



**ALLIS-CHALMERS**

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**INSTRUCTION  
BOOK**

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TYPE "F" MOVABLE PORTION  
FC-1000A

RUPTAIR MAGNETIC POWER CIRCUIT BREAKER  
AND AUXILIARY EQUIPMENT (STORED-ENERGY OPERATOR)

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# ALLIS-CHALMERS

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FC-1000

RUPTAIR MAGNETIC POWER CIRCUIT BREAKER  
AND AUXILIARY EQUIPMENT (STORED ENERGY OPERATOR)

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## PART I. DESCRIPTION

### 1.1 GENERAL

The Allis-Chalmers RUPTAIR movable portion consists of a magnetic circuit breaker for metal-clad switchgear application, with auxiliary equipment suitably arranged for best function and easy installation. As part of standard equipment, each order is furnished with one maintenance closing device for solenoid operated breakers or a charging crank for stored energy operated units.

The RUPTAIR magnetic circuit breaker differs essentially from oil breakers and air-blast breakers in that it does not depend on any stored medium such as oil or compressed air for arc interruption. The component parts of the breaker are mounted in a structural steel frame. The operator, the operating shaft, and connecting links are mounted on the lower section of the breaker frame and are well shielded. The horizontal terminal studs, which are insulated with flame retardant tubing, extend through the breaker bracket and support the other parts of the electrical circuit. Interruption occurs within the arc chute assemblies which are mounted at the top, over the contact structures.

### 1.2 METHOD OF ARC INTERRUPTION

Interruption is accomplished in air at atmospheric pressure, with the aid of a self-induced magnetic blowout field and air draft. At the time the trip coil is energized, current is being carried through the main contacts. As the movable contact assembly separates from the stationary contact assembly, the current transfers very quickly from the main contacts to the arcing contacts, thus keeping the main contact erosion to a minimum. (For breakers equipped with tertiary contacts, the current transfers from the mains, to the tertiary and then to the arcing contacts.) As the movable contact assembly continues its stroke, the arcing contacts part, drawing a power arc, which is transferred first to the stationary end arc runner then to the moving end arc runner. The transfer of the arc to the arc runners establishes the full flow of current through the blowout coils, setting up the magnetic field which, in accompaniment with natural thermal effects of the heated arc, the configuration of the current carrying circuit, etc., tend to force the arc upward into the barrier stack. The cool surfaces of the barrier stack cool and deionize the arc, while the "Vee" slots in the stack reduce its cross section and elongate it.

The arc runners are made of wide, heavy material for maximum heat dissipation and to minimize metal vaporization. To facilitate interruption of low currents, a puffer assembly provides a movement of air through the contact area to aid the magnetic field in moving the arc into the barrier stack. All of the above effects work together to increase the resistance of the arc and enable it to be extinguished at an early current zero.

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## PART 2. ADJUSTMENTS

### 2.1 GENERAL

The breaker has been completely set up, adjusted and tested at the factory.

Adjustments should not have to be made nor fastenings tightened when the breaker is received. If there is visible damage or breakage due to shipment, storage or installation, the adjustments 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: 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.**

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## PART 3. SE-3, STORED ENERGY OPERATOR

### 3.1 OPERATOR

The stored energy operator is an operator using compressed springs to close a circuit breaker. A motor compresses the springs through a gear reduction cam and latching system. Energizing the spring release coil operates the latch to release the charged springs and close the breaker.

### 3.2 CHARGING THE SPRINGS

A motor and gear unit (4-48) rotates cam (4-34) (15-10) which drives follower roll (4-35) (15-J). Arm (4-2) (15-9) rotates clockwise compressing closing springs (4-30). When springs are charged, latch (4-18) (15-11) falls behind roll (4-54) (15-H). When cam (4-34) (15-10) clears the follower roll (4-35) (15-J), only the latch (4-18) (15-11) holds the springs charged. (See Figure 13). Cam (4-34) (13-10) continues to rotate clockwise until it hits stop (5-30) on arm (5-2).

A charging handle is furnished to charge the closing springs manually: Open the control power circuit and engage the charging handle with the coupling on the front of the motor (4-48). The springs are charged by a counterclockwise rotation of the handle. Full spring compression will be realized by an audible snap as roll (4-54) (13-H) drops back on latch (4-18) (13-11) when cam (4-34) (13-10) clears follower roll (4-35) (13-J). Continue to rotate handle until motor coupling rotates freely without load.

### 3.3 CLOSING THE BREAKER

Energizing the spring release coil (5-50) rotates arm (4-20) and latch (4-18) (13-11), clockwise, thereby releasing the closing springs. The closing springs rotate arm (4-2) (13-9) counterclockwise which pushes link (13-8) upwards while it rotates arm (13-7) clockwise about fixed center (13-F). The closing force, thus applied at toggle roll (4-55) (13-D) through roll (4-54) (13-H) moves toggle linkage (13-4) and (13-5) towards a position which is slightly over the straight line, or the on toggle position (see Figure 14). Crank arms (14-2) and (14-3) rotate counterclockwise about fixed center (14-B). Crank arm (14-2) closes the breaker and stretches the breaker opening springs. The release of the closing springs returns arm (5-2) (14-9) to its position shown in Fig. 14. Cam (5-34) (14-10) is now allowed to go by stop (5-30) and be returned, along with the motor gearing, to the initial on engaged position by spring (5-32). The motor and gear unit then returns links (14-7, 8 and 9) to their positions shown in Figure 13.

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### 3.4 MANUALLY SLOW CLOSING THE BREAKER

Manually slow closing the breaker is accomplished by manually charging the springs as described in Section 3.2 except that the charging handle is rotated only until the trip latch (4-9) (13-12) drops in front of roll (4-56) (13-E).

#### CAUTION: BEFORE CONTINUING BE SURE -

1. Cam (4-34) (13-10) is engaged with following roll (4-35) (13-J).
2. Latch (4-18) (13-11) is NOT engaged with roll (4-54) (13-H).

The breaker can now be closed by slowly turning charging handle clockwise. The breaker is fully closed when arm (4-2) (13-9) is against stop (4-16).

### 3.5 OPENING THE BREAKER

Opening the breaker is accomplished either manually or electrically. Manually the breaker is tripped by pushing on the trip button which causes the trip pin to move downward, thus rotating trip latch (14-12) in a clockwise direction. Temporarily fixed center (14-E) is thereby released, enabling link (14-6) to rotate clockwise about fixed center (14-F). Since the restraining force on the breaker opening springs is now released, they act to rotate crank arms (14-2) and (14-3) clockwise about fixed center (14-B) and open the breaker. Toggle linkages (14-4) and (14-5) collapse to their position shown in (Figure 15) if the closing springs are not charged. If springs are charged, the linkage collapses to positions shown in Figure 13. Electrical tripping is as above except that the trip pin is actuated by the trip coil (4-49).

The tripping action described above can take place at any time during a closing operation either manual or electrical, and regardless of whether the closing springs are charged or discharged. Thus the mechanism is electrically and mechanically trip free in any position.

### 3.6 DELETED

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### 3.7 MAIN TOGGLE ROLL (Fig. 5)

When breaker is in closed position with roll (5-55) against block (5-15), center of main toggle roll (5-55) should be  $3/16$  to  $5/16$  beyond line of centers of latch roll (5-56) and pin (5-3). Adjustment is made by adding or removing shims (5-8).

### 3.9 CLOSING SPRINGS

(Applicable only on the FC 1000 and FA 350 breakers). With springs discharged, there should be  $1/4$  to  $1/2$  clearance between plate (4-19) and spring washer. Adjustment is made by moving nuts (4-44).

### 3.10 TRIP LATCH (Fig. 4)

The trip latch (5-9) should engage its roll (5-56)  $1/8$  to  $3/16$  above the lower edge of the latch face. Adjustment is made by screw (4-36). Note that this adjustment affects the clearance between the trip pin (5-49A) and the trip latch (5-9) (See Section 3.12.) With the springs charged and the breaker open, the trip latch (5-9) should clear its latch roll (5-56) by  $1/64$  to  $3/64$ . Adjustment is made by screw (4-7).

### 3.11 CLOSING LATCH (Fig. 4 & 5)

The closing latch (5-18) should engage its roll (5-54)  $1/8$  to  $3/16$  above the lower edge of the latch face. Adjustment is made by screw (4-42). Note that this adjustment affects the clearance between the trip pin (5-50A) and the arm (5-20) (See Section 3.12).

### 3.12 TRIPPING AND CLOSING SOLENOID (Fig. 5)

The tripping solenoid (5-49) and the closing solenoid (5-50) action and adjustments are identical. Each solenoid has been adjusted in the factory and should require no further adjustment. If readjustment is required it should be made only when the trip and closing latch bites are in correct adjustment (see Sections 3.10 and 3.11).

The armature should move freely and have no binds. The travel of the armature should be such that slow manual actuation will trip the latch and have  $1/32$  to  $1/16$  after travel. Adjustment is made by shimming the solenoid with washers on the mounting screws.

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With the coils deenergized there should be 1/8 to 3/16 clearance between the trip latch (5-9) and the trip pin (5-49A) on the tripping solenoid, and between the closing arm (5-20) and the trip pin (5-50A) on the closing solenoid. Adjustments are made by raising or lowering the respective hex nuts (5-6 and 5-60).

### 3.13 AUXILIARY EQUIPMENT

The auxiliary equipment consists of a secondary transfer device, control relay, auxiliary switch and closing rectifier as required. These are mounted on the lower portion of the breaker. The secondary finger contacts are wired such that when movable portion is moved into test or operating position in the cubicle the finger contacts engage the stationary contacts to complete the control circuit for operation of the breaker.

### 3.14 AUXILIARY SWITCH (Figure 11)

The auxiliary switch (1-15) has been adjusted at the factory and should normally not require further adjustment. 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.

### 3.15 INTERLOCK PLUNGER (Figure 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 1-11/16 to 1-13/16 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 (4-9) by 1/32 to 1/16. Adjustment is made by changing the effective length of the yoke attaching the foot lever to the interlock plunger.

### 3.15 A SPRING DISCHARGE (Figure 4A)

During insertion and removal of the circuit breaker from the cubicle the closing springs of the operator will automatically discharge. This is accomplished when paddle (4A-6) is moved upward upon coming in contact with cubicle stop angle (4A-5). This, in turn, (Figure 4) disengages closing latch (4-18) from latch roll (4-54) allowing closing springs to discharge.

If adjustment is required, proceed as follows:

Remove circuit breaker from the cubicle. Be sure closing springs are discharged. With paddle (4A-6) in the vertical position (as shown) remove cotter pin (4A-7). Remove rod (4A-3) from link (4A-1). Loosen nut (4A-4). Adjust rod until there is 1/16 +1/16 -0 clearance between pin (4A-8) and arm (4A-2) as shown. Insert rod (4A-3) into link (4A-1). Insert cotter pin (4A-7) in rod. Tighten nut (4A-4).

Charge closing springs and check automatic discharge feature as explained previously.

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### 3.16 OPERATOR CONTROL (Fig. 8)

The normal control for this operator has been incorporated in one switch assembly located at the rear of the unit. It consists of two heavy duty toggle switches (6) operated by a common linkage (4) from a motor switch cam (1) on the main charging cam shaft.

Referring to the breaker wiring diagram furnished with the installation, the 88-1 and 88-2 switches are shown with the springs discharged.

As the main charging cam rotates charging the main closing springs, the motor switch cam rotates. When the closing springs are charged the motor switch cam throws the common linkage to the 88-1 and 88-2 switch shutting off the motor.

When the closing springs are discharged the cam is freed and the reset spring (5-32) rotates the cam shaft releasing the switch which closes the motor circuit and starts the spring charge.

The 88 switch assembly is factory adjusted and pinned in position. If readjustment is required remove roll pin (2), loosen nut (3), and rotate the switch assembly clockwise as far as it will travel.

Refer to Section 3.2

Manually charge the closing springs fully. Place a 1/32 shim between one of the switch rolls (5) and arm (4). Slowly rotate the switch assembly counterclockwise until the switch roll reaches its extreme travel. Tighten nut (3).

Relocate and drill .190 diameter hole (at a convenient location) and drive in roll pin (2). Remove 1/32 shim.

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### 3.17 RESET RELAY (For Instantaneous Reclosure Service Only)

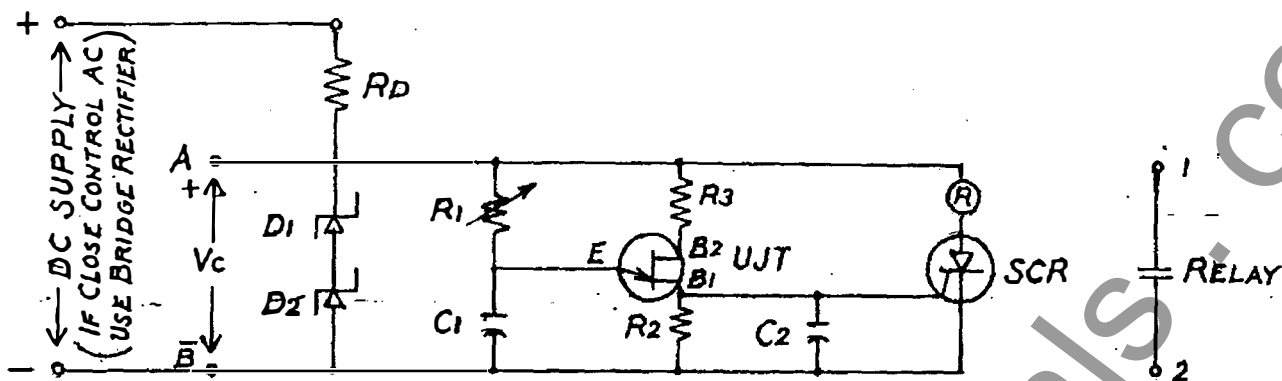
The ALLIS-CHALMERS RESET RELAY designed for use in circuit breaker control is a rugged electronic solid state time delay which operates a small relay. The relay contacts are rated at 15 amps.

The relay closing time is not affected by broad variance of voltage and current well beyond the standard circuit breaker control limits. The time delay error caused by temperature is minor being less than 3% from -20°C to +80°C and not over 5% to -40°C.

The voltage regulator and timing circuits are mounted on a printed circuit board and incapsulated in a resilient material for shock resistance.

The controlled supply voltage charges the capacitor (C<sub>1</sub>) through the time rate determining resistor R, to the triggering voltage of the unijunction transistor (UJT) which activates the SCR energizing the relay coil.

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TYPICAL RESET RELAY CIRCUIT

A constant voltage  $V_c$  is maintained across the terminals AB by the two zener diodes  $D_1$  and  $D_2$ . Resistor  $R_D$  drops the supply voltage to a value above the diode control voltage and the diodes further reduce the voltage to the control voltage value,  $V_c$ . The control voltage  $V_c$  causes the diodes to conduct and an increase or decrease in supply voltage will produce a corresponding change in the current which causes a change in the voltage drop across  $R_D$  equal to the change in supply voltage. To summarize, an increase or decrease in supply voltage will not affect the constant voltage drop  $V_c$  across the diodes. Two diodes in series are used because they provide more precise voltage regulation than one diode.

The unijunction transistor (UJT) is a switch which when turned on will allow a short pulse of relatively high current to flow and will then shut off. The terminals EB<sub>1</sub> of the UJT are an open circuit until the voltage at E exceeds a precise level  $V_f$ . In other words the UJT does not allow current to flow from point E to point B<sub>1</sub> until the UJT is turned on by the firing voltage  $V_f$ . The voltage drop  $V_c$  across the terminals AB charges the capacitor  $C_1$  through the variable resistor  $R_1$ . The time that it takes the capacitor  $C_1$  to charge to the firing voltage ( $V_f$ ) of the UJT is the time delay, and is controlled by the variable resistor  $R_1$ .

$R_1$  is preset in the factory for a delay of ten cycles and locked in place by the stem locking nut. A 5% change in resistor setting would mean a change in delay of approximately 1/2 cycle. The unit is adjustable from an approximately instantaneous to a 60 cycle delay. Any readjustment should be made using a cycle counter or equivalent for timing.

When the voltage drop across the capacitor and therefore at point E, exceeds  $V_f$  the terminals EB<sub>1</sub> act as a short circuit and the UJT discharges the capacitor through  $R_2$  and the gate terminal of the silicon controlled rectifier (SCR). That is, the UJT allows current to flow from the capacitor at point E to point B<sub>1</sub> and into the gate terminal of the SCR.

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The SCR is a latch type switch. Normally it blocks the flow of current through the relay R. When the gate terminal receives a current pulse from the capacitor discharging through the UJT, the SCR allows current to flow through the relay R. The SCR conducts even after the pulse is removed. The relay contacts R close allowing current to flow through the spring release coil circuit.

The gate terminal of the SCR is protected from random high frequency pulse by capacitor  $C_2$  which provides a short circuit to ground for these pulses. In other words the reactance of the capacitor  $C_2$  is negligible at high frequencies and the capacitor allows current to flow through it.

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## PART 4. DISCONNECT SECTION

### 4.1 BREAKER MECHANISM

The breaker mechanism consists essentially of movable contact arms and insulating links which connect the contact arms to the operator mechanism.

### 4.2 CONTACTS (Fig. 24 & 25)

The stationary contact structure of each phase is made up of three sets of contacts; main current carrying, tertiary, and arcing, which are mounted on the upper bushing stud. The movable contacts are attached to contact arms that pivot from the end of the lower bushing stud. Transfer areas of current carrying contacts are silver plated and contact surfaces are of silver-tungsten alloy. The main current carrying contacts are finger type and engage with a wiping action. The tertiary and arcing contacts are butt type. All contacts are backed by steel springs giving positive contact pressure when engaged.

### 4.2A SERVICING CONTACTS

The frequency of contact inspection depends on severity of service. Remove disconnect arms as a unit by removing screw (25-5), nut (25-10) and spring (25-12). Refer to Figure 25. Carefully inspect all contact surfaces in hinge joint. Silver washer (25-6) 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, replacing same number of spring washers that were removed, to assure proper adjustment. Replace badly pitted or burned contacts before they are damaged to such an extent to cause improper operation of breaker.

### 4.3 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 cycle on opening or 2 cycles on closing with the same coils. A hole is provided in the movable contact arm (25-14) for the purpose of attaching a speed analyzer connection.

### 4.4 CONTACT ALIGNMENT AND STROKE

The contacts are an integral part of the bushing assemblies and are carefully aligned with the upper and lower bushings before shipment and no further adjustment should normally be necessary. Check for proper contact alignment and, at the same time, for moving contact stroke by checking dimension c, View "AA", Fig. 23 between contact finger (24-3)

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In order to prepare breaker for contact lead check and adjusting, be sure that breaker is open. Disconnect the movable contact from operator link (1-47) by removing pin (1-46) and two spacers (1-45). Bring movable arcing contact (25-3) so that it just touches the stationary arcing contact (24-4) as shown in Fig. 23, View "AA", (Arcing Contacts Engaging). Measure dimension a, Figure 23, the shortest gap between the two tertiary contacts, and dimension b, View "AA", Figure 23, the shortest gap between the main contacts. Dimension a should be  $1/8$  to  $5/32$  and dimension b  $9/32$  to  $3/8$ .

If the dimensions a and b are found to be different, remove one roll pin from each plate (24-10), loosen eight screws (24-22). Insert a spacer as thick as correct dimension a between the tertiary contacts, and apply a C-clamp bearing on rear of block (24-8) and front of movable contact (25-3). Tighten C-clamp to obtain dimension b. With contacts held in this position, move two plates (24-10) back so that pins (24-16) are touching leading end of plate slots. Tighten eight screws (24-22) drill and insert pin to retain adjustment. Remove spacer, remove C-clamp, and reconnect movable contact to link (1-47).

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and plate (24-10), on each side of bushing top and bottom of each phase separately. It is not necessary that contacts touch simultaneously on all three phases.

When this dimension is found to be  $3/64$  to  $5/64$  at all four points in a phase, both the alignment of the contacts and the stroke of the moving contact of that phase are correct.

If this dimension is found to be different than  $3/64$  to  $5/64$  but all four in any phase measure within  $1/32$  of each other, it is necessary to adjust the stroke of the moving contact of that phase (see Section 4.6). If this dimension is not within tolerance, and there is a difference of over  $1/32$  among the four measurements in a phase, it is necessary to first adjust the contact alignment (see Section 4.5) and then the stroke of the moving contact (see Section 4.6).

#### 4.5 ADJUSTMENT FOR CONTACT ALIGNMENT

To adjust contact alignment, close and latch breaker. Loosen two screws (24-24) and two screws (24-25). Move top block (24-8) and bottom block (24-13) sidewise until dimension  $c$ , View "AA", Figure 23, is  $3/64$  to  $5/64$ . Refasten screws (24-24) and (24-25). Both the contact alignment and stroke will be in proper adjustment.

In the event that this exact dimension and tolerance cannot be obtained, move blocks (24-8) and (24-13) so that all four dimensions  $c$  in a phase are within  $1/32$  of each other. Contact alignment in this phase will then be in proper adjustment.

Care must be exercised in adjusting contact alignment to retain block (24-8) firmly against stop on top of stud.

#### 4.6 ADJUSTMENT FOR STROKE

This adjustment is accomplished by lengthening or shortening link (1-47) between operator mechanism and interrupter moving blade to bring dimension  $c$ , View "AA", Figure 23, to  $3/64$  to  $5/64$ . Open breaker, remove pin (1-48), loosen checknut, and adjust the length of link (1-47) by screwing rod end in or out as required to bring this dimension to within the tolerance in all four measurements in the phase. Make up checknut, replace pin (1-48) insert and spread cotter pin. The stroke should be adjusted in each phase individually.

#### 4.7 CONTACT LEAD (Fig. 23)

Contact lead is adjusted on breakers in the factory and should normally not require further adjustment. It should, however, be checked on each phase separately and only with contact alignment on the phase in correct adjustment.

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## PART 5. ARC CHUTE ASSEMBLY

### 5.1 ARC CHUTE ASSEMBLY (Fig. 1 & 26)

Each arc chute consists of a flame retardent envelope which provides phase isolation for interruption and venting of the by-product gases of interruption. The arc chute contains:

- a) The transfer stack consisting of refractory plates. It aids the transfer of the arc terminals from the stationary end arcing contact (24-4) to the stationary end runner (26-4).
- b) The stationary end arc runner (26-4) and moving end arc runner (26-3) to which the arc terminals transfer from the arcing contacts. The arc runners form paths for the arc terminals to travel up the arc chute.
- c) The stationary end and moving end blowout coils (1-24). The current in these coils creates the magnetic flux which passes through cores (1-34). The action of this flux on the arc forces the arc up the barrier stack.
- d) The barrier stack (26-23) consisting of a number of refractory plates with "vee-shaped" slots cemented together. The barrier stack cools, squeezes, and stretches the arc to force a quick interruption.
- e) Tube (26-18) encloses the barrier stacks and runners, and supports the deflectors (1-28) for outside phases, and deflector (1-29) for the center phase. The deflectors break up and disperse the ionized gases and other arc products.

Arc chutes are normally tilted (see Section 5.3) to expose contact area of breaker and/or to replace parts such as barrier stacks (26-23). The arc chutes may also be removed from breaker if necessary to replace parts not exposed when tilted by removal of pivot pins (1-7) in addition to removing fastenings per Sections 5.3 and 5.4.

### 5.2 PHASE BARRIERS (Fig. 1)

Full size barriers of high dielectric flame retardent material isolate each phase.

To remove the phase barriers disconnect springs (1-41) and tower panel (1-32) to floor. Remove bar (1-26) and then two outer phase barriers (1-5). Next remove two screws (1-13), plate (1-8), bar (1-27) and channel (1-51) in order as listed. Slide out inner phase barrier assembly (1-9). Replace parts in reverse order making certain that barriers are properly seated in their locating slots.

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### 5.3 TILTING ARC CHUTES (Fig. 1)

Remove phase barriers (see Section 5.2). Remove screws (1-37) and (1-39) on each phase. Place arc chute lifter on breaker as shown in illustration #205065. Insert 30 inch rod (furnished with lifter) through tubes in upper channels of lifter and through holes (1-17) in arc chute. Attach crank and raise arc chutes as shown in illustration #205066.

Upon lowering arc chutes, replace screws (1-37) and (1-39).

### 5.4 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.

To remove barrier stacks remove phase barriers and tilt arc chutes (see Sections 5.2 and 5.3). Next loosen two screws (1-50) and one screw (1-49) permitting tube (26-18) and deflector (1-28) or (1-29) to be removed as a unit. Note that the difference between inner and outer deflectors is the block to which bar (1-26) is fastened. This block extends beyond the rest of the deflector on the two outer phases.

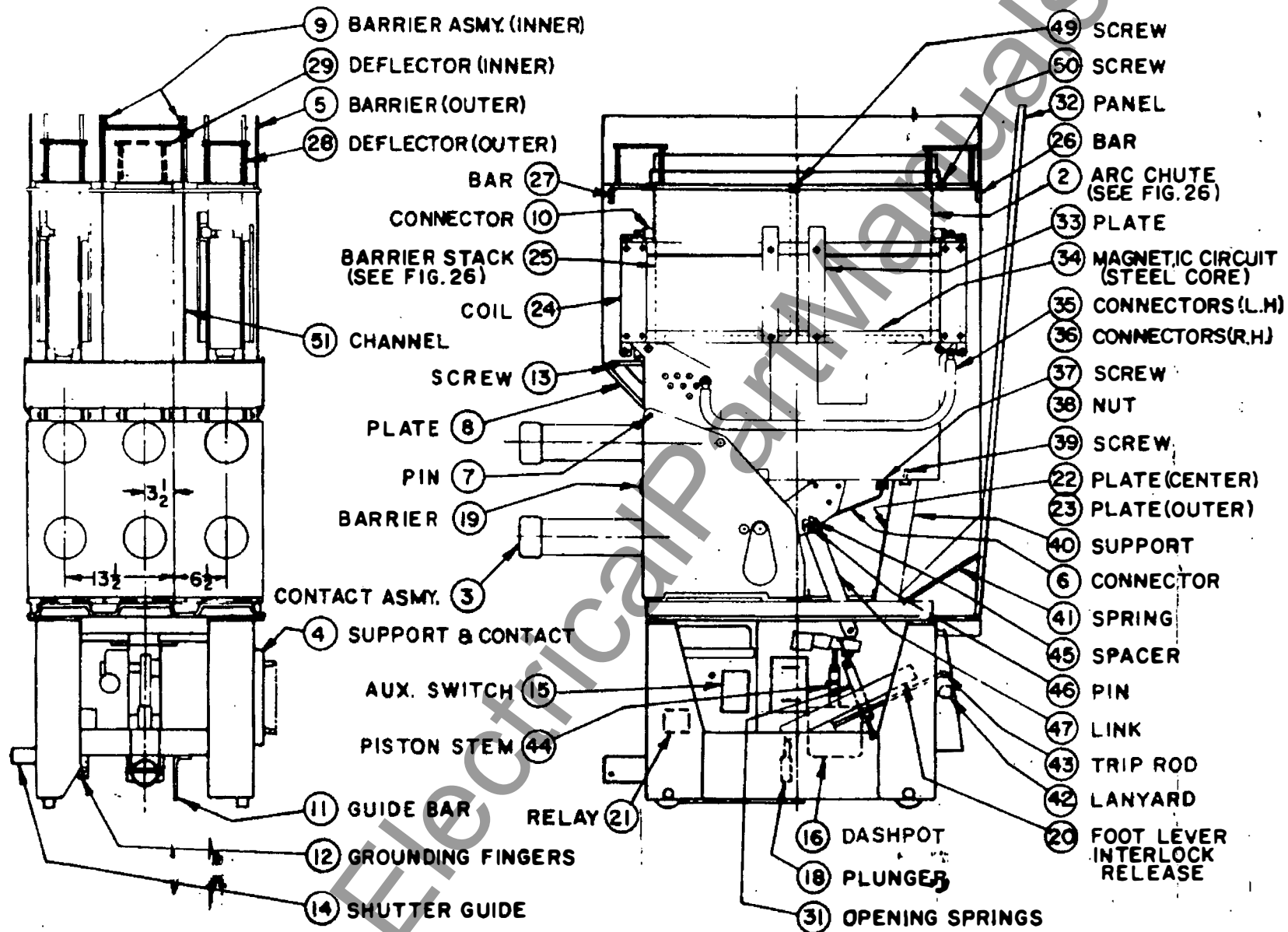
The barrier stacks (26-23) can next be removed. Care must be taken as a slotted refractory plate fits between each guide (26-7) and each arc runner, (26-3) and (26-4).

On installation make certain the "vee" slots of the barrier stack are downward and that the slotted refractory plate slips between the arc runner and its guide.

On replacing the tube (26-18) avoid any twisting which could damage parts of the barrier stack. Tighten screws (1-49) and (1-50).

Lower arc chutes and replace phase barriers as described in Section 5.3 and 5.2.

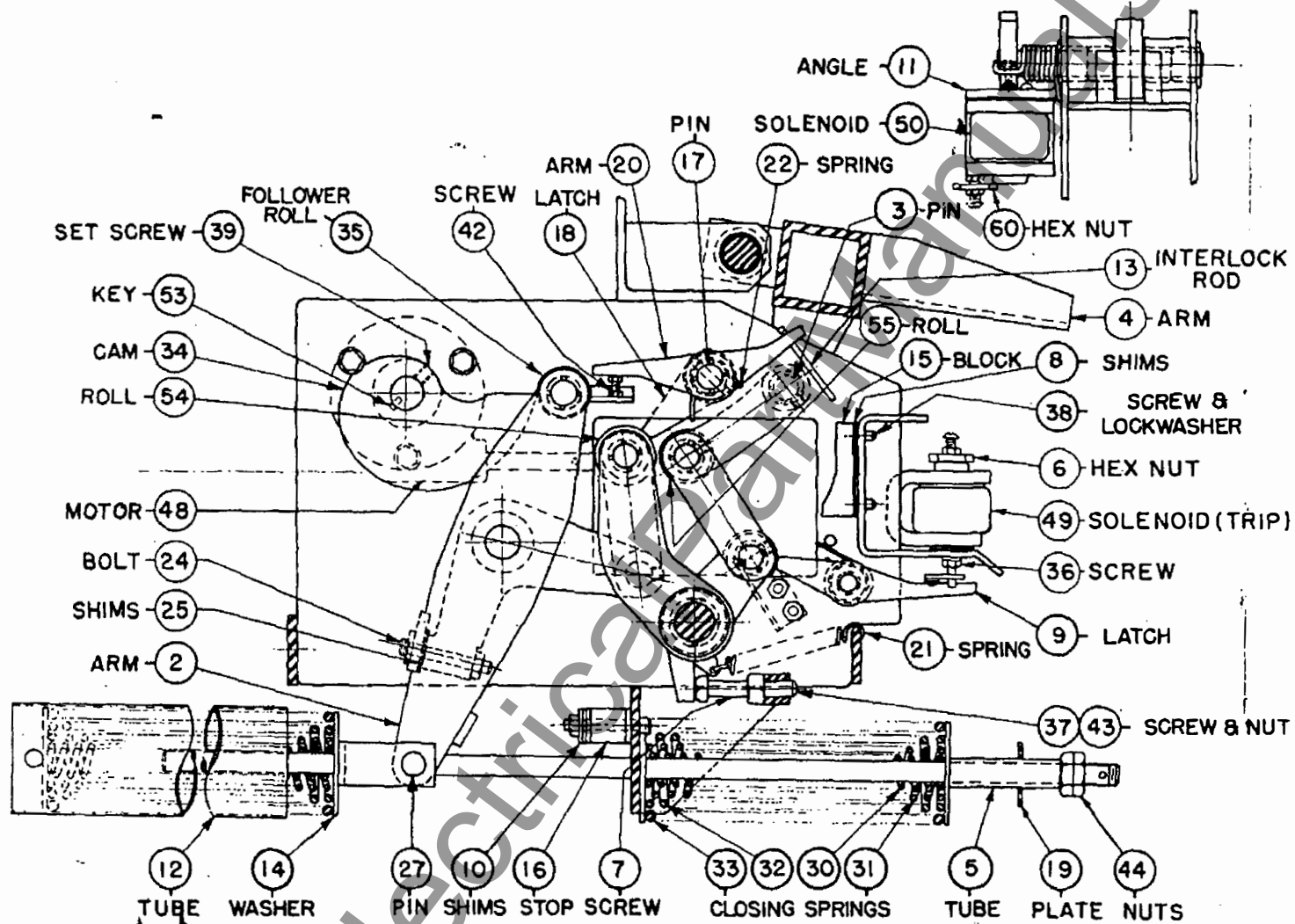
[www.ElectricalPartManuals.com](http://www.ElectricalPartManuals.com)



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**FIG. 1**  
**TYPICAL MAGNETIC BREAKER ASSEMBLY**  
 AUGUST 18, 1966  
 71-114-859-401

[www.ElectricalPartManuals.com](http://www.ElectricalPartManuals.com)



**FIG. 4**

**TYPICAL STORED ENERGY OPERATOR**  
 JUNE 20, 1962 71-303-129-401

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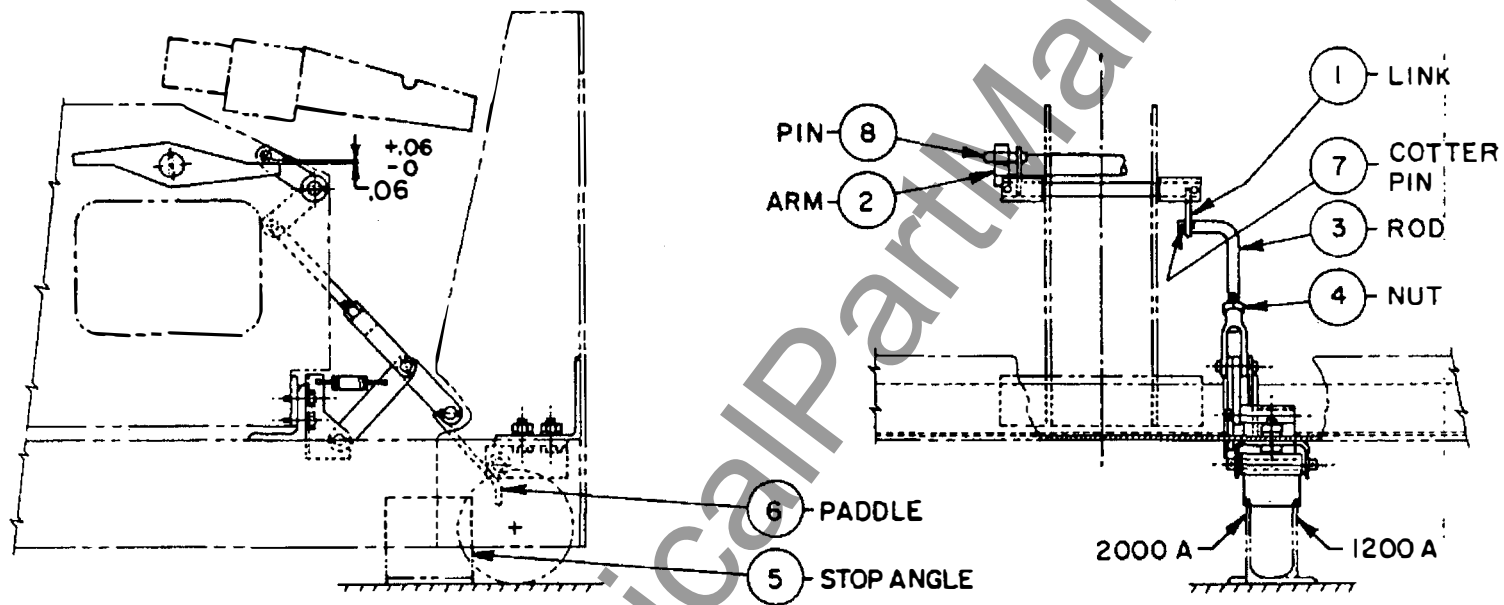


FIG. 4A

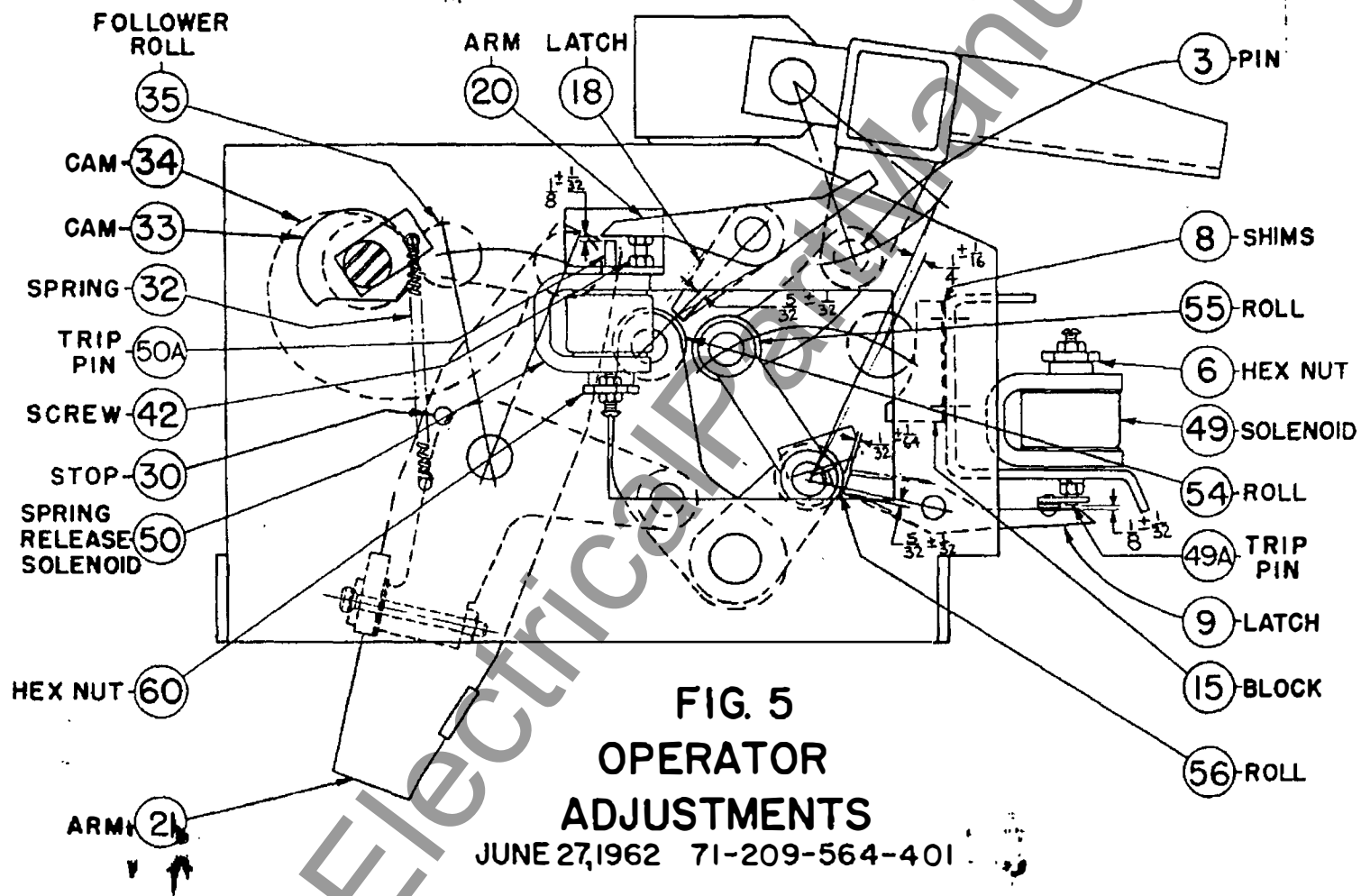
TYPICAL SPRING DISCHARGE

JUNE 29, 1967

72-220-161-401

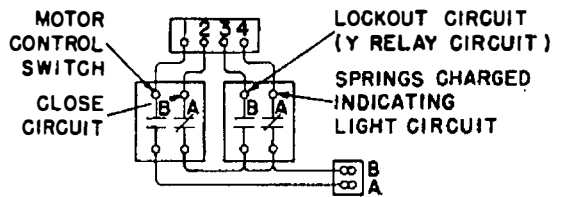
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SWITCHES SHOWN IN THROWN POSITION

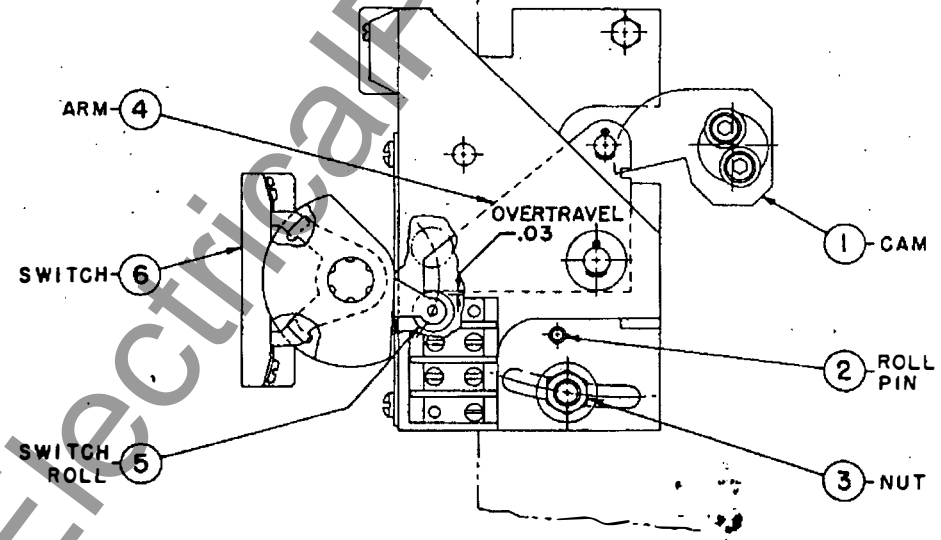
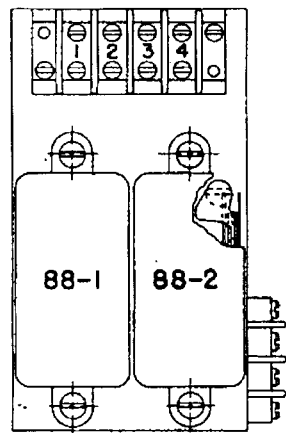
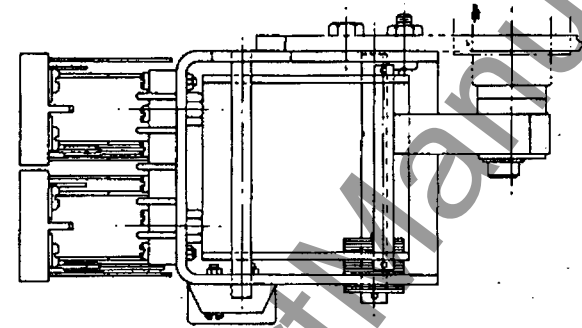


FIG. 8

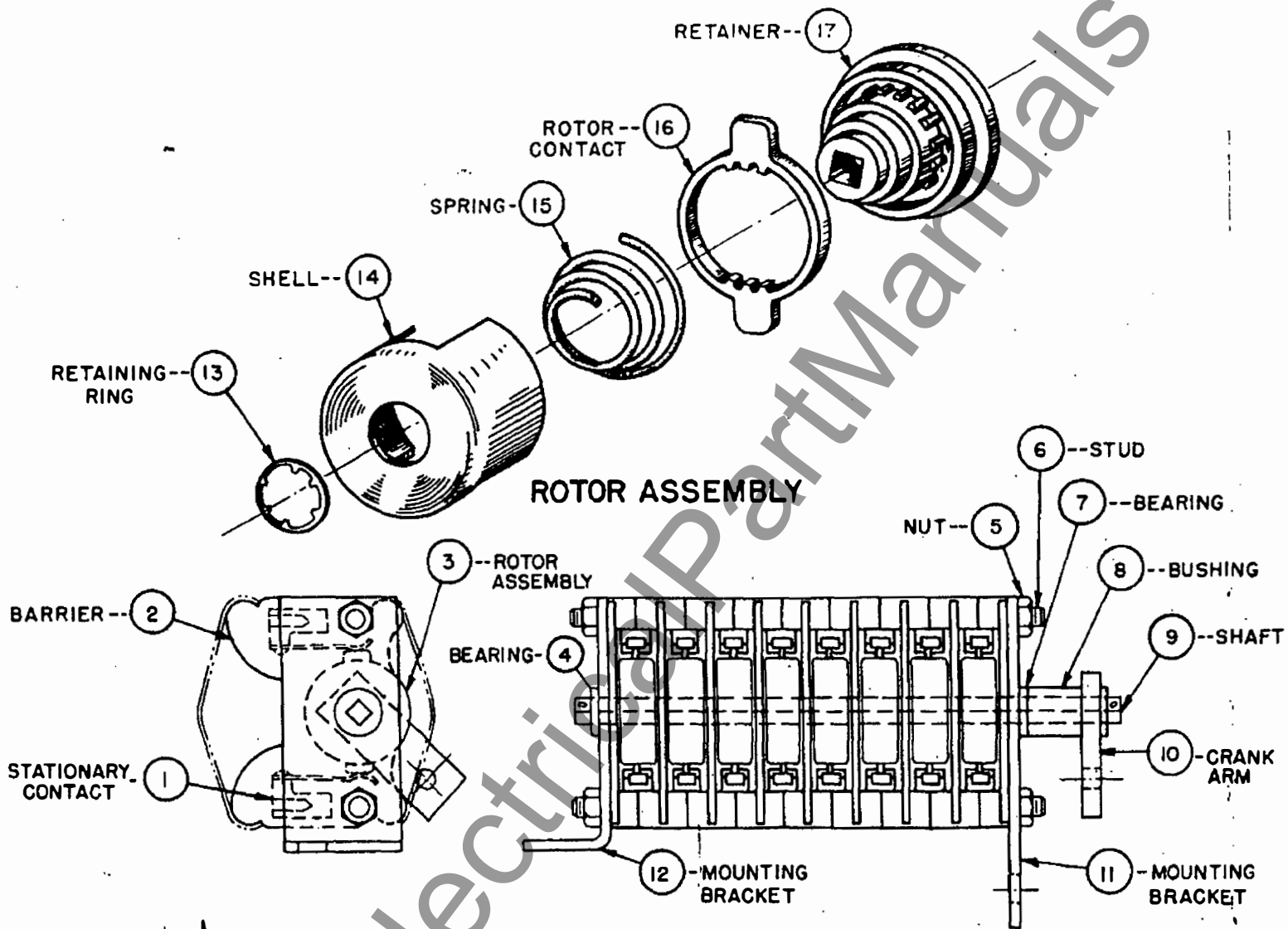
TYPICAL CONTROL SWITCH

JULY 27, 1966

72-320-033-401

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**FIG. 11**

**TYPICAL AUXILIARY SWITCH**

JULY 16, 1958

71-301-758

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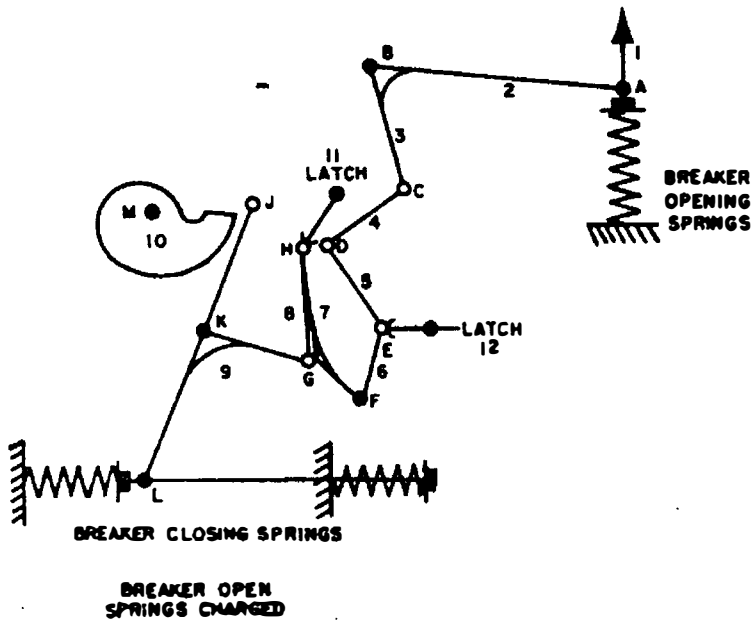


FIG. 13

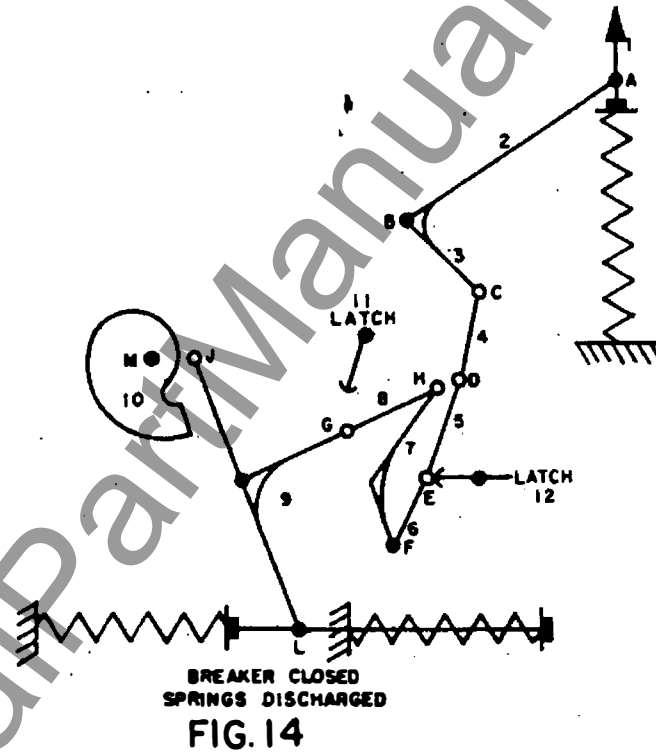


FIG. 14

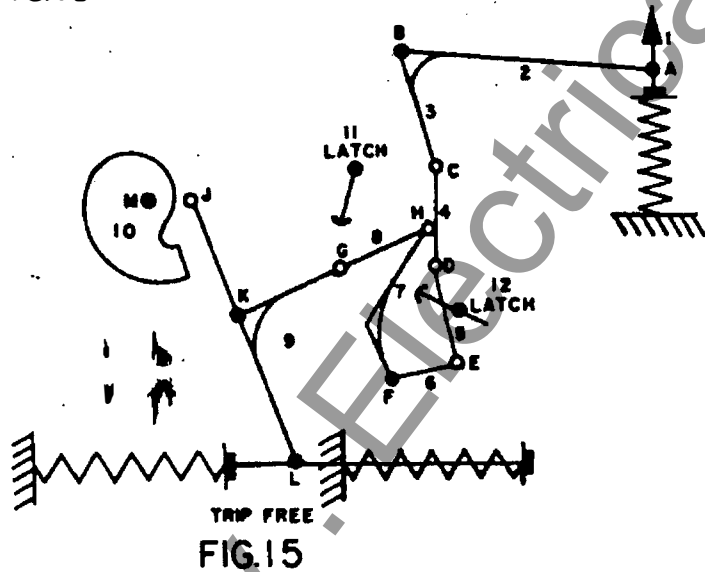


FIG. 15

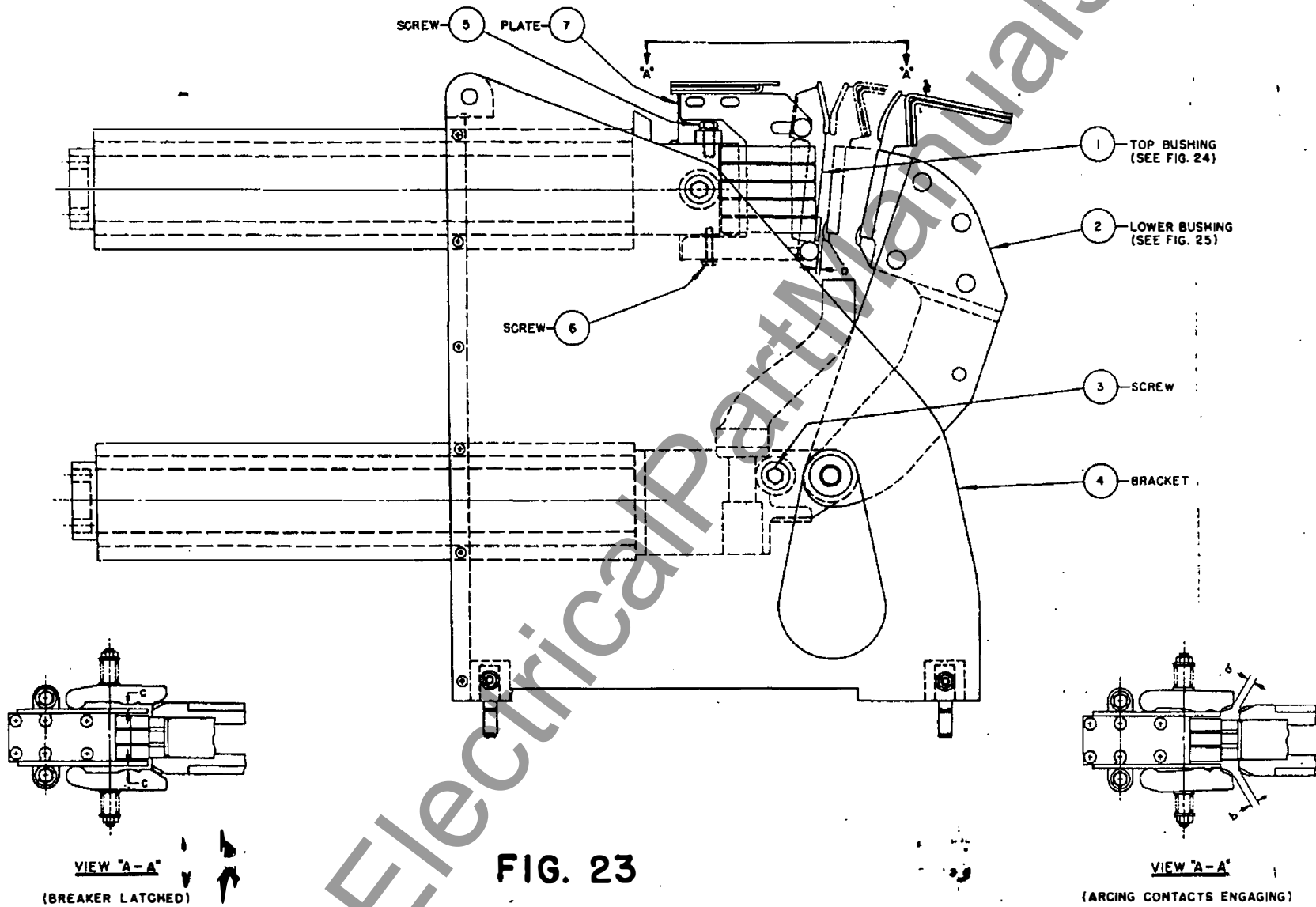
TYPICAL OPERATOR LINKAGE  
DIAGRAM

JUNE 1962

71-116-481

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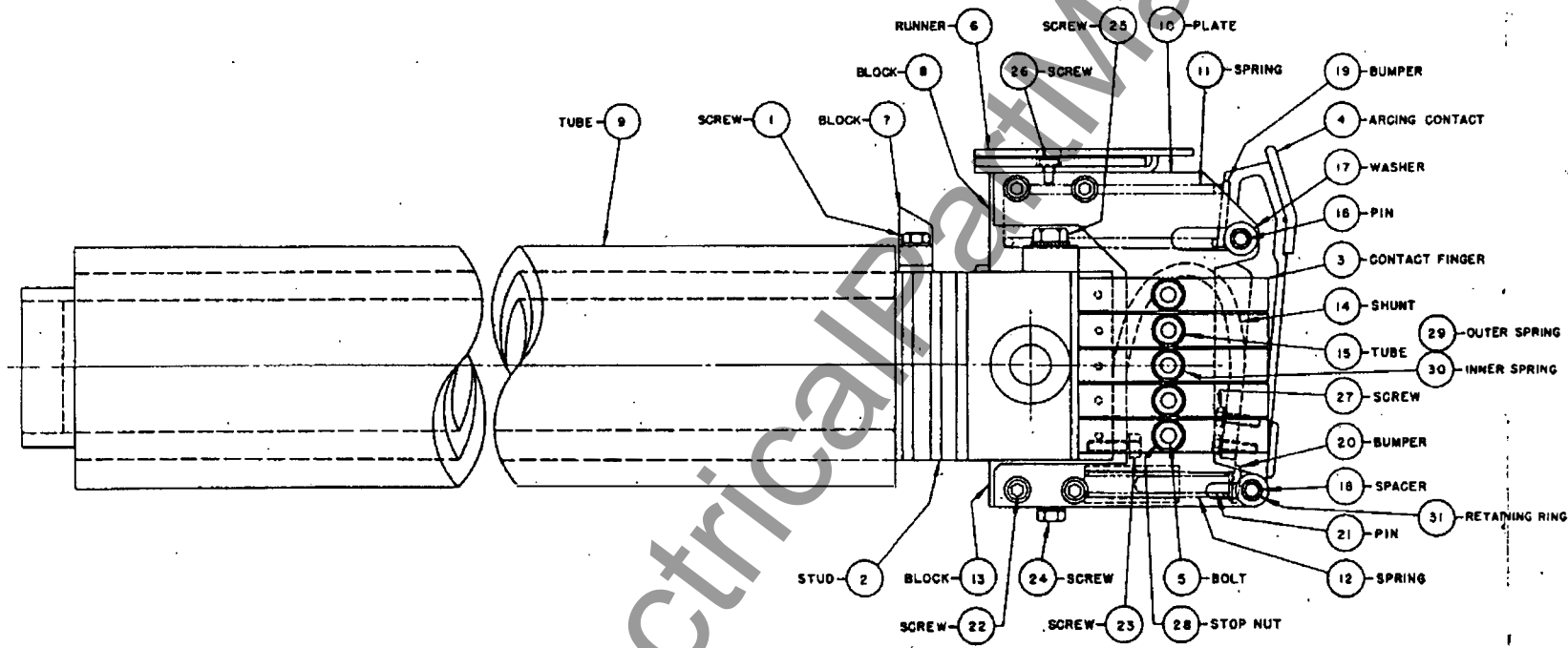
**FIG. 23**

**TYPICAL STUD & SUPPORT ASSEMBLY**

MAY 9, 1960

71-401-259

[www.ElectricalPartManuals.com](http://www.ElectricalPartManuals.com)



**FIG. 24**

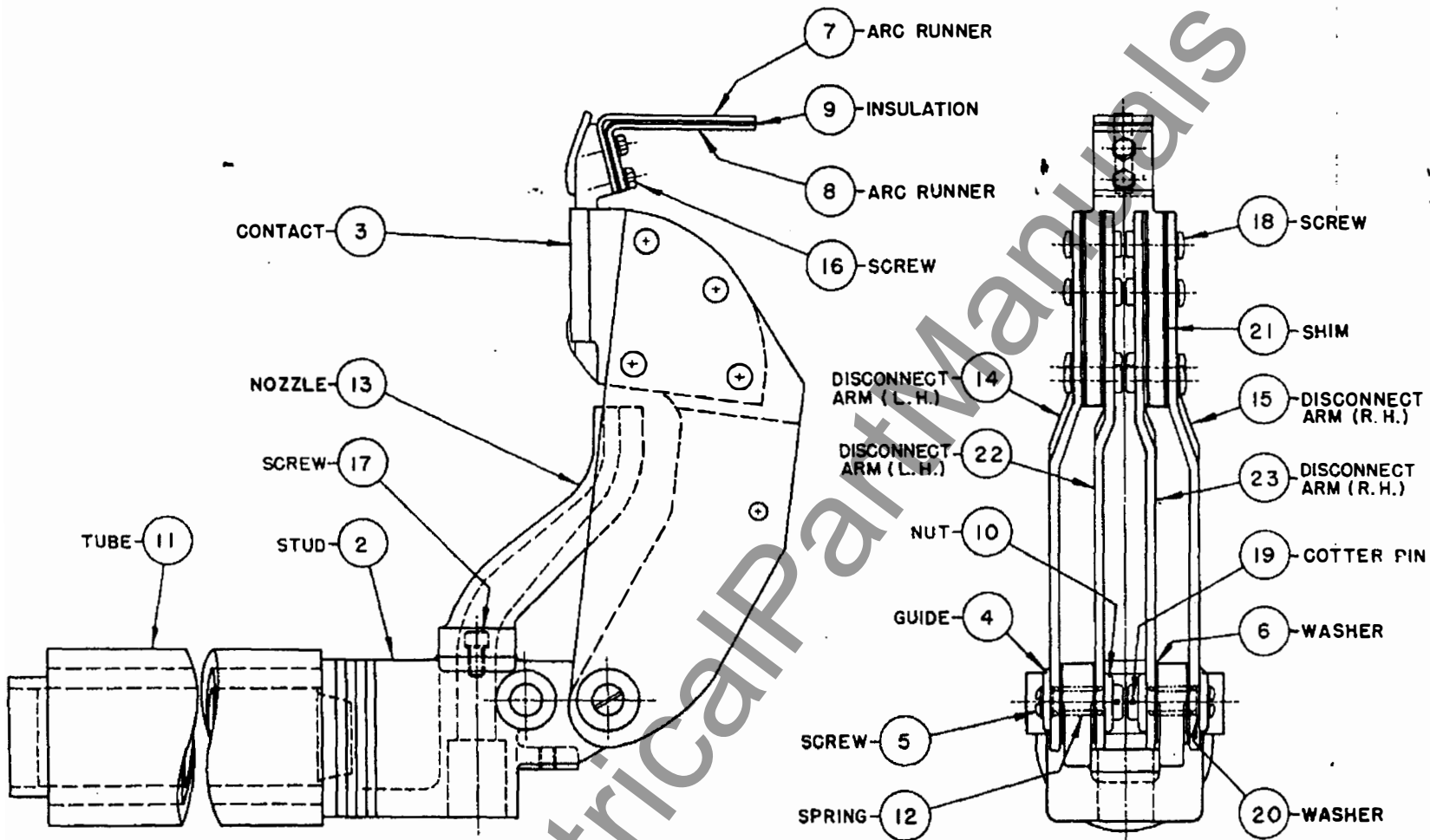
TYPICAL TOP BUSHING ASSEMBLY

APRIL 28, 1960

71-401-252

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**FIG. 25**

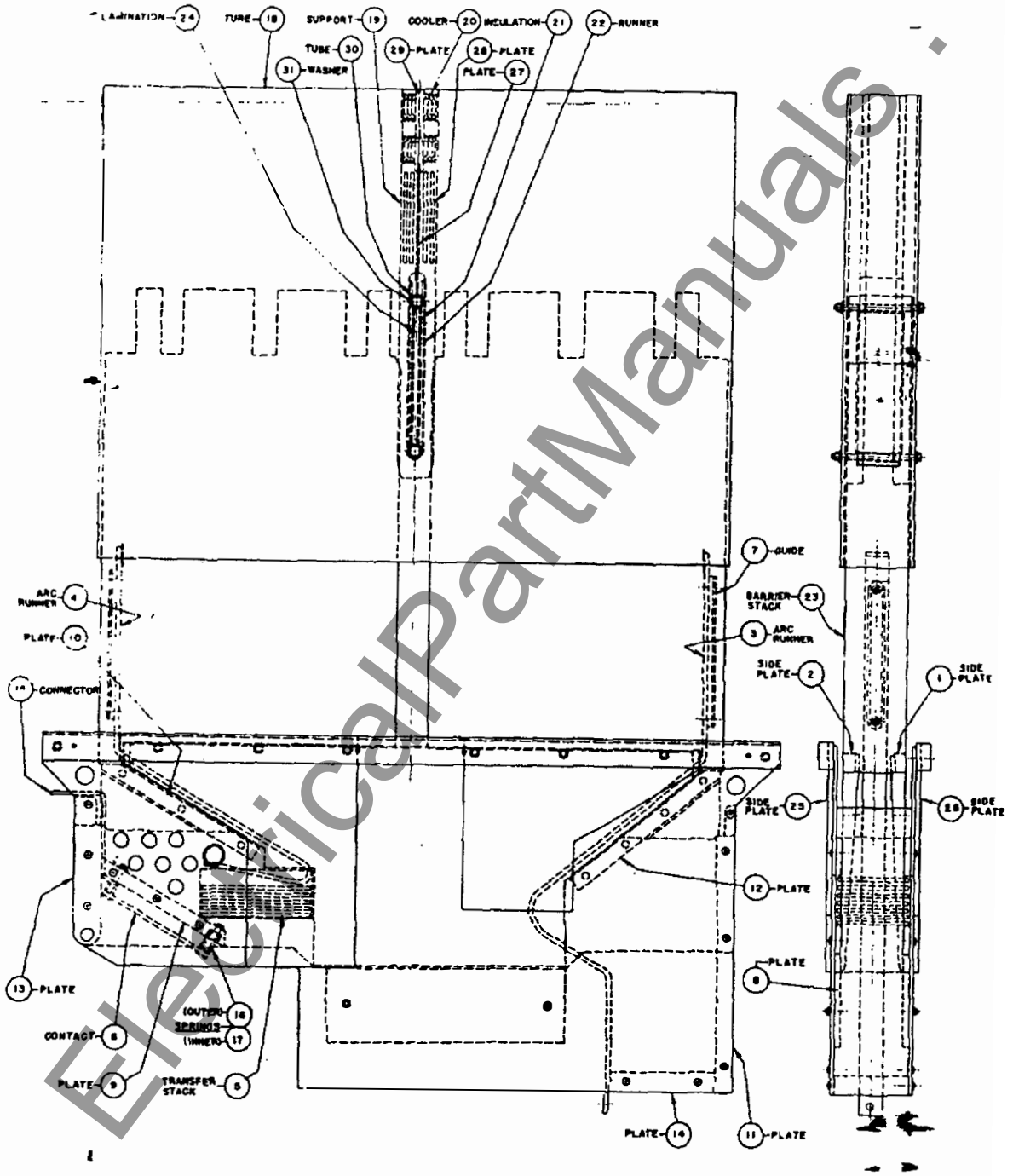
**TYPICAL LOWER BUSHING ASSEMBLY**

APRIL 29, 1960

71-302-468

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**FIG. 26**

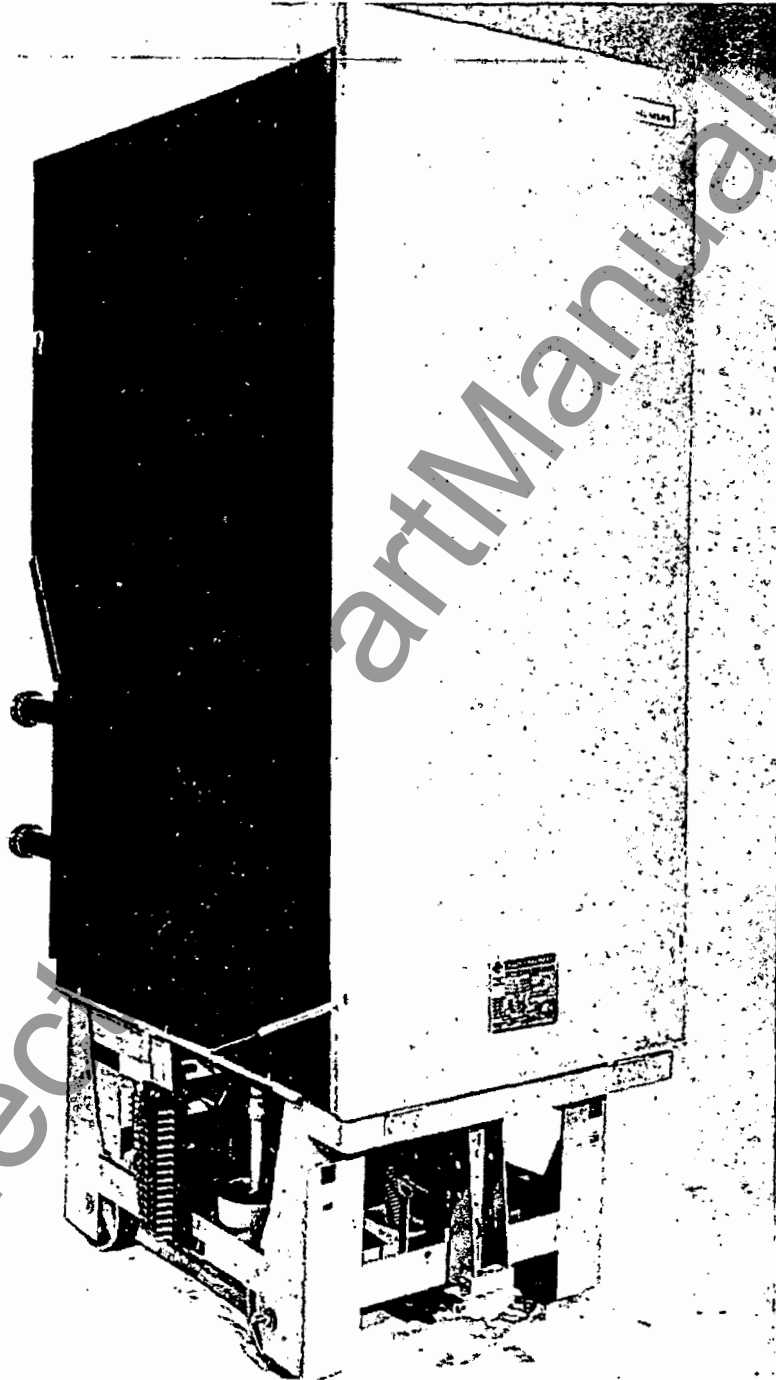
**TYPICAL ARC CHUTE**

**AUG. 16, 1961**

**71-114-858**

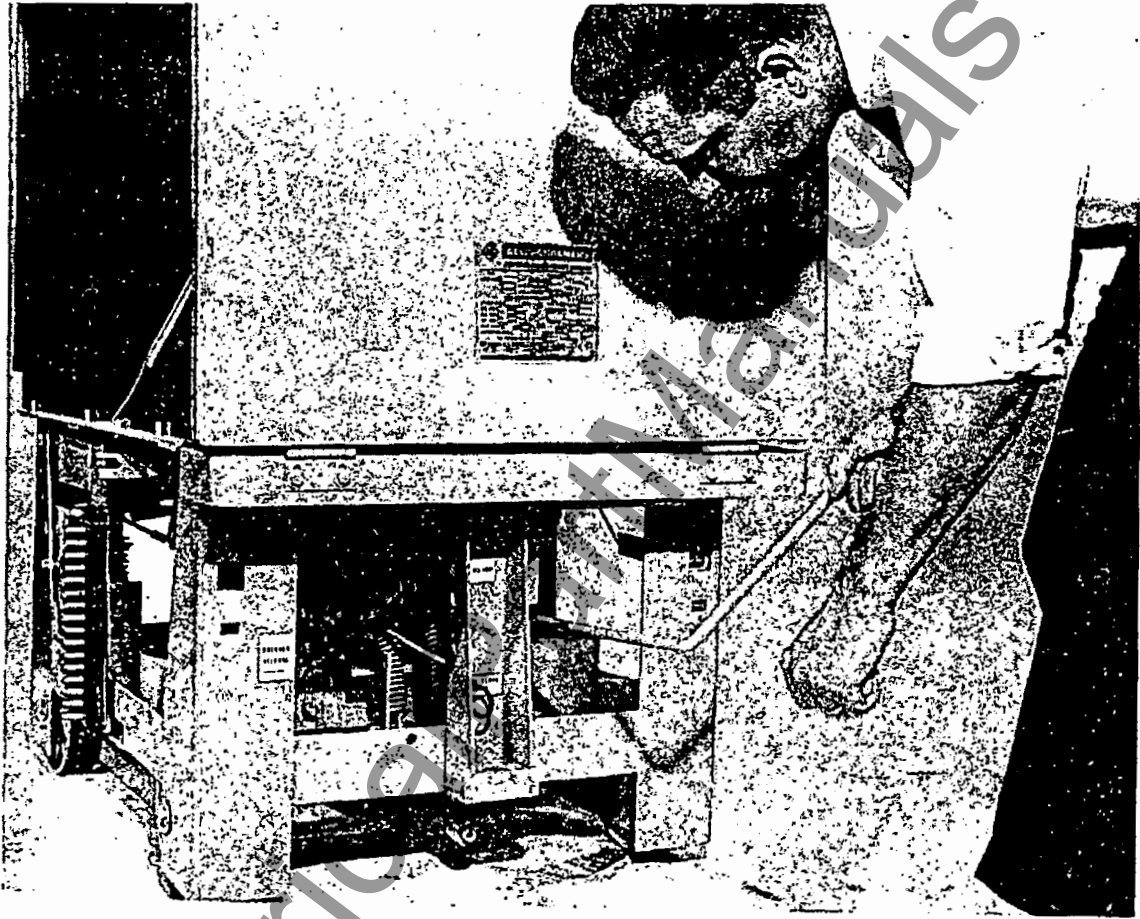
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205390 Front side view of Type F 13.8 kv, 1200 Amp.,  
Air Magnetic Circuit Breaker

[www.ElectricalPartManuals.com](http://www.ElectricalPartManuals.com)



205396 View shows application of manual spring charging handle on Type F Air Magnetic Circuit Breaker

www.ElectricalMaterials.com

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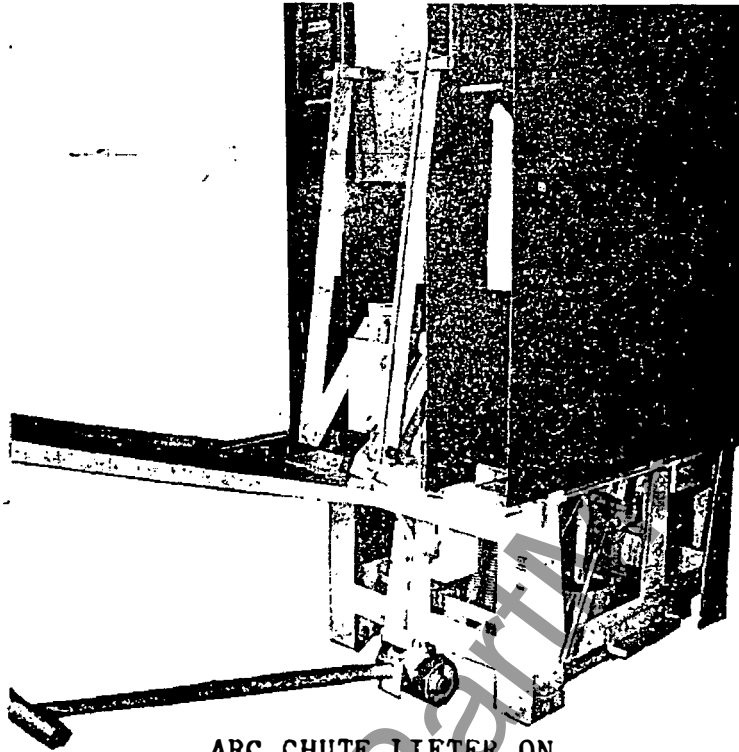


205391

View shows application of fifth wheel on Type F  
Air Magnetic Circuit Breaker

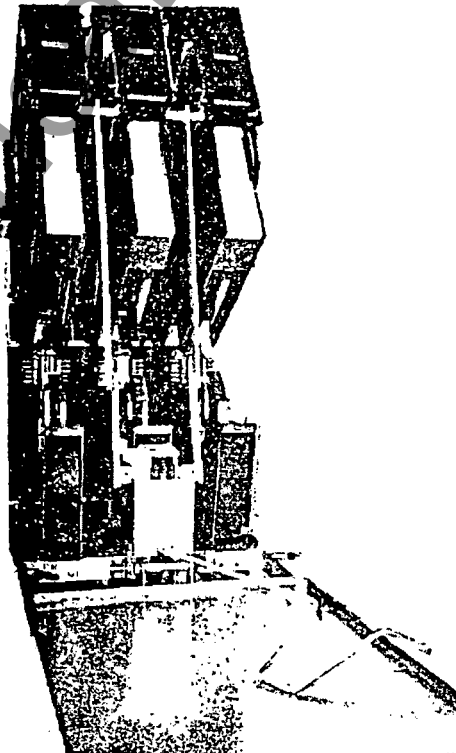
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Illust. #205065

ARC CHUTE LIFTER ON  
STORED ENERGY OPERATED BREAKER.



Illust. #205066

ARC CHUTE TILTED BACK

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