WOLFF MANUFACTURING COMPANY

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INSTRUCTIONS & PARTS LIST

MODEL DEMS

DOUBLE ENDED EIGHT SPINDLE ROLLER & IDLER REBUILDING MACHINE

The President's "E" Award
for Excellence in Exports

OPERATING MANUAL
WELDING EQUIPMENT INC.
MODEL DEMS
ROLLER & IDLER MACHINE

GUARANTEE

The L & B Welding Equipment, Inc., the seller, warrants all new equipment against defects in materials and workmanship for a period of 90 days from the date of shipment, provided the equipment has been properly operated and maintained under normal conditions. If the buyer gives the sellers inspection or evaluation confirms such defect, the seller shall correct such defect (s) at its option, either by repairs or replacement. No expense or responsibility well be made for repairs made other than L & B Personnel or those authorized. L & B Welding Equipment, Inc., shall not be liable for damages in case of failure to meet the conditions of this warranty. Upon expiration of the period of warranty, all liability for replacement or repairs shall cease. The foregoing guarantee is exclusive and there are no other guarantees or warranties either expressed or implied.

NOTICE

The L & B Welding Equipment, Inc., whose policy is one of continuous research and improvement, reserves the right to discontinue or modify machine models at any time, or to change any specifications or design, without notice or incurring any obligation.

SELECTION OF AN OPERATOR FOR YOUR MACHINE IS MOST IMPORTANT. IT IS NOT NECESSARY THAT HE HAVE PREVIOUS WELDING EXPERIENCE, BUT IT IS IMPORTANT THAT HE BE A GOOD, CONSCIENTIOUS EMPLOYEE. A GOOD OPERATOR COUPLED WITH YOUR MACHINE WILL ASSURE YOU OF GOOD WORKMANSHIP, HIGHER PRODUCTION AND MORE PROFITS.

YOUR MACHINE HAS BEEN TESTED AND ACTUALLY WELDED WITH BEFORE LEAVING THE FACTORY.

It is vital to the proper installation and operation of this machine that the operator and personnel installing this machine thoroughly read this manual before any attempt is made to install this machine. If all instructions contained herein are carefully followed, no problems should arise to delay the set up and operation of this machine. Failure to read and thoroughly understand this manual could result in improper installation and operation of the machine, thereby voiding the guarantee.

POWER REQUIREMENTS

The power requirements for this machine are either 440 Volts at 55 Amps. or 220 Volts at 110 Amps., A.C. (Alternating Current) THREE (3) PHASE, 60 CYCLE. (SPECIAL VOLTAGES AVAILABLE.) A single THREE PHASE disconnect switch is all that is required for the L & B Dual Power Unit. The 110 Volt A.C. power supply to operate the control box is obtained from auxiliary windings on the transformer windings and is hooked to the terminals marked 115 A.C. AUX on the terminal board located on the left hand corner of the power unit. This voltage supply is then carried to the control box through the cable connected to the power unit as explained later. The drawings contained in this manual show all necessary connections from the power unit to the machine. For Roller and Idler rebuilding, the main 4/0 welding cables are usually hooked up for STRAIGHT POLARITY. (THAT IS: THE MAIN WELDING CABLES TO THE MACHINE WIRE FEED ASSEMBLIES ARE HOOKED UP TO THE NEGATIVE BUSS BARS. THESE CABLES ARE IDENTIFIED 1 and 2 BY MARKINGS ON THE END OF THE WELDING CABLE CONNECTOR. THE CABLE WITH ONE X ON THE END IS FOR THE NUMBER ONE HEAD AND THE CONNECTOR WITH XX ON THE END IS FOR THE NUMBER TWO HEAD.) The GROUND CABLES should be hooked to the POSITIVE BUSS BARS and secured to the frame of the roller machine by the screw provided for that purpose. It is important that the GROUND connection to the frame of the roller machine be good and all paint and other possible causes such as rust, etc., be cleared from that point. ALL ELECTRICAL CONNECTIONS, INCLUDING THE SET SCREWS IN THE WELDING CABLE CONNECTORS, SHOULD BE CHECKED TO BE SURE THEY ARE TIGHT AND DID NOT WORK LOOSE DURING SHIPMENT. SEE POWER UNIT CABLING HOOK-UP ON PAGE 7.

FLOOR SPACE

The minimum amount of floor space for installation required is 7' x 10'. Refer to Page 5 for the machine floor plan. Deviations may be made in some cases to accommodate the machine.

HANDLING EQUIPMENT

In order to efficiently load and unload the machine, a lifting fork and/or jib crane that covers the necessary area is most useful.

FLUX AND WIRE

Three (3) thousand pounds of neutral flux such as Linde 50-8-48 and two (2) thousand pounds of either VICTOR VA5X or VICTOR VA7X, 1/8" or 5/32" diameter wire on 22" coils will be required for basic training purposes and to put the machine into production.

NOTE: DO NOT USE REGROUND FLUX FORMERLY USED TO REBUILD ROLLERS AND IDLERS FOR TRACK RAIL REBUILDING. REGROUND FLUX THAT WAS FORMERLY USED IN THE REBUILDING OF TRACK RAILS MAY BE USED TO REBUILD ROLLERS AND IDLERS, HOWEVER.

MAINTENANCE

Your L & B Roller & Idler Rebuilding Machine has been carefully designed to give you the best in today's know-how and practices in the rebuilding field. The machine, like any other, will require periodic maintenance. To enjoy trouble-free operation, it is important that the instructions contained in the MAINTENANCE SECTION beginning on Page 24 be followed.

TROUBLE SHOOTING

For your information and guidance, a complete TROUBLE SHOOTING section is contained in the MAINTENANCE SECTION. The operator and maintenance man for the machine should be thoroughly familiar with this section and refer to it if the need should ever arise. Proper maintenance will eliminate most potential trouble conditions.

REPLACEMENT PARTS SERVICE

Should replacement parts be required for your machine at any time, L & B maintains a complete stock of parts at the factory for you. All electrical Modules used in L & B equipment may be returned to the factory for repair on a parts exchange program as outlined in the MAINTENANCE SECTION. To secure needed parts quickly, call, wire or write the factory direct, attention PARTS MANAGER. Your request will be promptly filled. To avoid delay, always GIVE THE PART NUMBER AND COMPLETE DESCRIPTION OF THE PARTS ORDERED. Failure to give the above information may cause delay in filling your order.

VICTOR VA5X or VA7X FOR ROLLER AND IDIER REBUILDING

Tractor rollers and idlers are subject to severe impact and abrasion, load, side thrust and compression. VICTOR VA5X and VICTOR VA7X are ideally suited to the rebuilding of materials subject to these conditions. VICTOR VA5X is suitable for up to four (4) passes and has a hardness of 40-42 Rockwell "C." VA5X is machineable with carbide tools. VICTOR VA7X is suitable for multipass build up to seven (7) passes and has a hardness range of 38-42 Rockwell "C" and is also machineable with carbide tools. Both VA5X and VA7X may be used on either STRAIGHT or REVERSE polarity, submerged arc.

CARE OF WIRE AND FLUX IN STORAGE

The care of wire and flux in storage is most important. Flux or wire should never be stored in a damp place or be subject to moisture. Indication that wire or flux has been wet is sometimes apparent in the weld bead in the form of many small pin holes. NEVER REMOVE THE WRAPPING FROM A COIL OF WELDING WIRE UNTIL READY TO USE IT.

RECLAMATION OF FUSED FLUX

With the use of neutral flux with VICTOR VA5X or VA7X wire, the flux fused during the welding operation, may be reground and re-used. The L & B FLUX GRINDER is designed for this purpose and will recondition your flux by returning it to the proper screen size while removing contaminents. CAUTION: REGROUND FLUX THAT WAS FUSED IN REBUILDING ROLLERS AND IDLERS, SHOULD NOT BE USED AS FLUX IN THE REBUILDING OF TRACK RAILS. Reground flux that was fused rebuilding track rails may be used for the rebuilding of rollers and idlers however. It is suggested that the containers used to hold both the fused and reground flux be marked as to its use, so that improper use of the reground material will not occur. It is recommended that for best results, 20% new flux be added to the reground flux. If you do not regrind your own flux and send it out for grinding, it is adviseable that only one type be sent to avoid accidental mixing of the two different used fluxes.

INSTALLATION INSTRUCTIONS

SETTING UP THE MACHINE

Refer to the FLOOR PLAN on Page 5. It is recommended that the location of the machine be marked on the floor for reference. Remove all crating and packing from the machine components. NOTE: BE SURE TO CHECK ALL BOXES AND PACKING MATERIAL TO BE SURE NO PARTS ARE THROWN AWAY ACCIDENTALLY. Using the hardware supplied, set the machine up in the following order. Refer to page for assembly identification.

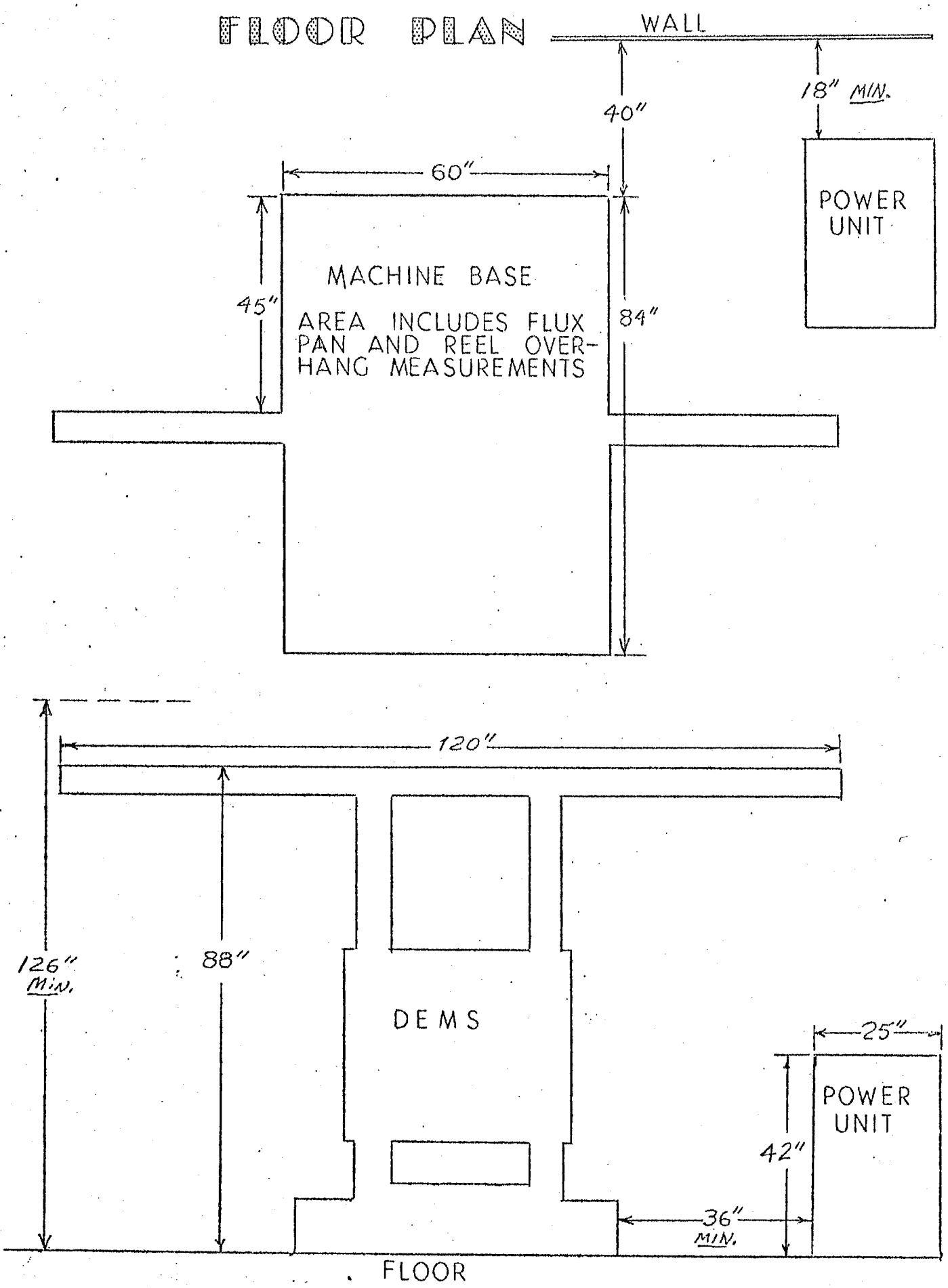
1. Keeping in mind the measurements on the floor plan, set the machine BASE in place. The BASE ASSEMBLY as shipped includes the BASE, VERTICAL COLUMNS, and LIFT CARRIAGE.
2. Mount the CARRIAGE BEAM with the holes at each end towards the front with the RACK GEAR down. (The CARRIAGE BEAM is made of 4" OD, 1/4" wall tubing, 10' long, with RACK GEAR mounted.)
3. Mount the REAR CARRIAGE RACK. (The REAR CARRIAGE RACK is made of 3/4" x 3" x 8' stock.
4. Using a suitable lift or hoist, mount the CARRIAGE ASSEMBLY on the CARRIAGE BEAM and REAR CARRIAGE RACK. Use care in performing this operation.
5. Mount the WIRE REEL ASSEMBLY on the CARRIAGE ASSEMBLY. (The WIRE REEL ASSEMBLY should be mounted to hang over the rear of the machine.
6. Mount the TWO SPINDLE DRUMS on the SPINDLE SHAFTS of the CANTELEVER ARM. The two SPINDLE DRUMS are removed when it is desired to rebuild Idlers. The two SPINDLE DRUMS should rotate easily on the IDLER SPINDLE SHAFTS. There are two (2) CONES, a spindle NUT and an EXPANSION WASHER for each SPINDLE SHAFT. The EXPANSION WASHER should be between the SPINDLE DRUM and the inside CONE when rebuilding ROLLERS and/or IDLERS.
7. When the six (6) steps above have been completed and the machine is in the position desired, bolt the BASE to the floor.
8. Set the DUAL CONSOLE POWER UNIT in place. See FLOOR PLAN.
9. Put the FLUX PAN, FLUX DIVERTERS, and GRATE in place. The machine set up is now completed.

INSPECTION AND ADJUSTMENT

When the machine set up is completed, inspect and/or adjust the following items:

1. Remove all PLUGS on MOTORS and GEAR BOXES and insert their VENT PLUGS. Check all GEAR BOXES to be sure they have oil in them and the proper level. (All GEAR BOXES are filled at the factory before shipment, but should be checked as a precaution.) THE SPINDLE SHAFTS HAVE BEEN LUBRICATED AT THE FACTORY WITH MOLYGREASE. REGULAR GREASE SHOULD NOT BE USED ON ANY FITTINGS ON THE CANTELEVER ARM OR SPINDLES. SEE LUBRICATION INSTRUCTIONS in the MAINTENANCE SECTION.
2. Put on the FLEXIBLE CABLES, and bolt the WELDING CABLE to them using the U BOLT connector supplied.
3. Fill the PLASTIC MOLYPOWDER BOTTLES with MOLYPOWDER (supplied with machine) and put them in the hole in the FLEXIBLE CABLES near the WIRE FEED ASSEMBLY.
4. Put the FLUX TUBES in the FLUX GATES to the rear of the WELDING TIP. The bottom of the FLUX TUBE should be EVEN with the bottom of the WELDING TIP.
5. The welding and control CABLES should be attached to the REAR CARRIAGE RACK, using the CABLE HANGER as shown in the picture on page .
6. Inspect the machine carefully for damage. If any damage is noted, notify the plant immediately, giving the part number if possible.
7. After the CARRIAGE ASSEMBLY has been placed on the CARRIAGE BEAM CARRIAGE RACK, be sure to put the bolts in each end of the CARRIAGE BEAM in the holes provided, to keep the CARRIAGE ASSEMBLY from being moved over too much.
8. When all of the above items have been checked and inspected, proceed to the INSTALLATION-ELECTRICAL WIRING SECTION on page .

FLOOR PLAN


WALL
18" MIN.
40"
60"
POWER UNIT
MACHINE BASE
AREA INCLUDES FLUX PAN AND REEL OVER-HANG MEASUREMENTS
45"
84"
120"
126" MIN.
88"
DEMS
25"
POWER UNIT
42"
36" MIN.
FLOOR

INSTALLATION OF THE THYRATRON TUBES

Remove the back cover housing the control box on the rear of the CARRIAGE ASSEMBLY. The THREE MOTOR DRIVE MODULES require THYRATRON TUBES. Insert the tubes in the tube socket. There is a pin on the side of the tube base that is aligned with the slot in the tube socket. Push the tube down into the socket and turn to the right. This will lock the tube in the socket. Place the cap from the MODULE securely on the top of the tube.

INSTALLATION OF TUBE AND RELAY ON TIME DELAY MODULE

The 6J5 TUBE and the PLUG IN RELAY supplied must be installed on the TIME DELAY MODULE, the fourth module from the right. Insert the PLUG IN RELAY in the TOP socket on the back of the module. Insert the 6J5 TUBE in the BOTTOM socket of the module. Both the RELAY and TUBE have a key base that allows them to be plugged in one way only.

CONNECTION OF 15 CONDUCTOR CABLE IN LIFT CARRIAGE

There are four cables attached to the CARRIAGE ASSEMBLY. Two of these are WELDING CABLES that along with the TEN (10) CONDUCTOR CABLE are connected in the POWER UNIT. The fourth cable is a 15 CONDUCTOR CABLE of which 12 CONDUCTORS are used and the remaining three (3) are spares. This cable is connected to the 12 screw TERMINAL STRIP in the back of the LIFT CARRIAGE. Remove the back of the LIFT CARRIAGE. To secure the cable and relieve strain on the terminal strip, a CONDUIT STRAP has been provided to hold the cable. Fasten the cable under this strap and connect the fanning strip to the TERMINAL STRIP as shown in Fig. 3. Replace the LIFT CARRIAGE BACK. Be careful to see that the cable is fitted into the slot cut at the bottom of the LIFT CARRIAGE BACK COVER for that purpose.

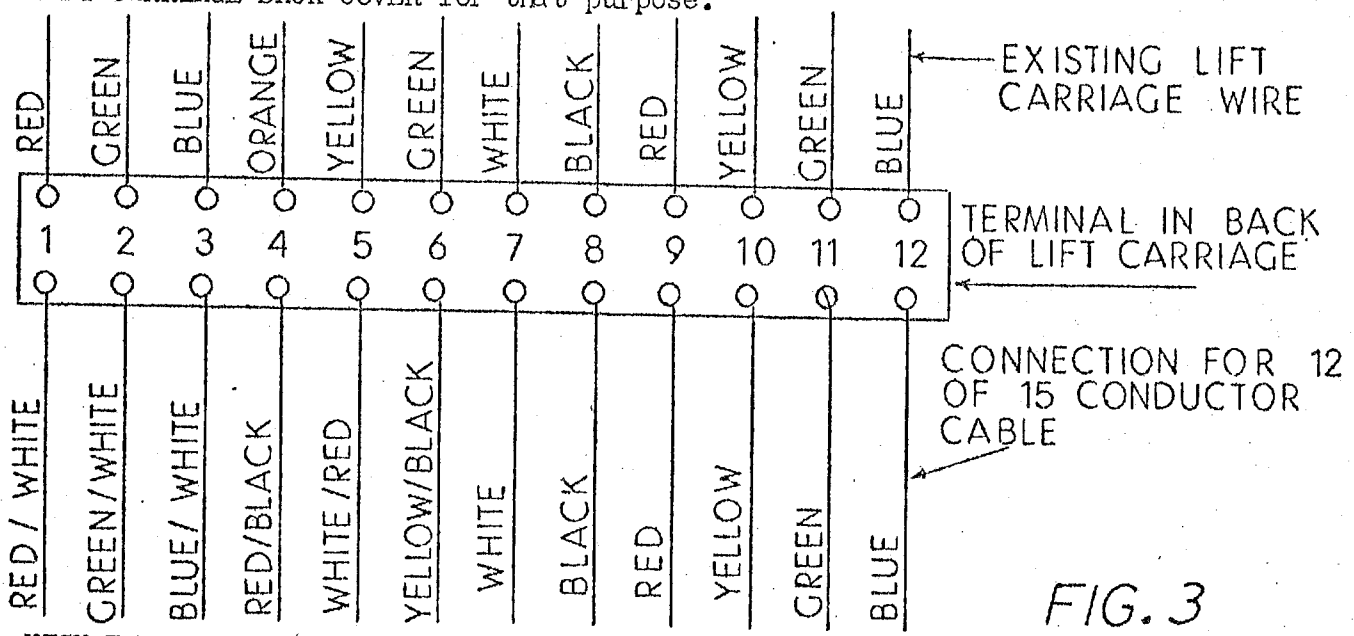


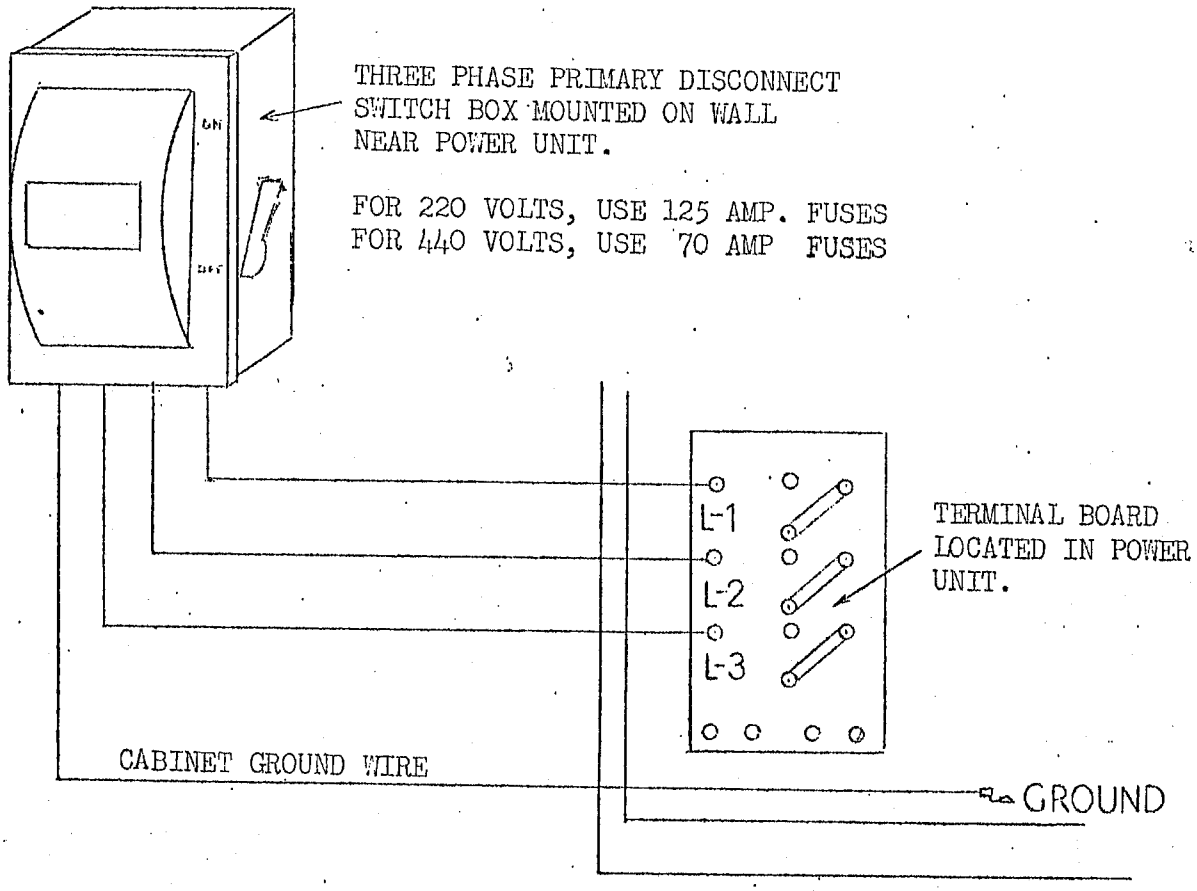
FIG. 3

HIGH FREQUENCY SPARK POINT GAP

The TWO (2) HIGH FREQUENCY MODULES housed in the left hand side of the control box, have SPARK POINT GAPS. These SPARK POINTS in the form of THREE (3) slugs on each MODULE, should have a gap between them of .030. As these points may have become loose in shipment, it is adviseable to check them for proper setting. Use an ignition feeler gauge and check the gap for .030. If the gap is not at this setting, reset them to the proper gap and be sure that the screws holding them are tight. THIS COMPLETES THE INSTALLATION OF THE MACHINE.

THREE PHASE POWER CONNECTION

The primary wiring for the L & B Dual Power Unit must be either 220 volt or 440 volts, THREE PHASE. A single three phase disconnect switch box is all that is required. Make sure the box is rated for the voltage and amperage given on the drawing below. The primary wiring should be completed before requesting the L & B Service Engineer for the training of your operator.



Remove the left hand side panel to connect three phase wiring to the terminals marked L1, L2, and L3. Refer to the electrical code covering your area for primary wire and conduit size.

STANDARD POWER REQUIREMENTS AT FULL OUTPUT

100% DUTY CYCLE, AT 35 VOLTS, 1000 AMPS. WELDING.

220 VOLTS 3 PHASE, 60 CYCLE, 110 AMPS., 42 KVA
440 VOLTS 3 PHASE, 60 CYCLE, 55 AMPS., 42 KVA

The L & B Dual Power Unit contains transformer windings and in order to check for a blown fuse, it is necessary to remove the fuse from the disconnect box and check with a continuity tester, or replace with a new fuse.

LINE SWITCH (S-1)

THE LINE SWITCH (S-1) turns ON and OFF the 115 Volt A.C. power supply for the CONTROL BOX AND OPERATORS STATION.

PILOT LIGHT (I-1)

THE PILOT LIGHT (I-1) indicates the LINE SWITCH (S-1) is ON.

LINE FUSE (F-1)

THE LINE FUSE (F-1) is located directly below the LINE SWITCH (S-1). It is a 15 Amp. fuse and is the main fuse for the CONTROL BOX AND OPERATORS STATION.

CONTACTOR SWITCH (S-2)

The CONTACTOR SWITCH (S-2) is located directly below the LINE FUSE. When this switch is placed in the ON position, it operates the CONTACTOR RELAY in the POWER UNIT, closing the windings of the step down transformer and supplying welding potential to the WELDING HEADS.

POSITIONING SWITCHES (S-10, S-11, S-12, S-13.)

There are FOUR (4) POSITIONING SWITCHES. Switches S-10 and S-11 are used to operate a MAGNETIC REVERSING RELAY in the back of the LIFT CARRIAGE, which in turn controls a motor and either RAISES or LOWERS the LIFT CARRIAGE according to the switch operated. Switches S-12 and S-13 are used to operate a MAGNETIC REVERSING RELAY IN THE BACK OF THE LIFT CARRIAGE, which in turn controls a motor and either turns the CANTELEVER ARM to the RIGHT or LEFT according to the switch operated.

WORK ROTATION SWITCH (S-9) FORWARD-OFF-REVERSE

THE WORK ROTATION SWITCH (S-9) determines the direction the SPINDLES will rotate, FORWARD or REVERSE with the center position being OFF.

WORK ROTATION SPEED CONTROL (R-8)

THE WORK ROTATION SPEED CONTROL (R-8) setting determines the speed at which the SPINDLES will rotate when the WORK ROTATION SWITCH (S-9) is operated to either the FORWARD or REVERSE position. The scale is graduated for reference only and the numbers DO NOT indicate the rotation speed at any particular setting.

AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15)

There are TWO (2) types of AUTOMATIC-MANUAL MOVEOVER SWITCHES in use today. Where the machine has a MANUAL SWITCH (S-16) this switch must be operated to moveover the head assemblies when the AUTOMATIC-MANUAL SWITCH (S-15) is in the MANUAL position. This switch is placed in the AUTOMATIC position when automatic moveover is desired. Where MANUAL SWITCH (S-16) is NOT used, AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15) is spring loaded on the MANUAL side and when operated in the MANUAL direction, the heads will move over until the switch is released. When the switch is released it will return to center and turn OFF the MANUAL moveover. This switch is placed in the AUTOMATIC position when automatic moveover is desired.

DIRECTION OF NO. 1 HEAD SWITCH (S-14)

THE DIRECTION OF NO. 1 HEAD SWITCH (S-14) on machines where it is used determines

DIRECTION OF NO. 1 HEAD SWITCH (S-14) (CONT'D.)

in conjection with the lever setting on the GEAR SHIFT control box next to the MOVEOVER MOTOR, the direction the No. 1. HEAD will move when the AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15) is used. The ARROWS on each side of the DIRECTION OF NO. 1 HEAD SWITCH indicates the direction the NO. 1 HEAD will move. ON LATE MODEL MACHINES, THE MANUAL SWITCH (S-16) and the DIRECTION OF NO. 1 HEAD SWITCH (S-14) IS NOT USED. WHERE SWITCHES (S-16) and (S-14) are NOT used, the GEAR SHIFT control box next to the MOVEOVER MOTOR is not used either.

MANUAL SWITCH (S-16)

On machines where this switch is used, with the AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15) in the MANUAL position, this switch must be operated to operate the MOVEOVER MOTOR. THE MOVEOVER MOTOR will operate as long as this switch is pressed and will turn the MOVEOVER MOTOR OFF when released.

DISTANCE MOVEOVER CONTROL (R-9)

THE DISTANCE MOVEOVER CONTROL (R-9) determines the amount of moveover that will be made when the AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15) is in the AUTOMATIC position. The amount of moveover desired is obtained by increasing or decreasing the setting of the control. The scale graduations are for reference only and do not indicate any certain amount of moveover for any particular setting.

AMPERAGE METERS (TWO)

THE AMPERAGE METERS (M-1, M-2) indicate the amount of amperage the machine is welding at. AMPERAGE METER (M-1) indicates the amount of amperage for the NO. 1 HEAD and AMPERAGE METER (M-2) indicates the amoerage for the NO. 2 HEAD. NOTE: THE METERS INDICATE AMPERAGE ONLY WHEN THE MACHINE IS ACTUALLY WELDING. The meters are shunted on the BUSS BARS in the power unit and connected through the 8 CONDUCTOR CABLE to the METERS and are in no way connected to the AMPERAGE ADJUSTMENT CONTROLS (R-6, R-7.)

AMPERAGE ADJUSTMENT CONTROLS (TWO)

The setting of the AMPERAGE ADJUSTMENTS CONTROLS (R-6, R-7) determines the speed of the WIRE FEED MOTORS, which in turn determines the WELDING AMPERAGE. CONTROL (R-6) is for the NO. 1 WELDING HEAD, and CONTROL (R-7) is for the NO. 2 WELDING HEAD. The scale graduations on the AMPERAGE ADJUSTMENT CONTROLS are for reference only, and do not indicate any particular amperage at any setting as the size of welding wire used would require a difference in control settings.

WELD SWITCHES (TWO)

There are two WELD SWITCHES (S-3, S-4). Switch (S-3) is for the NO. 1 HEAD and (S-4) is for the NO. 2 HEAD. When the operator has set the machine, operation of the WELD SWITCHES starts the welding cycle. There are TWO switches, one for each head so that one or both heads may be operated at the same time.

INCHING SWITCHES (FOUR)

There are four INCHING SWITCHES (S-5, S-6, S-7, S-8), TWO for each head. Switches S-5 and S-6 are used to INCH the wire UP and DOWN for the NO. 1 HEAD and Switches S-7 and S-8 are used to INCH the wire UP and DOWN for the NO. 2 HEAD. The speed at which the wire will inch when using these switches depends on the setting of the INCHING SPEED CONTROL (R-5ab.) The INCHING SWITCHES are not in the circuit when the WELD SWITCHES (S-3, S-4) are operated.

INCHING SPEED CONTROL (R-5ab)

THE INCHING SPEED CONTROL (R-5ab) is located on the bottom of the OPERATORS STATION PANEL, below the words INCHING SPEED, with the ARROW. The setting of this control determines the speed at which the wire will feed when the INCHING SWITCHES are operated. NOTE: THIS CONTROL SETS THE INCHING SPEED FOR BOTH HEADS AT THE SAME TIME. When feeding wire into the FIEXIBLE CABLES, this control may be set to maximum to feed the wire in as fast as possible. When INCHING the wire prior to welding, it is normally set at about 1/3 of scale. When starting the welding cycle, the speed the wire will inch down to start the arc is determined by this control also.

TESTING THE MACHINE

When all installations and electrical hook ups have been completed and the operator has thoroughly read and understands the DESCRIPTION AND USE OF OPERATORS STATION CONTROLS AND SWITCHES section, the following test of the machine should be made in order to determine that it is operating properly.

1. With ALL switches on the OPERATORS CONTROL PANEL OFF, turn the THREE PHASE PRIMARY DISCONNECT SWITCH BOX ON. When this switch is turned ON, the FAN MOTOR in the POWER UNIT should start. This provides ventilation for the POWER UNIT.
2. Turn the LINE SWITCH (S-1) ON, the PILOT LIGHT (I-1) should go ON when this switch is operated. WARNING: WAIT AT LEAST TEN (10) MINUTES AFTER THE LINE SWITCH HAS BEEN TURNED ON TO ALLOW THE THYRATRON TUBES TO WARM UP AND AGE. This should be done any time a NEW THYRATRON TUBE is put in the machine. Failure to do so my materially shorten the life of the tubes.
3. After TEN (10) minutes have elapsed, proceed with the test. Turn the CONTACTOR SWITCH (S-2) on. MAKE SURE THE WELDING TIPS ARE CLEAR FROM ANY OBSTRUCTION they might ground to. When this switch is turned ON, the meters on the FRONT OF THE POWER UNIT will indicate a voltage reading. The VOLTAGE METERS on the POWER UNIT should indicate the OPEN CIRCUIT VOLTAGE ONLY at this time. With the CONTACTOR SWITCH ON, adjust the voltage to about 35 volts using the VOLTAGE ADJUSTMENT HANDLES directly below the METERS on the front of the POWER UNIT. To adjust the WELDING VOLTAGE, the machine must be actually welding and when you do welding for the first time, RESET the VOLTAGE to the desired voltage, usually 30 VOLTS, while the machine is welding. When the Voltage has been set as stated above, turn the CONTACTOR SWITCH OFF.
4. Set the INCHING SPEED CONTROL to about 1/2 of scale and operate INCHING SWITCHES S-5 and S-6 and observe that the WIRE FEED MOTOR for the NO. 1 HEAD operates. Now operate INCHING SWITCHES S-7 and S-8 and observe that the WIRE FEED MOTOR for the NO. 2 HEAD operates.
5. Operate the WELD SWITCH (S-3) for the NO. 1 HEAD and observe in the CONTROL BOX that the NO. 1 HIGH FREQUENCY is FIRING. (THE MOTOR WILL NOT OPERATE UNLESS THE CONTACTOR SWITCH IS ALSO ON.) Turn the WELD SWITCH OFF. Now do the same with WELD SWITCH (S-4) for the NO. 2 HEAD.
6. Operate the ROTATION SWITCH (S-9) switch in the FORWARD position. The spindles will now operate in the direction AWAY from the operator. Return the switch to the center OFF position and then operate the switch in the REVERSE direction. The spindles should not operate in the opposite direction. That is, they should turn TOWARDS the operator. Turn the switch OFF. (CENTER POSITION.)
7. Now test the POSITIONING SWITCHES (S-10, S-11, S-12, S-13.) When the UP SWITCH is operated, the CARRIAGE should RAISE on the columns. When the DOWN SWITCH is operated, the CARRIAGE should LOWER on the columns. Now operate the POSITIONING SWITCH RIGHT (Indicated by the arrow.) The CANTELEVER ARM should rotate to the RIGHT. Then operate the POSITIONING SWITCH LEFT, and the CANTELEVER ARM should rotate to the LEFT.

8. Mount the MOVEOVER INDEXING SWITCH on the bracket provided for it on the CANTELEVER ARM, and plug the cord from this switch into the SOCKET provided on the front of the LIFT CARRIAGE. Turn the ROTATION SWITCH ON and see that the TRIP engages the MOVEOVER INDEXING SWITCH properly as it rotates.
9. ON MACHINE MODELS WHERE THERE IS NO MANUAL SWITCH (S-16) and DIRECTION OF NO. 1 HEAD SWITCH (S-14), operate the AUTOMATIC-MANUAL SWITCH (S-14) to the MANUAL POSITION. THE MOVEOVER MOTOR (M-3) should operate as long as the switch is held in the MANUAL POSITION. Now set the DISTANCE MOVEOVER CONTROL (R-9) up to about the Number 4 on the graduated scale, and place the AUTOMATIC-MANUAL MOVEOVER CONTROL in the AUTOMATIC position. Operate the ROTATION SWITCH (S-9) in the FORWARD position. When the TRIP rotates through the MOVEOVER INDEX SWITCH and this switch releases, the heads should move over automatically.
10. On machine models where the MANUAL SWITCH (S-16) and DIRECTION OF NO. 1 HEAD IS used, do the following. AT the GEAR SHIFT BOX next to the MOVEOVER MOTOR, set the lever in the HEADS OPPOSITE DIRECTION position. Place the DIRECTION of NO. 1 in the MANUAL position, operate the MANUAL SWITCH (S-16.) The MOVEOVER MOTOR SHOULD OPERATE as long as this switch is operated. Now with the ROTATION SWITCH in the FORWARD position, place the AUTOMATIC-MANUAL MOVEOVER SWITCH in the AUTOMATIC position. When the TRIP passes through the MOVEOVER INDEXING SWITCH and releases, the MOVEOVER MOTOR should operate automatically.

THIS COMPLETES THE TESTING OF THE MACHINE. WHEN THE OPERATOR HAS READ THE REMAINDER OF THIS MANUAL, HE WILL BE READY TO PUT THE MACHINE INTO PRODUCTION.

PRINCIPLE OF OPERATION

THE L & B CONSTANT POTENTIAL WELDING SUPPLY

The welding supply for L & B machines is supplied by a single Dual Console Power Unit. Following are two basic and underlying characteristics of these units.

1. Constant Voltage (Potential) power sources maintain constant voltage, once it has been set by the operator.
2. The welding amperage is varied by increasing or decreasing the rate of wire feed.

EXAMPLE: When the wire feed speed is increased, the amperage increases, but the voltage remains the same.

WARNING: THE L & B CONSTANT POTENTIAL POWER UNIT CAN NOT BE USED FOR MANUAL WEIDING.

The difference between the standard type welder and a constant potential unit is:

1. On a standard machine, the voltage and amperage both vary.
2. Because the voltage and amperage both vary, "hunting" occurs in the wire feed control and poor weld appearance results.
3. The L & B Constant Potential Unit maintains a uniform bead appearance because the welding voltage is in NO WAY connected to the wire feed controls, and the wire feed remains constant.

SETTING POWER SUPPLY VOLTAGE

The voltage for the welding supply should be set only when the machine is actually welding. While the machine is welding, set the desired voltage using the VOLTAGE ADJUSTMENT HANDLES located on the front of the POWER UNIT, below the VOLT METERS. There is a separate adjustment for each meter. Refer to the section, TYPICAL SETTING FOR VARIOUS ROLLERS AND IDLERS for the proper voltage.

CONTROL BOX AND OPERATORS STATION

The L & B Model DEMS ROLLER AND IDLER REBUILDING MACHINE CARRIAGE ASSEMBLY has a control box in the back, with an OPERATORS STATION mounted on the front between the FLUX HOPPERS. The main control box contains three (3) electronic MOTOR CONTROL MODULES, two of which control the WIRE FEED MOTORS, Thus varying the rate of welding wire feed (which in turn controls the welding amperage.) The third MODULE controls the SPINDLE DRIVE MOTOR, which controls the rate of speed the work is rotated. The box also contains two (2) HIGH FREQUENCY MODULES for arc initiation, and a TIME DELAY MODULE that controls the amount of step over (moveover) the machine will make. The MODULES contained in the control box are in turn controlled by the operator from the OPERATORS STATION on the front of the machine. Each MOTOR and MODULE combination is operated as a separate unit; however, all like MODULES are interchangeable for trouble shooting purposes. THERE IS NO CONNECTION between the rotation, wire feed motors, their modules, the time delay module and the welding voltage or amperage. The out-put of the high frequency is connected to the welding cables and thence to the welding tips at the coils, but only to initiate the arc when the welding begins. (The coils referred to above may be either coils with the welding cables attached to them, or the welding cable itself wound in the form of a coil around a core and covered with an insulating material tube.

The LIFT CARRIAGE contains the SPINDLE ROTATION MOTOR (This is a D.C. motor), the POSITIONING MOTORS for raising and lowering the LIFT CARRIAGE and the positioning of the CANTELEVER ARM, MAGNETIC REVERSING RELAYS to operate the POSITIONING MOTORS in the direction desired, according to the switch operated, all related wiring and a LIMIT SWITCH that operates when the LIFT CARRIAGE is lowered too far, stopping the LIFT MOTOR. When the LIFT CARRIAGE is lowered far enough to operate the LIFT SWITCH, the LIFT MOTOR must be operated in the UP position until completely clear of the LIMIT SWITCH before the LIFT CARRIAGE can be lowered again.

LOADING THE MACHINE

ROLLERS

The machine may now be loaded for welding. Eight (8) rollers may be put on the spindle drums. It is suggested for training purposes that the first set of rollers an operator does should be of at least the D7 size or larger. By the time he has finished a set of larger rollers, he will be proficient enough to do any size roller required. BE SURE THE EXPANSION WASHER IS BETWEEN THE CONE AND THE SPINDLE DRUM. If this is not done, binding of the SPINDLE SHAFT may occur with heat build up in the roller while welding.

IDLERS

The machine will hold two (2) idlers. To rebuild idlers, first remove the SPINDLE DRUMS, and put on the long TRIP for the moveover provided. Then put the expansion washers on the spindle shaft, and a CONE on each side. Then put the idler on one side, another CONE and the SPINDLE NUT. Then do the same on the other side. When the LONG TRIP for moveover is mounted, it is placed on the left hand side SPINDLE SHAFT. THE MOVEOVER INDEXING SWITCH must be shifted to a VERTICAL position as shown in Fig. 1.

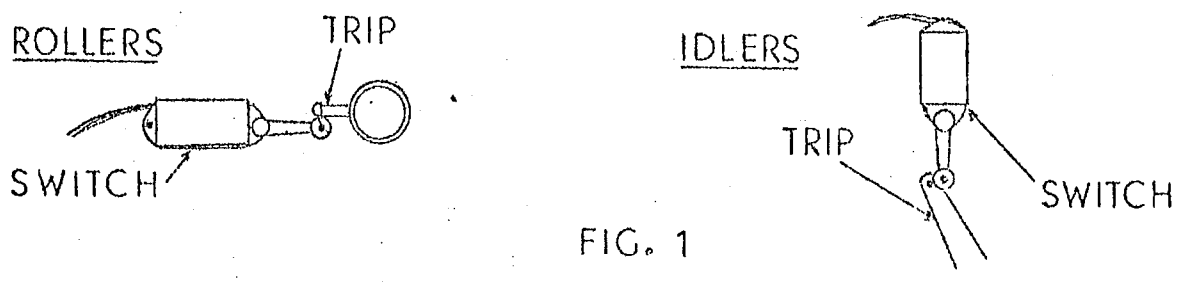


FIG. 1

The surface and flange MUST be cleaned by wire brush, dip tank, or steam cleaning to remove rust, oil, dirt, etc., which if not removed, will contribute to porosity and UNSOUND welds. If the flange has "rolled over" metal, it should be ground off. The roller and/or idler should be inspected for abnormal wear, and any places that show flat or thin spots should be built up by manual welding.

When setting up the roller or idler with the tips, use a center head and establish the center of the roller or idler at the top. (See WELD PROCEDURES) Using the lead adjustments for the heads, position the electrode (welding wire) approximately 1" off center IN THE DIRECTION OPPOSITE TO THE DIRECTION THE ROLLER OR IDLER WILL ROTATE WHEN WELDING. If the electrode is too close to center, a concave bead will result, sometimes with center bead cracking. In every case, to prevent poor submersion of the arc, the flux must be properly supported or damed with a retainer of asbestos or non-burning material fastened between the flux tube and the roller or idler surface.

Although it is beneficial to preheat medium carbon steels, preheating rollers will prohibit easy flux removal, and may cause difficulty in obtaining proper bead shape. (See PROCEDURES FOR REBUILDING ROLLERS AND IDLERS section.) Spoke type idlers MUST BE PREHEATED as described later in this manual.

If the welding is done in cold ambient air, the chill must be removed from the roller before welding. The temperature of the roller must be at least 70 degrees before welding.

Once the welding cycle has started it is adviseable to continue it until finished. If the welding cycle is broken for any reason for a period long enough to allow the roller to become cold, it must be preheated before resuming the welding cycle.

On single flange rollers, a sliding non-combustable flux support held in position, or, on idlers, a metal retaining ring clamped or tacked in position around the outside edge, will facilitate build up flush with the edge with out spilling.

On rollers that have worn concave, the low area should be filled with a partial pass of buildup material using a uniform step over. Another method would be to vary the step over and/or travel speed; a small step over for area very concave, and a large step over for areas or contour of the roller does not require a large amount of metal. A reduction of travel speed will result in more deposit of metal per lineal inch and this should be borne in mind when reducing the rate of travel speed. After the low surface has been restored evenly, complete passes should be applied until the surface is returned to the proper size.

See the section PROCEDURES FOR REBUILDING ROLLERS AND IDLERS for post welding treatment of rollers and idlers. AVOID SUBJECTING THE ROLLER OR IDLER TO ANY DRAFTS DURING OR IMMEDIATELY AFTER WELDING.

Always rotate rollers between passes to control the heat build up in the roller. It is considered best to rotate through all rollers following application of a pass of rebuild material, then start again with the first roller and apply the second pass. The rotation of rollers then proceeds as for the first pass. This is very important when rebuilding small size rollers.

The machine operator should thoroughly understand that even the best machine and welding wire is useless, if the proper procedures are not followed when rebuilding. Much testing and field checking has preceeded the procedures outlined in this manual and they should be strictly adheared too. Conversely, use of welding wires of thw wrong alloy or purpose will result in improper rebuilding of rollers and idlers.

Always use the VOLTAGE, AMPERAGE, and TRAVEL SPEEDS specified for the roller being rebuilt.

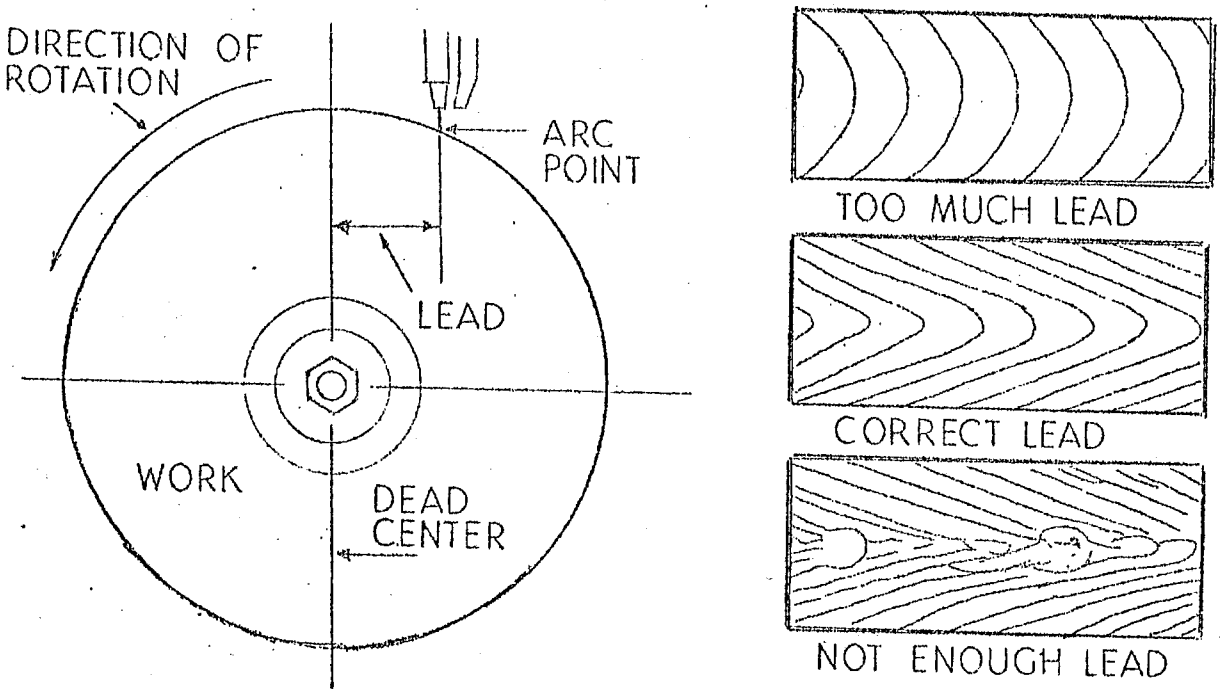
CONTROL OF BEAD CONTOUR

Four basic factors control bead contour on cylindrical work. In order to simplify the method of controlling bead contour, three of these basic factors, arc voltage, amperage, and rotating surface speed, may be regarded as constants. (When constant voltage units are used, speed of the wire feed is subsituted for amperage as a constant.) The fourth factor, lead, is used as the variable and may be changed to obtain proper bead contour. Following is a description of the four basic factors.

1. ARC VOLTAGE: Arc voltage determines the width or ahspe of the bead and has some moderate effect on the penetration of the weld. Increase the arc voltage and the bead width will flatten. Because of the flatter bead, the amount of flux fused, increases.
2. AMPERAGE: Amperage determines the penetration of the weld, and has a much greater effect on the penetration and deposit rates than voltage. The rate of wire burn off increases rapidly with an increase in current.
3. TRAVEL SPEED (ROTATION): Travel (rotation) speed has an effect on penetration and bead width. If the travel speed is doubled, penetration and bead width is reduced to about one half. Penetration is reduced because the work has less time to build up heat and bead width is reduced because the same amount of wire is spread over a greater lenght of work.

LEAD

Lead is the distance ahead of dead center, usually about 1 inch, at the point the deposit is made on the work. This permits the molten metal to solidify before starting downward from dead center. The determining factor in control of the bead contour by lead is a matter of when and where the molten metal solidifies. The flux, while acting as an electrical conductor and deoxidizing agent, also forms the bead. The molten metal must at least partially solidify before it passes dead center to prevent the force of gravity from pulling the deposit into a peak or globular beads.



NOTE: It should be noted that a increase in ROTATION SPEED after the lead has been set for a certain speed may require the lead to be changed. When the rotation speed is increased or decreased for any reason and the bead appearence does not appear as it ahould, correct the lead for the proper bead shape. .

FIG. 1

LEAD (CONT.)

Lead is an adjustment that must be completely understood by the operator. Voltage, amperage, or rotation speed adjustments should not be used to over come a faulty lead adjustment. Bead shape is the determining factor. Fig. 1 shows the method of determining the proper lead and the bead appearence for TOO MUCH LEAD, CORRECT LEAD, AND NOT ENOUGH LEAD. Too much lead causes a wide flat bead that may even be depress-in the center. If lead is too short, the beads have ripples that are long with a high bead, rough with globs of weld overrun. Correct lead gives a very smooth bead, with a slight crown and about 30 degree lines or ripples. See Fig. 2

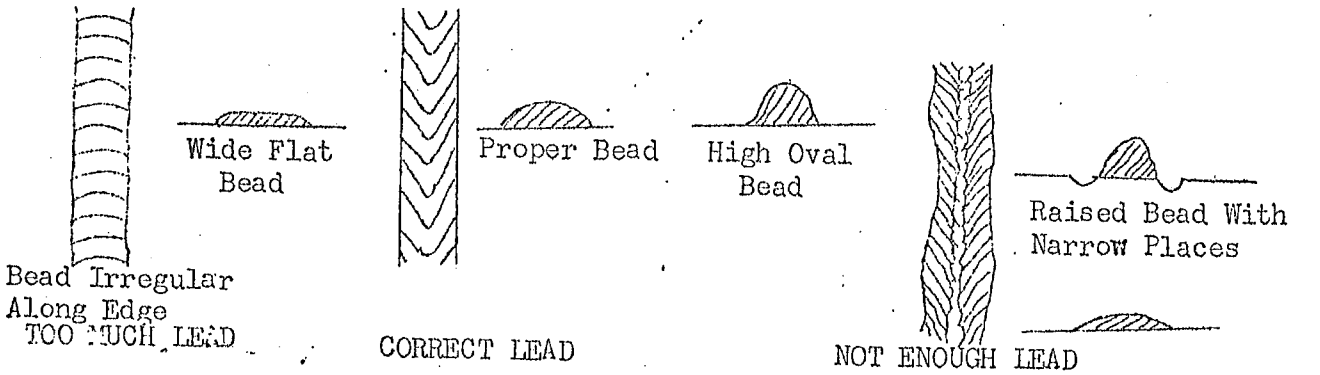


FIG. 2

TYPICAL WELD SETTINGS FOR VARIOUS ROLLERS AND IDLERS

TYPE OF ROLLER OR IDLER	ROTATION SPEED INCHES PER MINUTE	AMPERAGE	VOLTAGE
D-9, TD-25	30 TO 35	400 TO 450	30
D-8, TD-24, HD-19, HD-20, HD-21	30 TO 35	375 TO 400	30
D-7, TD-18, HD-15, HD-16	30 TO 35	350 TO 375	30
D-6, TD-9, TD-14, HD-7, HD-9, HD-11	35 TO 40	325 TO 350	30
D-4, TD-6, HD-5, HD-6	35 TO 45	300 TO 325	28

THE WELDING VOLTAGE MUST BE SET AFTER THE ARC IS INITIATED. THE WELDING VOLTAGE METERS ARE LOCATED ON THE FRONT OF THE DUAL POWER UNIT AND ADJUSTED BY USING THE HANDLES DIRECTLY BELOW THE METERS.

GAUGES

Gauge the roller or idler to rebuilt with a gauge of the size for the type of roller or idler to be rebuilt. It is important that the bore flange measurements be checked to determine the proper buildup required. Use of a gauge will tell the operator the amount of passes needed to return the roller or idler to size. It is a good idea to check the gauge occasionally to be sure that it is accurate. Gauges are normally stamped and error sometimes occurs in the stamping operation. Careless handling and improper use may also change the accuracy of the gauge.

PREHEAT

Although it is beneficial to preheat medium carbon steels before rebuilding, preheating rollers will prohibit easy flux removal and cause difficulty in obtaining proper bead shape. If welding is done in cold ambient air, it is adviseable to remove the chill from the roller. The temperature of the roller should be at least 70 degrees before welding.

When rebuilding drum type idlers, the surface to be rebuilt should be preheated as stated above for rollers, however the rebuilding of spoke type idlers require special preheating as outlined in the following paragraph. ALWAYS DRILL OR CUT A HOLE IN THE SIDE OF DRUM TYPE IDLERS TO VENT AND RELIEVE PRESSURE THAT IS PRESENT WHEN THERE IS WATER INSIDE THE IDLER.

All spoke type idlers must be preheated to a temperature of at least 400 degrees before rebuilding, in the following manner. Start the preheating at the HUB, and as the heat builds up, gradually work the heat out the spokes, from the HUB to the RIM. The purpose of this method is to allow the whole idler to expand and contract together, to prevent cracking of the rim surface or the point where the rim and the spokes are joined. When the idler has been preheated, the welding cycle should begin immediatly and continued until finished. If the cycle is broken for any reason, the idler should be kept at preheat or handles according to the post rebuilding procedures at the end of this section. If the welding cycle takes a long period of time, the HUB should be reheated occasionally to minimize stresses.

If spoke idlers are not preheated, the spokes will expand as they absorb welding heat, while the welding area is at the same time contracting as the heat leaves it. The spokes therefor push out as the rim contracts and attempts to pull in. These forces create enormous strains, and the rim and/or spoke will quite often break.

GENERAL

When rebuilding rollers, it is necessary to rotate the rollers between passes to keep the roller from becoming too hot. It is common practice to make a pass on a roller and then rotate to the next and so on, until all the rollers have had a pass completed and then return for the second. The method of build up may be one of two ways, that is, starting at the flange and welding in, or starting at the inside edge and welding towards the flange. Both methods have thier problems, but if the method used is from the flange in, the section dealing with cleaning of rollers and idlers in the ROLLER AND IDLER PREPERATION section, MUST be strictly adheared to.

It is considered best to rebuild the running surface of a roller first, and the flanges second. The roller will have been preheated during the rebuilding of the running surface and aid in depositing a sound bead on the flanges.

Continued on the next page.

SEQUENCE FOR LAYING BEADS - ROLLER RUNNING SURFACES

The low area is first built up, using a step over of from 1/8" to 1/4" as required. After the surface has been leveled, the complete pass across the entire surface is applied, until the roller has been returned to size. Rotate the rollers as described in the section, GENERAL, between passes. Do NOT rebuild from the flange in, when the first pass will come to the bottom of the flange, but wait until at least one pass has preheated the critical area at the base of the flange to aid in laying a sound bead.

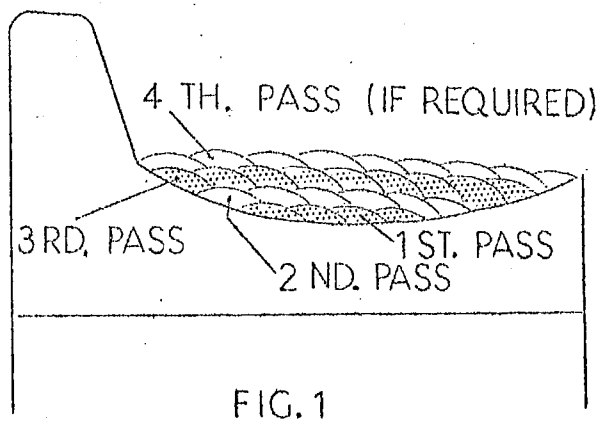


FIG. 1

SEQUENCE FOR LAYING BEADS - FLANGES

Two methods of flange rebuilding can be used. The method shown in Fig. 2 is the recommended method when ever possible. In the cases where thin buildup is required, the method in Fig. 3 should be used. It has been found that stacking beads as shown in Fig. 2, will result in harder metal application and aid in heat control of the flange. The advantages of controling heat in the flange area has been discussed elsewhere in the manual.

Tilt the positioner 5 to 10 degrees. Start at the base of the flange and using a small step over, build up the flange in a stepped bead method as shown in Fig. 2. (Quite often, no step over will be required.) As the outer edge of the flange is approached and in order to give taper, increase the rotation speed if required. The final bead should overlap the top of the flange about 50%. Often it will not be necessary to increase the rotation speed to get the proper taper as speed will increase with buildup.

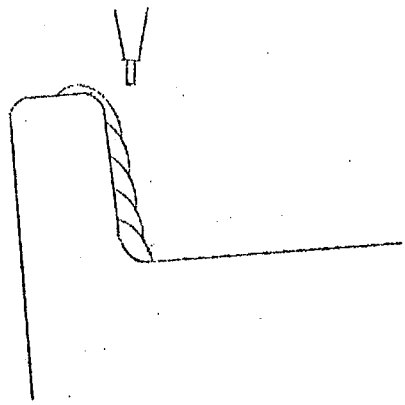


FIG. 2

Tilt the positioner 30 to 45 degrees and move the tip 1/16" to 1/8" further off dead center than used for building up the running surface. Start at the base of the flange and work to the edge, overlapping the top of the flange 50%. This method of buildup is best when a thin buildup is needed to return the flange to size and where precise control of the flange taper is required.

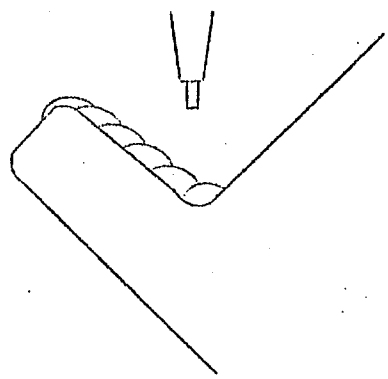


FIG. 3

SEQUENCE FOR LAYING BEADS - IDLER RUNNING SURFACES

The low area is built up first, using a step over from 1/8" to 1/4". After the surface has been leveled, the complete passes across the entire running surface is applied until the idler has been returned to size. Welding should start at the edge of the running surface and continue in to the base of the flange. If desired, the edge of the running surface may be built up to full size by laying successive beads on top of each other, before starting in to the flange. This method aids in producing a square edge. When the edge has been restored to full size, passes are made from the edge bead in to the flange until the entire running surface has been restored to size.

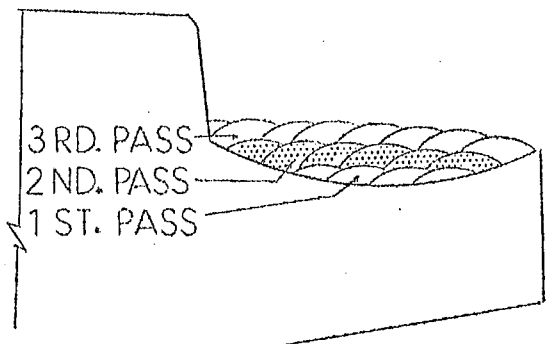


FIG. 4

SEQUENCE FOR LAYING BEADS - IDLER FLANGES

Two methods may be used to return the idler flange to size. Where a heavy buildup is required, in order to return the flange to size, tilt the positioner 5 to 10 degrees as shown in Fig. 5. Where less or very little buildup is required, the idler may be tilted from 45 to 90 degrees for buildup. Lead will be of less importance, the greater degree of positioner tilt used. Many consider it adviseable to place a full bead at the top of the flange to aid in wear quality.

For heavy flange buildup, tilt the positioner 5 to 10 degrees and build up the flange in a stacked bead pattern shown in Fig. 5. This method results in better hardness to the rebuilt area. As the bead approaches the end of the flange, it may be necessary to increase the rotation speed to give taper to the build up, however as the buildup becomes higher on the flange, the rotation speed of the work is increased by the increased diameter of the idler, and additional speed adjustment may not be required.

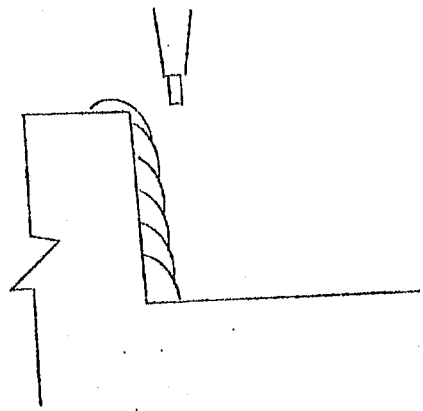


FIG. 5

Where little flange wear has occoured and relatively thin buildup is required, tilt the positioner from 45 to 90 degrees. Thin buildup can be easily accomplished when this method is used. Increase the rotation speed to increase taper and use small amounts of move over. See Fig. 6.

Where positioner angle is not too great, it is possible to build up both sides of flanges at the same time by positioning both heads and tilting them in towards the flanges slightly.

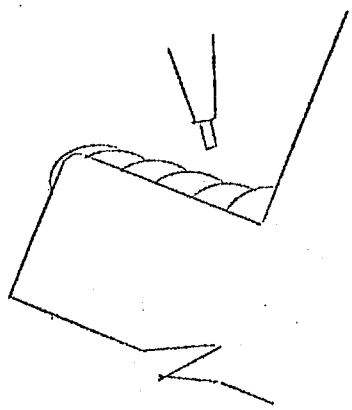


FIG. 6

POST WELDING HANDLING OF ROLLERS AND IDLERS

When the welding cycle has been completed on rollers, they should be removed from the machine and allowed to cool slowly. Avoid subjecting rollers to drafts and never set hot rollers on a concrete floor. It is best to set the rollers on a wooden form or the like and cover until cool.

Drum type idlers should be kept out of drafts and off cold floors until cool. Spoke type idlers should be removed from the machine and submerged in flux or lime and allowed to cool slowly to furthar lessen the chances of cracking.

BORE SHRINKAGE

Tractor rollers contract after welding and this reduces the bore diameter. The bore must then be rebored before re-assembly. Bore shrinkage can be an advantage on old type rollers at times. If any finishing operations are to be done on the roller, such as flame hardening, grinding or turning, these steps should be accomplished before boring. The amperage and rotation speeds for rebuilding various types of rollers and idlers shown earlier in this manual, should be strictly adheared too, to minimize heat input which also tends to hold down contaction of the bore.

INTERRUPTION OF REBUILDING CYCLE

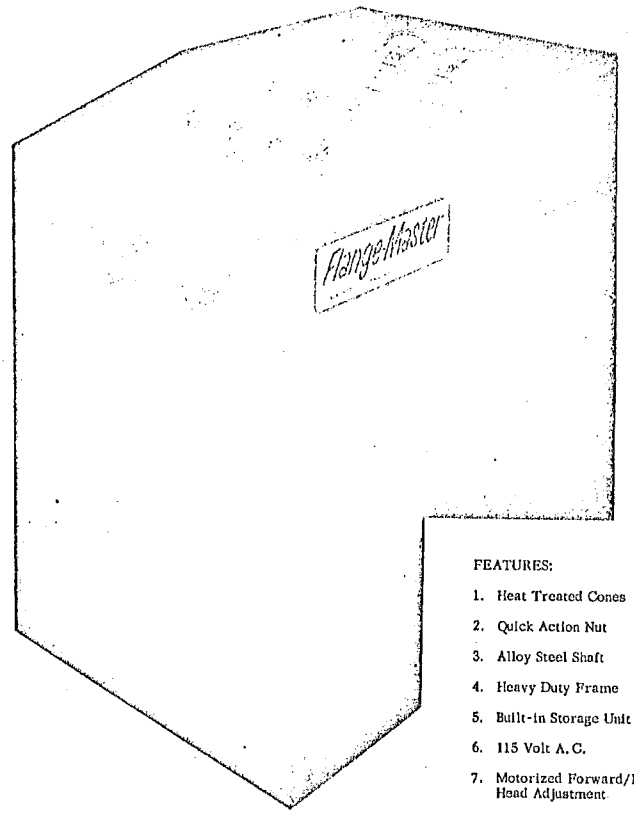
Where ever possible, the rebuilding cycle, once it has started, should be finished. If rollers are partially rebuilt and left on the machine until the next day to be finished, cracking due to stresses of the metal may take place. In some cases the cracking may be serious enough to materially shorten the life of the roller or ruin it while still in the rebuilding stage. If necessary to leave rollers for any period of time long enough to allow them to become cool, preheating MUST be accomplished before attempting to finish the rebuilding cycle.

FLAME HARDENING ROLLER FLANGES

Flame hardening can be defined as a process of heating the surface of an iron base alloy above transformation temperature range by means of high temperature flames and then quenching. During the rebuilding cycle of rollers, the hardness pattern put into the flanges by the manufacturer is often partially or completly annealed. In order to have rebuild life approach that of new as much as posiible, it is desircable to harden the flanges using the method described above. The L & B FLANGE MASTER roller flange flame hardening machine will accomplish this, giving a desireable combination of hard-wear resisting surface of Rockwell "C" - 50 and a tough shock resistant core. Use of the FLANGE MASTER provides an economical method of returning rebuilt roller flanges to a near new condition. Write the L & B factory or contact your nearest VICTOR wire distributor for full information.

ADVANTAGES OF ROLLER GRINDING

Grinding of rollers and idlers has several distinct advantages. The appearence of a roller speaks for itself, the rebuilder offering factory resized rollers has tremendous advantage, as the concentricityimportant for track life is maintained. In addition, constant minor impact during the grinding operation, relieves weld stresses and reduces boring requirements. Grinding is by far the most economical of finishing rollers and idlers on a cost per roller basis. Normal grinding time is about half that required for lathing operations and does not require the capital investment so often needed for a lathe. Grinding machines do not require a skilled operator as is often required for lathe operation, and any man in the rebuilding shop can be used for grinding operations. The L & B model RG, Roller and Idler grinder was designed especially for tractor rollers and idlers. Write the factory for full information and literature.



FEATURES:

1. Heat Treated Cones
2. Quick Action Nut
3. Alloy Steel Shaft
4. Heavy Duty Frame
5. Built-in Storage Unit
6. 115 Volt A.C.
7. Motorized Forward/Reverse Head Adjustment
8. Two Rows of Water
9. More Efficient Flame Heads

FLANGE MASTER

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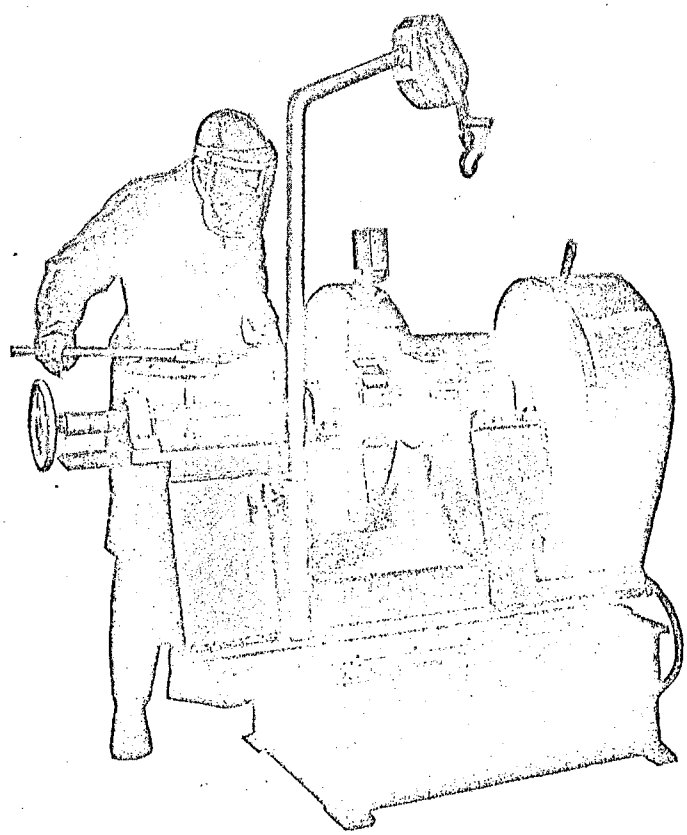


FEATURES:

1. HEAVY DUTY CONSTRUCTION
2. OPERATOR CONTROL
3. ENCLOSED DUST COLLECTOR
4. ADJUSTABLE SLIDES
5. AUTOMATIC ROLLER ROTATION
6. HANDLES IDLERS
7. LONG WEARING GRINDING WHEELS
8. ECONOMY PRICED

ROLLER GRINDER

THE WELDING OPERATION

SETTING THE ROTATIONAL SPEED

The speed of rotation is one of the factors governing bead width, and is usually set between 30 and 40 inches per minute. In order to determine the speed of rotation, start the rotation by placing the ROTATION SWITCH in the FORWARD position. At the same time mark a point on the roller with chalk. After fifteen seconds, mark the roller again with chalk and measure the distance between the chalk marks. Multiply by four (4). This will give the travel speed for one (1) minute. If the travel speed is too fast, DECREASE the setting of the WORK ROTATION SPEED CONTROL, and repeat the above speed setting procedure.

SETTING THE WELDING AMPERAGE

The welding amperage must be set by running sample welds. The meters DO NOT show the welding amperage unless the machine is actually welding. To begin with, set the AMPERAGE ADJUSTMENT CONTROLS at the number 5 on the graduated scale. After the welding has begun, the operator may then adjust the AMPERAGE ADJUSTMENT CONTROLS until the desired welding amperage is obtained. After a short time, experience will enable the operator to set the AMPERAGE ADJUSTMENT CONTROLS to the proper place for the amperage desired.

SETTING THE DISTANCE MOVEOVER CONTROL

When the heads are to be moved over automatically after each revolution, the welding must be started with the MOVEOVER TRIP in position with respect to the MOVEOVER INDEXING SWITCH shown in Fig. 1. When the welding has started, the AUTOMATIC-MANUAL MOVEOVER SWITCH is placed in the AUTOMATIC position when the roller or idler has completed about 2/3 of the first revolution. The moveover will then be done automatically each time the TRIP passes through the INDEX SWITCH. NOTE: BE SURE THE AUTOMATIC-MANUAL MOVEOVER SWITCH IS IN THE MANUAL SWITCH WHEN THE WELD IS STARTED. The DISTANCE MOVEOVER CONTROL should be set to obtain a moveover of approximately 1/2 the width of the bead. The amount of moveover will vary with the type and size of wire being used and the welding amperage; the operator, therefore, should strive to obtain 50% overlap of beads normally; however, should more or less moveover be desired, the range of the DISTANCE MOVEOVER control will allow him to do so. This is most helpful on flanges.

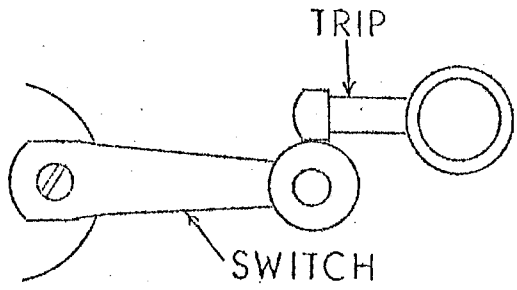


FIG. 1

STARTING THE WELDING CYCLE

With the wire positioned as desired and inched to about 1/8" from the work,

1. OPEN the FLUX GATES
2. Turn the CONTACTOR SWITCH ON
3. Turn the ROTATION SWITCH ON to the FORWARD position and immediately,
4. Turn the WELD SWITCHES ON.

The welding cycle will begin. When the roller or idler has completed about 2/3 of a revolution,

5. Place the AUTOMATIC-MANUAL MOVEOVER SWITCH in the AUTOMATIC position. The Automatic moveover is now ON and the heads will move over after each revolution. NOTE: The arrangement for setting direction the heads will move depends on the machine model and the switches used. See the next page for instruction and settings for models used.

STOPPING THE WELDING CYCLE

To stop the welding cycle, when the automatic moveover has stepped over and the machine is laying the last bead desired:

1. Turn the AUTOMATIC-MANUAL MOVEOVER SWITCH OFF, by returning it to either the CENTER POSITION or to the MANUAL position, according to the switch.
2. When the roller or idler reaches the point you wish to stop welding, turn OFF the WEID SWITCHES, and after a slight hesitation,
3. Turn the CONTACTOR SWITCH OFF.
4. Turn the ROTATION SWITCH OFF by returning it to the CENTER position.
5. CLOSE THE FLUX GATES

NOTE: IF WELDING IS DESIRED ON ONLY ONE HEAD FOR SOME REASON SUCH AS ON SINGLE FLANGE ROLLERS, the operator need operate the WELD SWITCH for the head to be used ONLY. It should be remembered, however, that the welding head not in use still has welding potential as operation of the CONTACTOR SWITCH closes welding potential to BOTH heads.

IMPORTANT: ALWAYS ALLOW THE MACHINE TO WARM UP FOR AT LEAST FIVE (5) MINUTES WHEN TURNED ON. THIS IS NECESSARY TO ALLOW THE THYRATRON TUBES TO REACH THE PROPER HEAT BEFORE BEING FIRED IN OPERATION. MAKE SURE ALL SWITCHES ARE OFF ON THE OPERATORS STATION BEFORE TURNING THE LINE SWITCH ON.

DIFFERENT TYPES OF MOVEOVER CONTROLS

CHAIN DRIVE MOVEOVER

THE CHAIN DRIVE type moveover has two (2) MOVEOVER ASSEMBLIES mounted on a flat CARRIAGE BEAM with the MOVEOVER MOTOR mounted on the right hand side of the beam. The handles on the front of the MOVEOVER assemblies is turned either UP or DOWN until the CHAIN GRIP engages the MOVEOVER CHAIN. The direction the handles are thrown determines the direction the head will move. The moveover motor turns the same way all the time, the direction the handles are engaged determining the head movement. Where this type of moveover is used, there is only ONE (1) switch in the moveover section on the OPERATORS STATION, this switch being the AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15). There are three (3) positions on this switch, the CENTER position being the OFF position. The MANUAL position of the switch is spring loaded, and operates as long as the switch is held in the MANUAL position. When released it returns to the CENTER position and turns itself OFF. The other position is used when automatic moveover is desired and used in accordance with previous instruction.

THREADED SHAFT TYPE MOVEOVER

Where moveover of the HEADS is accomplished by rotation of THREADED SHAFTS, the SWITCHES are used. An AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15,) a MANUAL MOVEOVER SWITCH (S-16,) and a DIRECTION OF NO. 1 HEAD SWITCH (S-14.) In addition to this switch arrangement, a moveover GEAR SHIFT BOX mounted between the MOVEOVER MOTOR and the MOVEOVER CARRIAGE ASSEMBLY is used. The GEAR SHIFT BOX engages and disengages the THREADED SHAFTS according to the SHIFT LEVER setting; the settings are: NO. 1 HEAD ONLY, HEADS IN OPPOSITE DIRECTIONS, and HEADS SAME DIRECTION. This shift arrangement allows the operator to select the type of moveover he desires to use, and used in conjection with the DIRECTION OF NO. 1 HEAD switch, the operator can select the direction the moveover will be made in. EXAMPLE: With the GEAR SHIFT LEVER set in the HEADS OPPOSITE DIRECTION position, and the DIRECTION OF NO. 1 HEAD switch set in the LEFT position (as shown by ARROWS on each side of the switch,) when the moveover is operated, either MANUAL or AUTOMATIC, the HEADS will moveover in a direction OPPOSITE to each other and towards the outside of the MOVEOVER CARRIAGE.

IMPORTANT: READ THIS PAGE CAREFULLY

MAINTENANCE SECTION

CARE, LUBRICATION, TROUBLE SHOOTING, ELECTRICAL DRAWINGS

THIS SECTION HAS BEEN CAREFULLY PREPARED AND EDITED TO COVER EVERY TYPE OF CARE, LUBRICATION, AND TROUBLE SHOOTING REQUIRED FOR YOUR MACHINE. THE SECTION ON TROUBLE SHOOTING IS DIVIDED INTO A SPECIFIC AREA OF TROUBLE, AND WHERE NEEDED, IT IS CROSS-REFERENCED. THE OPERATOR AND MAINTENANCE MAN FOR THE MACHINE SHOULD BE THOROUGHLY FAMILIAR WITH THIS SECTION AND USE IT WHERE NECESSARY. DOWN TIME MAY BE GREATLY REDUCED IF THE INSTRUCTIONS CONTAINED IN THIS SECTION ARE FOLLOWED.

PARTS EXCHANGE

For ease of maintenance and reduced down time, the major units of this machine are of modular design, for fast trouble isolation and clearance. The modular units contained in this machine are:

3 MOTOR DRIVE MODULES, PART NO. 107-001
1 TIME DELAY MODULE, PART NO. 107-003
2 HIGH FREQUENCY MODULES, PART NO. 107-006

It is recommended that ONE (1) each of the above modules be carried in your spare parts. When it becomes necessary to use a module to clear trouble in the machine, you may return the defective one to the plant for exchange, and upon notification, we will ship you another from PARTS EXCHANGE. Prices for PARTS EXCHANGE MODULES are available upon request to the PARTS MANAGER, L & B WELDING EQUIPMENT, INC., 2424 SIXTH STREET, BERKELEY 2, CALIFORNIA, U.S.A.

SUGGESTED SPARE PARTS STOCK

The following spare parts are suggested for your stock. Prices upon request.

QTY.	STOCK NO.	DESCRIPTION
1	107-001	MOTOR DRIVE MODULE
1	107-003	TIME DELAY MODULE
1	107-006	HIGH FREQUENCY MODULE
1	122-009	WELDING TIPS 1/8" or
GR	122-010	WELDING TIPS 5/32"
2	100-013	FLEXIBLE CABLES
4	122-006	4½ TIP EXTENSIONS
20	122-004	TIP NUT
1 set	518-001	KNURLED WIRE FEED ROLL
1	518-002	PRESSURE ROLL
2	528-004	WIRE FEED GUIDE
1	101-002	ACTUATOR COIL
1	115-003	CURRENT RELAY
1	501-015	NON-METALLIC DRIVE GEAR
1	501-019	PINION GEAR FOR 1/8" WIRE
1	501-020	PINION GEAR FOR 5/32" WIRE
1	510-001	15 TOOTH SPROCKET
2 lbs.	525-040	MOLYPOWDER
2 lbs.	525-041	MOLYGREASE
2	121-001	THYRATRON TUBE
1	117-008	DPDT CENTER OFF ROTATION SW.
1	115-001	PLUG IN RELAY (TIME DELAY)
2	121-002	6J5 TUBE (FOR TIME DELAY)
2	117-010	INCHING SWITCH
1	106-001	0-500 AMP., AMPERAGE METER
2	521-007	FLUX TUBE
2	521-008	FLUX GATES
1	106-003	0-50 VOLT., VOLT METER
1	117-015	MOVEOVER INDEX SWITCH

OPTIONAL ITEMS

1	108-019	1/8 H .P., D.C. MOTOR
1	108-012	1/15 H.P. MOVEOVER MOTOR
1	108-006	1/3 H.P., A.C. MOTOR
1	502-006	TWF 1260 500:1 GEAR BOX
1	502-007	UF 113A 15:1 GEAR BOX
1	502-008	UF 113 30:1 GEAR BOX

BASIC MAINTENANCE AND LUBRICATION

LUBRICATION

FLEXIBLE CABLES: Check L & B MOLUBE POWDER supply every eight hours.

GEAR BOXES: Pre-lubricated at the factory with SAE 90 Worm Gear Lubricant. Change every year using a good grade of worm gear lubricant. Consult your local gear lube representative for proper type as it may vary with geographical location.

SPINDLE SHAFTS: Grease with L & B MOLUBE GREASE every one hundred (100) hours.

COPPER GROUND PLATE: Grease with L & B MOLUBE GREASE every one hundred (100) hours. (The copper ground plate is located inside the cantelever arm with a flexible tube running to a grease fitting located on the bottom of the cantelever arm for ease in greasing the ground plate.)

MOTORS: Oil the SPINDLE DRIVE MOTOR, POSITIONING MOTOR, VERTICAL LIFT MOTOR, and MOVEOVER MOTOR once a month, or as required, using a good grade of motor oil. Check the grease packing on the WIRE FEED MOTORS ball-bearings once a month and repack as required.

NOTE: L & B MOLUBE POWDER and L & B MOLUBE GREASE is available in two pound containers from our factory, prices available upon request.

MAINTENANCE

WARNING: Make sure the power supply is OFF when performing the following maintenance operations on the machine.

CONTROL BOX: Blow out with a light stream of air once a week.

FLEXIBLE CABLES: Remove MOLUBE POWDER bottle and the WELDING TIP. Blow out the flexible cables with a stream of DRY air, from the tip end, each time a new reel of wire is put on.

WIRE FEED MOTORS AND ASSEMBLIES: Remove MOLUBE POWDER BOTTLES. Open the wire feed assembly and blow off the top of the machine, once a week. Be sure the insulating block the wire feed assembly is mounted on is kept clean to avoid flux and molypowder powder causing a ground to the mounting screws.

LIFT CARRIAGE: Remove the back of the LIFT CARRIAGE and blow out the LIFT CARRIAGE with a stream of air, once a month. It would be advisable to check the gear boxes at this time, also.

POWER UNIT: Remove both sides of the power unit and air clean thoroughly once a month, starting from the outside air intake grill, through the selenium rectifiers, down over the transformer windings and out the exhaust vent. (In dusty areas, cleaning of the power unit should be done more frequently.)

WELDING TIPS: CHANGE AS REQUIRED. (Normally this will be necessary after every fourth or fifth reel of wire.) Change tip when the hole is worn or out of shape. Flashed tips in some cases can be cleaned and re-used.

WEIDING CABLES: The welding cable connectors should be checked and the set screw in them tightened once a month to insure good contact. Check the connection to the buss bars periodically to see that they are tight. If the welding cables become HOT while welding (they will get warm and this is normal) check all connections, including the ground connection.

HIGH FREQUENCY SPARK POINT GAP: Check the High Frequency spark point gap (the space between the three slugs,) every three (3) months for proper spacing. The gap should be at least .030 and not more than .035. If the gap is not within this range, reset to the proper gap using an ignition feeler gauge. The spark point slugs should be securely tightened to avoid their coming in contact with each other and shorting out the High Frequency transformer, or walking apart due to vibration.

ELECTRICAL CONNECTIONS, CONTROL BOX AND POWER UNIT: It is considered good maintenance practice to check all electrical connections in the control box and power unit for loose connections every six (6) months.

RELAY CONTACTS: Clean as required using proper cleaning tool; never use sand paper or emery cloth to clean relay contacts.

MODEL DEMS TESTING PROCEDURES

GENERAL: A simple Volt-Ohm Meter or other continuity tester may be used to good advantage to test various components of your machine, such as the TRIPLET model 310 meter. This meter may be purchased from the L & B factory if you desire. It should be borne in mind, however, that in order to obtain a proper test, a Volt-Ohm Meter should be used by someone familiar with it, who can properly evaluate the test. There will be times when the replacement electrical part will not be of the same size or rating as the one ordered. This does not mean that it is the wrong part, but that the one sent has been found to perform better and will work in place of the original.

TESTING OF MODULES: The most effective and easiest way to test a module, be it MOTOR DRIVE, TIME DELAY or HIGH FREQUENCY, is to replace it with a spare and see if replacement corrects the trouble. If replacement corrects the trouble, return the defective one to the plant for repair under our MODULE EXCHANGE PROGRAM. Where spare modules are not available, they may be interchanged for trouble shooting purposes.

TESTING SWITCHES: Switches can best be tested by using an OHMETER or some type of continuity tester, which will indicate to a person that is familiar with them, whether the switch is defective or not. This test may be made on all switches in your machine. NOTE: It is often necessary to disconnect the switch from the circuit to obtain a proper test. Circuits wired to the switch may cause improper test if this is not done.

TESTING POTENTIOMETERS (INCH, AMPS CONTROLS, DISTANCE MOVEOVER & ROTATION SPEED):

TO OBTAIN AN ACCURATE TEST, THE POTENTIOMETER SHOULD BE DISCONNECTED FROM THE CIRCUIT. Testing of potentiometers is accomplished by placing an Ohmeter lead on the center and one of the outside terminals, and noting the change of reading as the control is rotated. The change of reading should be smooth; it it is not, a defective potentiometer is indicated. Be sure to use the proper scale on the meter for this test. Potentiometers used in this equipment have a tolerance of plus or minus 20%; therefore, the MAXIMUM reading of the control may be plus or minus 20% of the stated resistance of the potentiometer.

TESTING THYRATRON TUBES:

The best and most effective test of a thyratron tube is to replace it with a new one. If replacement corrects the trouble, a defective tube is indicated. Thyratrons should be allowed to warm up at least five (5) minutes before operating the machine. If the life of the thyratron tube is abnormally short, look for tube to socket contact trouble, such as corroded contacts, loose pins, and/or cap, etc.

TROUBLE ISOLATION

WIRE FEED TROUBLE

1. Check the tip, flexible cable and wire feed assembly for worn or obstructed areas. Check the motor drive module for blown fuse. Uses 5 amp. fuse.
2. Interchange the two WIRE FEED MOTOR PLUGS. (If trouble remains on the same head, it is either the motor, wire feed, flexible cable, or tip assembly.) If trouble changes heads when motor plugs are interchanged, return the plugs to their respective sockets and proceed to step 3.
3. Interchange (or replace the suspected) the THYRATRON TUBES. If trouble now changes heads, the tube is bad and should be replaced. If trouble does not change heads, proceed to step 4.
4. Interchange the two wire feed MOTOR DRIVE MODULES. If trouble now changes heads, a defective MODULE is indicated and should be repaired or replaced. You may return the defective module to the factory for repair. If trouble does not change, proceed to step 5.
5. If, after the above checks have been made, the trouble still exists, check the following for their respective heads for defect. Balance of circuit. INCHING SPEED CONTROL, INCHING UP SWITCH, INCHING DOWN SWITCH, AMPS CONTROL, WELD SWITCH, CONTACTOR SWITCH.

1. Replace the THYRATRON TUBE. If this does not correct the trouble, proceed to step 2. (The tube may be interchanged with a tube on the wire feed MOTOR DRIVE MODULE for testing purposes.)
2. Replace the MOTOR DRIVE MODULE for spindle motor. If this does not correct the trouble, proceed to step 3. (The spindle drive, MOTOR DRIVE MODULE, may be interchanged with the wire feed MOTOR DRIVE MODULES for testing purposes.)
3. Check the DIRECTION OF ROTATION SWITCH and the ROTATION SPEED CONTROL for defect.
4. Check SPINDLE DRIVE MOTOR for defect.

NOTE: Be sure to check the gear box and related mechanical drive assemblies of the spindle drive, for worn, broken or binding conditions.

TIME DELAY (MOVEOVER) TROUBLE

1. Check for defective MOVEOVER SWITCH (Mounted on Cantelever Arm.)

TIME DELAY (MOVEOVER) TROUBLE (CONT'D.)

2. Replace the RELAY; if this does not correct the trouble proceed to step 3.
3. Replace the 6J5 TUBE. If this does not correct the trouble, proceed to 4.
4. Check CONDENSER C1, and replace if necessary.
5. Replace the TIME DELAY MODULE. If this does not correct the trouble, proceed to step 6.
6. Check the AUTOMATIC-MANUAL MOVEOVER SWITCH and where used, the MANUAL SWITCH and the DIRECTION OF NO. 1 HEAD SWITCH. Check the DISTANCE MOVEOVER CONTROL and the MOVEOVER MOTOR FOR DEFECT.

HIGH FREQUENCY TROUBLE

1. Check the SPARK POINT GAPS for setting. Should be between .030 and .035.
2. Interchange the HIGH FREQUENCY MODULES. If trouble changes heads, a bad MODULE is indicated. If trouble does not change heads, proceed to step 3.
3. Check the WELD SWITCH for the head in trouble, check the CURRENT RELAY and the ACTUATOR COIL for the head in trouble.
4. Check the HIGH FREQUENCY output leads from the MODULES to the coils and all the way to the tip for arcing condition.

POSITIONING TROUBLE

1. If trouble raising LIFT CARRIAGE, check the UP positioning switch, the associated MAGNETIC RELAY, and the LIFT MOTOR.
2. If trouble lowering the LIFT CARRIAGE, check the DOWN positioning switch, the associated MAGNETIC REVERSING RELAY, and the LIFT MOTOR.
3. If trouble positioning the cantelever arm RIGHT, check the RIGHT positioning switch; the associated MAGNETIC REVERSING RELAY; and the POSITIONING MOTOR.
4. If trouble positioning the cantelever arm LEFT, check the LEFT positioning switch, the associated MAGNETIC REVERSING RELAY, and the POSITIONING MOTOR.

TROUBLE SHOOTING GUIDE

ROTATION (TRAVEL) TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
MOTOR WILL NOT RUN	Blown FUSE on SPINDLE MOTOR DRIVE MODULE; BAD ROTATION SWITCH (S-9); Defective WORK SPEED ROTATION CONTROL (R-8); Defective MOTOR (M-4); Defective spindle MOTOR DRIVE MODULE; OPEN in WIRING; BINDING GEARS in GEAR BOX; Broken RUBBER COUPLING in CANTELEVER ARM, BINDING GEARS in CANTELEVER ARM.
MOTOR RUNS SLOW	BINDING GEARS IN CANTELEVER ARM or GEAR BOXES; LOW 110 Volt A.C. power supply for CONTROL BOX; Bad RUBBER COUPLING in the CANTELEVER ARM; Bad ROTATION SWITCH (S-9); Defective WORK SPEED ROTATION CONTROL (R-8); Defective spindle MOTOR DRIVE MODULE; Defective or weak THYRATRON TUBE; Poor contact between THYRATRON TUBE pins and TUBE SOCKET contacts, corroded; Bad or defective MOTOR (M-4).
MOTOR DRIVE MODULE FUSE BLOWS	Temporary OVERLOAD; BINDING GEARS in CANTELEVER ARM or in GEAR BOXES; Defective MOTOR DRIVE MODULE; Defective MOTOR (M-4); Defective ROTATION SWITCH (S-9); Shorted or grounded WIRING; Defective WORK SPEED ROTATION CONTROL (R-8.)
CANNOT CONTROL MOTOR SPEED:	Defective WORK ROTATION SPEED CONTROL (R-8); Defective spindle MOTOR DRIVE MODULE; Corroded or poor contact between THYRATRON TUBE and SOCKET; defective THYRATRON TUBE; Defective MOTOR (M-4.)

ROTATION (TRAVEL) TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
ROTATION MOTOR SLUGGISH IN COLD CLIMATES	Improper GEAR BOX LUBRICANT in cold climates. See your local gear lube representative for recommended proper gear lubricant for your area.

WIRE FEED TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
WIRE FEED MOTOR RUNS, BUT WIRE DOES NOT FEED	Not enough tension on PRESSURE ROLL; Too much tension on the PRESSURE ROLL; Obstructed FLEXIBLE CABLE; Worn KNURLED WIRE FEED ROLLS; Too much tension on WEIDING WIRE REELS; Worn out PRESSURE ROLLS; Defective or flashed WELDING TIP; Improper WEIDING TIP for wire being used; Wire OUT OF SHAPE due to manufacture or too much tension on the PRESSURE ROLL; Wire BINDING on the WEIDING WIRE REEL; Cross-overs of WEIDING WIRE on the WELDING WIRE REELS.
WIRE FEED MOTOR DOES NOT RUN	Blown FUSE on the MOTOR DRIVE MODULE; Bad THYRATRON TUBE; Defective MOTOR DRIVE MODULE; Defective WIRE FEED MOTOR; Binding GEARS in the MOTOR GEAR BOX; Binding PINION and NON-METALLIC DRIVE GEAR; Open lead to MOTOR; Defective INCHING SPEED CONTROL (R-5ab); Defective AMPERAGE ADJUSTMENT CONTROL (R-6) or (R-7) if motor does not run for welding; Defective WELD SWITCH (S-3) or (S-4); Defective INCHING SWITCHES (S-5) or (S-6) for HEAD NO. 1; Defective INCHING SWITCHES (S-7) or (S-8) for HEAD NO. 2, if motor does not run for inching.
BOTH WIRE FEED MOTORS DO NOT RUN	Blown LINE FUSE (F-1); Defective LINE SWITCH (S-1); Low 110 Volt A.C. power supply to CONTROL BOX; Blown 15 Amp. FUSE in POWER UNIT; REFER TO PARAGRAPH * WIRE FEED MOTOR DOES NOT RUN.
MOTOR RUNS FOR A WHILE AND THEN WILL NOT RUN WIRE FEED MOTOR RUNS SLOW	SEE PREVIOUS PARAGRAPHS: WIRE FEED MOTOR DOES NOT RUN; and BOTH WIRE FEED MOTORS DO NOT RUN. Open armature circuit of MOTOR (Usually a swinging open in the MOTOR ARMATURE.) Low 110 Volt A.C. power supply to CONTROL BOX; Defective THYRATRON TUBE; Corroded or poor contact between THYRATRON TUBE pins and socket; Defective MOTOR DRIVE MODULE; Defective INCHING SPEED CONTROL (R-5ab); DEFECTIVE AMPERAGE ADJUSTMENT CONTROL (R-6) or (R-7). Defective WELD SWITCH (S-3) or (S-4); BINDING GEARS in WIRE FEED MOTOR GEAR BOX; Binding of PINION and NON-METALLIC DRIVE GEAR; Too much tension on WEIDING WIRE REEL; Obstructed FLEXIBLE CABLE; Obstructed or flashed TIP; Too much tension on PRESSURE ROLL; Binding wire or cross-overs in wire on WEIDING WIRE REEL; Defective MOTOR (M-1) or (M-2.)
WIRE FEED MOTOR DRIVE MODULE BLOWS FUSES	Temporary overload; Defective THYRATRON TUBE; Defective MOTOR DRIVE MODULE; Defective WIRE FEED MOTOR; Shorted MOTOR armature; Grounded WIRING.
CANNOT CONTROL WIRE FEED MOTOR SPEED. (CANNOT CONTROL INCHING OR AMPERAGE SPEED.) ERRATIC WEIDING	Defective INCHING SPEED CONTROL (R-5ab); Defective AMPERAGE ADJUSTMENT CONTROL (R-6) or (R-7); Open FIELD WINDING in the MOTOR; Defective ARMATURE in the MOTOR; Corroded THYRATRON TUBE pins and/or socket contacts. WEIDING WIRE COIL no centered on REEL; Improper tension on PRESSURE ROLL; Obstructed FLEXIBLE CABLE; Defective or flashed TIP; Too much tension on PRESSURE ROLL; changing wire diameter; Kinks or bends in WEIDING WIRE; Welding amperage can be controlled with INCHING SPEED CONTROL; See section CURRENT RELAY TROUBLE; Bad work ground; bad FLUX; Welding at too LOW AMPERAGE.

WIRE FEED TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
CANNOT CONTROL INCHING SPEED	Defective INCHING SPEED CONTROL (R-5ab); (If inching speed can be controlled by AMPERAGE ADJUSTMENT CONTROL, see CURRENT RELAY TROUBLE SECTION.)
WIRE FEED SLUGGISH IN COLD CLIMATES	Improper lubricant for GEAR BOXES in cold climate. See the local gear lubricant representative for proper lubricant in your area.

HIGH FREQUENCY TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
HIGH FREQUENCY FAILS TO OPERATE	Too wide SPARK POINT GAP;(Should be between .030 and .035); Defective HIGH FREQUENCY MODULE; Defective WELD SWITCH (S-3); or (S-4); Defective CURRENT RELAY (K-1) or (K-2); (See the CURRENT RELAY TROUBLE SECTION.) Defective ACTUATOR COILS in power unit; (See CURRENT RELAY TROUBLE SECTION); Defective parts in HIGH FREQUENCY MODULE; No 110 Volt A.C. to MODUIE.
HIGH FREQUENCY DOES NOT GO OFF	CURRENT RELAY failed to operate (See CURRENT RELAY TROUBLE SECTION.) Can control WEIDING AMPERAGE with INCHING SPEED CONTROL when this happens.
HIGH FREQUENCY GOES ON AND OFF	While welding: See paragraph ERRATIC WELDING in the WIRE FEED TROUBLE section. Welding at too low AMPERAGE.

TIME DELAY (MOVEOVER)

NOTE: THERE ARE TWO TYPES OF MOVEOVER ARRANGEMENTS used on the Model DMS Roller Machines - the CHAIN DRIVE MOVEOVER and the THREADED SHAFT MOVEOVER. In order to cover both type, two TIME DELAY (MOVEOVER) TROUBLE sections are provided.

CHAIN DRIVE MOVEOVER

TROUBLE SYMPTON	PROBABLE CAUSE
HEADS DO NOT MOVE OVER IN AUTOMATIC POSITION	Defective MOVEOVER SWITCH (S-17); Defective AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15); Defective DISTANCE MOVEOVER CONTROL (R-8); Defective TUBE on TIME DELAY MODULE; Defective PLUG IN RELAY on TIME DELAY MODULE; Defective TIME DELAY MODULE; Defective MOVEOVER MOTOR (M-3); Defective CONDENSER (C-1).
HEADS DO NOT MOVE OVER IN MANUAL POSITION	Defective AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15); Defective DISTANCE MOVEOVER CONTROL (R-8); Defective TUBE on TIME DELAY MODULE; Defective PLUG IN RELAY on TIME DELAY MODULE; Defective TIME DELAY MODULE; Defective MOVEOVER MOTOR (M-3.)
HEADS CONTINUE TO MOVE OVER IN AUTOMATIC MOVE-OVER CONDITION CANNOT CONTROL AMOUNT OF MOVEOVER	Defective PLUG IN RELAY on TIME DELAY MODULE; Defective AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15); Defective TIME DELAY MODULE; Defective MOVEOVER SWITCH (S-17.) Defective DISTANCE MOVEOVER CONTROL (R-8); Defective TUBE on TIME DELAY MODULE; Defective PLUG IN RELAY on TIME DELAY MODULE; Defective MOVEOVER SWITCH (S-17.)

THREADED SHAFT DRIVE

TROUBLE SYMPTON	PROBABLE CAUSE
HEADS DO NOT MOVE IN DIRECTION DESIRED	Wrong setting on moveover GEAR SHIFT BOX; Defective DIRECTION OF NO. 1 HEAD SWITCH (S-14); NOTE: THE DIRECTION OF NO. 1 HEAD SWITCH and the GEAR SHIFT BOX must be used in conjection with each other to obtain desired direction moveover.

THREADED SHAFT (CONT.)

TROUBLE SYMPTON	PROBABLE CAUSE
HEADS DO NOT MOVE OVER IN AUTOMATIC POSITION	Defective AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15); Defective MOVEOVER SWITCH (S-17); Defective DIRECTION OF NO. 1 HEAD SWITCH (S-14); Defective DISTANCE MOVEOVER CONTROL (R-9); Defective TUBE in TIME DELAY MODULE; Defective PLUG IN RELAY in TIME DELAY MODULE; Defective TIME DELAY MODULE; Defective MOVEOVER MOTOR (M-3); Defective CONDENSER (C-1.)
HEADS DO NOT MOVE OVER IN MANUAL POSITION	Defective MANUAL SWITCH (S-16); Defective AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15); Defective DIRECTION OF NO. 1 HEAD SWITCH (S-14); Defective PLUG IN RELAY on TIME DELAY MODULE; Defective TUBE in TIME DELAY MODULE; Defective TIME DELAY MODULE; Defective MOVEOVER MOTOR (M-3).
HEADS CONTINUE TO MOVE OVER IN AUTOMATIC MOVE-OVER CONDITION	Defective PLUG IN RELAY on TIME DELAY MODULE; Defective CONDENSER (C-1); Defective AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15); Defective TIME DELAY MODULE.
CANNOT CONTROL AMOUNT OF MOVEOVER	Defective MOVEOVER DISTANCE CONTROL (R-9); Defective TUBE in TIME DELAY MODULE; Defective CONDENSER (C-1); Defective MOVEOVER SWITCH (S-17); Defective PLUG IN RELAY on TIME DELAY MODULE; Defective AUTOMATIC-MANUAL MOVEOVER SWITCH (S-15.)

VERTICAL LIFT TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
LIFT CARRIAGE WILL NOT RAISE	Defective UP switch (s-10); Defective MAGNETIC REVERSING REIAY (K-3); Defective LIFT MOTOR (M-5); Open wiring; Low 110 Volt A.C. Power supply.
LIFT CARRIAGE WILL NOT LOWER	Defective DOWN switch (S-11); Defective MAGNETIC REVERSING RELAY (K-3); Defective LIFT MOTOR (M-5); Open wiring; Low 110 Volt A.C. power supply; Defective LIMIT SWITCH (S-18.)

NOTE: There is a LIMIT SWITCH in the bottom of the LIFT CARRIAGE that will now allow the LIFT CARRIAGE to go down all the way. When the carriage is lowered too far, the LIMIT SWITCH will operate and stop the LIFT CARRIAGE. When this condition has happened, it is necessary to RAISE the carriage until the LIMIT SWITCH is clear before it can be lowered again.

POSITONG TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
CANNOT POSITION CANTE-LEVER ARM RIGHT	Defective RIGHT POSITIONING switch (S-12); Defective MAGNETIC REVERSING RELAY (K-4); Defective POSITIONING MOTOR (M-6); Open wiring; Low 110 Volt A.C. power supply.
CANNOT POSITION CANTE-LEVER ARM LEFT	Defective LEFT POSITIONING switch (S-13); Defective MAGNETIC REVERSING RELAY (K-4); Defective POSITIONING MOTOR (M-6); Open wiring; Low 110 Volt A.C.Power Supply.

There are three (3) types of CURRENT RELAY systems in use on Model DEMS Roller machines, the GATE TYPE, PLUNGER TYPE, and ACTUATOR COIL-CURRENT RELAY type. The function of these systems is the SAME regardless of the type used and when using this section, use only the type on your machine and disregard the other. Pictures of the various types in use are contained in the REPLACEMENT PARTS LIST in the back of this manual. The drawings in the ELECTRICAL SECTION on page 33 will show the various circuit arrangements for them. On the GATE and PLUNGER type CURRENT RELAY systems, the RELAYS are actually small micro-switches used as relays.

CURRENT RELAY TROUBLE

CURRENT RELAY TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
CAN CONTROL AMPERAGE WITH INCHING SPEED; CURRENT RELAY FAILED TO OPERATE	Defective CURRENT RELAY (K-1) or (K-2); Defective ACTUATOR COIL (Where used); Open, grounded or shorted wiring in the cable between ACTUATOR COIL and CURRENT RELAY. (On GATE and PLUNGER types.) PLUNGER or GATE out of adjustment.
HIGH FREQUENCY DOES NOT GO OFF WHEN WELDING STARTS	SAME AS PARAGRAPH ABOVE
CAN CONTROL INCHING SPEED WITH AMPERAGE CONTROL; HIGH FREQUENCY DOES NOT GO ON CURRENT RELAYS OPERATE AND THEN DE-ENERGIZE CONTINUOUSLY	CURRENT RELAY ENERGIZED ALL THE TIME; Defective CURRENT RELAY (K-1) or (K-2); Defective ACTUATOR COIL (Where used.); also possible shorted or grounded wiring in cable between ACTUATOR COIL and CURRENT RELAYS. See Section: ERRATIC WELDING; Welding at too low AMPERAGE.

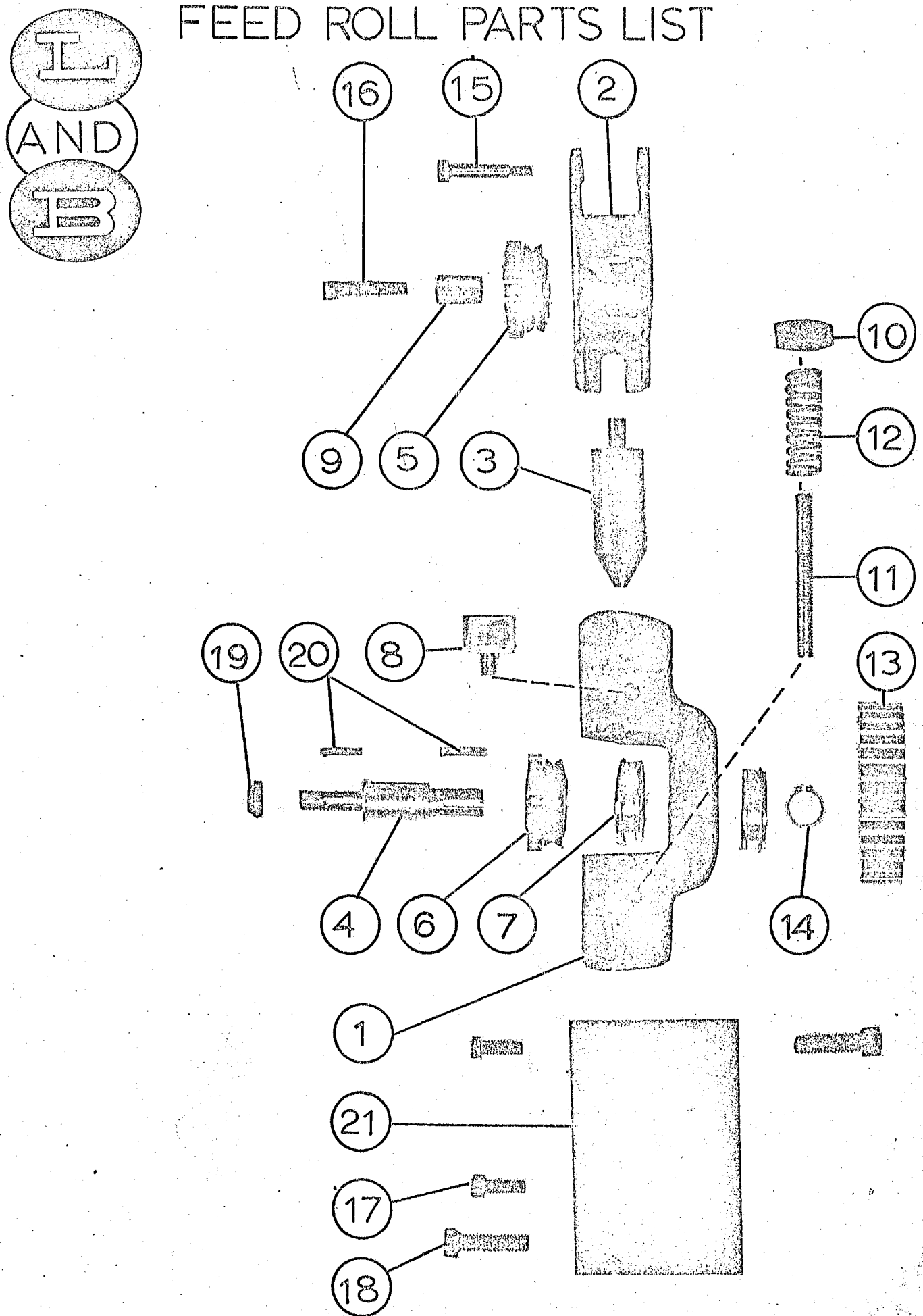
A.C. SUPPLY VOLTAGE TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
POWER SUPPLY INDICATOR (I-1) DOES NOT GO ON	Burned out INDICATOR BULB (I-1); Blown 15 amp. FUSE (F-1); Blown 15 amp. FUSE in power unit; Defective LINE SWITCH (S-1); Blown primary Fuse in MAIN DISCONNECT BOX.
LOW A.C. VOLTAGE; DIM LIGHTS; FAN RUNS SLOW	Blown or defective PRIMARY FUSE in THREE PHASE DISCONNECT BOX; Defective LINE SWITCH (S-1); Defective 15 amp. FUSE in POWER UNIT; Open or defective lead in cable from POWER UNIT to CONTROL BOX; Loose CONNECTION in POWER UNIT and/or the CONTROL BOX; Defective 115 Volt A.C. WINDING in POWER UNIT. (Located on same transformer core as the AUTO TRANSFORMER); Check for charred wiring on AUTO TRANSFORMER.
15 AMP. FUSE IN POWER UNIT BLOWN.	Temporary overload; Defective VENTILATING FAN in POWER UNIT; Shorted or grounded leads in cabling to CONTROL BOX; Bad LINE SWITCH (S-1); Shorted INDICATOR LIGHT (I-1); Grounded or shorted wiring in CONTROL BOX, FUSE (F-1) will blow also.
FAN ON FRONT OF DEMS DOES NOT RUN LIGHTS ON DEMS FRONT DO NOT WORK VENTILATING FAN IN POWER UNIT DOES NOT RUN	Defective FAN MOTOR; Blown 15 amp. FUSE (F-1); Open, shorted or grounded wiring to FAN. Burned out LIGHT BULB; Blown 15 amp. FUSE (F-1); Open, short or grounded wiring to lights. Blown 15 amp. FUSE in POWER UNIT; Defective VENTILATING FAN MOTOR; Open wiring to FAN MOTOR; Blown FUSE in THREE PHASE DISCONNECT BOX. WARNING: DO NOT WELD IF VENTILATING FAN IN POWER UNIT IS INOPERATIVE; SERIOUS DAMAGE MAY RESULT.

WELDING TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
LOW OR NO D. C. VOLTAGE CANNOT ADJUST TO VOLTAGE DESIRED	CHECK for loose or charred wiring in POWER UNIT; shorted TRANSFORMER WINDINGS; Burned out SELENIUM RECTIFIERS (Will smell like rotten eggs); Blown PRIMARY FUSE in THREE PHASE DISCONNECT BOX; Defective D.C. VOLT METER on front of POWER UNIT; Open lead to VOLT METER; Open lead to VERNIER ASSEMBLY on AUTO TRANSFORMER; Open on VERNIER (SLIDE) assembly of AUTO TRANSFORMER caused by improper seating of VERNIER on AUTO TRANSFORMER WINDINGS or by DIRT; Bad leads to or from CONTACTOR RELAY; Pitted or dirty CONTACTS on the CONTACTOR RELAY.

ALLOY ALUMINUM HOUSING
FEED ROLL PARTS LIST

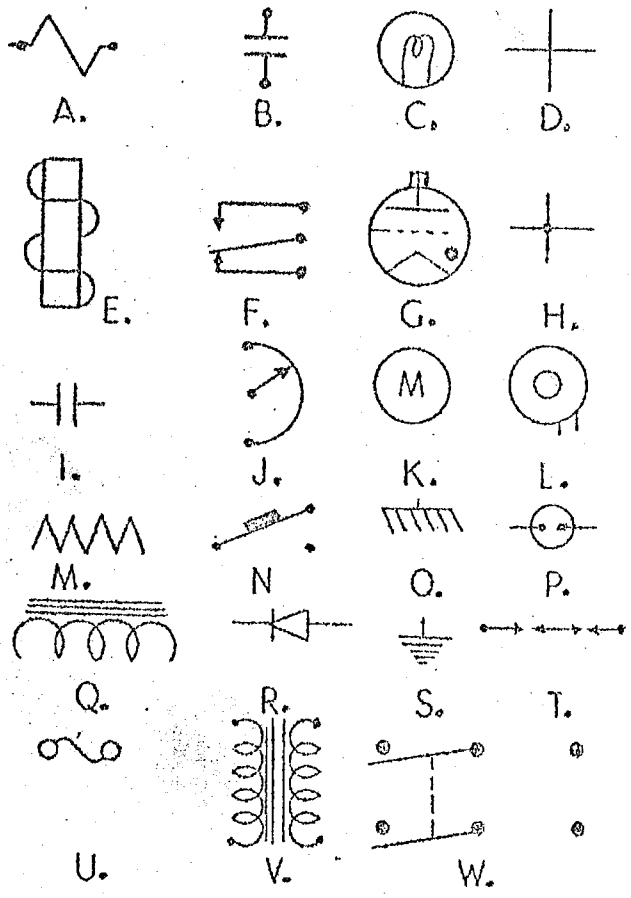


WELDING TROUBLE

TROUBLE SYMPTON	PROBABLE CAUSE
UNABLE TO RAISE WELDING VOLTAGE OVER 28 VOLTS	Improper THREE (3) PHASE INPUT VOLTAGE; SELENIUM RECTIFIER stack aging and losing its effectiveness.
LOSE WELDING POWER WHILE WELDING, OR AT START WHEN WELDING FOR SOME TIME:	CONTACTOR RELAY de-energized by operation of THERMAL CUT-OUTS; (The THERMAL CUT-OUTS are in series with the winding of the CONTACTOR RELAY and are inserted in the FINS of the SELENIUM RECTIFIERS. If the STACK OVERHEATS, they will operate, DE-ENERGIZING THE CONTACTOR RELAY and welding power is lost.) Usually caused by RECTIFIERS getting too HOT, due to accumulation of dirt on FINS, LACK of VENTILATION in the POWER UNIT, welding with SIDE OFF power unit, AIR INTAKE GRILL within 18" of wall or other obstruction.
WEIDING CABLES GET HOT (WILL GET WARM, AND THIS IS NORMAL)	Loose connection on BUSS BARS; Loose SET SCREWS in welding cable CONNECTORS; Poor ground connection on machine; Poor connection to FIEXIBLE CABLE; Poor SPLICE (If one has been made); Welding cable too small size (MUST BE 4/0 SIZE); Broken strands of wire in welding cable causing high resistance.
WEIDING BEAD ON ONE HEAD RESEMBIES ROPE	Power Unit SINGIE PHASING due to BLOWN PRIMARY FUSE in the THREE PHASE DISCONNECT BOX; (NOTE: In order to test the FUSES, it is necessary to remove them from the DISCONNECT BOX and either replace with a good one, or test with an OHMETER or other CONTINUITY TESTER.) WARNING: WHEN THIS CONDITION IS NOTICED, TURN OFF THE MACHINE UNTIL THE FUSES ARE CHECKED.

ELECTRICAL SECTION

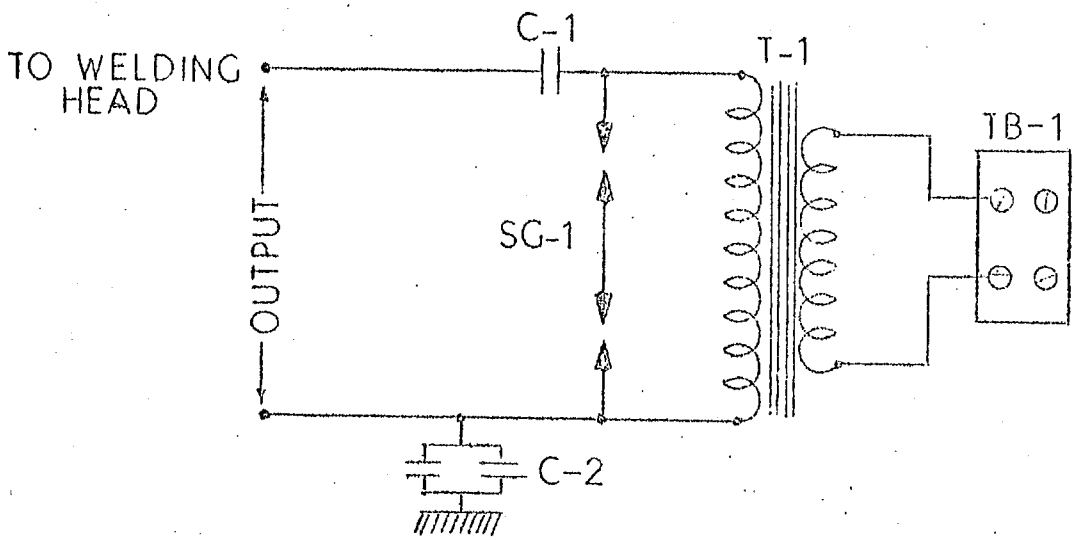
THIS SECTION CONTAINS ALL ELECTRICAL DRAWINGS FOR YOUR MACHINE. REPLACEMENT PARTS LISTS ARE INCLUDED ON MODULE DRAWINGS. SYMBOLS USED ON L & B DRAWINGS ARE SHOWN BELOW FOR YOUR INFORMATION.



A - Magnetic relay winding
B - Magnetic relay contacts
C - Lamp bulb
D - Wires cross, no connection
E - Relay winding
F - Relay contact
G - Thyratron tube
H - Wires cross, connected
I - Condensor
J - Potentiometer
K - Meter
L - Actuator coil
M - Resistor
N - Spring return switch (micro)
O - Chassis ground
P - Neon indicator
Q - Choke coil
R - Rectifier
S - Ground
T - Spark point slugs
U - Fuse
V - Transformer
W - Switch (DPDT)

HIGH FREQUENCY MODULE

STOCK NO. 107-006

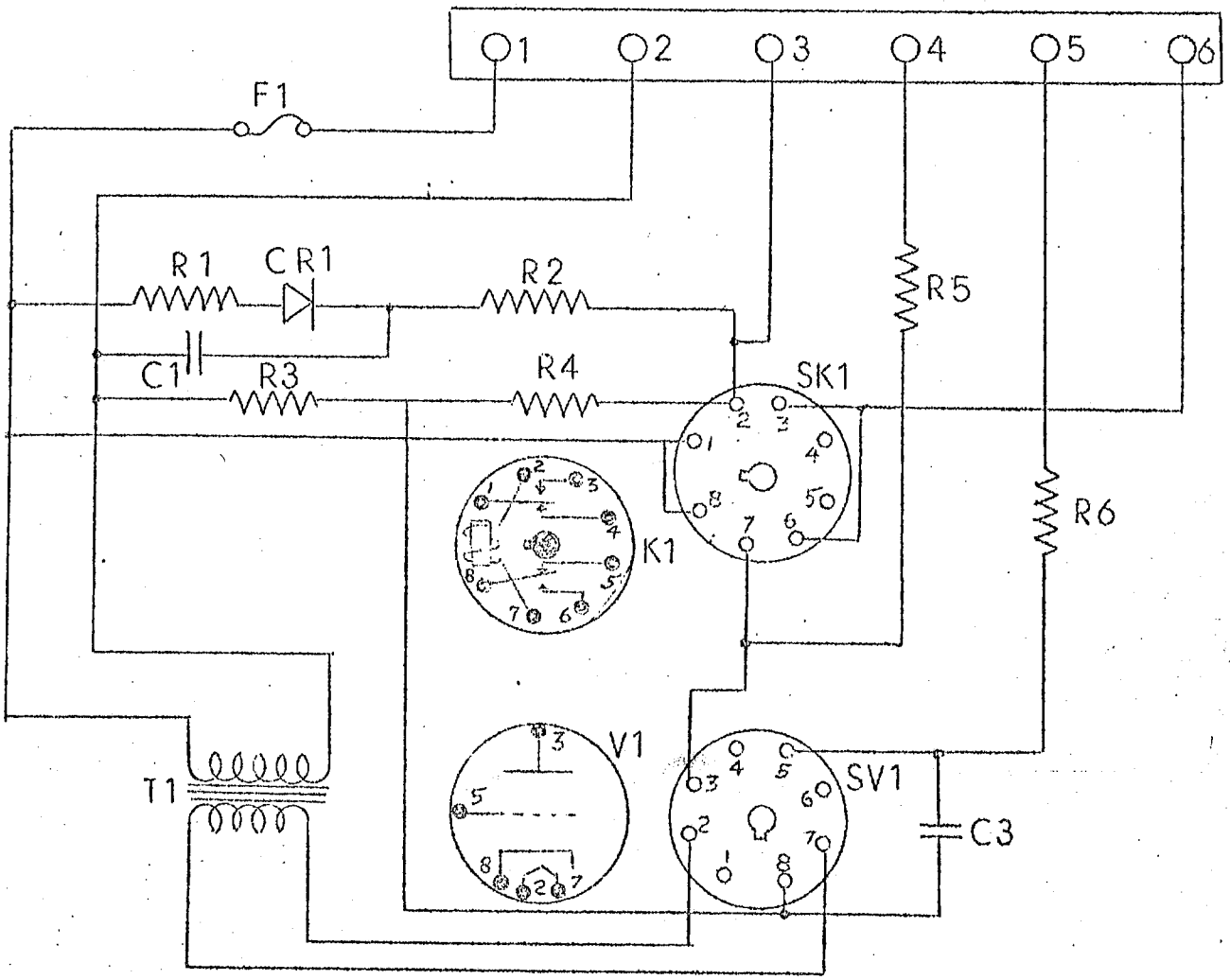


WARNING: THE OUTPUT OF THE HIGH FREQUENCY MODULES IS 6,000 VOLTS AND SHOULD NEVER BE TESTED WITH THE POWER ON, EXCEPT BY QUALIFIED PERSONELL.

PARTS LIST

PART	L&B STOCK NO.	DESCRIPTION
TB-1	118-012	2 TERMINAL BARRIER STRIP
T-1	119-004	110 VOLT PRIMARY, 6,000 VOLT SECONDARY TRANSFORMER.
SG-1	122-017	SPARK POINTS.
C-1	102-011	.002 MFD.; 6,000 VDC MICA CONDENSER
C-2	102-010	.005 MFD., 6,000 VDC CONDENSER
	104-003	MOUNTING INSULATOR FOR SPARK POINTS (THIS PART NOT SHOWN.)

TIME DELAY MODULE STOCK NO. 107-003

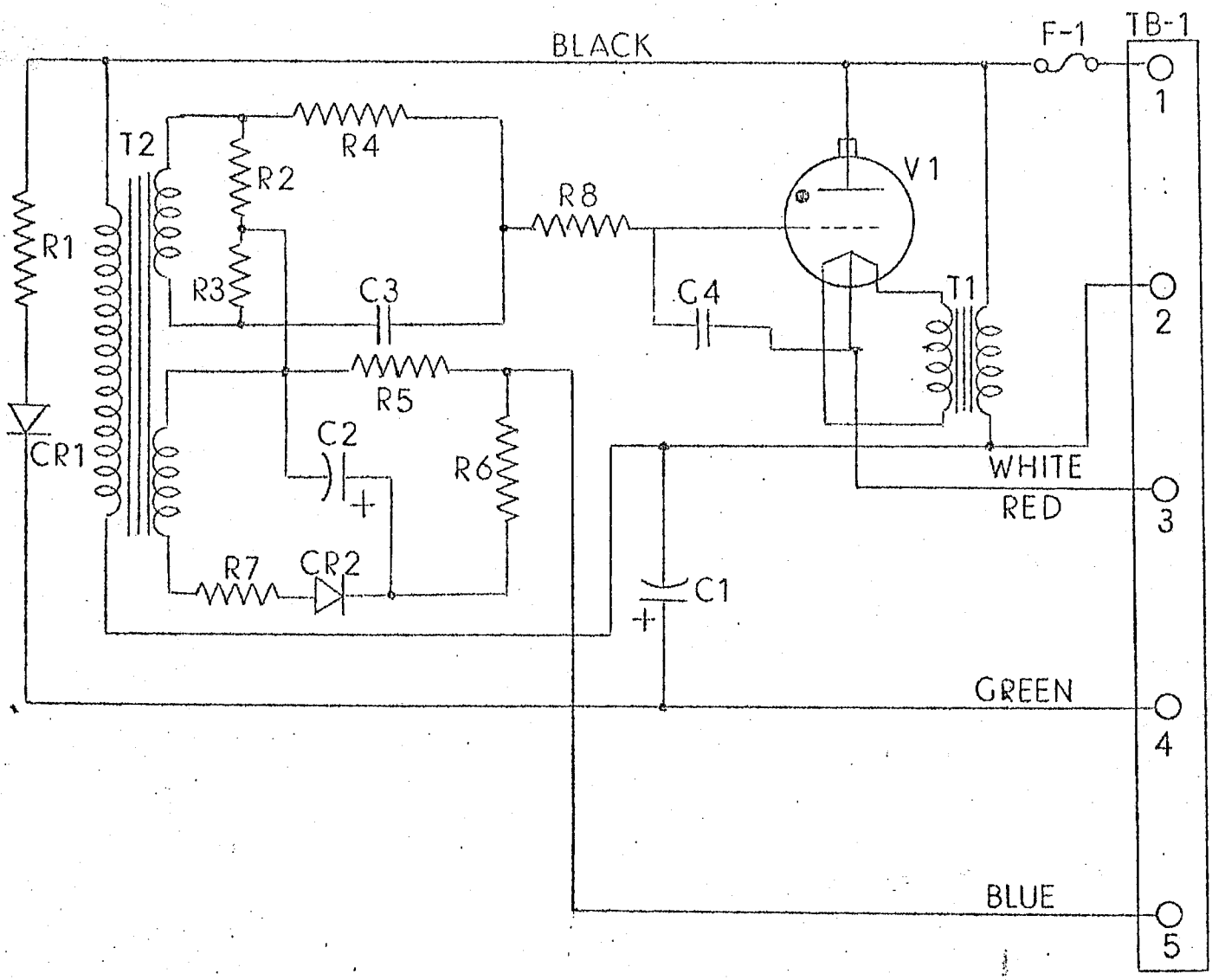


PARTS LIST

PART	L&B STOCK NO.	DESCRIPTION
F1	103-002	1 AMP. FAST BLOW FUSE
R1	116-021	36 OHM, 1 WATT RESISTER
R2	116-022	470 OHM, 1 WATT RESISTER
R3	116-009	3900 OHM, 1 WATT RESISTER
R4	116-002	56,000 OHM, 1 WATT RESISTER
R5	116-006	10,000 OHM, 2 WATT RESISTER
R6	116-023	360,000 OHM, 1 WATT RESISTER
K1	115-001	PLUG IN RELAY
V1	121-002	6J5 VACUUM TUBE
CR1	114-005	30 MIL. SELENIUM RECTIFIER
T1	119-008	FILIMENT TRANSFORMER
C1	102-012	8 MFD.; 250 VDC CONDENSER
C3	103-006	1 MFD., 300 VDC CONDENSER
SV1, SK1	111-012	8 PIN OCTAL SOCKET

NOTE: Sockets SK1 and SV1 are identical. They are arranged on the back of the module one over the other. The PLUG IN RELAY is used in the TOP SOCKET and the 6J5 TUBE is used in the BOTTOM SOCKET.

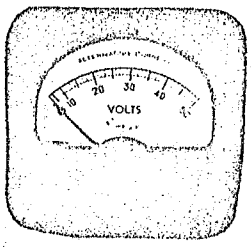
MOTOR DRIVE MODULE STOCK NO. 107-001



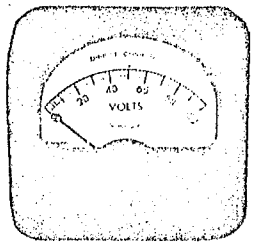
PARTS LIST

PART	L&B STOCK NO.	DESCRIPTION
F1	103-001	5 AMP. FAST BLOW FUSE
V1	121-001	THYRATRON TUBE
CR1	114-001	500 MIL. SELENIUM RECTIFIER
CR2	114-002	75 MIL. SELENIUM RECTIFIER
T1	119-002	FILIMENT TRANSFORMER
T2	119-001	PHASE SHIFTING TRANSFORMER
R1	116-020	25 OHM, 25 WATT, WIRE WOUND RESISTER
R2; R3	116-001	1800 OHM, 1 WATT RESISTER
R4, R5	116-002	56,000 OHM, 1 WATT RESISTER
R6	116-005	470,000 OHM; 1 WATT RESISTER
R7, R8	116-004	100,000 OHM, 1 WATT RESISTER
C1	102-001	60 MFD. 350 VDC CONDENSER
C2	102-002	10 MFD. 150 VDC CONDENSER
C3	102-003	.05 MFD. 600 VDC CONDENSER
C4	102-004	.005 MFD. 600 VDC CONDENSER
	111-013	THYRATRON TUBE SOCKET
	111-019	FUSE HOLDER

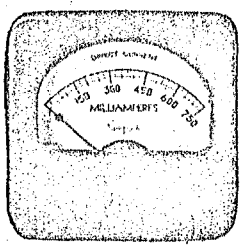
METERS USED ON L & B EQUIPMENT



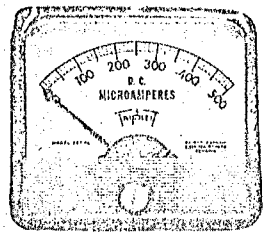
STOCK NO. 106-004
0-50 Volt A.C. Meter



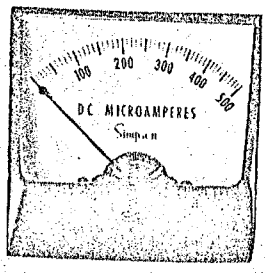
STOCK NO. 106-008
0-100 D.C. Volt Meter



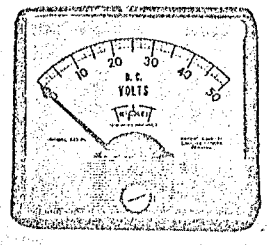
STOCK NO. 106-005
0-750 Milliamperes
Meter



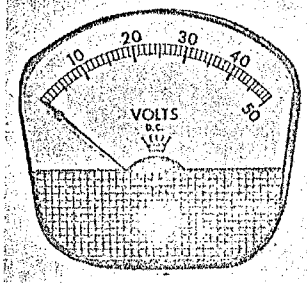
STOCK NO. 106-009
0-500 D.C. Microamperes
Meter



STOCK NO. 106-006
0-500 D.C. Microamperes
Meter



STOCK NO. 106-010
0-50 D.C. Volt Meter



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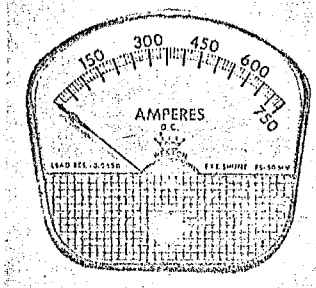
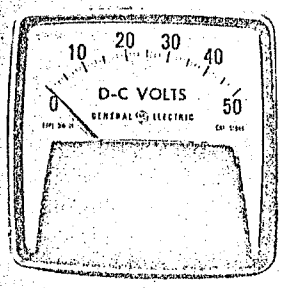
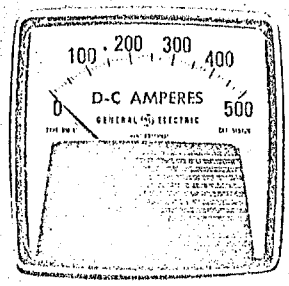
0-50 D.C. Volt Meter



STOCK NO. 106-011
0-750 Amperes Meter



STOCK NO. 106-002
0-50 D.C. Volt Meter



STOCK NO. 106-001
0-500 D.C. Amperes
Meter

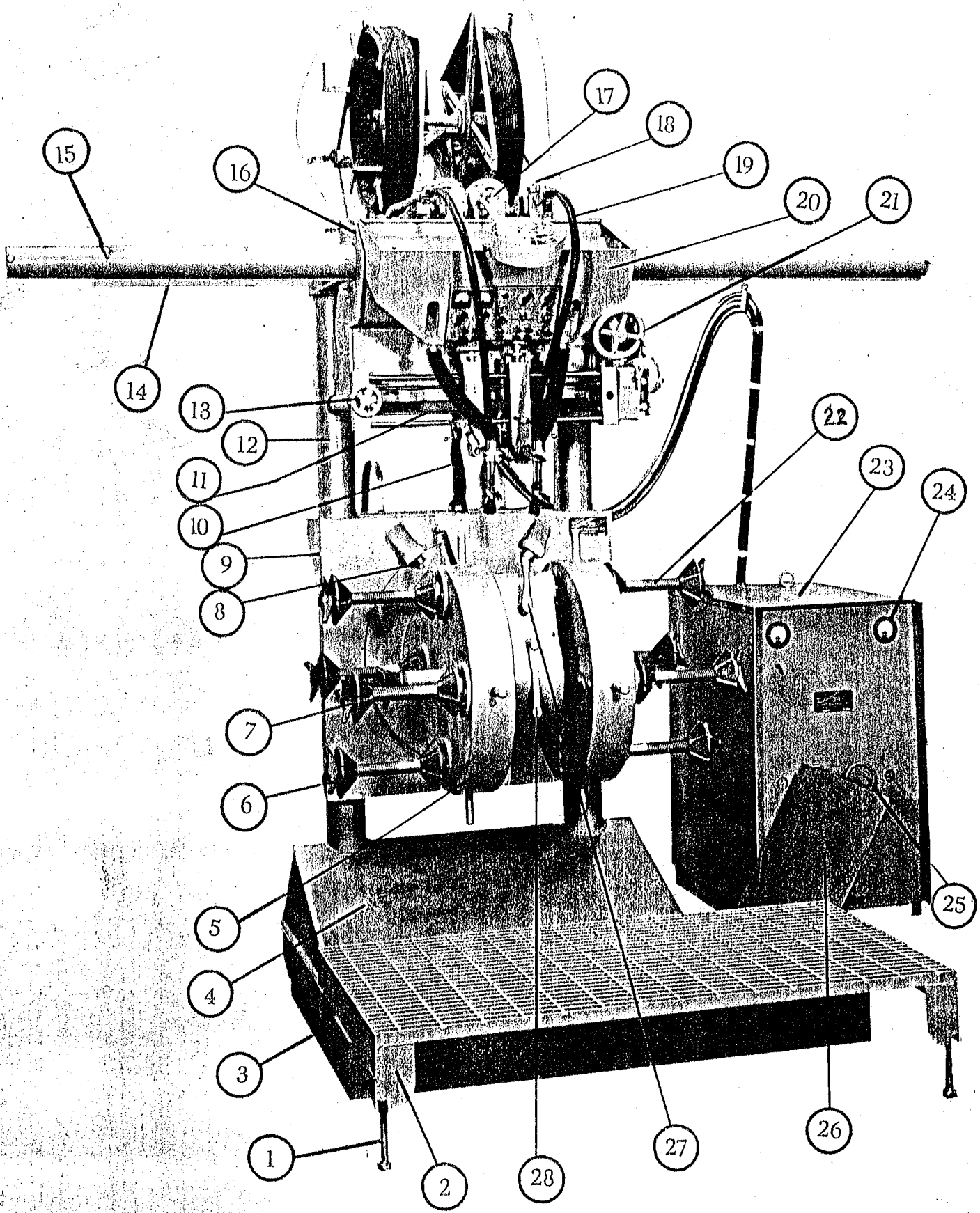


Fig. 1

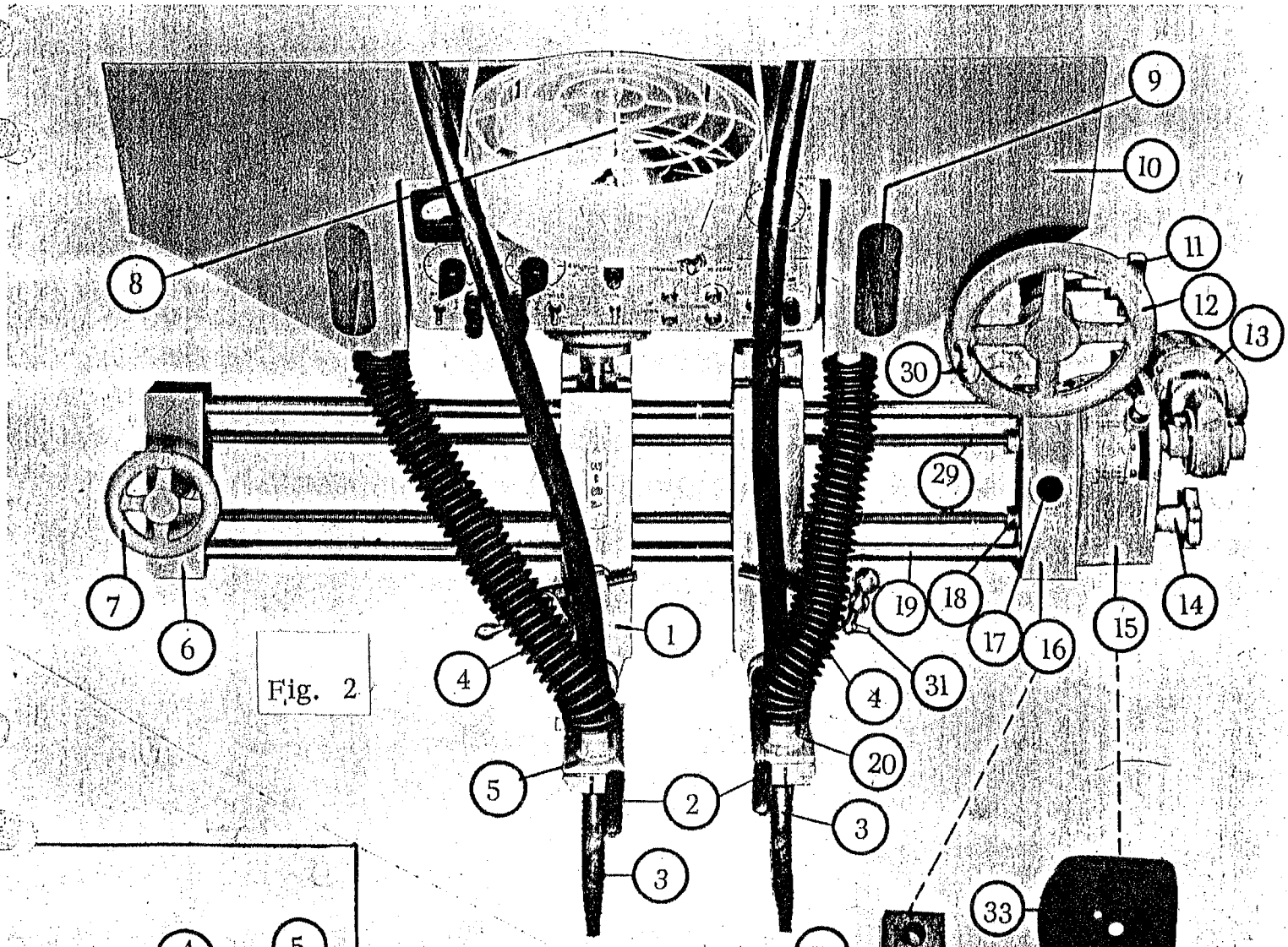

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Fig. 2

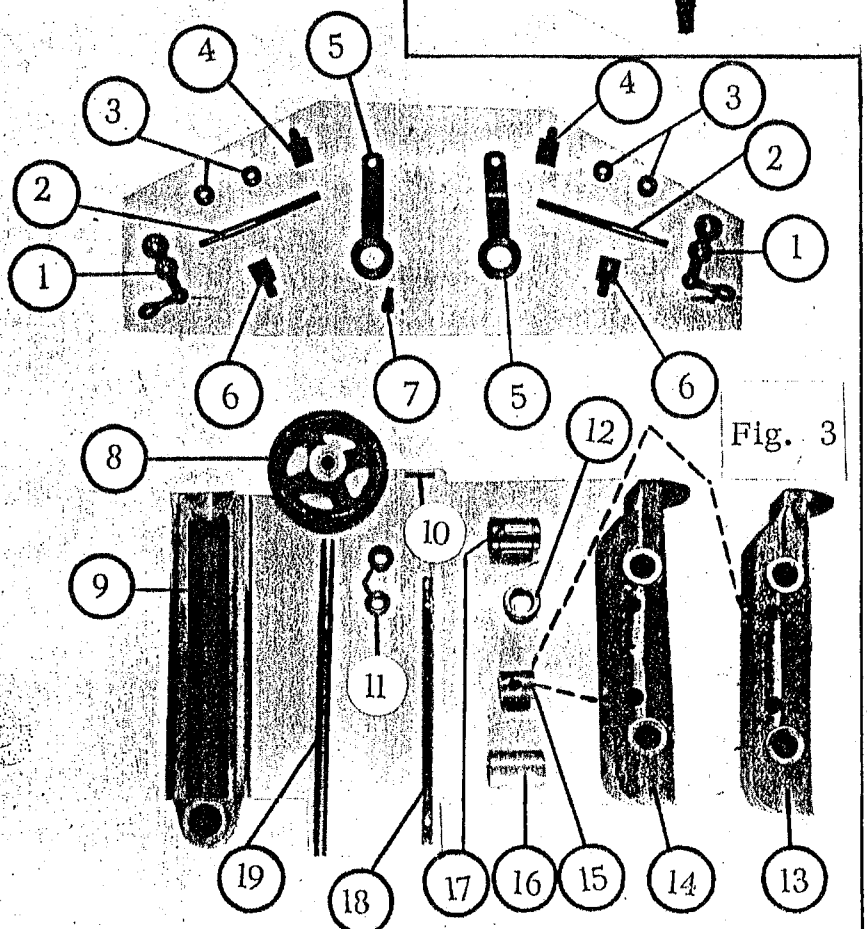
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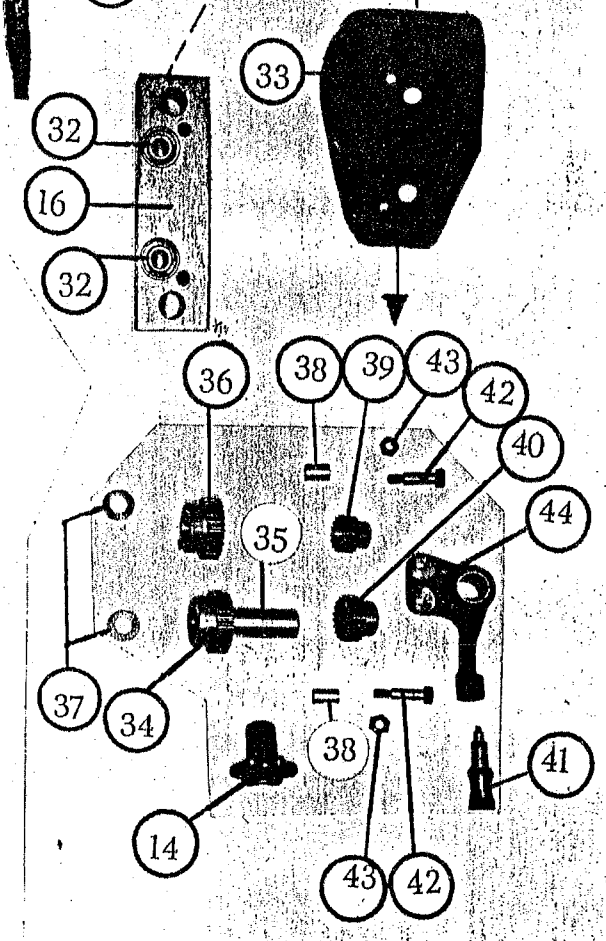
Fig. 3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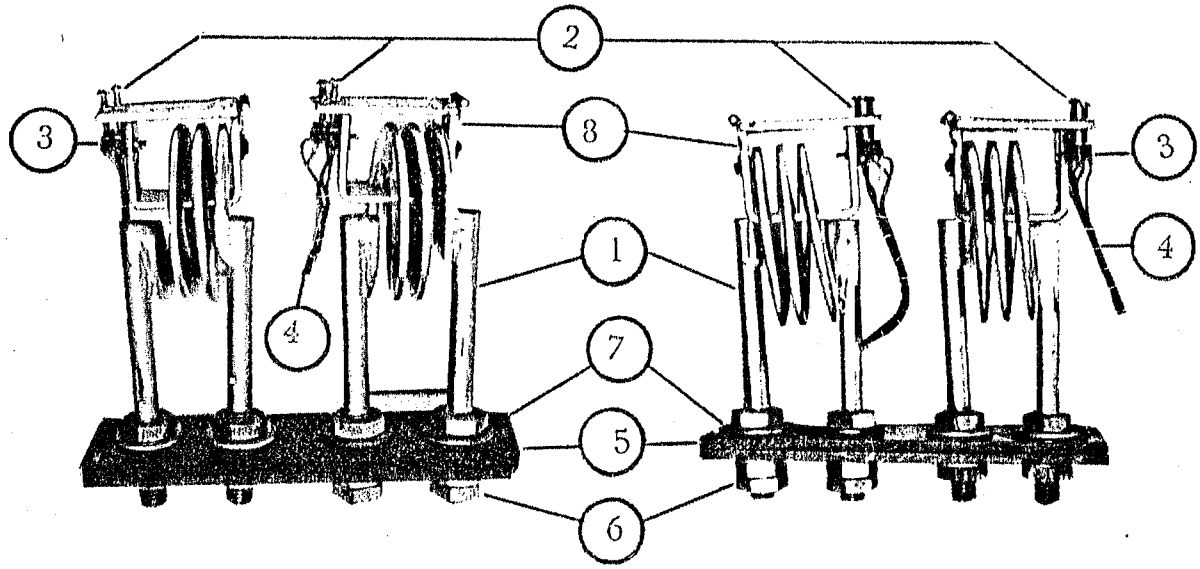

FIG. 4

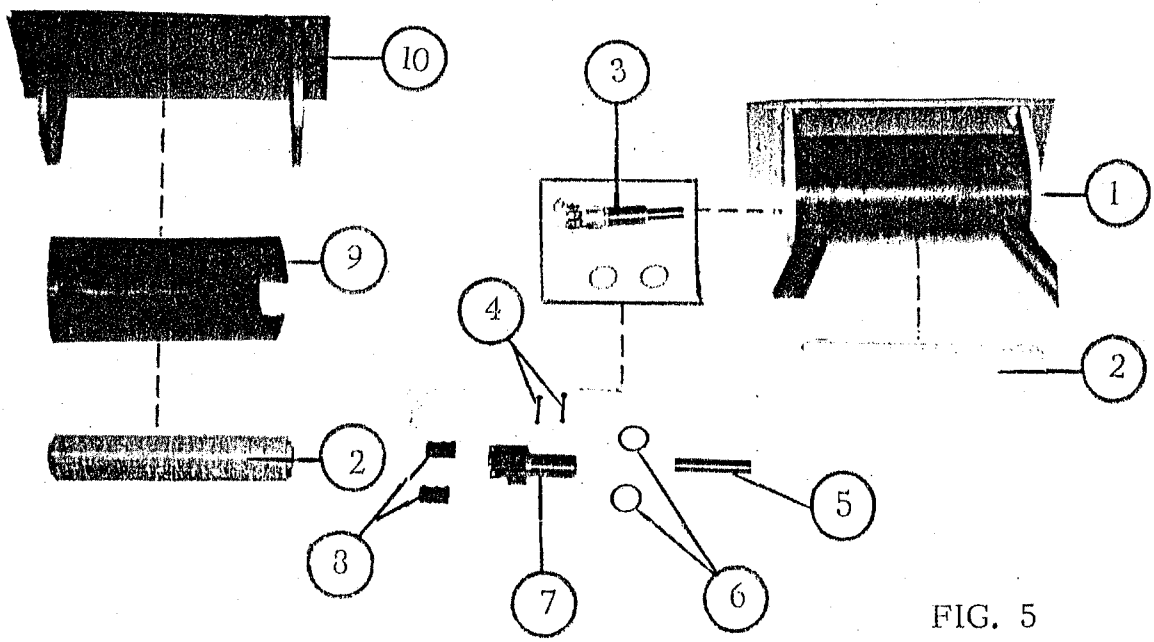

FIG. 5

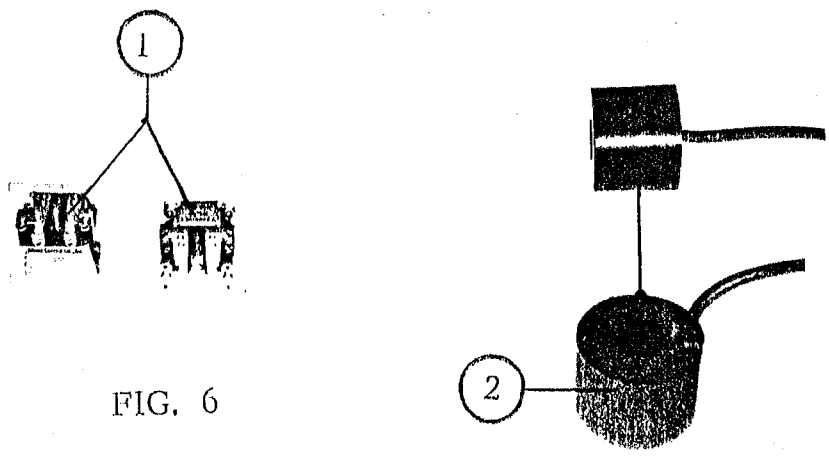

FIG. 6

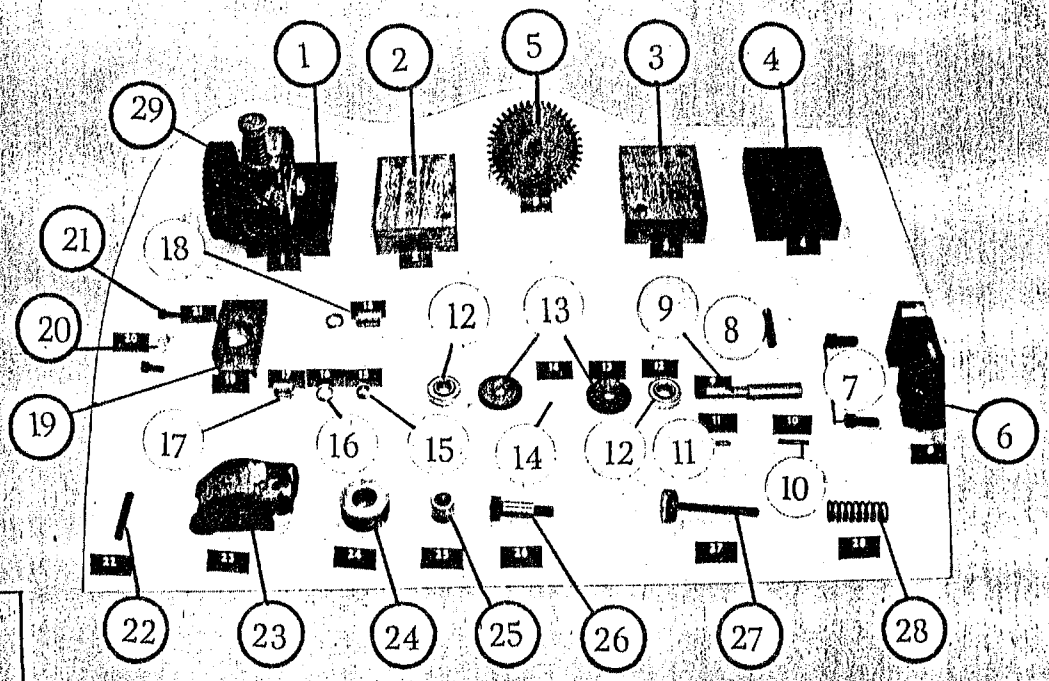

Fig. 7

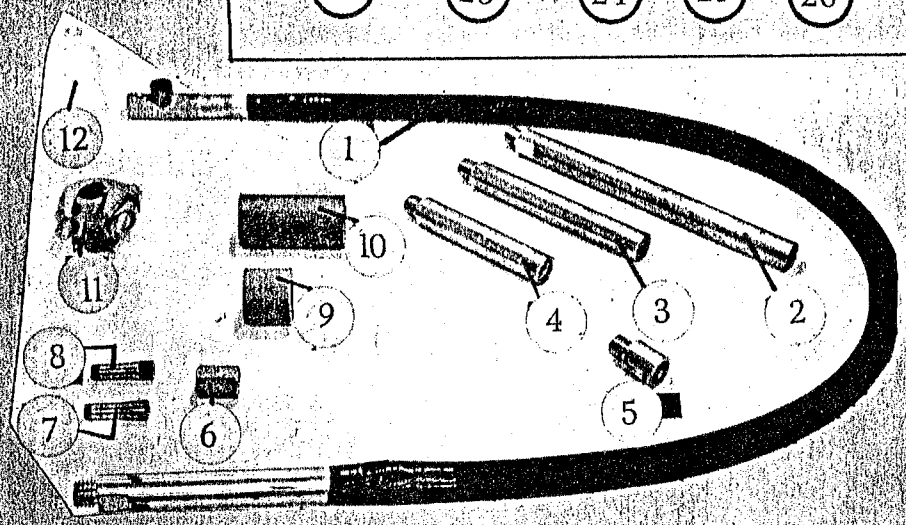

Fig. 8

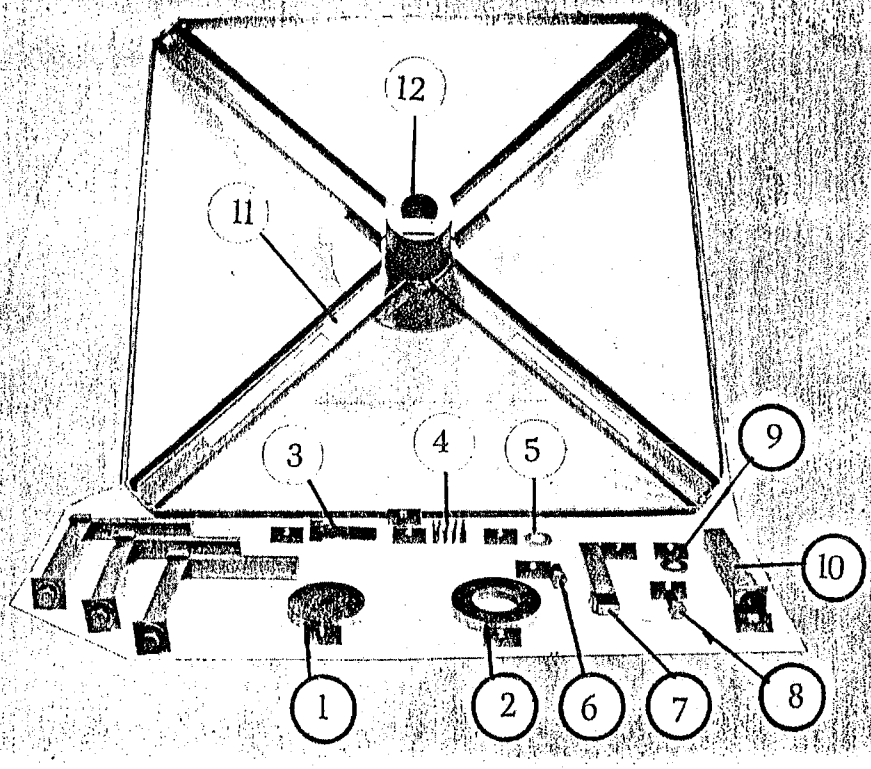

Fig. 9

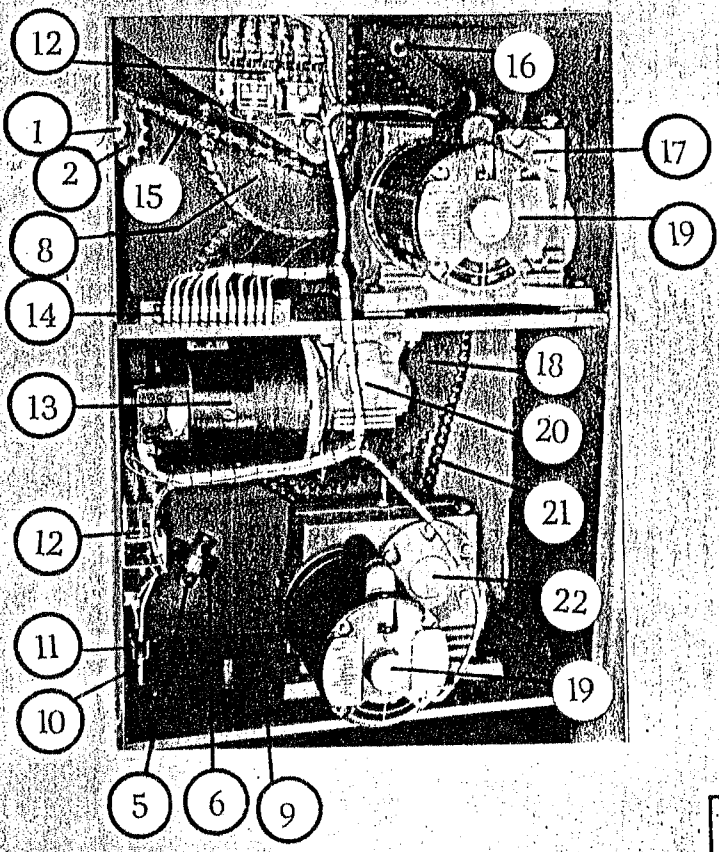
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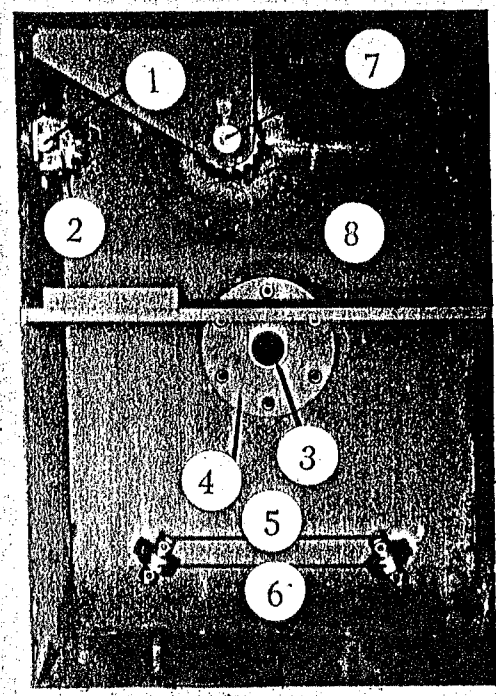
Fig. 10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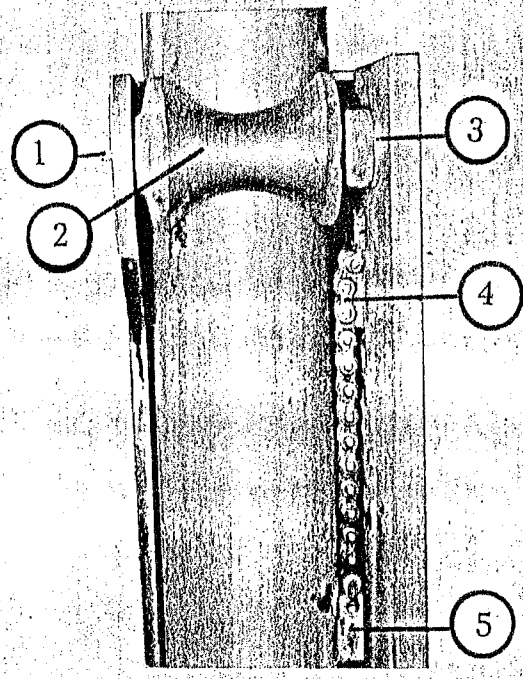
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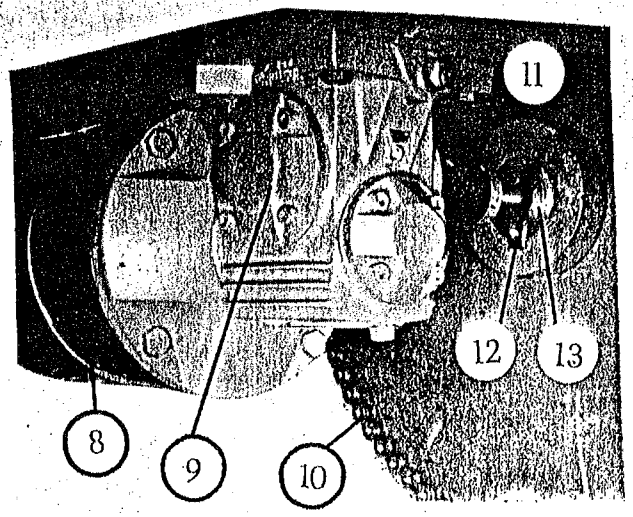
Fig. 11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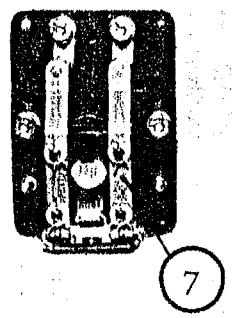
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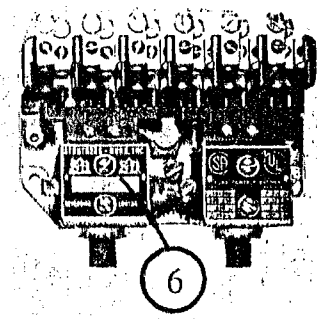
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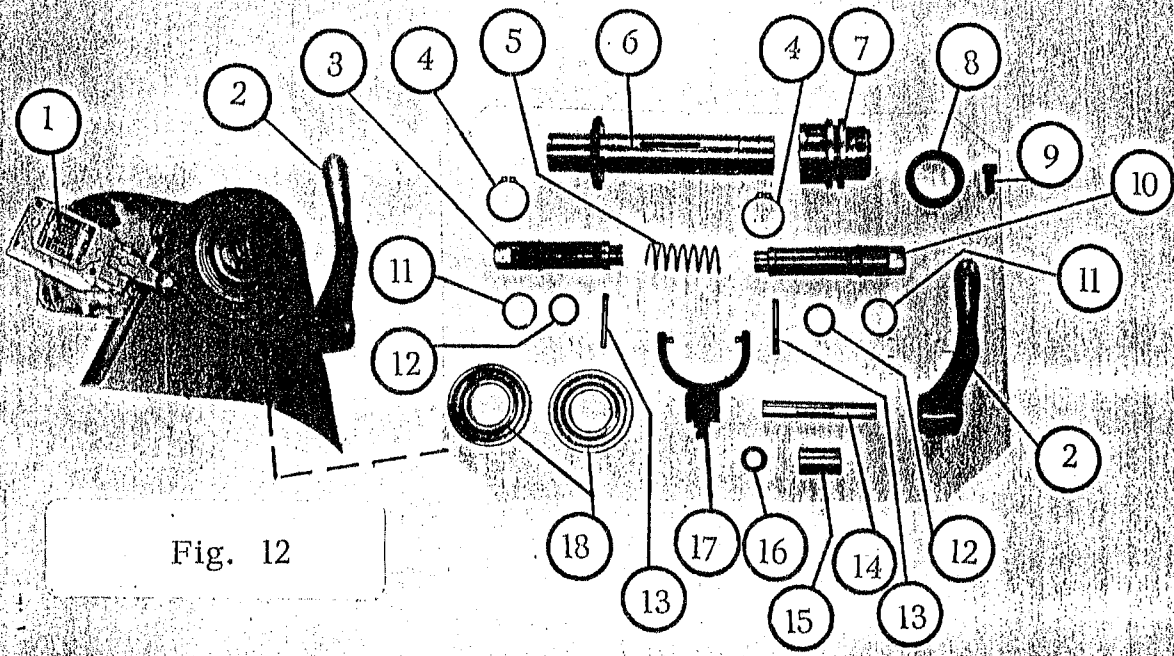


Fig. 12

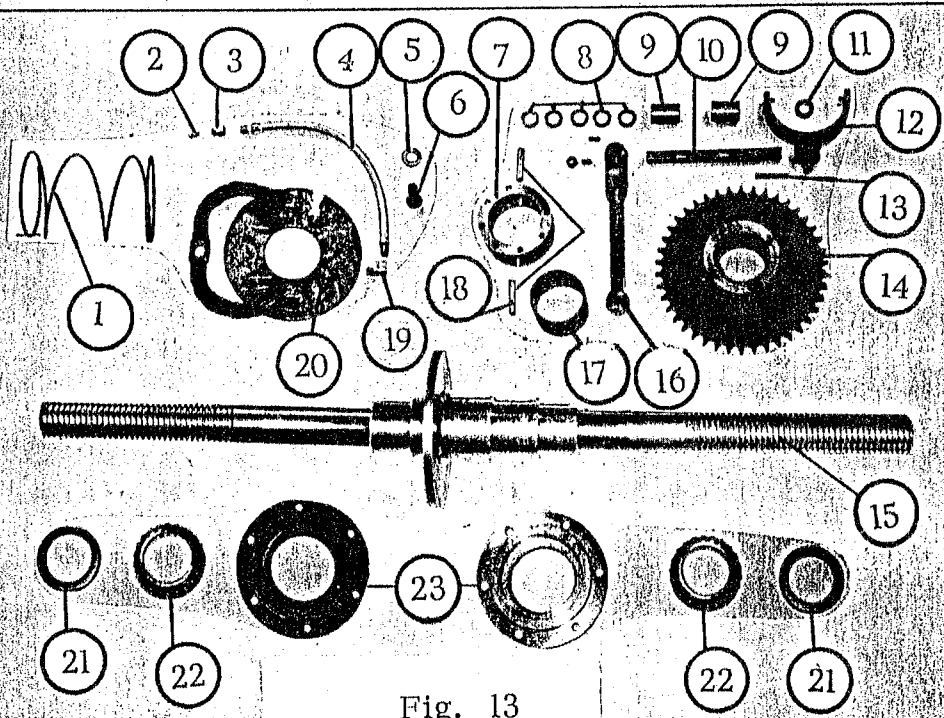


Fig. 13

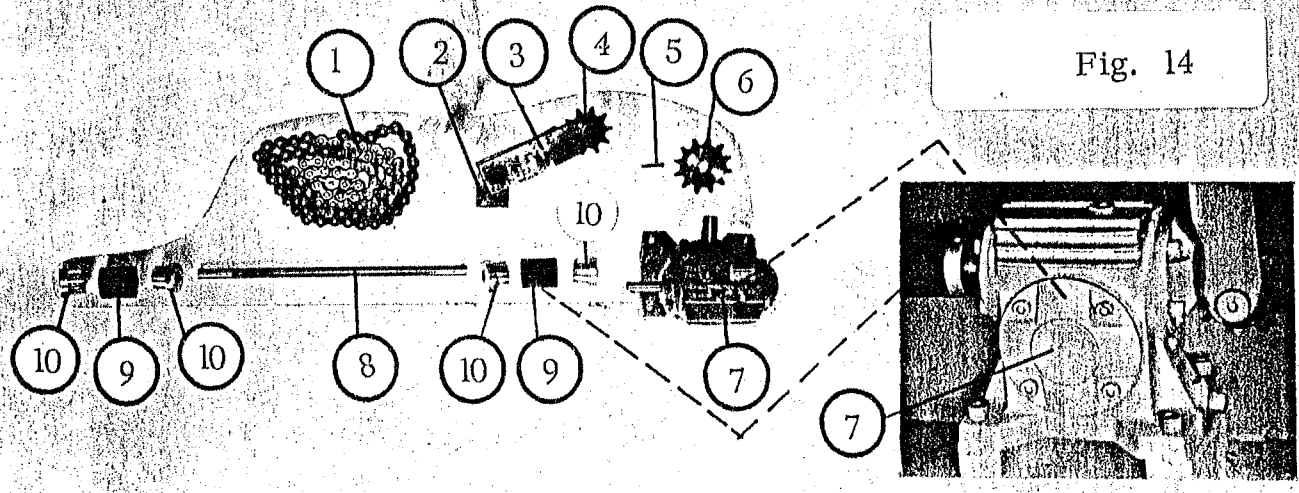
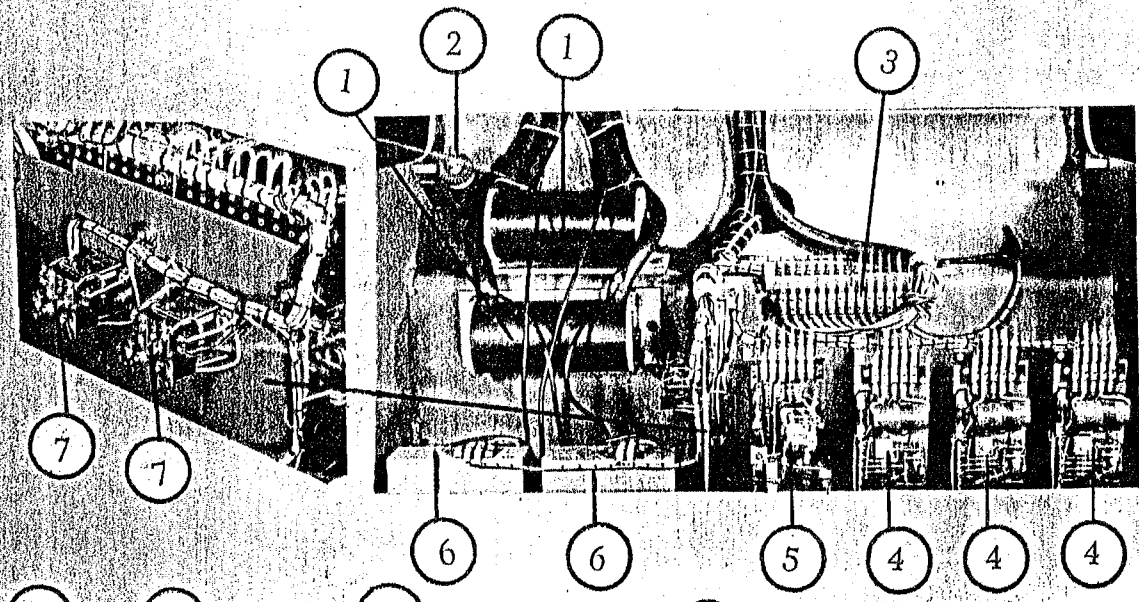


Fig. 14



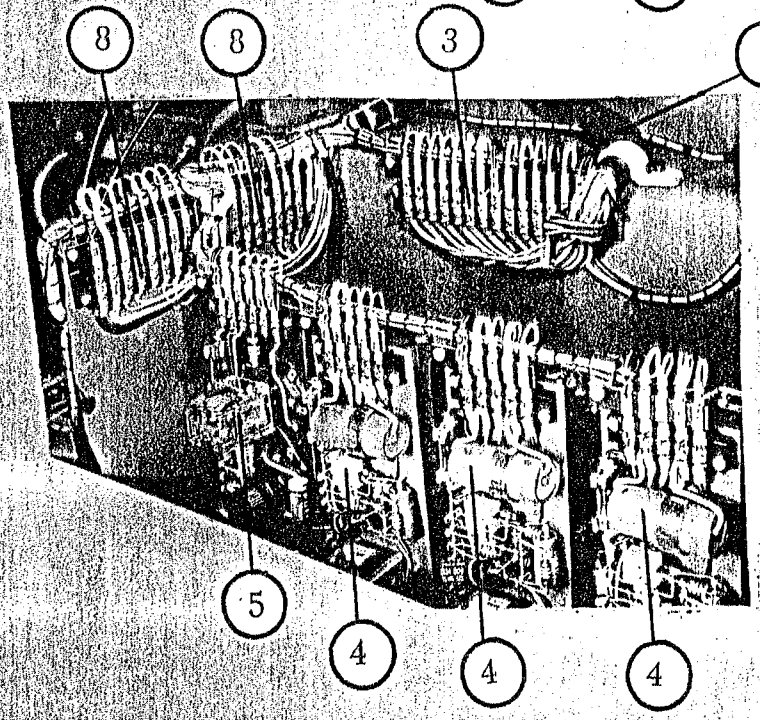


Fig. 15

Fig. 16

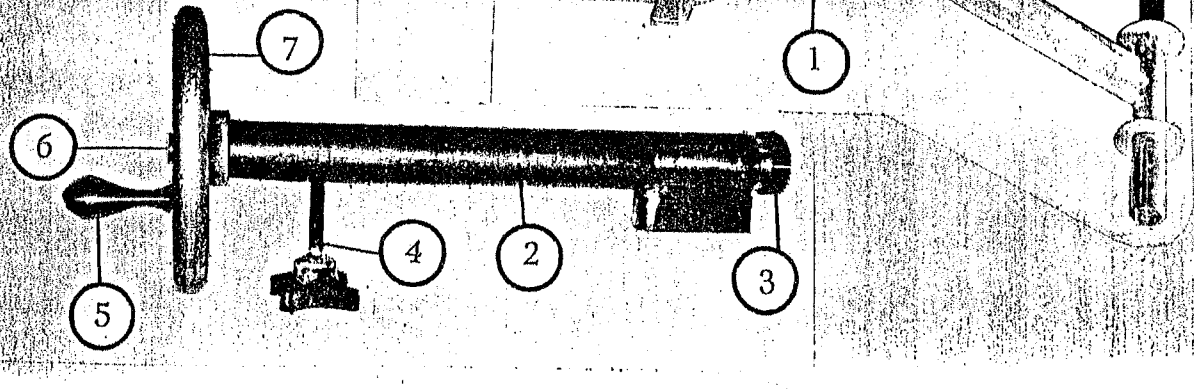
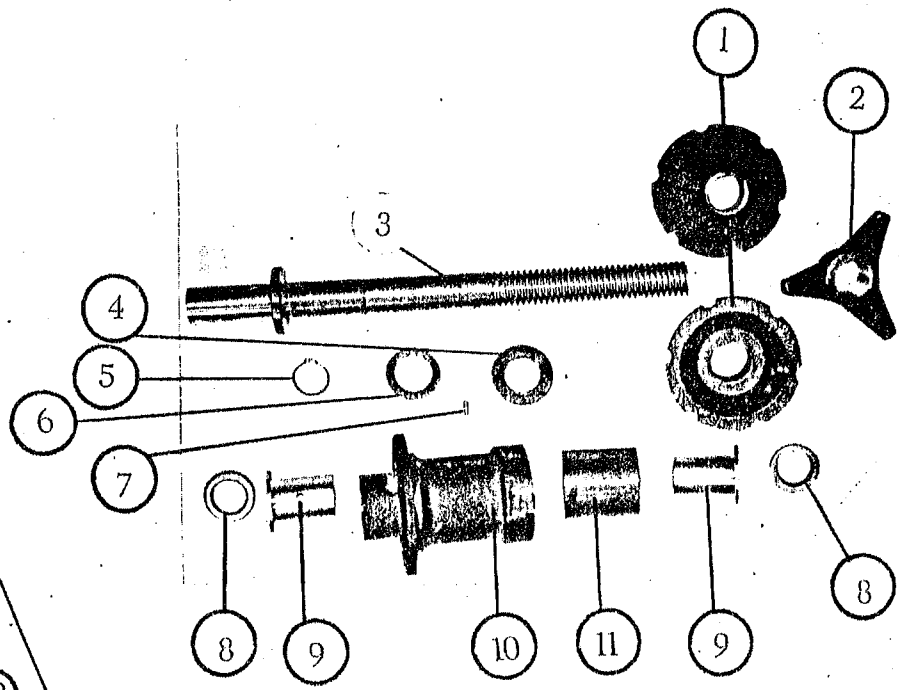


Fig. 17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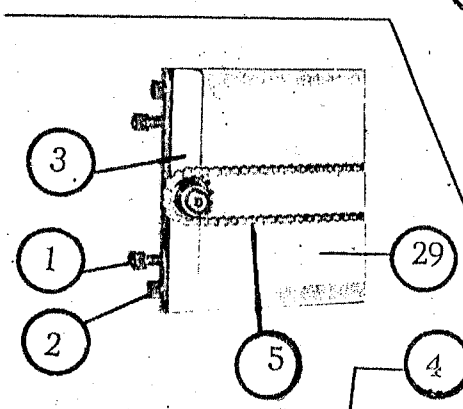
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Fig. 18

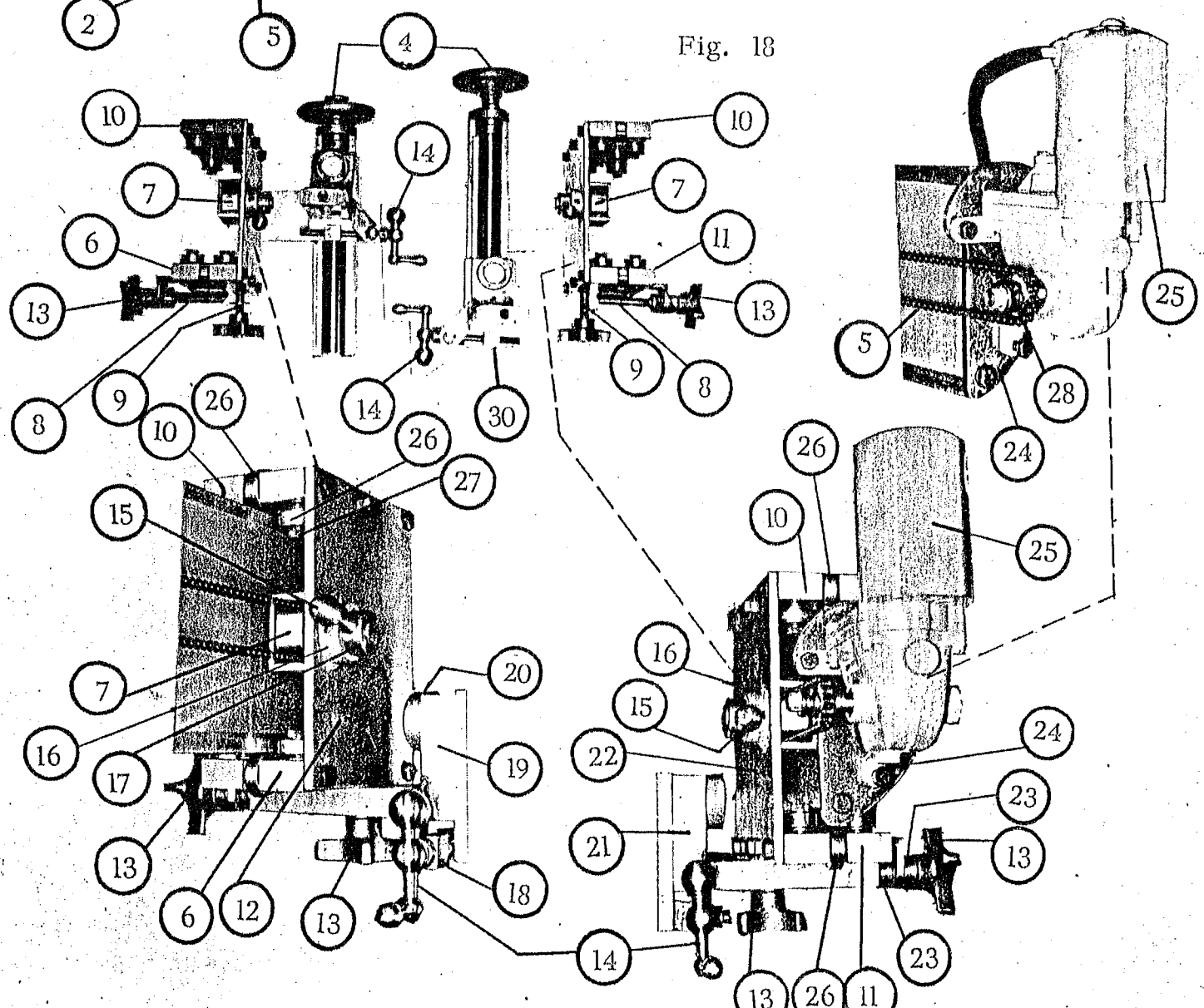
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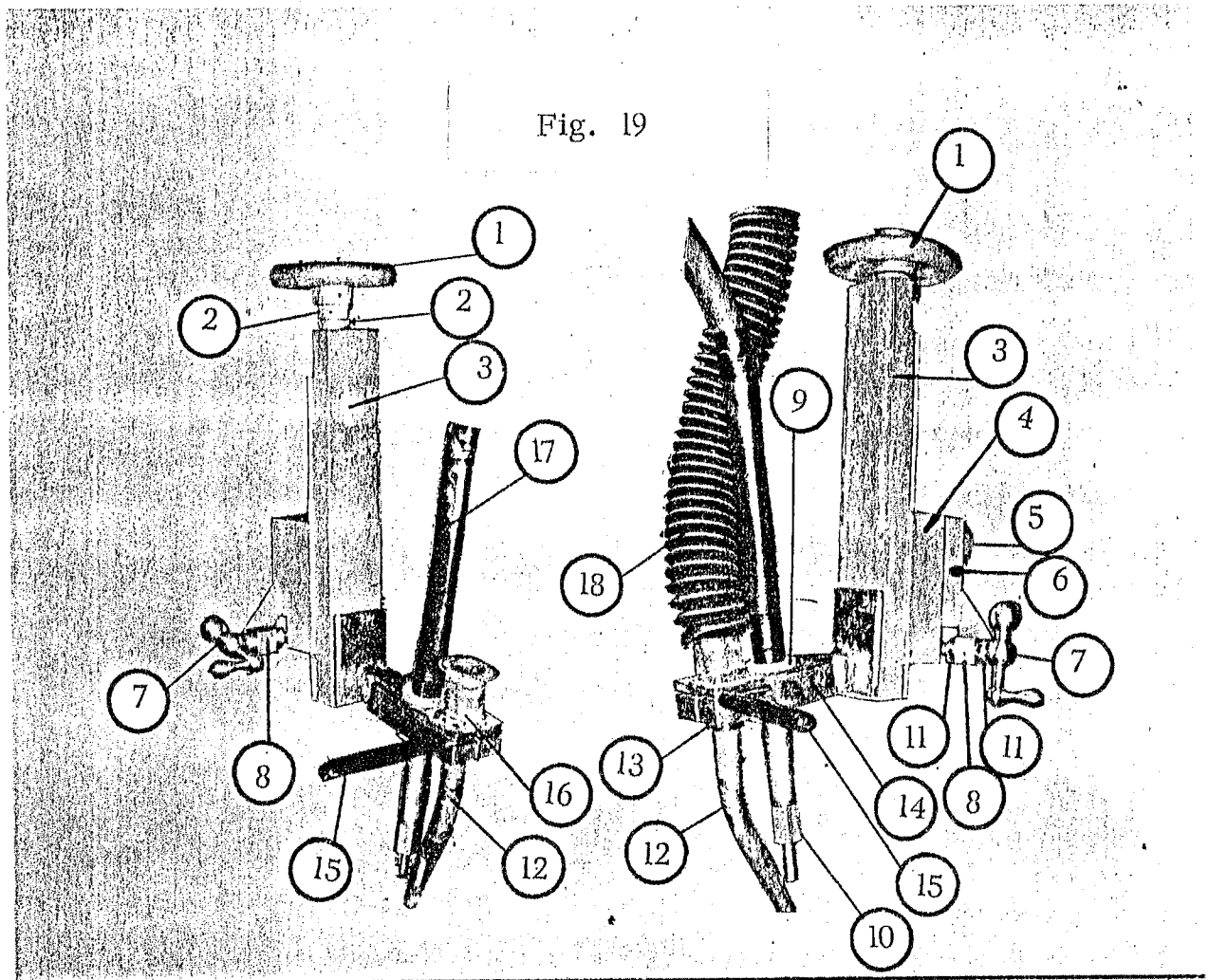
Fig. 19



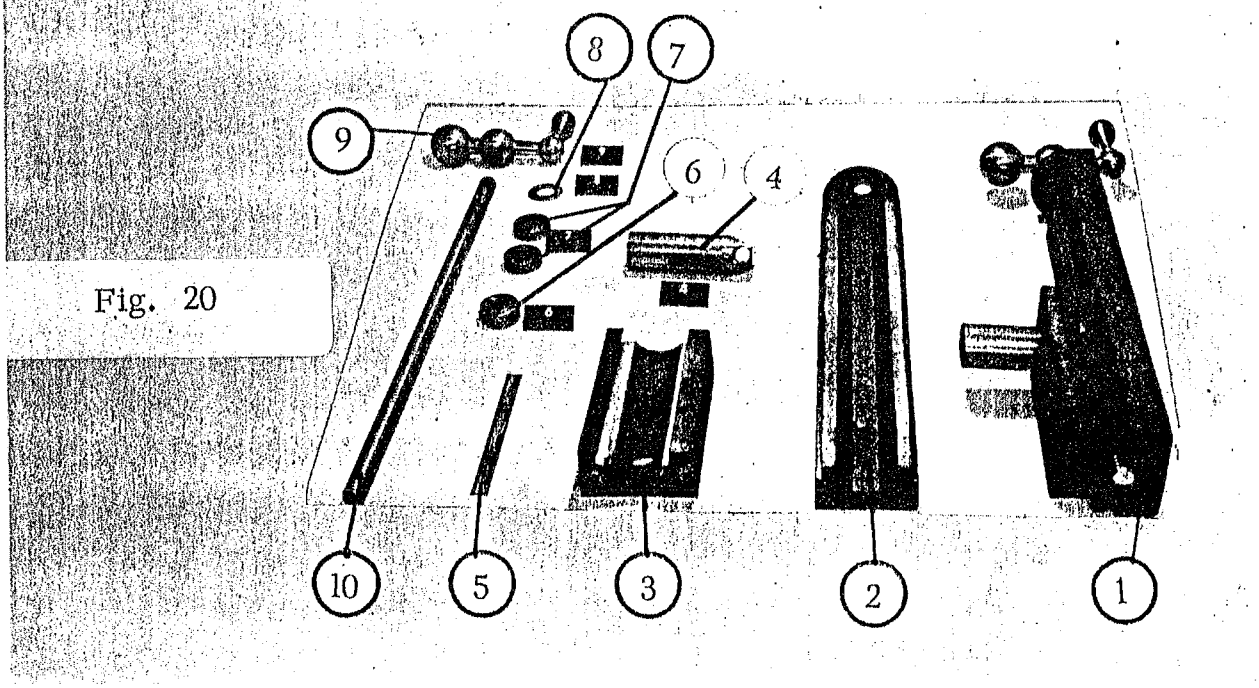


Fig. 20

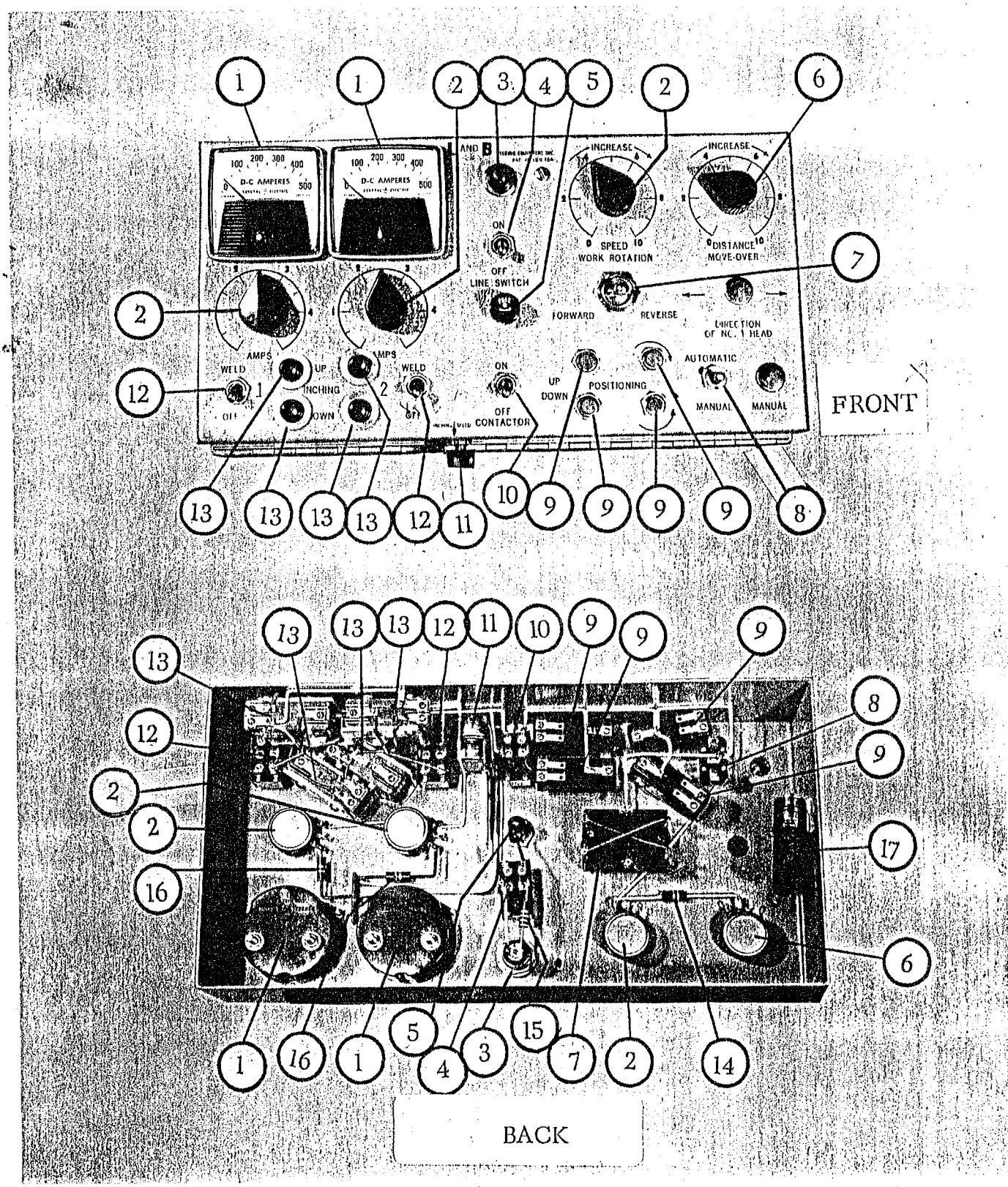

FRONT
BACK
D-C AMPERES
AMPS
WELD
INCHING
UP
DOWN
ON
OFF
LINE SWITCH
CONTACTOR
INCREASE
SPEED
WORK ROTATION
DISTANCE
MOVE-OVER
FORWARD
REVERSE
DIRECTION OF NO. 1 HEAD
POSITIONING
AUTOMATIC
MANUAL

Fig. 21

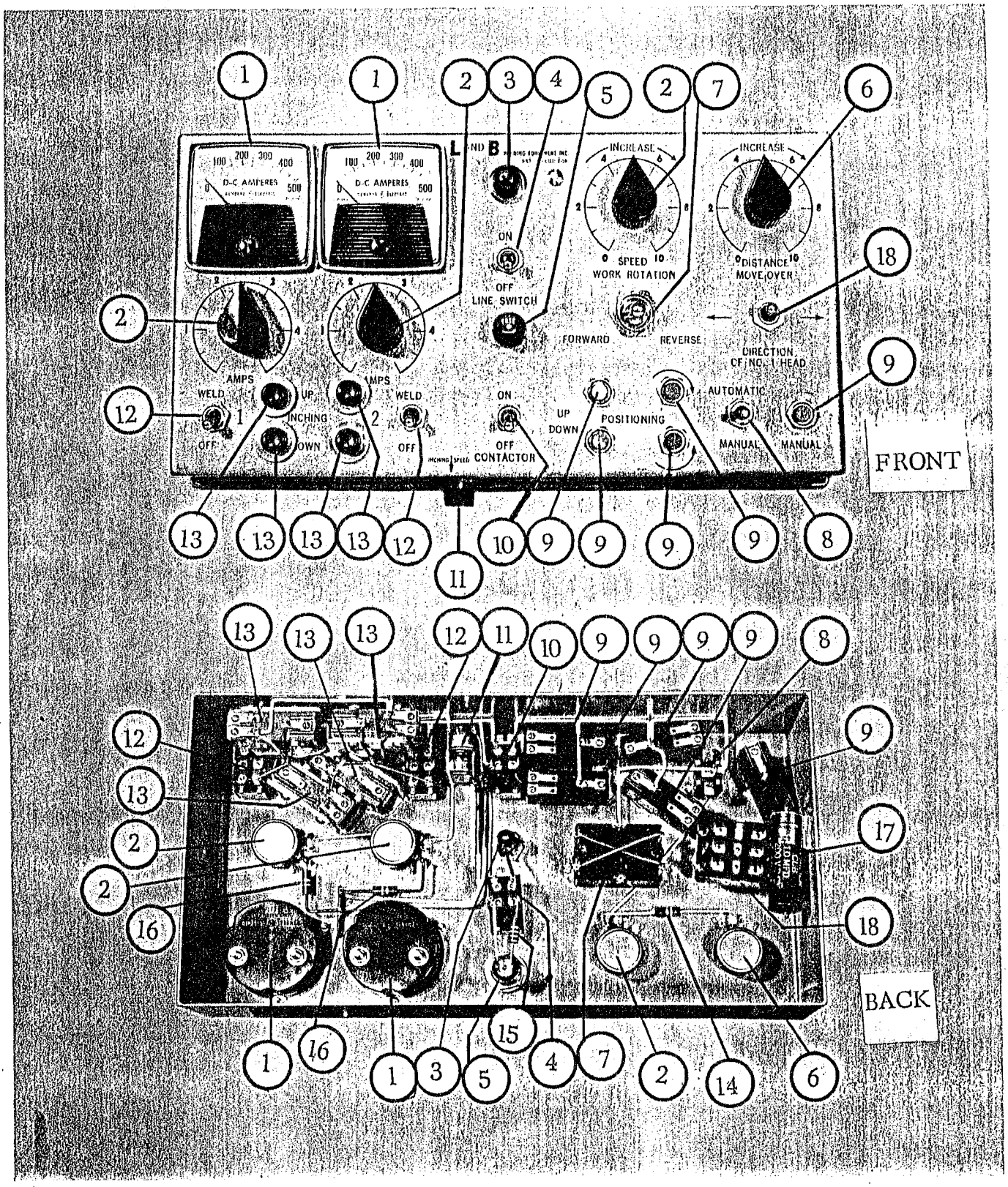
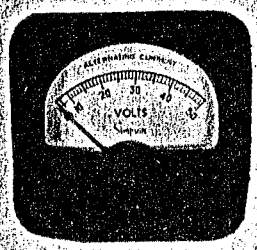
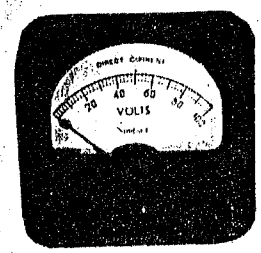

D-C AMPERES
INCREASE
SPEED
WORK ROTATION
DISTANCE
MOVE OVER
ON
OFF
LINE SWITCH
FORWARD
REVERSE
DIRECTION OF INCH HEAD
AMPS
WELD
UP
INCHING
DOWN
OFF
ON
CONTACTOR
POSITIONING
AUTOMATIC
MANUAL
FRONT
BACK

Fig. 22

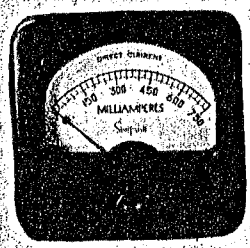
METERS USED ON L & B EQUIPMENT



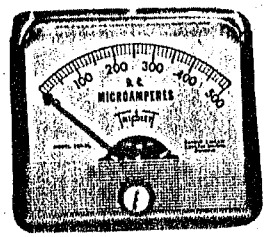
STOCK NO. 106-004
0-50 Volt A.C. Meter



STOCK NO. 106-008
0-100 D.C. Volt Meter

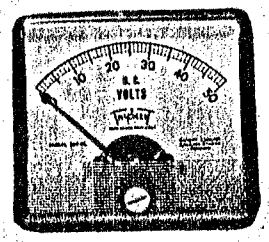


STOCK NO. 106-005
0-750 Milliamperes
Meter

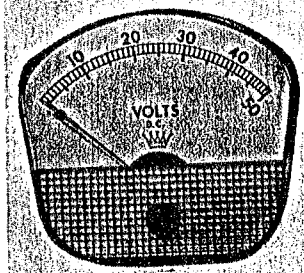


STOCK NO. 106-009
0-500 D.C. Microamperes
Meter

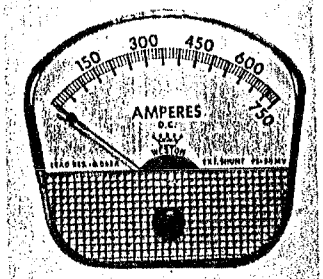
STOCK NO. 106-006
0-500 D.C. Microamperes
Meter



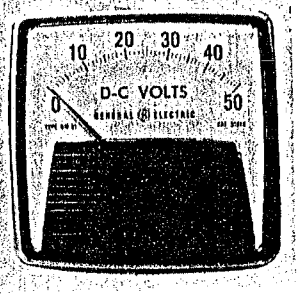
STOCK NO. 106-010
0-50 D.C. Volt Meter



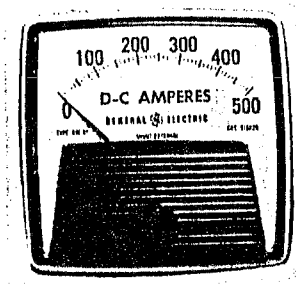
STOCK NO. 106-007
0-50 D.C. Volt Meter



STOCK NO. 106-011
0-750 Amperes Meter



STOCK NO. 106-002
0-50 D.C. Volt Meter



STOCK NO. 106-001
0-500 D.C. Amperes
Meter

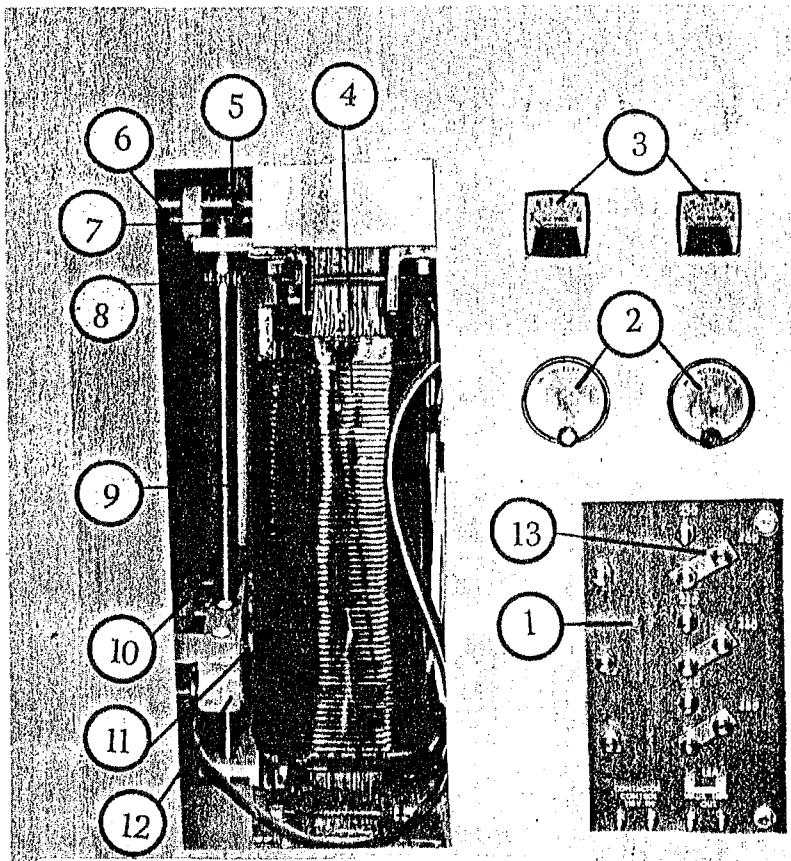


FIG. DW 1

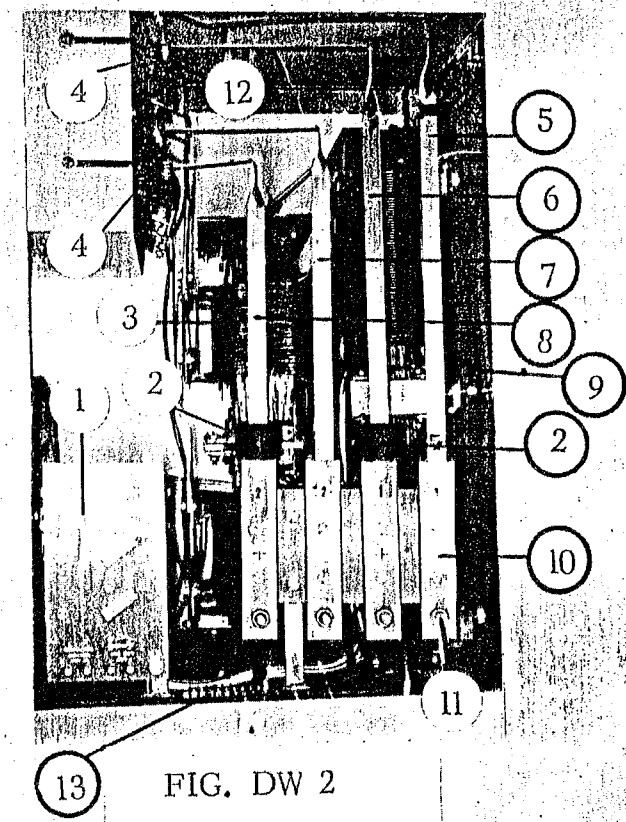


FIG. DW 2

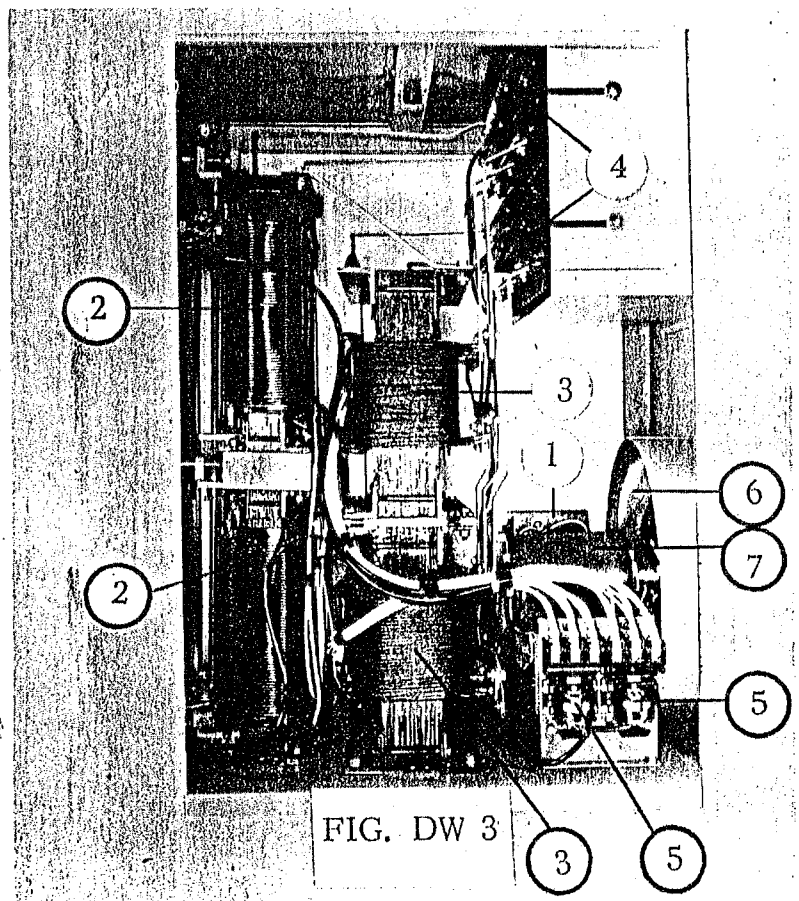


FIG. DW 3

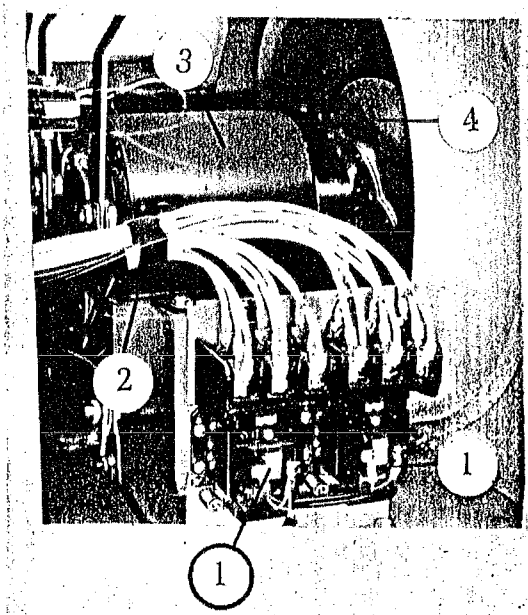


FIG. DW 4

PARTS INDEX

FIG. 1

ITEM	STOCK NO.	DESCRIPTION
1	529-057	3/4" x 7" MACHINE BOLT
2	512-036	OPERATORS PLATFORM
3	521-018	FLUX BIN
4	517-012	BASE PLATE
5	530-019	SPINDLE DRUM ASSEMBLY
6	514-001	TDC-2 1-1/2" CONE
7	514-002	SPINDLE NUT - 1-1/2"
8	508-003	1-7/8 BEARING
9	530-020	LIFT CARRIAGE ASSEMBLY
10	525-026	CANVAS DUST COVER
11	503-027	MOVEOVER SCREW (SPECIFY LENGTH)
12	517-010	CARRIAGE SUPPORT COLUMN
13	506-012	4" HANDWHEEL 1/2" BORE
14	512-044	BACK CARRIAGE SUPPORT BAR
15	517-011	CARRIAGE BEAM
16	530-021	UPPER CARRIAGE ASSEMBLY
17	108-019	1/8 H.P. D.C. MOTOR
18	530-001	WIRE FEED ASSEMBLY
19	100-013	FLEXIBLE CABLE
20	521-010	FLUX HOPPER
21	506-011	7" HANDWHEEL
22	503-026	SPINDLE SHAFT 1-1/2"
23	113-011	DUAL CONSOLE POWER UNIT
24	106-015	0-50 DC VOLTMETER
25	506-013	VOLTAGE ADJUSTMENT HANDLE
26	521-019	FLUX DIVERTER
27	506-023	INDEX FORK HANDLE
28	506-022	ROLLER IDLER SHIFT LEVER

FIG. 2

ITEM	STOCK NO.	DESCRIPTION
1	516-004	VERTICAL SLIDE ASSEMBLY
2	521-008	FLUX GATE
3	521-007	FLUX TUBE
4	527-007	CONVOLUTED HOSE 1-1/4" ID
5	521-020	FLUX GATE BODY - LEFT
6	530-006	MOUNTING BAR LEFT HAND
7	506-012	4" HANDWHEEL w/ 1/2" BORE
8	108-027	COOLING FAN
9	521-009	FLUX HOPPER WINDOW
10	521-010	FLUX HOPPER
11	506-006	HAND KNOB
12	506-011	HAND WHEEL 7"
13	108-011	MOVEOVER MOTOR
14	506-006	HAND KNOB
15	516-009	MOVEOVER GEAR HOUSING
16	530-007	MOUNTING BAR RIGHT HAND
17	503-028	LEAD ADJUST TUBE
18	529-024	1/2" SET COLLAR
19	503-029	HORIZONTAL GUIDE BAR
20	521-021	FLUX GATE BODY - RIGHT
NUMBERS 21 through 28 NOT USED		
29	503-027	MOVEOVER SCREW (SPECIFY LENGTH)
30	506-020	MACHINE HANDLE
31	506-017	ANGLE ADJUSTMENT CRANK
32	508-008	BEARING

(CONT'D. NEXT PAGE)

FIG. 2 (CONT'D.)

ITEM	STOCK NO.	DESCRIPTION
33	SAME AS ITEM #15	
34	501-033	28-TOOTH SPUR GEAR WITH 7/8" BORE
35	503-032	SHAFT 1/2" OD x 7/8" ID x 3-1/8"
36	501-034	28-TOOTH SPUR GEAR WITH 1/2" BORE
37	522-011	1/2" ID x 1" OD x 1/16" THRUST WASHER
38	509-029	3/8" ID BUSHING
39	501-035	16-TOOTH SPUR GEAR WITH 1/2" BORE
40	501-036	20-TOOTH SPUR GEAR WITH 1/2" BORE
41	506-024	SHIFTING LEVER HANDLE
42	529-059	3/8" x 1" SHOULDER BOLT
43	529-060	5/16" JAM NUT

FIG. 3

ITEM	STOCK NO.	DESCRIPTION
1	506-017	ANGLE ADJUSTMENT HANDLE
2	503-017	ANGLE ADJUSTMENT SHAFT
3	529-023	ANGLE ADJUSTMENT SCREW COLLARS
4	512-015	ANGLE ADJUSTMENT SWIVEL BLOCK
5	506-018	ANGLE ADJUSTMENT LEVER
6	512-014	ANGLE ADJUSTMENT ANCHOR BLOCK
7	529-042	HEAD ANGLE DOG POINT SCREW
8	506-016	VERTICAL ADJUSTMENT HAND WHEEL
9	504-014	VERTICAL ADJUSTMENT SLIDE
10	529-041	VERTICAL ADJUSTMENT HAND WHEEL PIN
11	522-008	VERTICAL ADJUSTMENT THRUST BEARING
12	524-003	3/4" ID GREASE SEAL
13	504-017	VERTICAL ADJUSTMENT SLIDE MOUNT - RIGHT
14	504-018	VERTICAL ADJUSTMENT SLIDE MOUNT - LEFT
15	529-040	MOVEOVER DRIVE INSERT NUT
16	509-030	BRONZE BUSHINGS
17	509-031	THOMPSON BALL BUSHING
18	528-005	VERTICAL ADJUSTMENT BRASS GIB ADJUSTING STRIP
19	503-016	VERTICAL ADJUSTMENT SCREW SHAFT

FIG. 4

ITEM	STOCK NO.	DESCRIPTION
1	124-014	HIGH FREQUENCY INDUCTOR COIL (OLD STYLE)
2	529-054	#440 x 1" MACHINE SCREW WITH NUT
3	117-017	MICRO SWITCH
4	100-014	MICRO SWITCH WIRING (SPECIFY LENGTH)
5	104-010	HIGH FREQUENCY INDUCTOR MOUNTING PLATE
6	529-055	5/8" - 11 BRASS JAM NUT
7	529-056	5/8" BRASS CUT WASHER
8	124-015	HIGH FREQUENCY INDUCTOR COIL GATE ASSEMBLY

FIG. 5

ITEM	STOCK NO.	DESCRIPTION
1	124-001	HIGH FREQUENCY INDUCTOR ASSEMBLY
2	104-004	HIGH FREQUENCY INDUCTOR CORE
3	124-003	CURRENT RELAY SWITCH ASSEMBLY
4	124-007	MICRO SWITCH MOUNTING SCREWS
5	124-005	MICRO SWITCH ACTIVATING ROD (PLUNGER)
6	124-006	CURRENT RELAY SWITCH ADJUSTING SHIMS
7	124-004	MICRO SWITCH BRACKET
8	117-017	MICRO SWITCH
9	104-005	INDUCTOR COVER
10	124-002	INDUCTOR BRACKET

FIG. 6

ITEM	STOCK NO.	DESCRIPTION
1	115-003	CURRENT RELAY
2	101-002	ACTIVATOR COIL

FIG. 7

ITEM	STOCK NO.	DESCRIPTION
1	530-001	WIRE FEED ASSEMBLY
2	104-019	PRESSED WOOD INSULATING BLOCK (LEFT)
3	501-015	NON-METALLIC SPUR GEAR
4	104-013	PRESSED WOOD INSULATING BLOCK (RIGHT)
5	104-001	MICARTA INSULATING BLOCK (RIGHT)
6	504-007	FEED ROLL BODY
7	529-011	5/16" x 3/4" SOCKET HEAD CAP SCREW
8	528-004	WIRE GUIDE, 5/16" x 1-1/2"
9	503-004	FEED ROLL SHAFT
10	529-010	KEY
11	529-009	KEY
12	508-008	BEARING
13	518-001	KNURLED WIRE FEED ROLL
14	528-003	FEED ROLL SHIM
15	509-023	BUSHING, 1/2" ID x 5/8" OD x 3/16" LONG
16	509-024	BUSHING, 3/8" ID x 1/" OD x 1/4" LONG
17	509-025	BUSHING, 3/8" ID x 1/2" OD x 5/8" LONG
18	509-026	BUSHING, 3/8" ID x 1/2" OD x 7/8" LONG
19	504-008	FEED ROLL BODY COVER
20	529-008	LOCK NUT
21	529-007	1/4" x 1/2" SOCKET HEAD CAP SCREW
22	525-037	1/4" x 1" x 5/8" ROLL PIN
23	504-009	FEED ROLL CAP
24	518-002	WIRE FEED PRESSURE ROLL
25	509-019	BUSHING
26	529-006	1/2" x 1" SOCKET HEAD SBOULDER BOLT
27	529-019	WIRE FEED TENSION ADJUSTING SCREW
28	519-004	WIRE FEED TENSION SPRING

FIG. 8

ITEM	STOCK NO.	DESCRIPTION
1	100-013	FLEXIBLE CABLE
2	122-008	10" TIP EXTENSION
3	NOT USED	
4	122-006	4-1/2" TIP EXTENSION
5	122-005	1-1/2" TIP EXTENSION
6	122-004	TIP NUT
7	122-009	1/8" WELDING TIP
8	122-010	5/32" WELDING TIP
9	104-017	3/4" ID x 1-1/4" OD x 1-1/4" LONG CABLE INSUI
10	NOT USED	
11	122-002	2 BOLT U CLAMP
12	525-010	3 OUNCE MOLYPOWDER BOTTLE (PLASTIC)

FIG. 9

ITEM	STOCK NO.	DESCRIPTION
1	104-015	WIRE REEL INSULATOR 1/2"
2	104-016	WIRE REEL INSULATOR 1-1/2" ID
3	529-001	1/2" x 2" SOCKET HEAD CAP SCREW
4	519-005	WIRE REEL TENSION SPRING
5	529-002	1/2" ID CUT WASHER
6	529-003	3/8" x 1" HEX HEAD CAP SCREW

(CONT'D. NEXT PAGE)

FIG. 9 (CONT'D.)

ITEM	STOCK NO.	DESCRIPTION
7	512-011	WIRE RETAINING BRACKET
8	529-003	3/8" x 1" HEX HEAD CAP SCREW
9	529-004	3/8" ID CUT WASHER
10	512-010	WIRE COIL SUPPORT
11	518-013	WIRE REEL FRAME
12	104-008	WIRE REEL SHAFT INSULATOR

FIG. 10

ITEM	STOCK NO.	DESCRIPTION
1	503-033	IDLER SPROCKET SHAFT
2	510-011	15-TOOTH SPROCKET
3	509-032	BUSHING 2" ID x 2-1/2" OD x 2" LONG
4	516-010	BH1 CENTER BEARING HOUSING
5	503-035	LOWER BEARING SHAFT
6	508-011	LOWER BEARING
7	530-022	LIFT SPROCKET DRIVE ASSEMBLY
8	510-012	54 TOOTH SPROCKET
9	529-061	3/4" x 3" SET SCREW
10	117-019	BRACKET FOR ITEM #11
11	117-018	B22RA2 MICRO SWITCH
12	115-002	MAGNETIC REVERSING RELAY
13	108-017	1/4 DC MOTOR 110 V.
14	118-021	12 TIE TERMINAL BLOCK
15	511-015	D60 CHAIN 12'6" LONG
16	111-009	FEMALE PLUG
17	502-006	300:1 REDUCTOR
18	510-013	84-TOOTH SPROCKET
19	108-006	1/3 H.P. AC MOTOR 110 VOLT
20	502-007	15-1 REDUCTOR
21	511-014	#50 CHAIN (SPECIFY LENGTH)
22	REFER TO ITEM #17.	

FIG. 11

ITEM	STOCK NO.	DESCRIPTION
1	525-028	3/16" SPRING LOADED GREASE FITTING
2	528-008	LIFT CARRIAGE GUIDE
3	529-062	1" ID CUT WASHER
4	515-015	D 60 CHAIN 12'6"
5	512-040	LIFT CHAIN ANCHOR BLOCK
6	115-002	MAGNETIC REVERSING RELAY
7	115-011	RELAY
8	108-017	1/4 DC MOTOR 11OV.
9	502-007	15:1 REDUCTOR
10	511-014	#50 CHAIN
11	503-034	1/2" FLEXIBLE COUPLING
12	529-063	DRIVE KEY
13	517-013	CANTILEVER ARM SUPPORT DISC HUB

FIG. 12

ITEM	STOCK NO.	DESCRIPTION
1	117-015	INDEXING SWITCH
2	506-023	INDEX FORK HANDLE
3	503-043	SPINDLE DRIVE SHAFT LEFT
4	529-074	1-9/16" ID SNAP RING
5	519-010	SPINDLE DRIVE ASSEMBLY SPRING 7 COIL
6	530-029	SPINDLE DRIVE TUBE
7	530-030	SPINDLE DRIVE SLEEVE
8	529-075	1-9/16" ID SET COLLAR

(CONT'D. NEXT

FIG. 12 (CONT'D.)

ITEM	STOCK NO.	DESCRIPTION
9	529-072	3/8" x 1-1/4" SOCKET HEAD CAP SCREW
10	503-044	SPINDLE DRIVE SHAFT - RIGHT
11	524-007	GREASE SEAL 1-1/8" ID
12	529-076	"O" RING
13	529-073	DOWEL PINS 1/4" x 2"
14	503-045	INDEX OPERATING SHAFT
15	509-035	BUSHING 5/8" ID x 1" OD x 2" LONG
16	524-005	5/8" ID GREASE SEAL
17	530-031	INDEX FORK
18	508-014	BEARING

FIG. 13

ITEM	STOCK NO.	DESCRIPTION
1	519-009	CROSS SHAFT SPRING
2	525-028	3/16" SPRING LOADED GREASE FITTING
3	503-038	FLEXIBLE GREASE CABLE COUPLING
4	525-030	FLEXIBLE GREASE CABLE
5	529-066	1/2" FLAT WASHER
6	529-067	1/2" x 3/4" HEX HEAD CAP SCREW
7	530-023	CROSS SHAFT CLUTCH SLIDE ASSEMBLY
8	522-012	5/8" THRUST WASHER
9	509-034	BUSHING 5/8" ID x 1" OD x 1-1/2" LONG
10	503-037	ROLLER IDLER SHIFTING SHAFT
11	524-005	5/8" ID GREASE SEAL
12	530-024	ROLLER IDLER SHIFTING FORK
13	529-064	5/16" SQUARE SHIFTING SHAFT KEY
14	510-012	54-TOOTH SPROCKET
15	503-036	MAIN CROSS SHAFT
16	506-022	ROLLER IDLER SHIFT LEVER
17	509-033	BUSHING 2-1/2" ID x 2-3/4" OD x 2"
18	529-068	3/8" x 1-1/2" DOWEL PIN
19	525-031	1/8" PIPE TAP
20	525-029	CROSS SHAFT COPPER GROUND RING
21	524-004	3" ID GREASE SEAL
22	508-012	TAPER ROLLER BEARING ASSEMBLY
23	516-011	CROSS SHAFT BEARING HOUSING

FIG. 14

ITEM	STOCK NO.	DESCRIPTION
1	511-014	#50 CHAIN (SPECIFY LENGTH)
2	512-041	CHAIN TIGHTENER MOUNTING BLOCK
3	530-025	CHAIN TIGHTENER
4	510-015	10-TOOTH SPROCKET
5	529-065	3/16" x 1-1/2" ROLL PIN
6	510-014	12-TOOTH SPROCKET
7	502-008	30:1 REDUCTOR
8	503-040	1/2" OD x 14" SHAFT
9	503-034	1/2" FLEXIBLE COUPLING
10.	503-039	1/2" FLEXIBLE COUPLING END

FIG. 15

ITEM	STOCK NO.	DESCRIPTION
1	124-001	HIGH FREQUENCY INDUCTOR ASSEMBLY
2	501-037	30-TOOTH SPUR GEAR
3	118-013	15 TIE TERMINAL STRIP
4	107-001	MOTOR DRIVE MODULE
5	107-003	TIME DELAY MODULE
6	107-006	HIGH FREQUENCY MODULE

(CONT'D. NEXT PAGE)

FIG. 18 (CONT'D.)

ITEM	STOCK NO.	DESCRIPTION
29	517-014	MOVEOVER CARRIAGE BEAM
30	512-015	ANGLE ADJUSTMENT SWIVEL BLOCK

FIG. 19

ITEM	STOCK NO.	DESCRIPTION
1	506-014	VERTICAL SLIDE ASSEMBLY HANDWHEEL
2	522-005	1/2" ID THRUST BEARING
3	504-001	VERTICAL SLIDE FRONT CASTING
4	504-002	VERTICAL SLIDE HOLDER
5	525-024	1" ID SET COLLAR
6	512-008	LEAD ADJUSTMENT BLOCK
7	506-017	ANGLE ADJUSTMENT CRANK
8	512-015	ANGLE ADJUSTMENT SWIVEL BLOCK
9	104-017	CABLE INSULATOR
10	122-004	TIP NUT
11	529-023	ANGLE ADJUSTMENT SCREW COLLARS
12	521-007	FLUX TUBE
13	104-029	FLUX NOZZLE INSULATOR
14	521-023	FLUX GATE BODY - RIGHT
15	521-008	FLUX GATE
16	521-022	FLUX GATE BODY - LEFT
17	104-030	10" CABLE SHEATH
18	527-007	CONVOLUTED HOSE 1-1/4" ID

FIG. 20

ITEM	STOCK NO.	DESCRIPTION
1	516-004	VERTICAL SLIDE ASSEMBLY (COMPLETE)
2	504-001	VERTICAL SLIDE, FRONT CASTING
3	504-002	VERTICAL SLIDE HOLDER
4	528-001	VERTICAL SLIDE LEAD NUT
5	528-002	VERTICAL SLIDE GIB (BRASS)
6	529-024	1/2" I.D. THRUST BEARING
8	NO LONGER USED	
9	NOT USED THIS MACHINE.	
10	503-00 5	BRASS SLIDE LEAD SCREW

FIG. 21

ITEM	STOCK NO.	DESCRIPTION	USED AS
1	106-001	0 - 500 AMP. METER	M1, M2
2	112-001	.1 Meg., 2 Watt POTENTIOMETER	R6, R7, R8
3	105-001	NE51 NEON BULB	I-1
	111-020	LIGHT SOCKET W/JEWEL FOR ITEM #3	
4	117-001	DPST SWITCH	S-1
5	103-005	15 AMP. CARTRIDGE FUSE	F-1
	11-021	FUSE HOLDER FOR ITEM #5	
6	112-002	2.5 MEGOHM 2-WATT POTENTIOMETER	R-9
7	117-008	DPDT ROTATION SWITCH (NO PASS CENTER)	S-9
8	117-009	SPDT SWITCH	S-15
9	117-011	MICRO. SWITCH	S10, S11, S12, S13
10	117-001	DPST SWITCH	S-2
11	112-003	.1 / .1 MEGOHM 2-WATT POTENTIOMETER	R-5ab
12	117-006	DPDT SWITCH	S-3, S-4
13	117-010	MICRO. SWITCH	S5, S6, S7, S8
	118-017	MOUNTING BRACKETS FOR ITEM #13	
14	116-002	56K OHM, 1-WATT RESISTOR	R-4
15	116-014	6.8 K OHMS, 1-WATT RESISTOR	R-1
16	116-004	10 0 K OHM, 1-WATT RESISTOR	R2, R3
17	103-012	1 MFD. 400 V.DC. CONDENSER	C-1
	122-012	DIAL POINTER KNOB FOR ITEM #2	

FIG. 22

ITEM	STOCK NO.	DESCRIPTION	USED AS
1	106-001	0-500 AMP METER	M1; M2
2	112-001	.1 MEGOHM 2-WATT POTENTIOMETER	R6, R7, R8
	122-012	DIAL POINTER KNOB FOR ITEM #2	
3	105-001	NE 51 NEON BULB	I-1
	111-020	LIGHT SOCKET WITH JEWEL FOR ITEM #3	
4	117-001	DPST SWITCH	S-1
5	103-005	15 AMP. CARTRIDGE FUSE	F-1
	111-021	FUSE HOLDER FOR ITEM #5	
6	112-002	2.5 MEGOHM 2-WATT POTENTIOMETER	R-9
7	117-008	DPDT ROTATION SWITCH (NO PASS CENTER)	S-9
8	117-009	SPDT SWITCH	S-15
9	117-011	MICRO SWITCH	S10, S11, S12, S13, S16
10	117-001	DPST SWITCH	S-2
11	112-003	.1 & .1 MEGOHM 2-WATT POTENTIOMETER	R-5ab
12	117-006	DPDT SWITCH	S-3, S-4
13	117-010	MICRO SWITCH	S5, S6, S7, S8
	118-017	MOUNTING BRACKETS FOR ITEM #13	
14	116-002	56 K OHM 1 Watt RESISTOR	R-4
15	116-014	6.8 K OHM 1-Watt RESISTOR	R-1
16	116-004	100 K OHM 1-Watt RESISTOR	R-2, R-3
17	103-012	1 MTD. 400 VDC CONDENSER	C-1
18	117-005	3 PDT SWITCH (CENTER OFF)	S-14

RECOMMENDED LUBRICANTS FOR BOSTON GEAR REDUCTORS

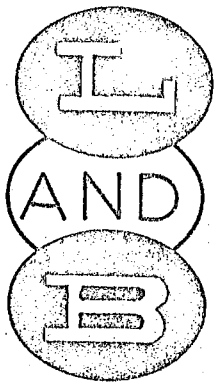
Ambient or Room Temperature Range	Recommended Oil Or Equivelent	Viscosity Range S.U. V. Seconds	Pour Point
40° F to 90° F	Mobil 600W Cylinder Oil	137 to 143 at 210° F	40° F
80° F to 125° F	Mobil Extra Hecla Super Cylinder Oil	190 to 205 at 210° F	50° F
+50° to -20° F	Mobil Compound BB*		
0° to -50° F	Mixture of 90% Mobil Compound BB Or Equivalent and 10% Kerosene*		

*Note: These lubricants should never be used above or below the indicated temperature range.

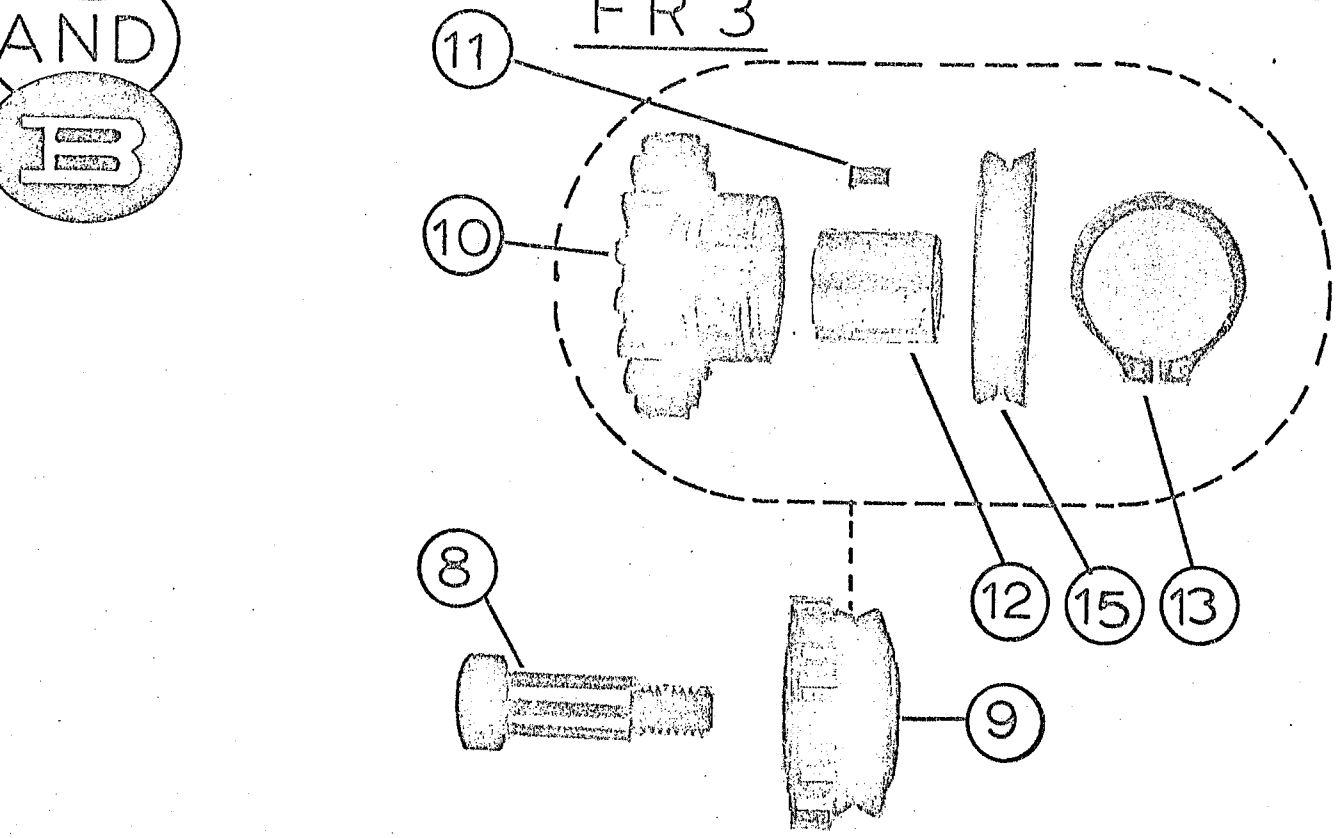
Oil and Running Temperature - After the initial run of approximately 80 hours the housing should be drained and thoroughly flushed with a light flushing oil. The housing should then be drained and refilled with recommended oil. A second oil change should be made after 250 hours of operation. Thereafter, under normal conditions, oil should be replaced at regular intervals of 1000 hours of operation.

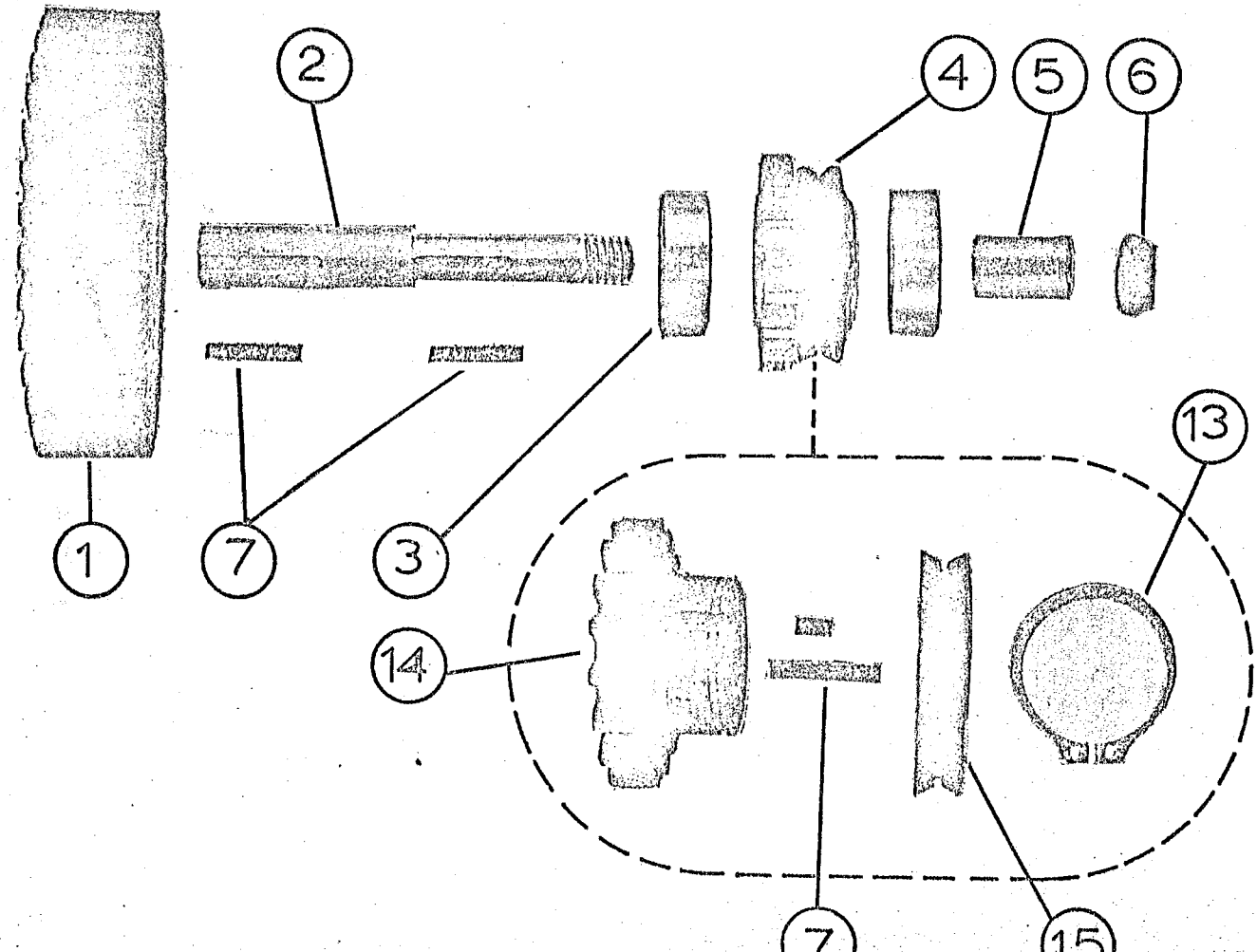
CAUTION: Oil should be changed more often if unit is operated in chemical fumes, extremely moist, dusty of high ambient temperature conditions. Under such conditions Drain, Flush and Refill the housing with recommended oil every 500 hours of operation or less. Magnetic Drain Plugs are furnished in most sizes and should be thoroughly cleaned at each oil change. Single reduction Reductors and Ratiomotors may reach a temperature of approximately 200° F, double reduction units may reach a temperature of approximately 160° F, especially during the first few days of operation.

ASSEMBLY
FEED ROLL PARTS LIST



FR 3





ASSEMBLY
FEED ROLL PARTS LIST FR3

1	501-069	22 Tooth Non-Metallic Gear
	501-039	30 Tooth Non-Metallic Gear
	501-049	36 Tooth Non-Metallic Gear
	501-015	42 Tooth Non-Metallic Gear
2	503-004	Feed Roll Shaft
3	508-008	Bearing
4	530-061	Feed Roll Assembly Ring Type FR3
5	509-038	Spacer
6	529-008	3/8 Lock Nut
7	529-078	3/4 Long Key
8	529-006	1/2 x 1 Shoulder Bolt
9	530-060	Pressure Roll Assembly Ring Type FR3
10	518-005	Pressure Roll Gear
11	529-079	1/4" Key
12	509-037	Bushing
	508-036	Needle Bearing
13	529-077	1 1/2 Snap Ring
14	518-006	Feed Roll Gear
15	518-009	3/32 Feed Roll Rings
	518-008	5/32 Feed Roll Rings
	518-007	1/8 Feed Roll Rings