating, tightening, inspection, tests, etc. A permanent record is usually desirable and should list for each serial number, the date, operation counter reading, general condition of equipment, and work done by serviceman.

Be sure that the breaker and its mechanism is disconnected from all electric power and that the breaker is in the open position before any maintenance is attempted.

5.2 CONTACTS

Inspect all contacts frequently, depending on severity of service. Replace badly pitted or burned contacts before they are damaged to such an extent as to cause improper operation of the breaker.

5.3 BARRIER STACKS

The barrier stacks are fragile and should be handled carefully. The barrier stacks should be inspected for erosion of the plates in the areas of the slots. The stacks should be replaced when a milky glaze is observed on the full length of the edges of most of the slots. They should be likewise replaced if plates are broken or cracked. When cleaning the breaker and cubicle, inspect for pieces of barrier stack refractory material which would obviously indicate breakage.

5.4 BREAKER TIMING

Check the contact adjustment and breaker timing, also check adjustments of auxiliary equipment and see that it functions properly. A comparison of breaker timing at any period of maintenance with that taken when the breaker was new will immediately indicate a condition of maladjustment or friction should the timing vary more than 1/2 cycles on opening or 2 cycles on closing with the same coils.

5.5 LUBRICATION

Lubrication is of the utmost importance and a special effort should be made to assure that all moving parts are kept clean and properly lubricated at all times. The disconnect hinge joint and the solenoid armature are lubricated with microfine dry graphite. Graphite should be rubbed in well and all excess carefully removed.

CAUTION: GRAPHITE MUST BE KEPT OFF INSULATION UNDER PENALTY OF REPLACEMENT, AS IT CANNOT BE SATISFACTORILY REMOVED.

Bearing pins and other moving parts should be lightly lubricated with a light film of "Aero Lubriplate" or equal. Needle bearings will in general not require frequent lubrication, but care should be taken to prevent entrance of dirt and foreign material during maintenance work. Mating surfaces of main and arcing contacts should not be lubricated.

5.6 MAINTENANCE GUIDE

Refer to the attached "Schedule of Checks and Adjustments," Appendix A, for a digest of pertinent instruction book information, a guide to simple and convenient maintenance procedures. Make adjustments to values tabulated in "Circuit Breaker Adjustment Values," Appendix B attached.

PART 6- REPLACEMENT PARTS

6.1 HOW TO ORDER

When ordering replacement parts, it is very important to give complete information. This information should include:

(1) Breaker serial number

(2) Number of pieces required

(3) Reference number

(4) Instruction book number

(5) Description of part (Use instruction book descriptions where possible)

(6) Rated voltage of all motors, relays, and coils ordered

(7) Rated amperes of all motors, relays, and coils ordered

(8) Rated voltage of breaker

(9) Rated amperes of breaker

The breaker serial number is necessary to determine the correct identity of a part; without this serial number, Allis-Chalmers Mfg. Co. cannot be sure of the correct identity of the desired parts.

If any doubt exists as to the instruction book reference or the description, a dimensional sketch of the desired part will help to properly identify it.

6.2 RECOMMENDED SPARE PARTS LIST (BWX-6631)

It is recommended that sufficient parts be carried in stock to enable operators of circuit breakers to replace without delay any worn, broken, or damaged parts. A list of recommended spare parts follows and is arranged to facilitate choosing the correct parts for the breakers involved. Two columns on this list give the quantities recommended for an installation of one to five breakers and for an installation of five or more breakers.

Ref. No.	Description	Drawing No.	Recommend for Stock 1-5 Breakers	Recommend for Stock 5 or more Breakers
1-3	Contact Finger Assembly			
	1200 Amps	71-201-738-501	2	6
	2000 Amps	71-201-458-501	2	6
4-8	Coil (Closing)	71-208-440	1	1
4-17	Coil (Trip)	71-209-234	1	1
1-21	X-Relay			
	DC (less coil)	71-307-178-501	1	1
	DC (Coil)	71-207-181	1	1
	230V AC (with coil)	W-643-201	1	1
	115V AC (with coil)	W-643-208	1	1
1-21	Y-Relay and Coil			
	125V DC	W-541-306	1	1
	250V DC	W-541-307	1	1
	48V DC	W-541-309	1	1
	230V AC	W-643-211	1	1
	115V AC	W-643-212	1	1
2-23	Barrier Stack	71-208-818-501	1	3
1-21	Silicon Rectifier Assembly (for AC close)	71-111-264-501	1	1
1-21	Surge Protector (for AC close)	W-663-301	1	1
3-10	Arcing Contact (Moving)	71-112-913-501	1	3
3-9	Arcing Contact (Stationary)	71-112-966-501	1	3
3-11	Contact Finger			
	MA-75/150 1200Amps	71-112-903-501	4	12
	MA-150 2000Amps	71-112-903-501	8	24

6.2 RECOMMENDED SPARE PARTS LIST (CONTINUED)

Ref. No.	Description	Drawing No.	Recommend for Stock 1-5 Breakers	5 or more Breakers
3-19	Disconnect Arm (RH)			
	MA-75/150 1200Amp 40KA Momentary	71-208-255-508	1	3
	MA-150 2000Amp	71-208-255-512	1	3
3-18	Disconnect Arm (LH)			
	MA-75/150 1200Amp	71-208-255-507	1	3
	MA-150 2000Amp	71-208-255-511	1	3
3-25	Washer (Silver)	71-177-196-003	2	6
3-17	Washer (Silver)	71-177-196-005	2	6
3-23	Spring Washer	71-167-537-001	6	18
3-15	Belville Washer	71-140-901-001	4	12

6.3 REPLACING PARTS

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

CAUTION: BEFORE REMOVING ANY PART, MAKE SURE THAT THE BREAKER AND ITS OPERATING MECHANISM IS DISCONNECTED FROM ALL ELECTRIC POWER AND THAT THIS BREAKER IS IN THE OPEN POSITION.

6.3a PHASE BARRIERS (Fig.1)

Lower panel (1-32) and loosen center phase screw (1-23). The phase barrier assemblies (1-5) and (1-7) can now be lifted and removed from the breaker.

6.3b TILTING ARC CHUTES (Fig. 1)

Remove phase barriers (see Section 6.3a). Remove screws (1-23), (1-37), and (1-39) on each phase and barrier (1-22). With arc chute support in place, tilt back the arc chutes.

After tilting arc chutes upright and replacing phase barriers, be sure screws (1-23), (1-37), and (1-39) are tightened securely on all three phases.

6.3c BARRIER STACKS (Fig. 1)

Tilt back arc chutes (See Section 6.3b). Remove four screws (2-2), barrier (2-1), from each arc chute. Slide barrier stack (2-23) through top of arc chute.

When sliding a barrier stack into the arc chute, care should be taken to see that the end containing the Vee-shaped slots goes in first.

APPENDIX A

SCHEDULE OF CHECKS AND ADJUSTMENTS

This tabulation is intended to serve as a ready reference for servicing of this equipment. Other items may be added as experience dictates. For a thorough understanding of the breaker, it is recommended that the instruction book be studied.

1- Breaker should be prepared for servicing outside of its cubicle. Breaker must be in the open position and disconnected from electric power. Remove phase barriers (Section 6.3a) and tilt back arc chutes to expose breaker interior (Section 6.3b). Remove screws (1-23), (1-37), and (1-39), and barrier (1-22) prior to raising arc chutes.

2- Operate breaker with maintenance closing device to check general operation and freedom of movement.

3- Visually inspect all parts during all phases of servicing.

4- If a travel recording device is available, it will furnish an excellent indication of the mechanical operation of the breaker. Refer to Section 5.4.

5- Clean all parts of breaker. An air blower is useful in removing dust from generally inaccessible places.

6- Check operating mechanism toggle adjustment per Section 4.2.

7- Check trip latch (4-27) adjustment per Section 4.3.

8- Check latch roll stop screw (4-75) adjustment per Section 4.3.

9- Check prop latch (4-97) adjustment per Section 4.3.

10- Check trip armature (4-17) aftertravel per Section 4.8

11- Check auxiliary switch adjustment per Section 4.4.

12- Check control relay for proper action.

13- Operation counter is actuated by a spring which should be adjusted for minimum force by positioning of the counter arm. Record counter reading.

14- Check trip interlock plunger (1-18) per Section 4.7.

15- Check all wiring for frayed or broken wires, tighten all terminals.

16- Check all hardware for tightness. Note that Stover locknuts are used in many places. These nuts may be identified by the slightly egg-shaped hole on one end and the parallel grooves on the corresponding face of the nut.

17- Operate breaker manually and electrically. Check operation at minimum close and trip voltage if possible.

18- If breaker is rectifier operated, refer to BWX-6494 for rectifier instructions.

19- Remove disconnect arms as a unit by removing screw (3-24) and nut (3-14). Refer to Fig. 3. Carefully inspect all contact surfaces in hinge joint. Silver washer (3-25) and adjacent surfaces should be clean and free of roughness or galling. Lubricate silver washer and mating surfaces by rubbing in microfine dry graphite used sparingly. Reassemble hinge joint. Tighten hinge joint per Section 4.10.

20- Check arcing contact hinge joint per Section 4.9.

21- Inspect condition of auxiliary switch contacts.

22- Inspect condition of control relay contacts.

23- Check contact alignment per Section 4.11.

24- Check contact lead per Section 4.12.

25- Check contact stroke per Section 4.13.

26- Check for barrier stack erosion per Section 5.3.

27- Check condition of contacts.

28- Reassemble breaker. Be sure screws (1-23), (1-37), and (1-39) are secured in each phase.

29- Check breaker in cubicle. Check general fit and line-up. Check operation of trip interlock plunger in test position and fully inserted position. Check secondary wiring fingers for good contact. Check grounding contacts for good contact.

30- GENERAL

The above points will provide a quick reference for maintenance procedures. Other items may be added as experience dictates. For a thorough understanding of the equipment, the instruction book should be studied. Refer to Part 5 for general comments on maintenance and lubrication.

APPENDIX B

CIRCUIT BREAKER ADJUSTMENT VALUES

Item No.	Breaker Component	Reference Section No.	Illustration No.	Adjustment Values
1	Clearance between toggle roll and prop latch	4.2	4-15 4-97	1/32 ± 1/64
2	Clearance between toggle roll and stop	4.2	4-15 4-59	1/16 ± 1/32
3	Point of engagement latch roll and latch face	4.3	4-15-A 4-27	3/16 + 0, -1/16
4	Clearance of latch roll and latch face	4.3	4-15-A 4-27	1/32 ± 1/64
5	Point of engagement prop latch and toggle roll	4.3	4-97 4-15	1/8 to 3/16
6	Interlock plunger above floor line	4.7	1-18	1-3/4 ± 1/16
7	Max. clearance plunger above floor line - to trip breaker	4.7	1-18	2-1/16
8	Clearance latch trip rod and trip latch	4.7	1-43 4-27	1/32 to 1/16
9	Trip armature overtravel	4.8	4-17	1/16 to 3/32"
10	Pounds-pull of disconnect blade	4.9	3-18 3-19	5 to 7 lbs.
11	Contact alignment, Dimension c, View "AA"	4.10	3—	No greater than .020

APPENDIX B (Continued)

Item No.	Breaker Component	Reference Section No.	Illustration No.	Adjustment Values
12	Contact lead, Dimension b, View "AA"	4.11	3--	1/4 + 0, -1/32
13	Contact stroke, Dimension a, View "AA"	4.12	3--	1/16 + 3/64, -0
14	Contact stroke, Dimension d.	4.12	3-11 3-18 3-19	6 ± 1/8

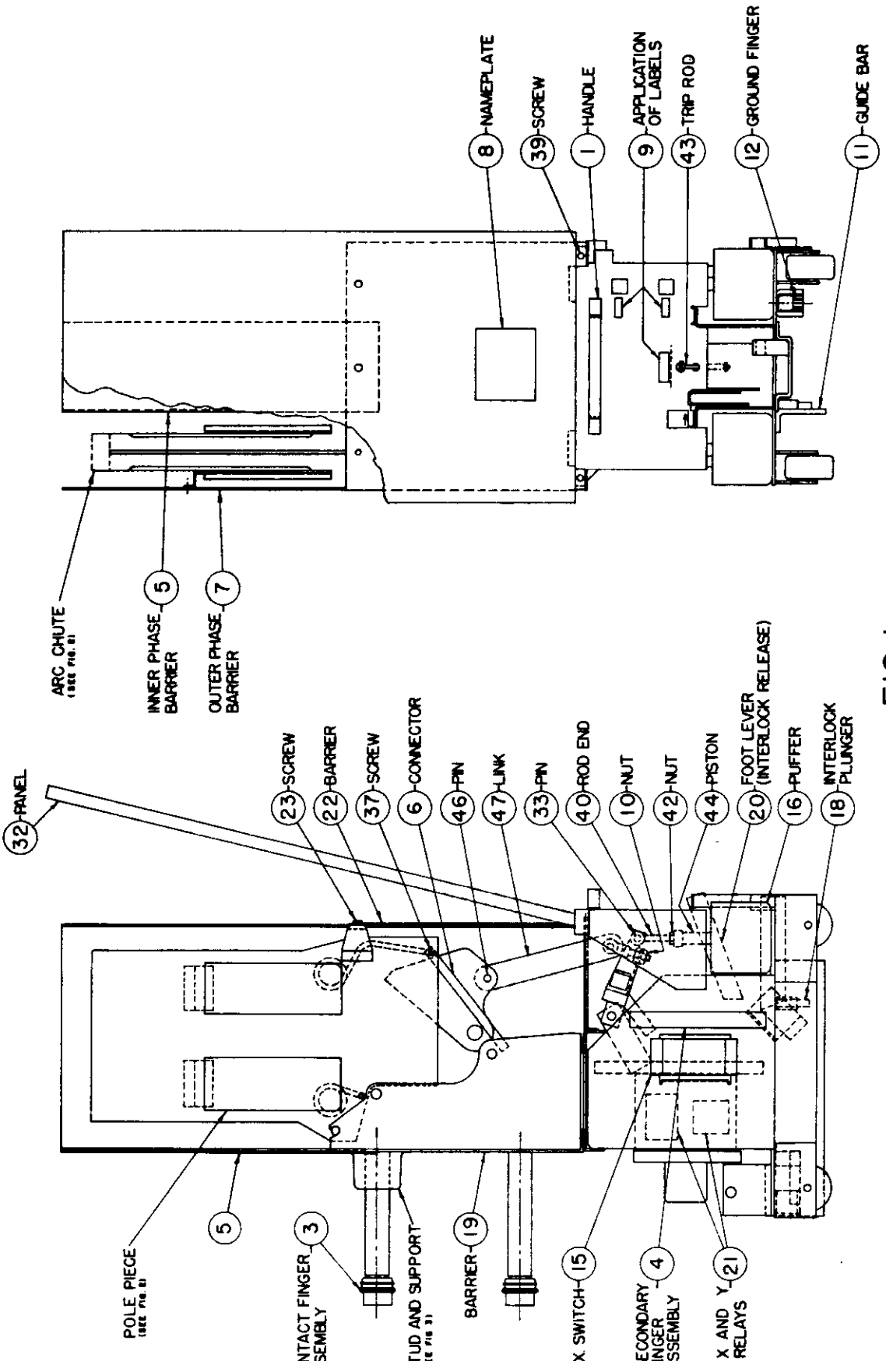


FIG. 1
TYPICAL MAGNETIC BREAKER

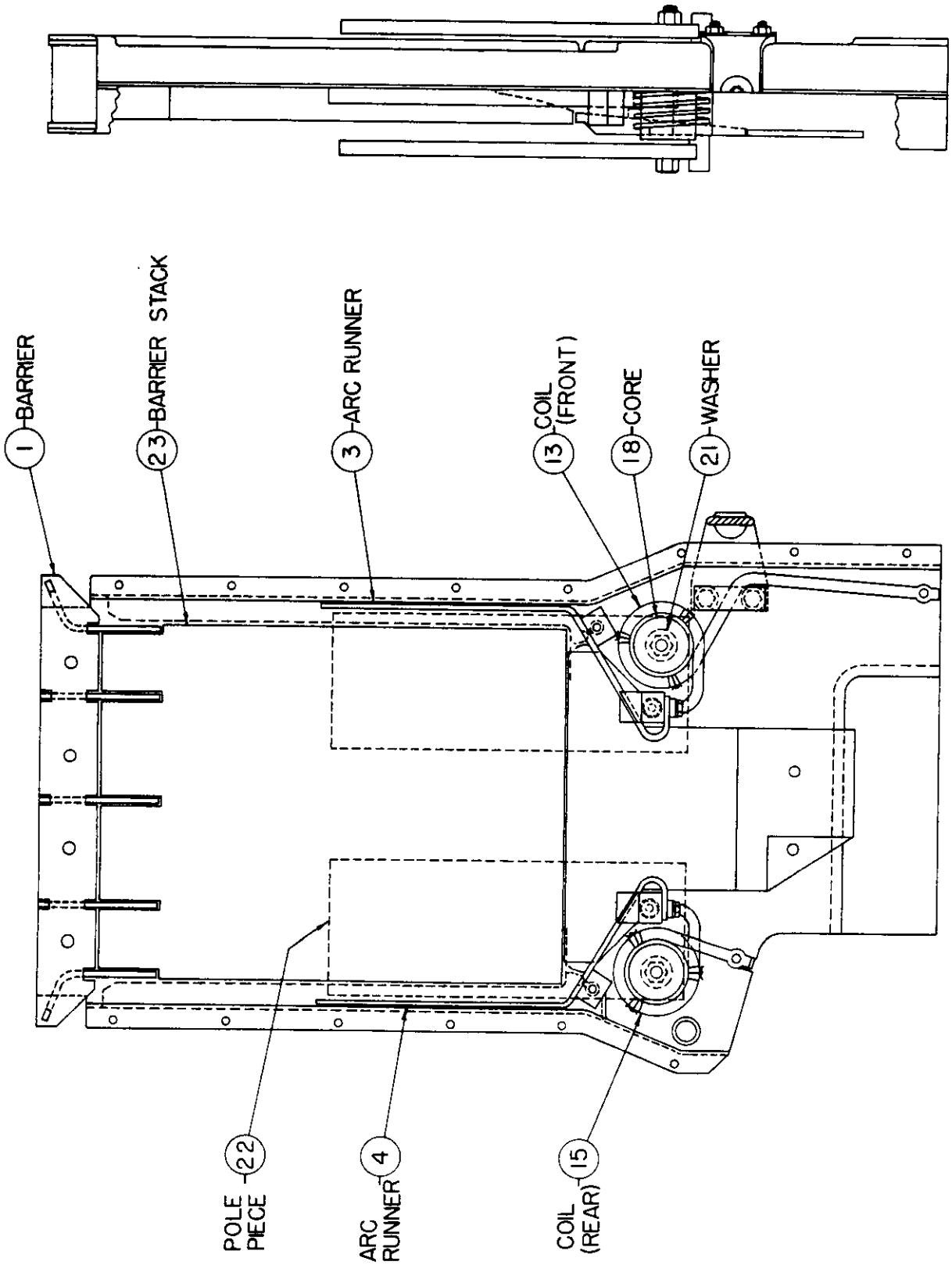


FIG. 2
TYPICAL ARC CHUTE

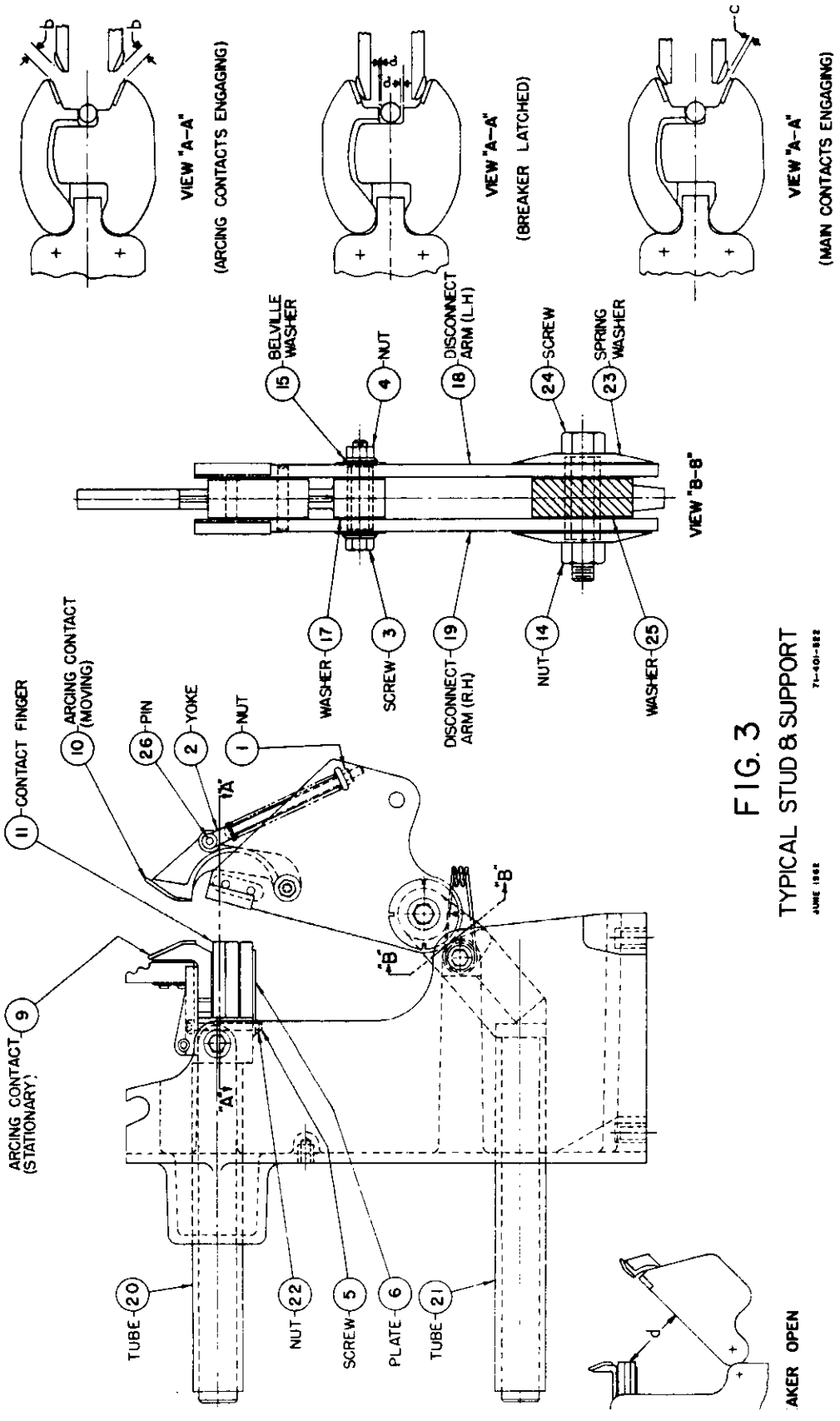


FIG. 3
TYPICAL STUD & SUPPORT
71-401-882
JUNE 1982

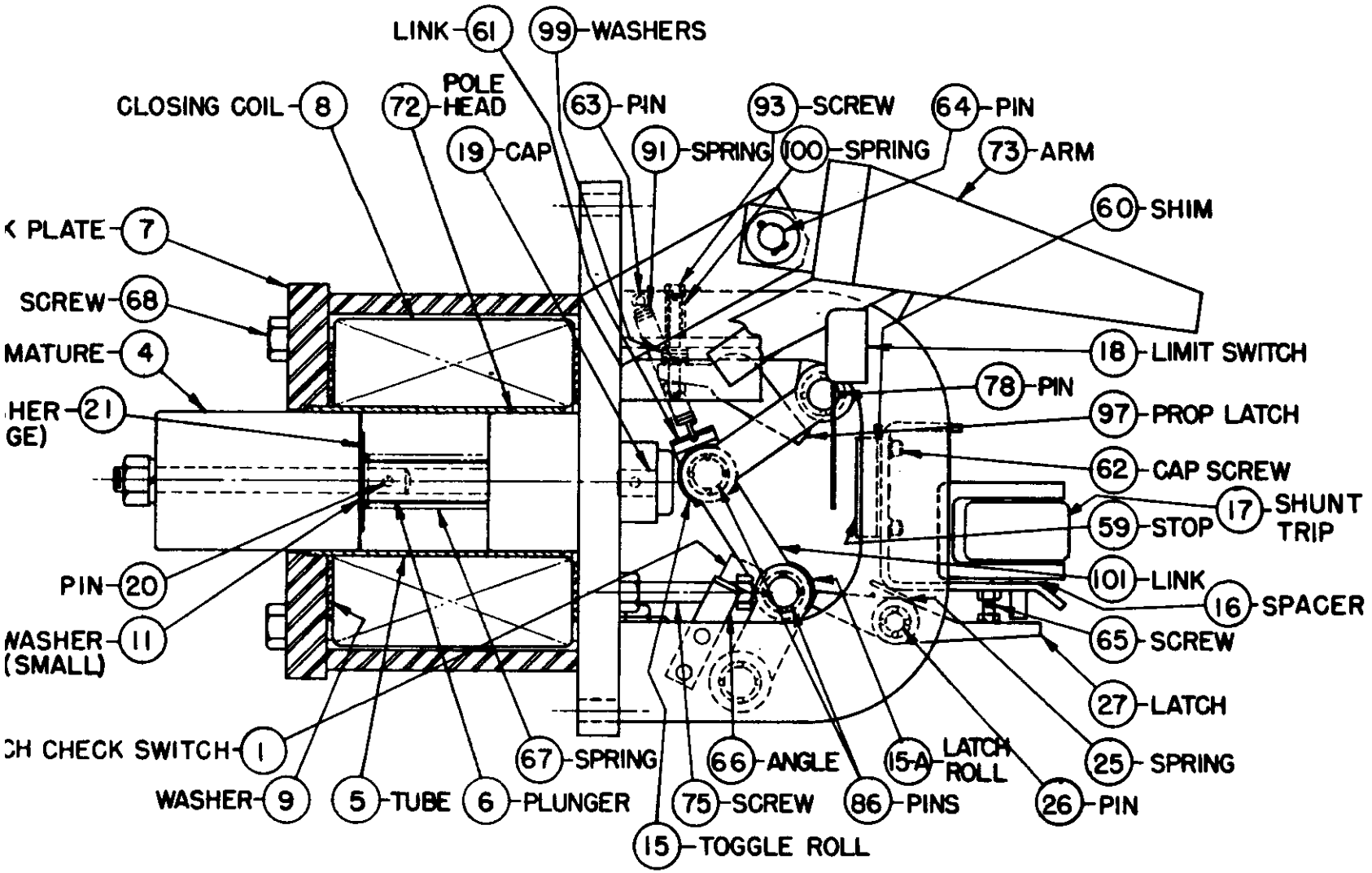


FIG. 4

TYPICAL OPERATOR ASSEMBLY

NOVEMBER 10, 1961

71-302-979

ALLIS-CHALMERS MANUFACTURING COMPANY

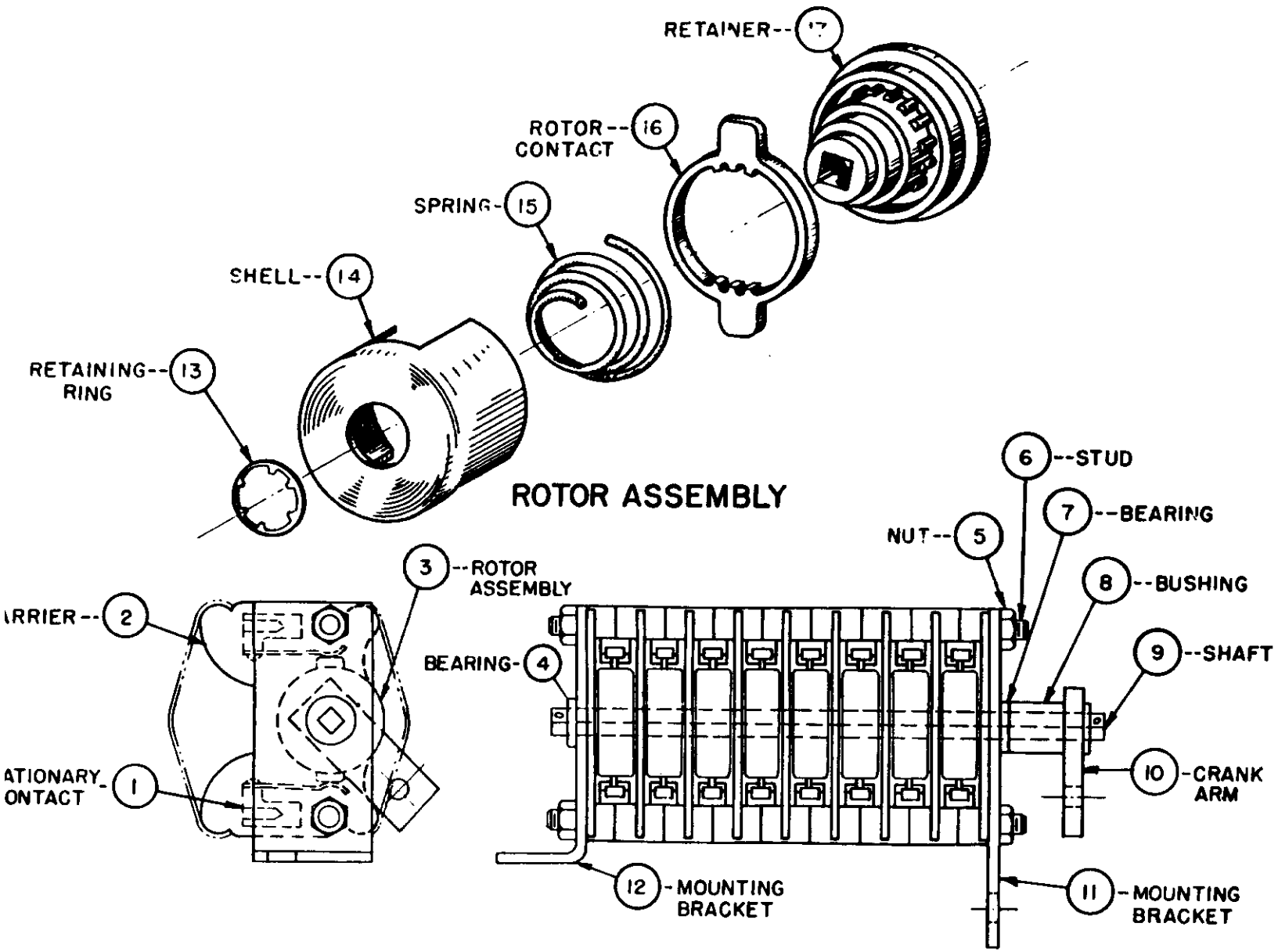
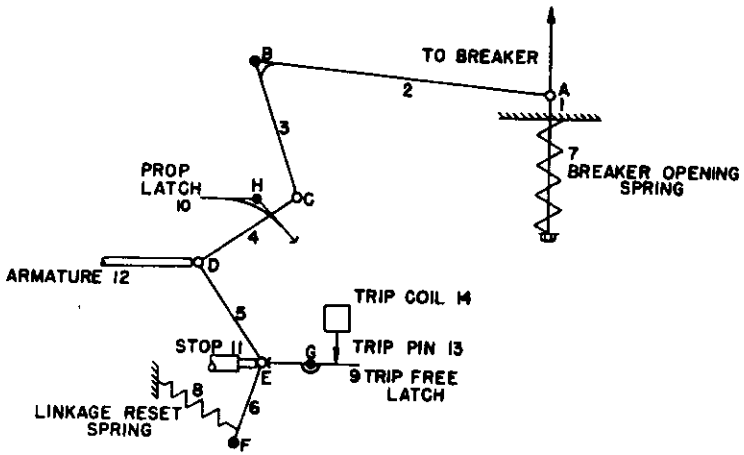


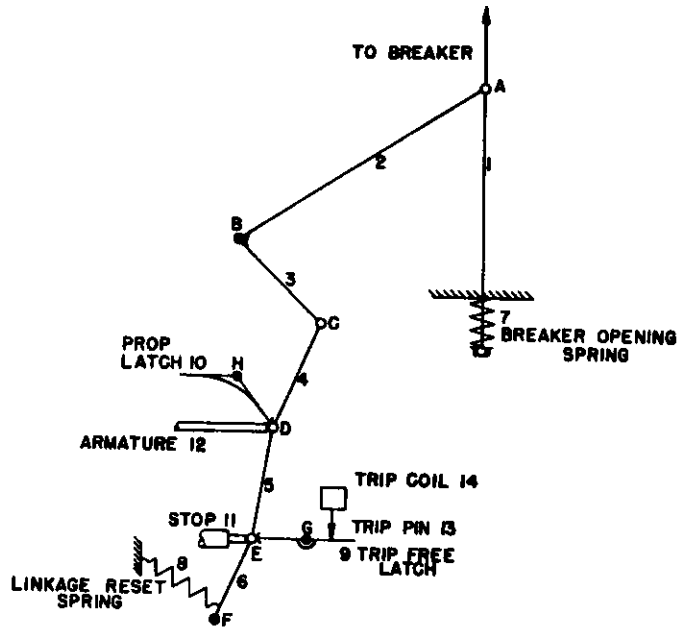
FIG. 11

TYPICAL AUXILIARY SWITCH



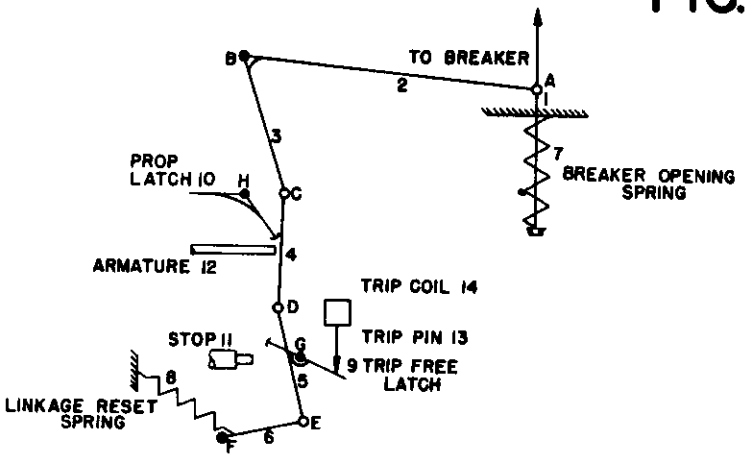
OPEN

FIG. 13



CLOSED

FIG. 14



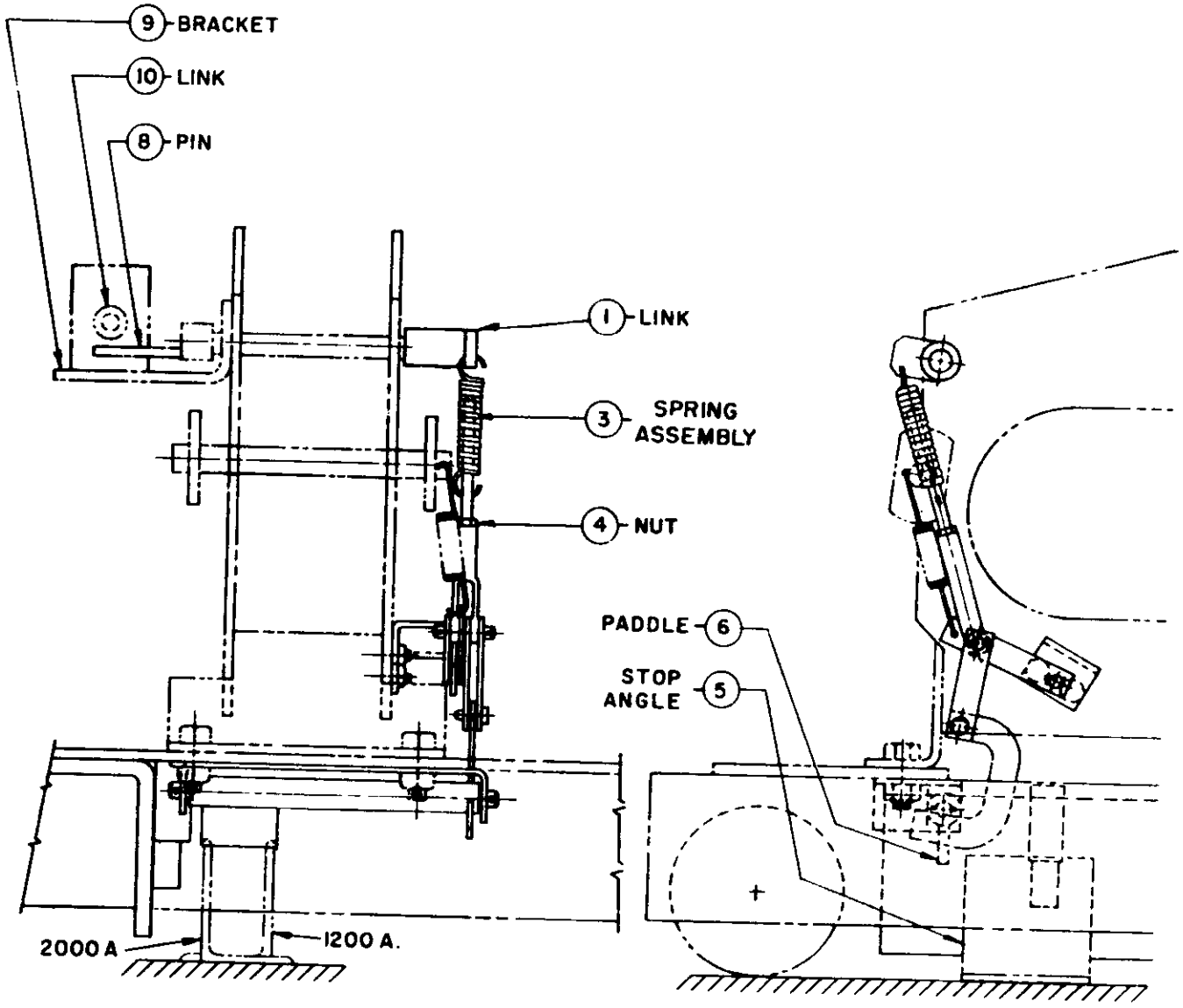
TRIP FREE

FIG. 15

TYPICAL OPERATOR LINKAGE DIAGRAM

ALLIS-CHALMERS MANUFACTURING COMPAN

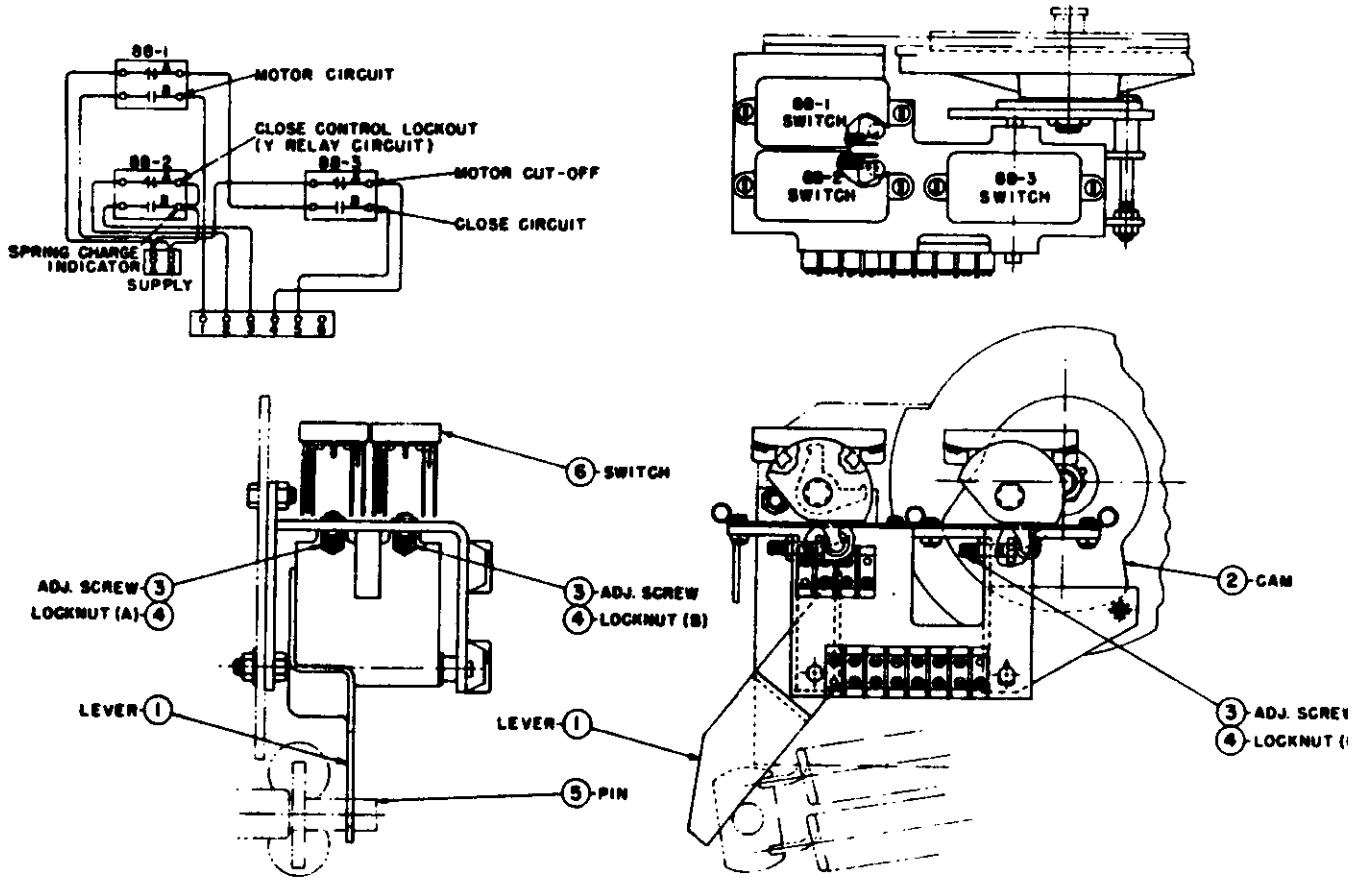
SPRING DISCHARGE



When the breaker enters or leaves the cubicle, the paddle (6) passes over the stop angle (5). Deflection of the paddle (6), thru spring assembly (3) pulls down on link (1) raising pin (8) which lifts link X (of the over toggle latch lock) releasing the closing springs.

Adjustment is by the length of spring assembly (3) thru the clevis at the lower end.

CONTROL SWITCH

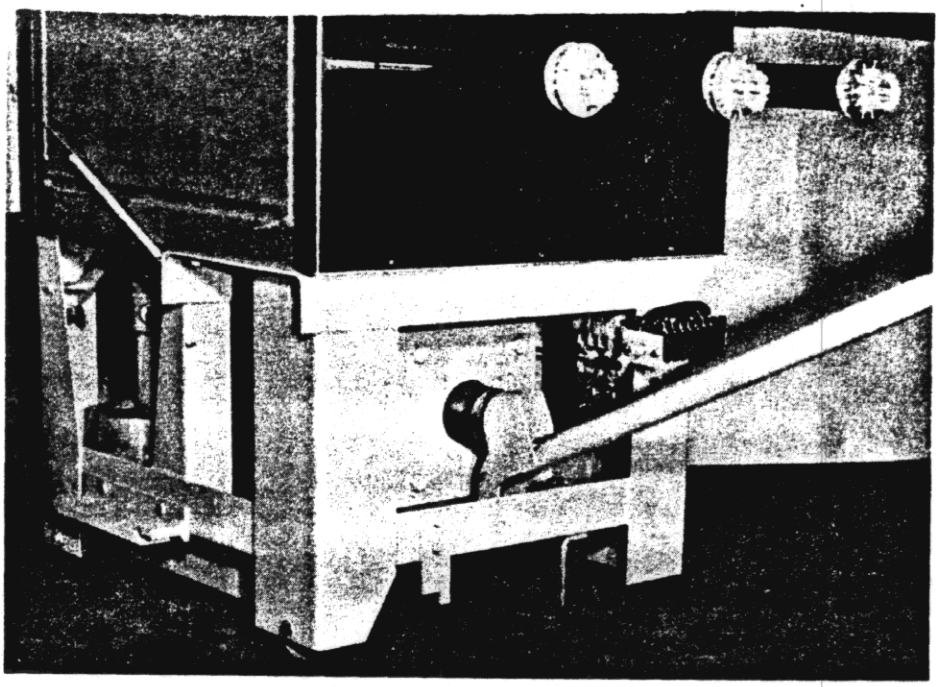


To adjust - With the hand crank, rotate the gears in charging direction until roller of 88-3 rests on the crown of cam (2). Adjust the switch by screw (3) to allow 1/32" to 1/64" over travel.

Continue charging the springs until 88-3 switch throws (near full charge). Adjust 88-1 and 88-2 switches by screws (3) to snap over.

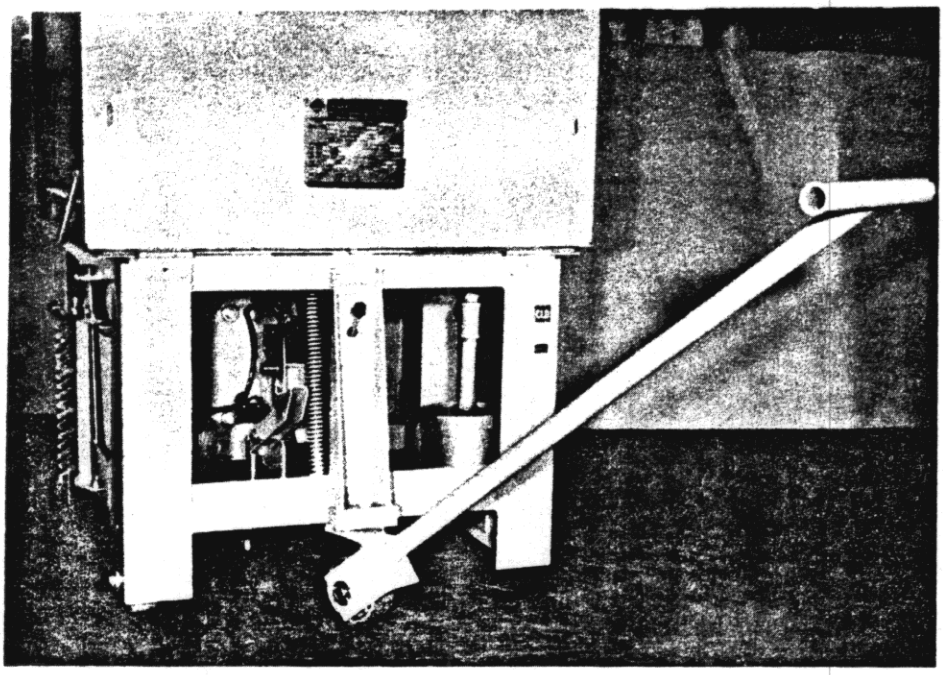
Discharge Springs - Recharge springs, by hand crank, and readjust 88-1 and 88-2 switches to throw with or after 88-3.

Illust. 205127



Manual Closing Device

Illust. 205128



Fifth Wheel