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WAR DEPARTMENT

TECHNICAL MANUAL

CHARGING SET SCR-169

(Power Unit PE-43-HK)

7, August, 1943

WAR DEPARTMENT
Washington 25, 7, August, 1943

ORDER NO. 7542—PHILA—43

CHARGING SET SCR-169
(Power Unit PE-43-HK)

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DESTRUCTION NOTICE

WHY—

To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—

When ordered by your commander, or when you are in immediate danger of capture.

HOW—

1. Smash—Use sledges, axes, hand axes, pick axes, hammers, crowbars, heavy tools, etc.
2. Cut—Use axes, hand axes, machete, etc.
3. Burn—Use gasoline, kerosene, oil, flame-throwers, incendiary grenades, etc.
4. Explosives—Use firearms, grenades, TNT, etc.
5. Disposal—Bury in slit trenches, fox-holes, other holes. Throw in streams. Scatter.
6. USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—

1. Smash—Engine cylinder, crankcase, flywheel, magneto, carburetor, air cleaner, gasoline tank, blower housing, and generator end bell.
2. Cut—Field and armature windings and all connecting wires and cables.
3. Burn—Engine mounting base, carrying case, instruction books, and other documents.
4. Bury—Any or all of above pieces after breaking.

DESTROY EVERYTHING

SAFETY NOTICE

Operation of this equipment involves the use of voltages dangerous to human life.

Observe all precautions and safety regulations.

If Power Unit PE-43-HK is operated within a building, make certain that all exhaust connections are gas-tight and that room is well ventilated. Carbon monoxide, contained in exhaust gases, is tasteless, odorless, and a deadly poison.

Stop the unit before attempting to work on it or remove gasoline tank filler cap. Avoid spilling gasoline on a hot engine.

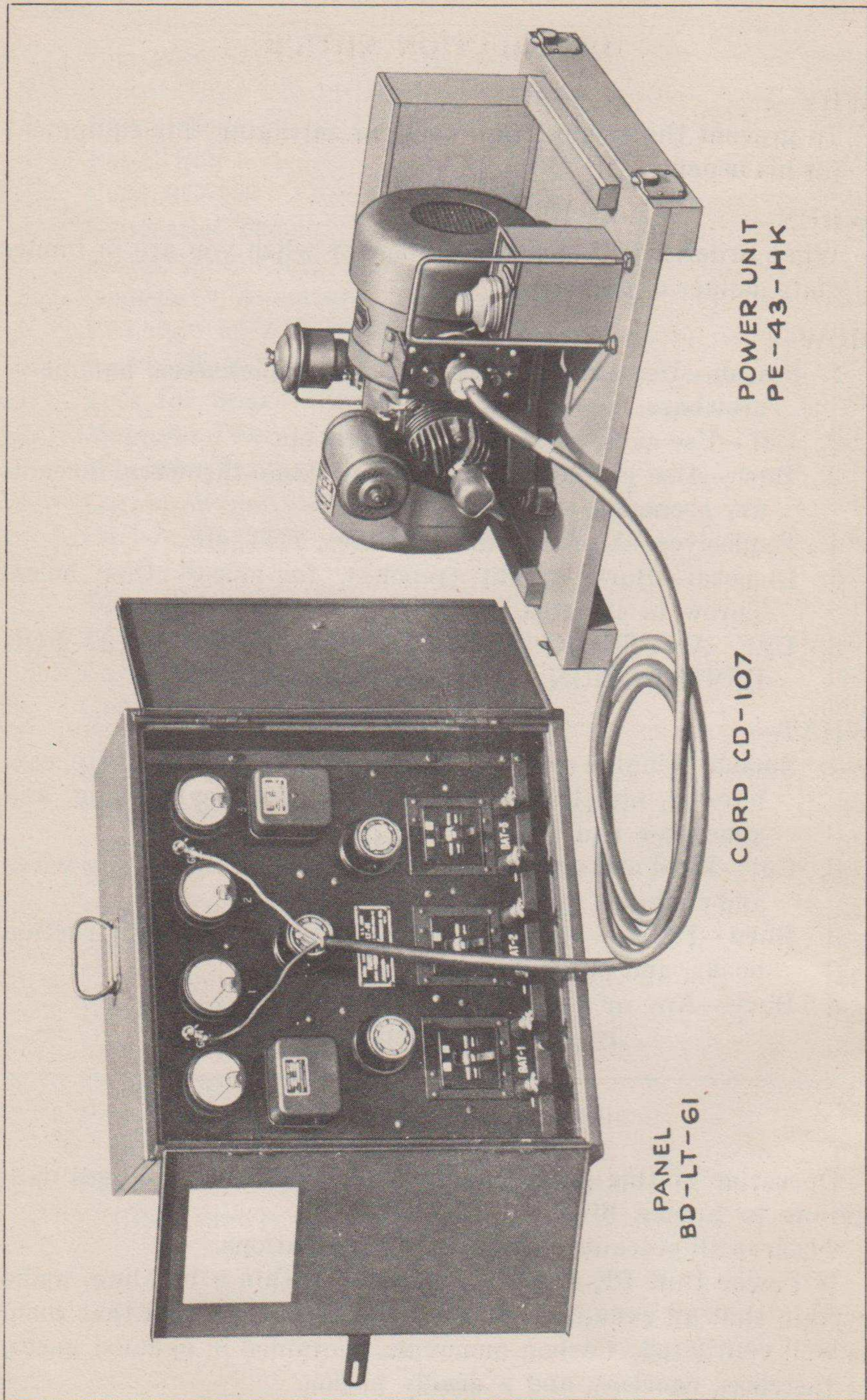


FIG. 1. CHARGING SET SCR-169

SECTION I

DESCRIPTION

1. General.—

Charging Set SCR-169 (PE-43-HK) is composed of three major components, namely, Power Unit PE-43-HK, Panel Board BD-LT-61 mounted in a steel cabinet, and Cord CD-107 connecting the panel board to the power unit. It is designed to furnish direct current power to three independent battery charging or lighting circuits.

2. Power Unit PE-43-HK.—

a. Power Unit PE-43-HK is a compact, portable gasoline-engine driven, direct connected generating set of the manual starting type, designed to furnish 32-volt direct current for battery charging service.

b. A carrying case consisting of crate platform (176) and cover crate (177) is provided for protection of the unit during transportation. Tool and spare parts box is located on the crate base. The entire equipment is painted olive drab. All screws, nuts, washers, and bolts are protected against corrosion by parkerizing.

3. Components and Ratings.—

Power Unit PE-43-HK consists of the following:

a. Engine.—The engine or prime mover is a single cylinder, two-cycle, air cooled unit, 2 $\frac{1}{4}$ " bore, 1 $\frac{3}{4}$ " stroke and delivers 1.35 hp at 2350 rpm. Piston displacement is 6.95 inches. It is designed to operate satisfactorily on commercial gasolines with octane rating as low as 72. The unit will operate approximately three hours on one filling of the fuel tank (64).

b. Generator.—The driven unit or generator is a 550-watt, 32-volt, direct current, shunt wound, totally enclosed four pole unit. It is built for continuous operation at its full load speed of 2350 rpm. The generator voltage can be regulated in the range of 32 to 40 volts by increasing or decreasing the engine speed. To increase speed, turn knurled regulator (94) toward cylinder (counter-clockwise). To decrease, turn in opposite direction. Speed is preadjusted for 32 volts under full load. The armature of the generator is mounted directly to the engine crankshaft.

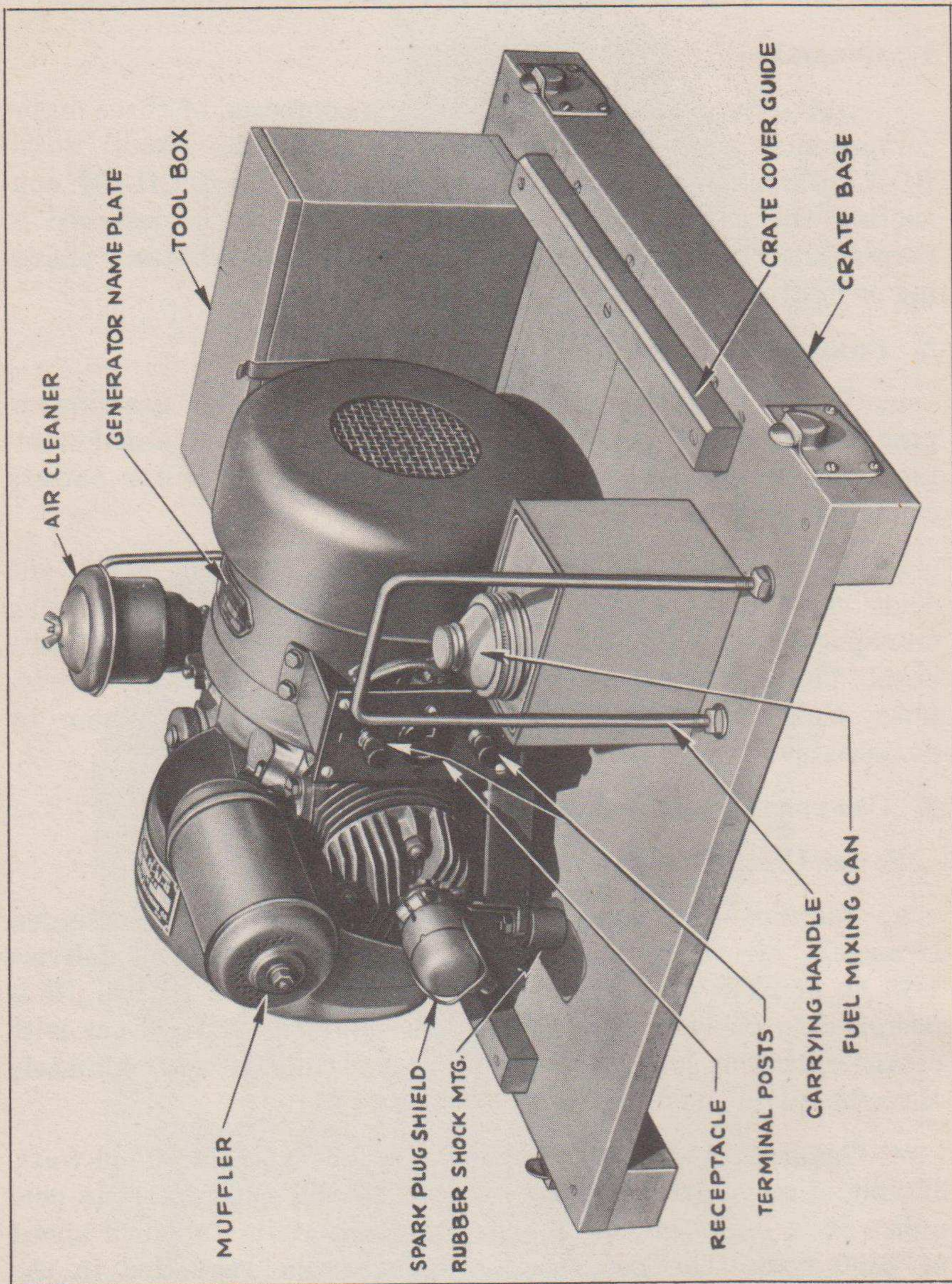


FIG. 2. POWER UNIT PE-43-HK FRONT VIEW

c. Terminal Board.—A terminal board (120) of phenolic material having mounted on it a polarized receptacle (121) and two terminal posts (122) is mounted on the shell of the generator (111).

d. Base.—Power Unit PE-43-HK is mounted on a crate platform base (176) by means of four special shock absorbing mountings (62). These hold the unit securely in position to permit safe transportation and they also absorb vibrations when the unit is in operation. The crate platform is provided with carrying handles for portability when the unit is uncrated.

e. Cover Crate.—The cover crate (177) is designed to fit over the crate platform and is held securely in position by means of four snap latches. The cover crate provides complete protection for the unit when not in use and during transportation.

4. Weights and Dimensions.—

	Length	Width	Height	Wt. lbs.
Base	22 $\frac{5}{8}$	23 $\frac{1}{2}$	2 $\frac{1}{4}$	16 $\frac{1}{2}$
Charging Set Complete	22 $\frac{5}{8}$	23 $\frac{1}{2}$	24 $\frac{1}{4}$	138 $\frac{3}{4}$
Engine	19	10 $\frac{1}{2}$	12 $\frac{1}{2}$	53
Generator	7 $\frac{1}{2}$	9 $\frac{1}{8}$ dia.		29

SPARE PARTS

- 1 Set (3) piston rings
- 2 Sets—all gaskets
- 1 Spare starting rope
- 1 Magneto breaker arm
- 1 Magneto breaker point and plate assembly
- 1 Magneto Capacitor
- 1 Set (4) generator brushes
- 2 Spark Plugs

TOOLS

- 1 Pliers 6"
- 1 Screwdriver
- 1 Adjustable wrench 8"
- 1 Open end wrench $\frac{3}{8} \times \frac{7}{16}$
- 1 Open end wrench $\frac{1}{2} \times \frac{9}{16}$
- 1 Double end feeler gauge .020-.035
- 1 Carbon scraper
- 1 Spark plug wrench
- 1 One quart fuel mixing can
- 2 Sheets crocus cloth
- 1 Box end wrench $\frac{1}{2}$ "
- 1 Flywheel puller

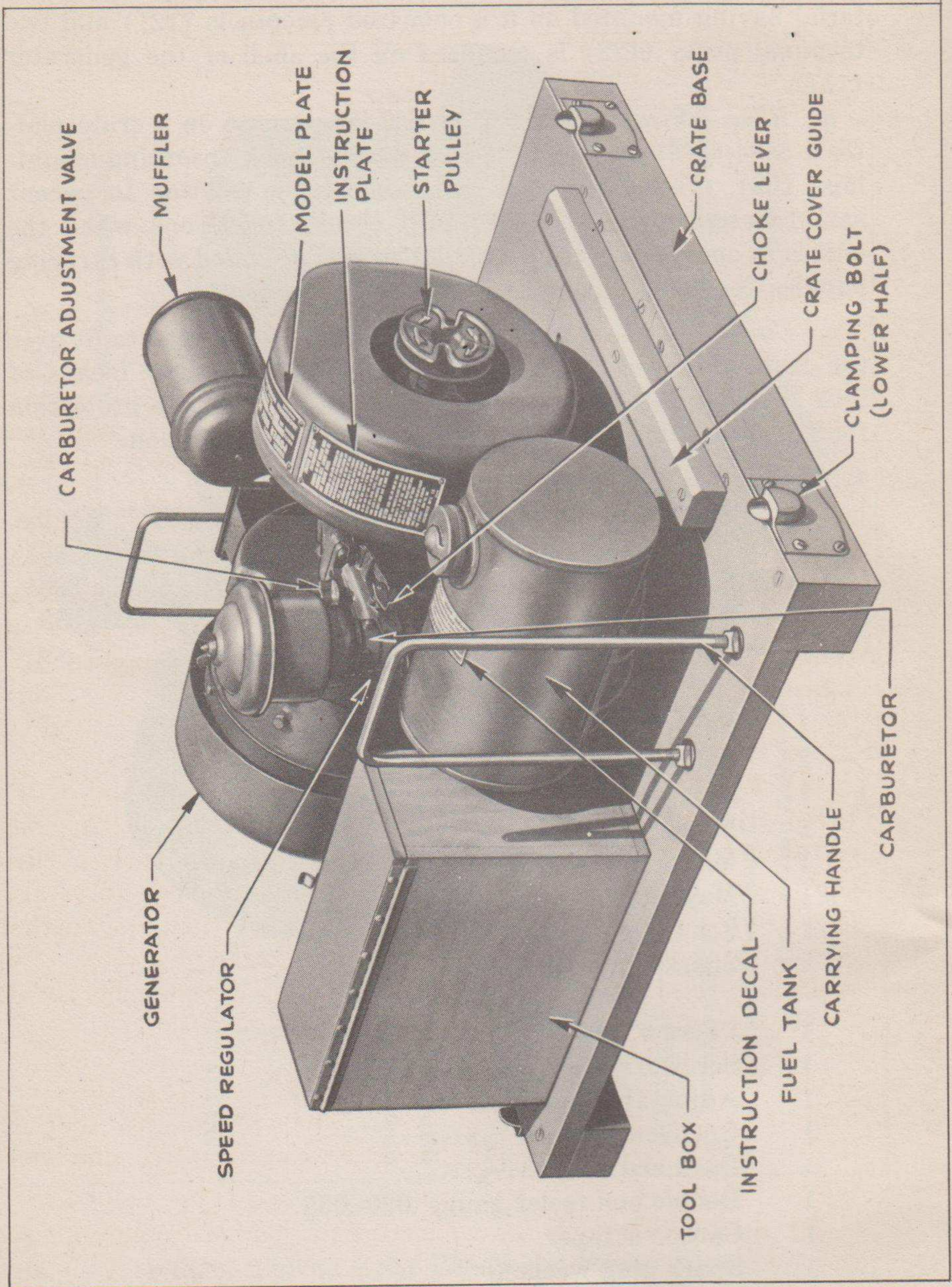


FIG. 3. POWER UNIT PE-43-HK REAR VIEW

5. Panel Board.—

Panel Board BD-LT-61 is a black phenolic plate reinforced with steel and is bolted to brackets welded directly to the steel cabinet. Sufficient space is allowed between the panel and the cabinet to permit free circulation of air around the panel board and prevent overheating. The following items are mounted on the panel board:

a. One voltmeter (D. C.)

(1) The voltmeter has a range 0-50 and measures the direct-current voltage delivered.

b. Three ammeters (D. C.)

(1) Each of the three ammeters has a range of 0-15 amperes and measures the direct-current amperes delivered to each battery charging circuit. They are numbered 1, 2, and 3, to correspond with circuits BAT-1, BAT-2, and BAT-3.

c. One three-circuit contactor switch.

(1) This switch has three separately insulated and independent poles actuated by a single magnet, one pole being connected in the positive line of each charging circuit. It is enclosed in a weather-proof box provided with a removable cover.

d. One reverse current relay.

(1) The reverse current relay controls the magnet coil of the three-circuit contact switch. At no load the relay closes when the power unit voltage reaches 38 to 40 volts and opens when the power unit voltage drops to 29 to 31 volts. The relay also opens on failure of the power unit voltage or when the current is reversed and flows from the batteries into the generator. The relay is enclosed in a weather-proof box with a removable cover.

e. Eight terminals.

(1) Two binding posts for connecting the power unit are mounted near the top of the panel. They are plainly marked GEN— and GEN+ meaning the generator negative and generator positive respectively.

(2) Six binding posts for connecting the load are mounted near the lower edge of the panel. They are marked minus (—) and plus (+) for Battery-1, Battery-2, and Battery-3.

(3) All of the terminals are equipped with wing nuts and washers.

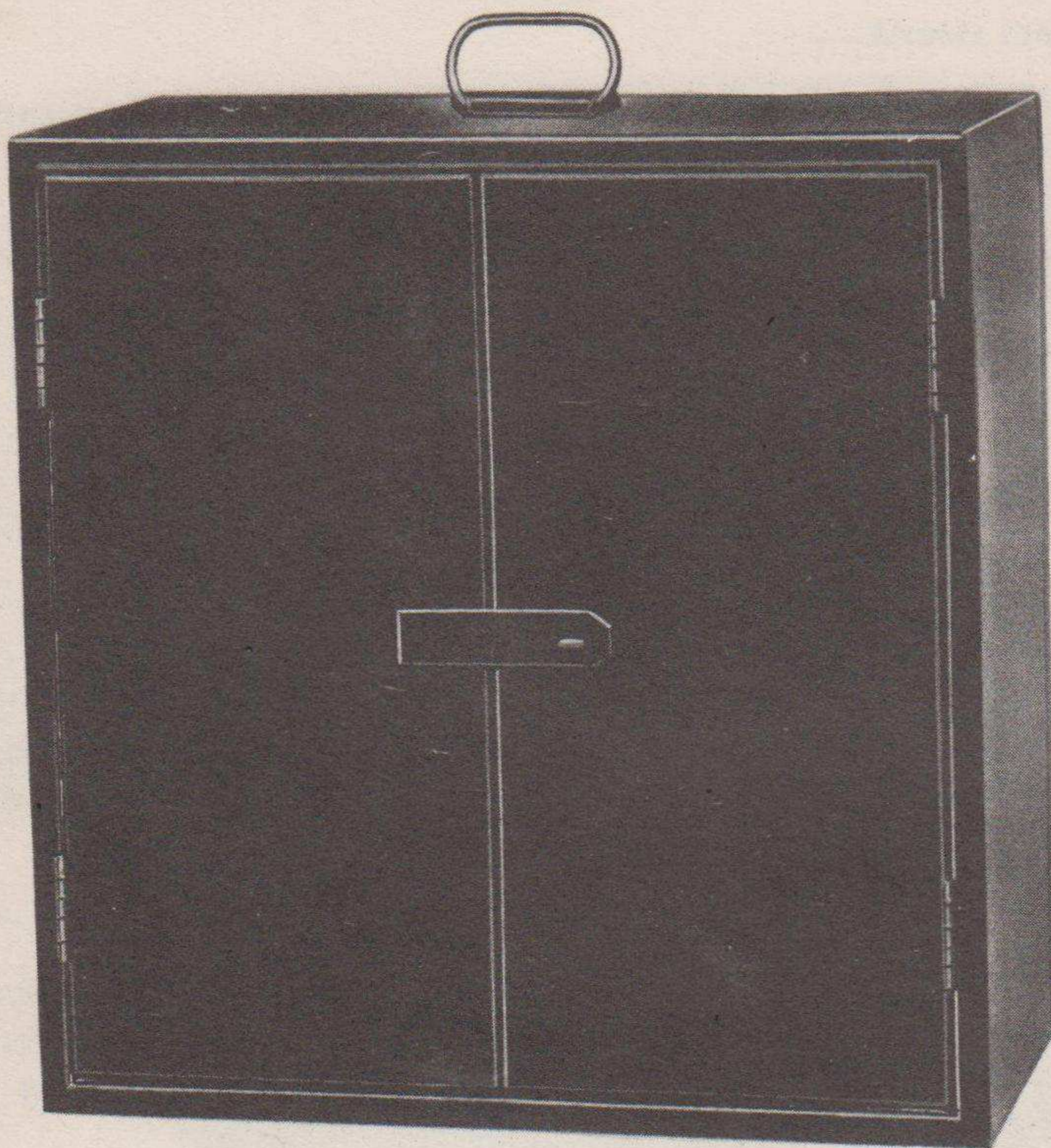


FIG. 4. PANEL BOX

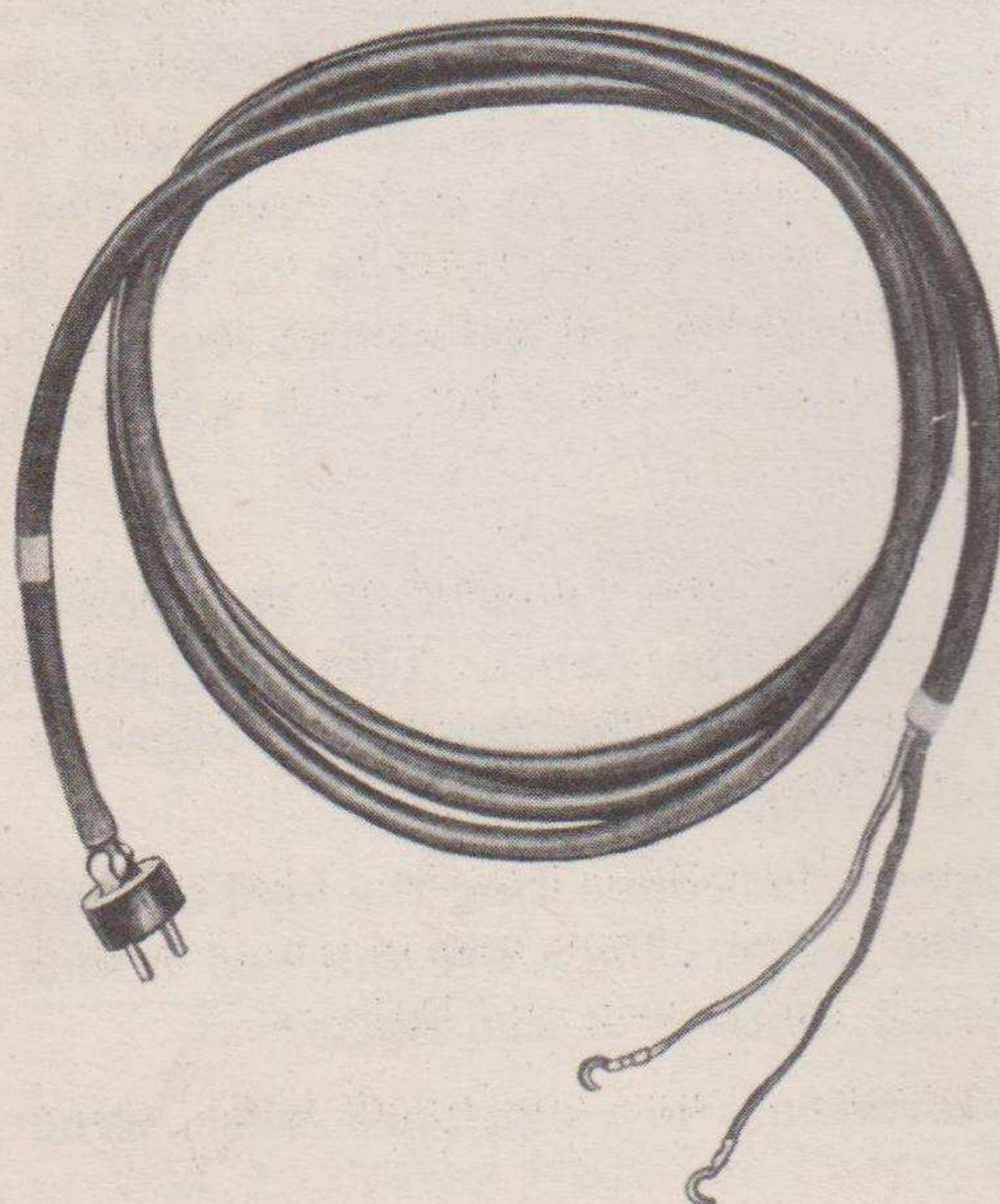


FIG. 5. CORD CD-107

f. Three circuit breakers.

(1) The three circuit breakers are located near the bottom of the panel. One circuit breaker is wired in each charging circuit so that the current may be turned off or on independently. The breakers are set to trip open instantaneously when the current reaches a value of 10 amperes, plus or minus one ampere.

g. Three charging rheostats.

(1) Three charging rheostats are provided to control current to each charging circuit. To increase the current turn rheostat knob in a counter-clockwise direction (to the left). To decrease current, turn knob in a clockwise direction (to the right).

6. Cord CD-107.—

Cord CD-107 is a two-conductor rubber insulated cord approximately 15 feet long which connects the panel to the power unit. At one end of the cord, each conductor is equipped with a hook type terminal. Each terminal is stamped plus (+) or minus (—) respectively. The other end of the cord is equipped with a polarized plug. The contact blade coinciding with diameter of the plug is connected to the conductor marked plus (+).

An adjustable clamp is provided to clamp the cord and relieve the strain from the screws used for the electrical connection.

A metal identification tag stamped CD-107 is attached to the cord near the plug end.

SECTION II

INSTALLATION AND OPERATION

NOTE: ALL DIRECTIONAL MOVEMENTS ARE TO BE MADE AS OBSERVED FROM REAR (FUEL TANK) END OF EQUIPMENT.

7. Installation.—

Inspect all cases and equipment for any damage that might have occurred during shipment. Should any items be unserviceable, report this fact immediately and procure replacements.

To remove cover crate (177) cut strapping that is around crate. Then remove power unit crate by loosening the four latches that hold it to the base (176).

The panel board is already mounted in the metal panel box. To remove panel box assembly, take off top of box and lift straight up until clear of box.

Cord CD-107 is contained in a separate box located in the panel box on top of the panel board.

8. Preparation for Use.—

a. Fuel and lubrication. Lubrication of the entire engine is accomplished by mixing oil with the gasoline. The oil in the mixture is carried into the cylinder where it lubricates cylinder wall, piston, piston rings, piston pin, connecting rod and main bearings.

To prepare fuel, mix one-half pint S. A. E. 30 oil to one gallon of gasoline. (In this ratio, the proportion is 16 parts gasoline to one part oil.) Stir mixture thoroughly before pouring into fuel tank. For single filling of fuel tank, fill the combination fuel-mixing can-cap and measuring device to the top with oil. Pour oil into fuel mixing can (144) and then fill with gasoline. Stir contents or shake can well before pouring mixture into the fuel tank. **Under no conditions are the oil and gasoline to be poured into fuel tank separately. Never attempt to fill tank while unit is operating.**

b. Starting. Check to make sure magneto high tension wire (45) is attached to spark plug. Open fuel line shut-off (67). Then with fuel in the gasoline tank follow these directions:

(1) Turn carburetor needle valve (93) counter-clockwise (to the left) to No. 5 or the half open position.

(2) Move choke lever (100) to vertical position. Stand behind unit.

(3) Slip knotted end of starting rope (54) into notch on starter pulley (53) and wind around clockwise (to the right).

(4) Pull rope up sharply to the rear steadying unit with left hand on fan housing. Repeat until engine starts. (Note: If engine does not start on the 4th or 5th cranking, refer to trouble chart, page 14.)

(5) Then move choke lever (100) to horizontal position. When engine is warm, adjust needle valve (93) so engine runs smoothly. Under load it may be necessary to make a slight compensating adjustment of the needle valve.

For subsequent starting, the carburetor needle valve will not have to be disturbed. Merely use choke as described in starting instructions. This does not apply, however, where climatic conditions are extremely cold. In that case, the needle valve should be opened fully for starting.

c. Flooded engine. Choking the engine too much when starting will flood it. This is particularly true when starting a warm engine. To overcome a flooded condition, first close fuel line shut-off (67). Open crankcase drain cock (13) located immediately underneath carburetor and crank engine a few times. When drained close drain cock (13) and open fuel line shut-off (67) before cranking. Remove and dry spark plug before again attempting to start the unit.

d. Stopping. To stop engine close fuel line shut-off (67).

ALWAYS CLOSE FUEL LINE SHUT-OFF WHEN TRANSPORTING UNIT.

9. Operation.—

Power Unit PE-43-HK is intended to furnish power for battery charging service and is designed to deliver 550-watt, direct-current at 32 volts. The unit should not be overloaded more than ten percent. Don't operate continuously at an overload.

To connect Charging Set SCR-169 for operation see (Fig. 28, page 63).

a. Engine operation. (See para. 8, page 12.)

b. Generator operation. There are two precautions that should be observed in operating the generator:

(1) Be sure it is properly connected with panel board (See paragraph 13, page 20, and Fig. 1, page 4).

(2) Be sure generator is not overloaded or short circuited for long periods of time. The generator will stand short periods of overload to 600 watts, but above that wattage the unit is apt to overheat and destroy the windings.

10. Troubles, Causes, Remedies.—

Engine troubles usually are: failure to start, difficulty in starting, runs and stops, not up to speed (2350 rpm), overheating and loss of power. In locating engine trouble it is advisable to install a new spark plug to see if this corrects the difficulty. If it does not, leave new plug in while checking further.

SYMPTOM	POSSIBLE CAUSE	CHECK	REMEDY
<i>a. Engine</i>			
(1) Fails to start or hard to start	No fuel in tank	Fuel tank	Fill
	Fuel line shut off not open	Shut-off valve	Open
	Defective spark plug	Spark plug	Replace
	Carbon across spark plug electrodes	Spark plug	Clean
	Spark plug gap too wide	Spark plug	Adjust to .035
	Obstruction under carburetor air valve	Carb. air valve	Remove See Para. 14, Page 28
	Obstruction under carburetor reed valve	Carburetor reed valve	Remove See Para. 14, Page 28
	Wet spark plug	Spark plug	Dry or replace
	Water or dirt in fuel	Fuel tank	Drain, clean and refill
	Carburetor nozzle clogged	Carburetor	Clean out
	Cylinder port holes clogged	Cylinder	Clean out See Para 14, Page 31
	Muffler clogged	Muffler	Clean out See Para 14, Page 31
	Magneto points out of adjustment	Magneto	Adjust gap to .020 See Para. 14, Page 22
	Broken high tension cable	Magneto cable	Replace See Para. 14, Page 27
	Defective condenser	Magneto	Replace See Para. 14, Page 27
	Defective coil	Coil	Replace See Para. 14, Page 27
	Engine flooded	Crankcase drain valve	Open and drain See Para. 8, Page 13
Engine not up to speed	Engine speed	Increase to 2350 rpm. See Para 14, Page 29	
Incorrect fuel mixture	Gas tank	Drain and refill	
Carburetor needle valve not properly adjusted		Reset See Para. 8, Page 12	
Carburetor choke lever not in running position		Move to horizontal position	
(2) Engine overheats and lacks power	Engine port holes clogged	Cylinder	Clean out See Para. 14, Page 31
	Muffler clogged	Muffler	Clean out See Para. 14, Page 31
	Piston and cylinder head carbonized	Cylinder and piston head	Clean
	Wrong type spark plug	Spark plug	Use Champion J6 or equivalent
	Carburetor needle valve improperly adjusted	Needle valve	Readjust See Para. 8, Page 12
Overload on generator	Engine speed	Increase to 2350 rpm.	

SYMPTOM	POSSIBLE CAUSE	CHECK	REMEDY
<i>b. Generator</i> (1) Arcing at brushes	Dirty commutator or collector rings	Commutator and collector rings	Clean See Para 15, Page 33
	Worn out brushes	Brushes	Replace See Para 15, Page 33
(2) Fails to generate voltage	Brushes stuck in holders	Brush holders	Free up
	Brushes not properly seated	Brushes	See Par. 15 Page 36
	Brushes stuck in holders	Brush holders	Free up
	Worn out brushes	Brushes	Replace See Para. 15, Page 33
	Brushes not properly seated	Brushes	See Para 15, Page 36
	Dirty commutator or collector rings	Commutator and collector rings	Clean See Para. 15, Page 33
(3) Fails to deliver rated output (550 watts, 32 volts)	Broken connections	Connections	Rewire
	Defective armature	Armature	Replace
	Defective filter condenser	Filter condenser	Replace
	Defective condenser	Generator condenser	Replace
(4) Noisy radio reception	Engine not up to speed	Engine speed	Increase to 2350 rpm
	Dirty commutator or collector rings	Commutator and collector rings	Clean
	Worn out brushes	Brushes	Replace
	Brushes not properly seated	Brushes	See Para. 15, Page 36
(4) Noisy radio reception	Rheostats incorrectly adjusted	Rheostats	Readjust See Para. 5, Page 11
	Defective condensers	Filter condenser	Replace
	Defective filter condenser	Filter condenser	Replace
	Defective condenser	Generator condenser	Replace
	Loose connections in filter	Filter	Tighten connections
	Loose spark plug shielding assembly	Spark plug shielding	Tighten
(4) Noisy radio reception	Defective magneto high tension wire shielding	High tension wire shielding	Replace

SECTION III

FUNCTIONING OF PARTS

11. Generator Theory.—

Figure 6 shows a permanent bar magnet, with lines of flux leaving the north pole and entering the south pole. If a wire is moved past the pole of the magnet at right angles to the pole as shown, a voltage will be induced in the wires. The amount of this voltage depends on three things:

- a. Strength of the magnet
- b. Length of wire
- c. Speed of movement of wire

The stronger the magnet (the greater the density of the lines of flux) and the faster the wire is moved, the greater will be the voltage induced in it per unit of length. This is the simple fundamental principle of operation of any generator, either direct current or alternating current.

In practice, an electromagnet (Fig. 7, page 17) is used instead of a permanent magnet. The reason for its use is that a permanent magnet tends to lose its strength over a period of time. Also, the strength of an electromagnet can be controlled by the number of turns of wire wound on it and by the amount of current (amperes) supplied through this wire.

In an actual generator the field poles serve as electromagnets. The armature winding acts the same as the wire shown moving by the end of the magnet in Figures 6-7. This movement is spoken of as cutting the lines of flux of the magnet. This motion induces a voltage in the armature winding which is connected to the armature commutator. The carbon brushes mounted in brush holder assemblies serve to pick up this voltage from the armature as it rotates, and wires from the brushes make the voltage available at the terminals of the generator.

Once the field poles are magnetized they retain some of the magnetism (called residual magnetism) even though there is no current in the field winding when the generator is not running. When the armature starts to rotate, the armature windings pass through, or cut, the field flux of this residual magnetism. This generates a small amount of voltage in the armature. This action keeps increasing as the armature comes up to speed until the full rated voltage of the generator is reached.

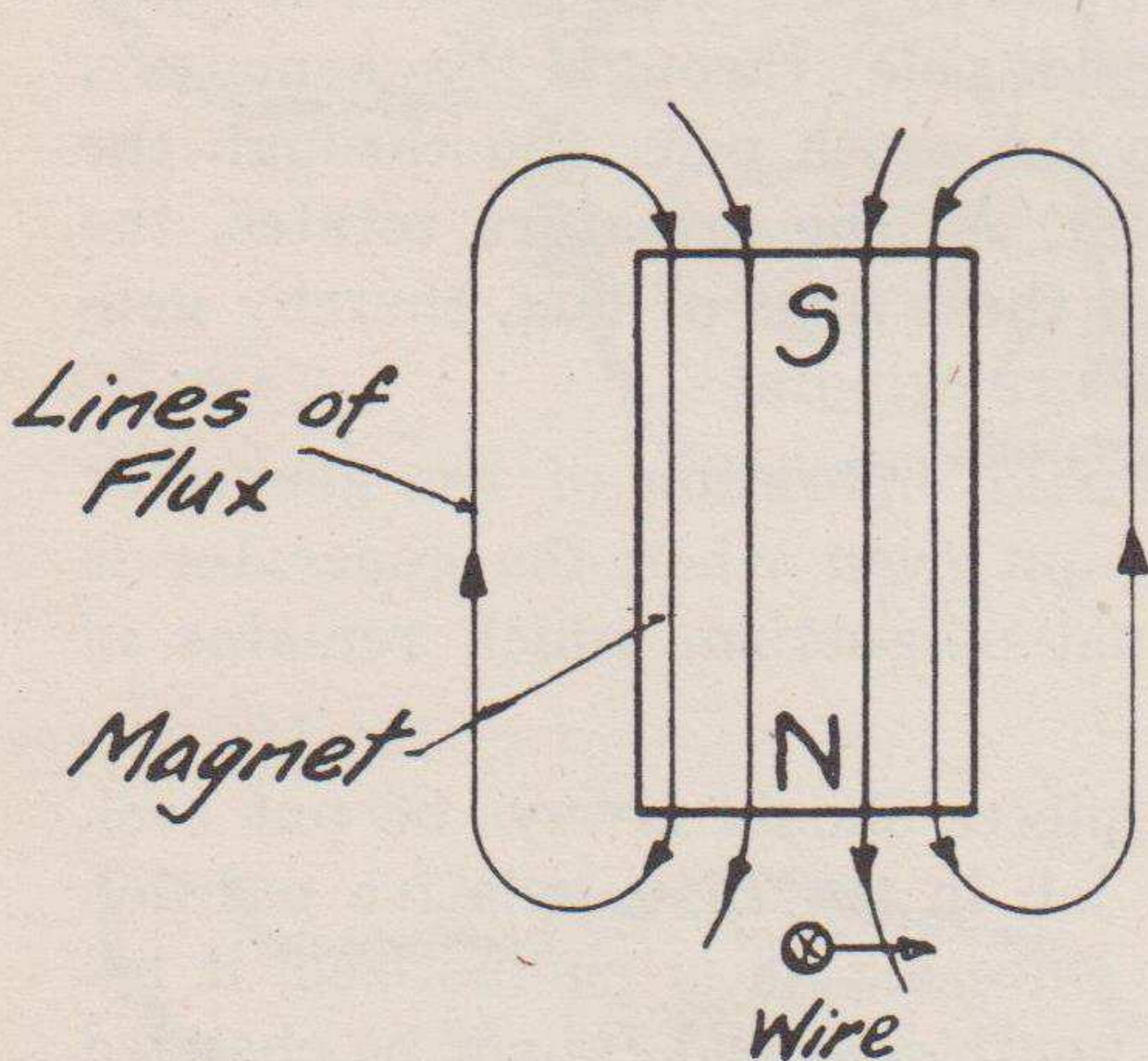


FIG. 6. GENERATOR THEORY,
PERMANENT MAGNET

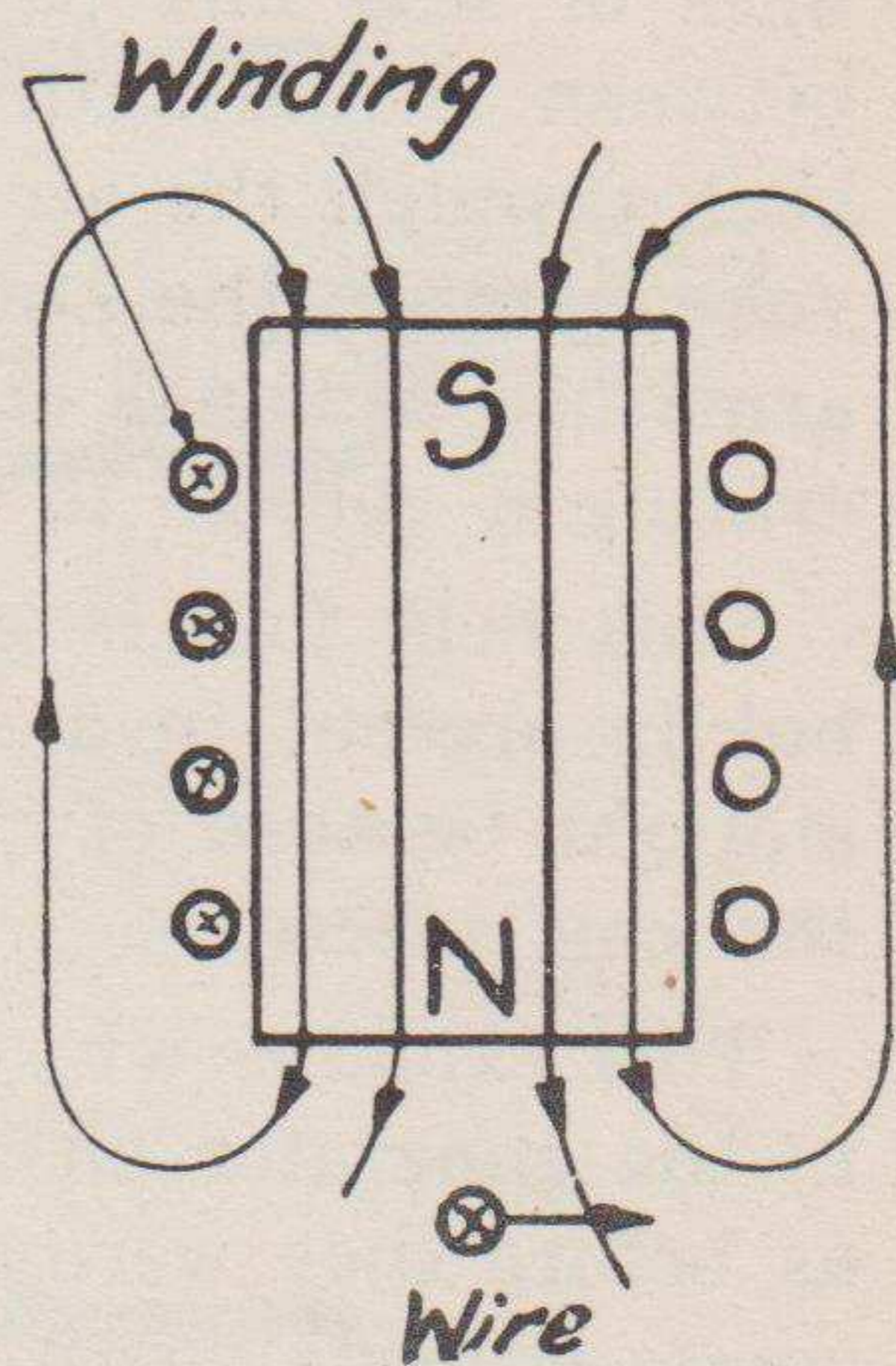


FIG. 7. GENERATOR THEORY
ELECTROMAGNET

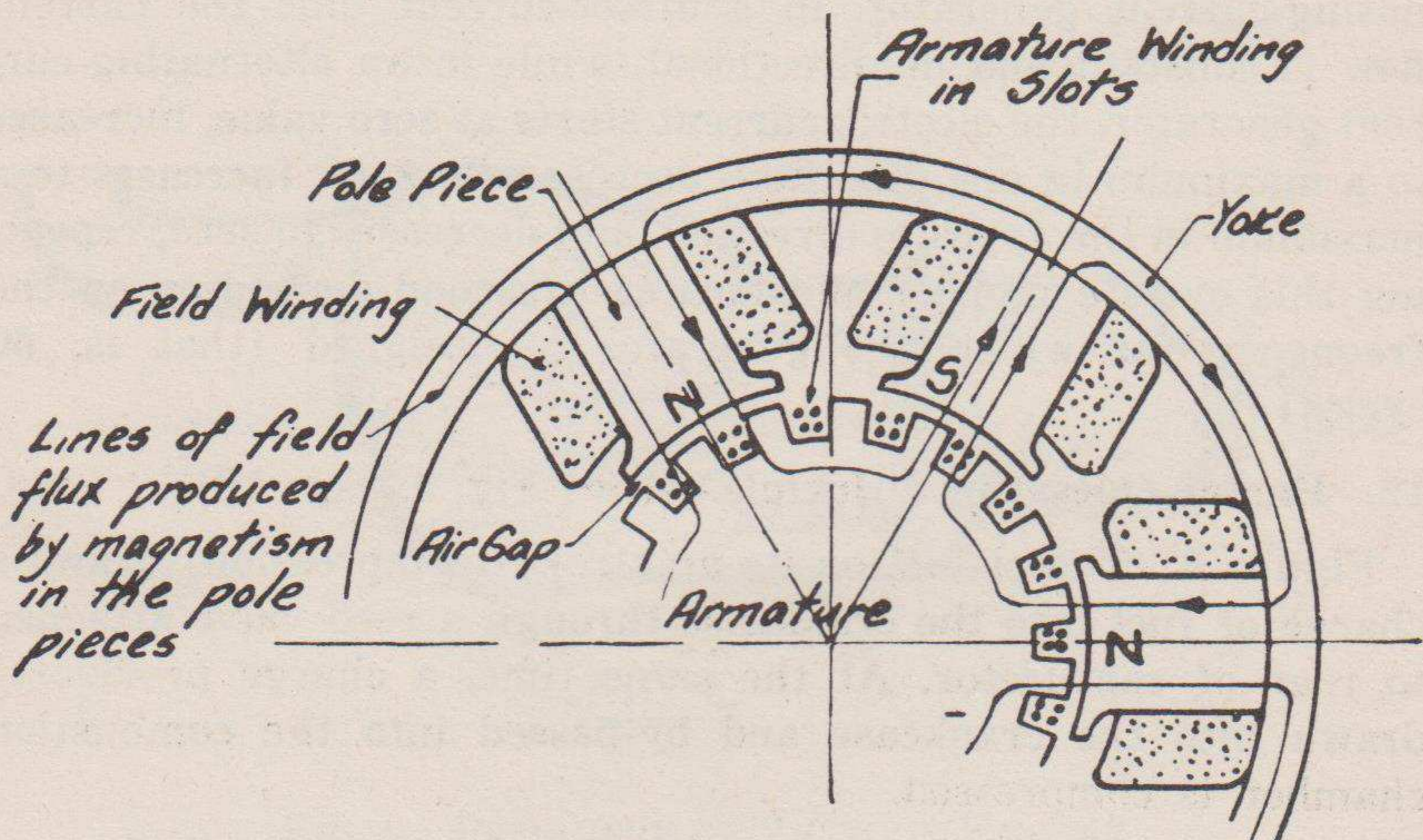


FIG. 8. GENERATOR ARMATURE AND FIELD WINDINGS

Figure 8, page 17, shows the principal parts of a generator and illustrates the function of the armature and field windings. The lines of field flux pass from a north pole through the air gap between the armature and field pole, through the armature, back through the air gap into the south pole, and through the yoke back to the starting point. As the armature rotates, the armature windings cut through these lines of flux, thereby generating a voltage in the armature windings.

This field flux is greater during operation of the generator but is present in a small amount even when the generator is stopped because of the residual magnetism which remains in the pole pieces.

This explains why the pole pieces should always be put back in the generator on a service job in the same relative position as before they were removed. Once a pole is magnetized, it becomes either a north pole or a south pole and cannot be changed except by the application of an external supply of voltage as from a storage battery. Even with this method it is sometimes difficult to change the magnetism of the field poles if they have been in service for some time.

In summarizing the difference between a direct-current generator such as is used on Power Unit PE-43-HK and an alternating-current generator, in a direct-current unit the current flow is constant and unidirectional, while in an alternating-current generator, the electric current starts at zero value, increases to a maximum in one direction, decreases to zero, increases to a maximum in the opposite direction, and decreases to zero, repeating this cycle a number of times each second depending on the frequency for which the generator is designed (that is, 60 cycles).

12. Engine Operating Principle.—(See Fig. 9, page 19)

Figure A. The piston, on its up stroke (compression) draws a charge of fuel into the crankcase through a reed valve attached to rear of carburetor. At the same time, a charge previously drawn into the crankcase and by-passed into the combustion chamber is compressed.

Figure B. The charge in the combustion chamber is ignited when the piston is $\frac{1}{8}$ inch from top dead center. The expansion of the burning gases forces the piston down on its power stroke. The descending piston compresses the charge previously drawn into the crankcase.

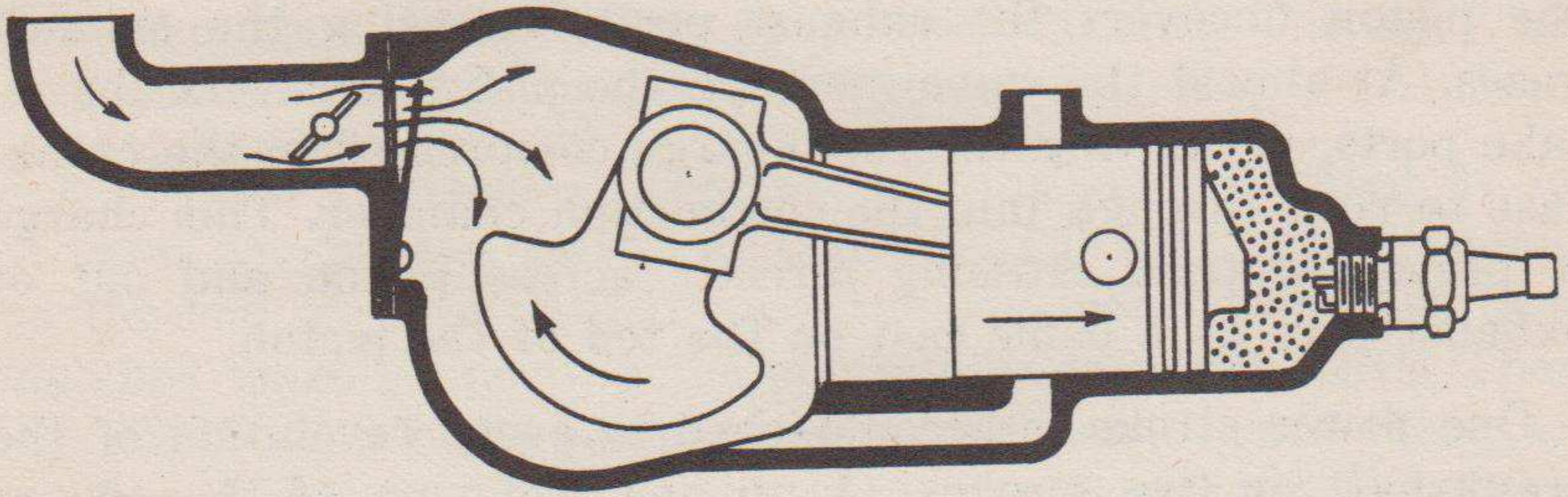


FIG. A

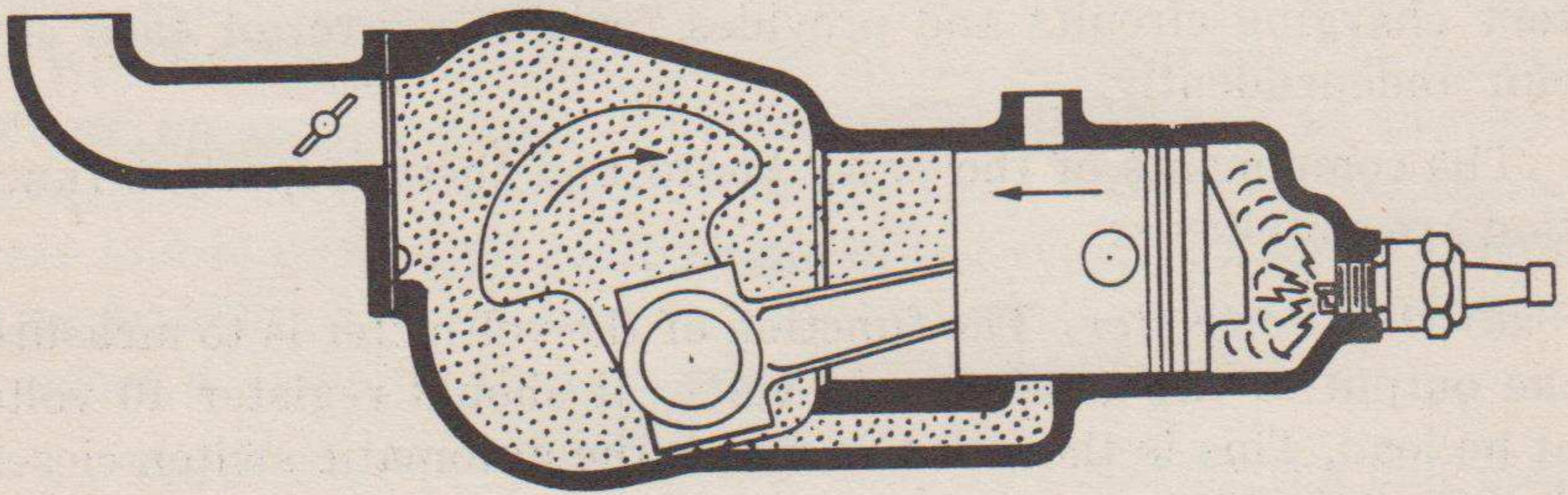


FIG. B

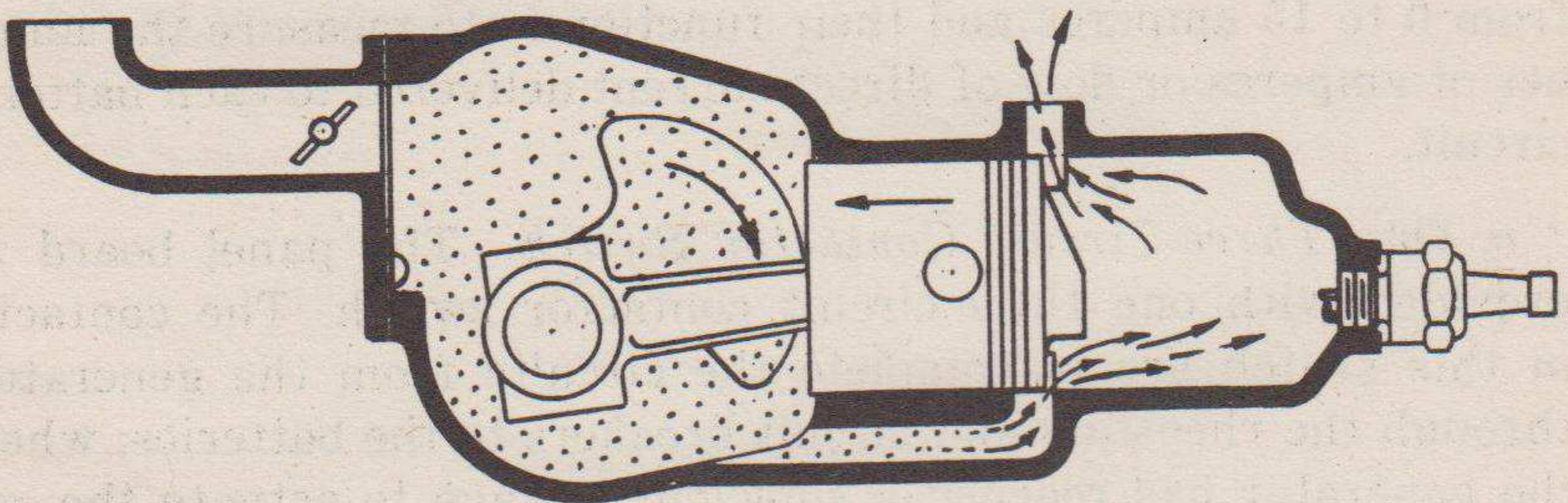


FIG. C

FIG. 9. PRINCIPLE OF 2 CYCLE ENGINE

Figure C. Near the bottom of its downward (power) stroke the piston uncovers the exhaust ports, releasing the exhaust gases. At almost the same moment, the piston uncovers the intake ports, permitting the fuel charge compressed in the crankcase to rush through into the combustion chamber. This charge is prevented from crossing directly across piston and out of exhaust port by a baffle cast on the top of the piston.

One power stroke is accomplished to every revolution of the crankshaft or two strokes (1 up and 1 down) of the piston.

13. Theory of Panel Board Components.—

Panel Board BD-LT-61 is a distribution and control device for distributing the output of the generator to three separate battery charging circuits and provides for the control of each circuit independently.

The components of the panel board and their respective function are as follows:

a. One Voltmeter. The function of the voltmeter is to measure the output of the generator in volts. It should register 40 volts at no load. This is the point at which the automatic switch closes for the charging operation.

b. Three Ammeters. There are three ammeters mounted on the panel board. They are number 1, 2, and 3 to correspond with BAT-1, BAT-2, and BAT-3 circuits. Each one has a range of from 0 to 15 amperes and their function is to measure the number of amperes or flow of direct-current delivered to each battery circuit.

c. One Three-Circuit Contactor Switch. The panel board is provided with one three-circuit contactor switch. The contacts in this switch are to complete the circuits from the generator through the rheostats and circuit breakers to the batteries, when the generator has reached a sufficient voltage to actuate the reverse current relay, which in turn controls the contactor switch. The electromagnet is energized through the operation of the reverse current relay.

d. One reverse current relay. The function of the reverse current relay, is to control the electromagnet coil of the three-circuit contact switch. There are two windings in a reverse current relay. One operates on voltage, the other on amperage. The voltage winding closes the contact at 38 to 40 volts. The

amperage winding will force open the contact when a reverse flow of current from battery to generator occurs. The relay also opens on failure of the power unit voltage.

e. Eight Terminals. The two binding posts located at top of panel are marked GEN— and GEN+. The hook type terminals on the end of Cord CD-107 are similarly marked and are to be matched when connecting the power unit to panel board. There are six binding posts for connecting the panel board. They are marked minus (—) and plus (+) for each battery circuit and serve to transfer power load from power unit, through panel board to batteries.

f. Three Circuit Breakers. The three circuit breakers are located near the bottom of the panel board. One circuit breaker is wired in each charging circuit so the current may be turned off or on independently. The circuit breakers are an overload protection device to prevent damage from a too rapid charging rate and to protect all components in the event of a short circuit. The breakers are set to trip instantaneously when the current reaches a value of 10 amperes, plus or minus 1 ampere.

g. Three Charging Rheostats. The function of the charging rheostat is to provide control of the current to each circuit by increasing or decreasing the amount of resistance in the circuit. Turning the rheostats in a clockwise direction (to the right) increases the resistance, counter-clockwise direction (to the left) decreases resistance.

SECTION IV MAINTENANCE

14. Engine.—

This section deals mainly with minor points of inspection and adjustment that can be performed in the field. To insure satisfactory operation of the unit follow directions thoroughly.

a. Spark plug.—If engine fails to start, starts hard, or misses, the spark plug may be damaged or dirty. Remove from cylinder head and shield (1), first disconnecting magneto high tension wire (45). Then reattach high tension wire to spark plug and lay plug on cylinder. Spin motor to check spark. If no spark occurs at the spark plug points, clean out plug or install a new one.

Always use Champion J6 spark plug or one in equivalent heat range. Point gap should be .035. Make certain gasket is on spark plug when installing in engine. (See Fig. 10, page 22.)

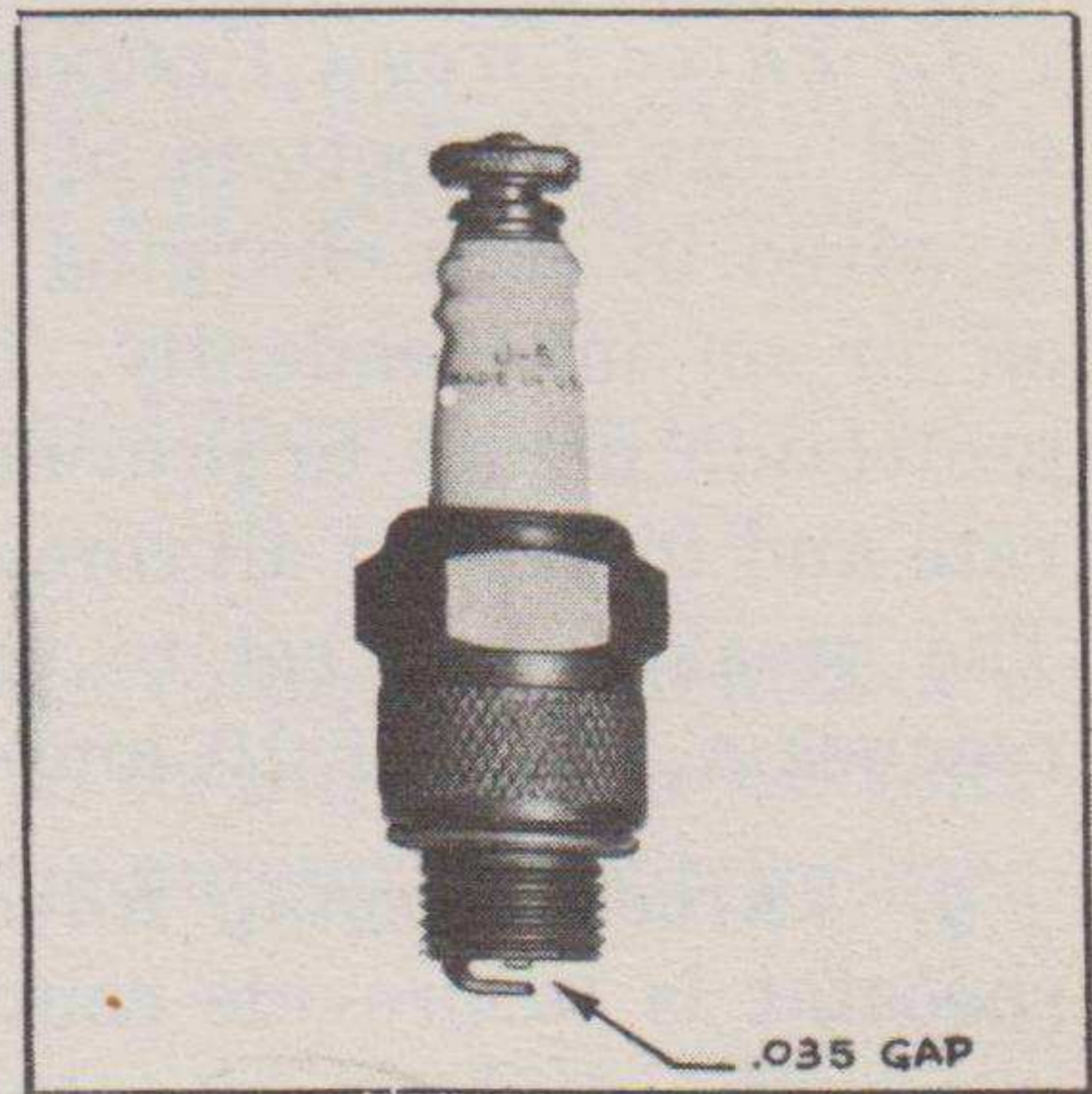


FIG. 10. SPARK PLUG

It is extremely important when plug is dirty to thoroughly scrape out all carbon, brownish lead deposits, and loose particles.

b. Magneto.—It is recommended, if there is an indication the magneto is causing trouble, that a test be made before attempting to repair it. Check magneto by holding high tension wire (45) $\frac{3}{16}$ " away from a point on the engine (see Fig. 11, page 23). Do not grasp the uninsulated portion of the wire when making these tests. When the engine is cranked in the usual manner, a properly performing magneto will have a spark output strong enough to jump the prescribed gap. The only adjustable part on the magneto is the breaker plate (37) which provides adjustment for the breaker points. To adjust breaker points, first remove housing (52). Then unscrew starter pulley from crankshaft. Screw on flywheel removal tool (142) supplied with equipment and tap tool on the end to loosen flywheel (49) which should then be removed to provide access to points. To adjust points, turn

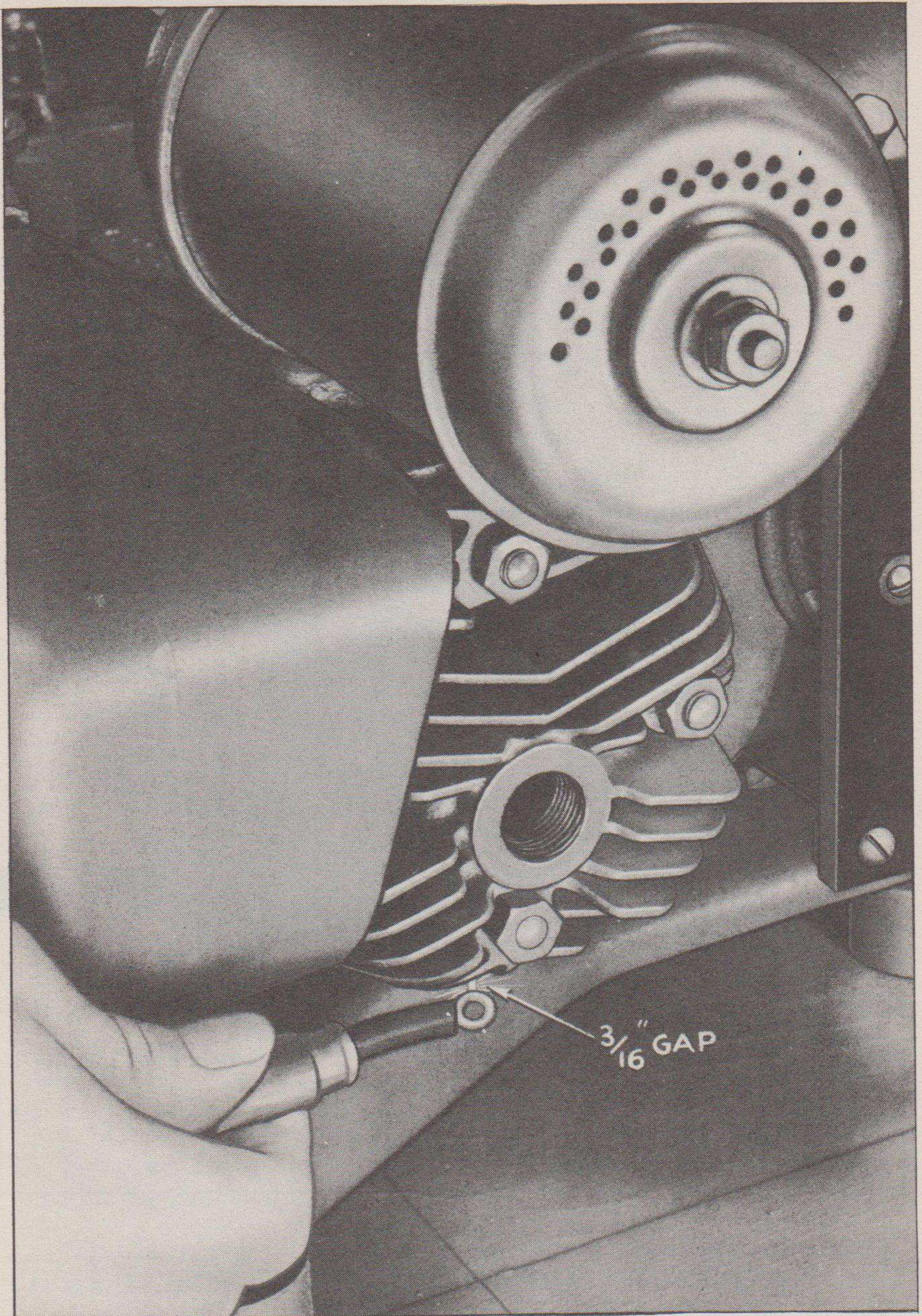


FIG. 11. TEST FOR SPARK OUTPUT

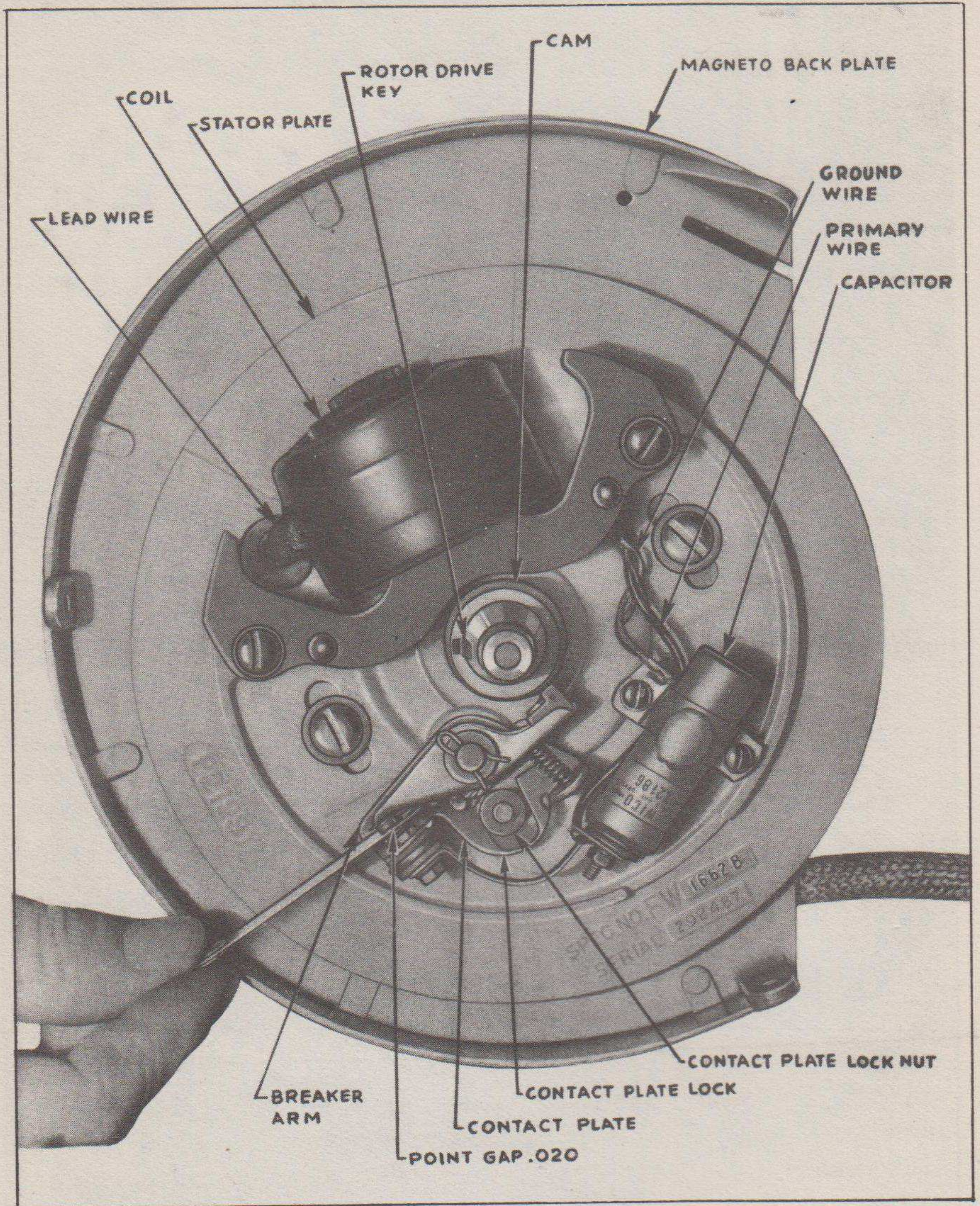


FIG. 12. MAGNETO POINT ADJUSTMENT

engine clockwise (to the right) by hand until breaker points are fully open. Check point opening (see Fig. 12, page 24) with feeler gauge (148). Correct opening is .020". (Note: Although contact points remain open during the entire travel of the cam (40) from the breaking edge, being closed only while the flat section of the cam is passing the breaker arm (38) fibre, the cam must be positioned so the breaker arm fibre rests on highest point of cam when gauging point opening.) If points need re-setting, bend down contact plate lock, loosen lock nut (47) which holds breaker plate (37) in position, and move plate up or down as might be necessary to obtain proper point opening. After setting is accomplished, be sure to tighten lock nut (47) and bend ear of plate lock against flat of lock nut so it cannot loosen up.

The breaker plate setting should be made only in the manner prescribed. At no time should the fixed contact (on plate 37) be loosened or breaker arm (38) bent to provide adjustment.

The moving contact is integral with breaker arm. In replacing breaker arm (38), make certain breaker arm bushing is in place. If either contact point needs replacing, it is recommended both be changed at same time to insure satisfactory operation. The breaker arm bearing is packed with a cam lubricant at the time of assembly, and should not require additional lubrication. A small amount is also packed on the breaker arm shoe and wipes off on cam surface, providing permanent lubrication between these rubbing surfaces. Uneven or pitted contact points may be restored to a true even condition by using a smooth carborundum or dressing stone. Be sure to remove all dust particles. However, it is recommended to replace points in this condition. For minor dressing, a fine grain sand paper such as No. 00 can be used.

c. To time magneto.—If for any reason, the magneto assembly is removed from the engine, these directions covering timing should be followed.

(1) Check point opening as outlined under magneto directions (Para. 14, page 25). Remove spark plug. Turn crankshaft (20) in direction of engine rotation (to the right) until piston reaches top dead center.

(2) Insert a small rod through spark plug hole in cylinder head (7) until it touches top of piston. Scribe a line on the rod flush with top of spark plug hole. Then withdraw rod and scribe

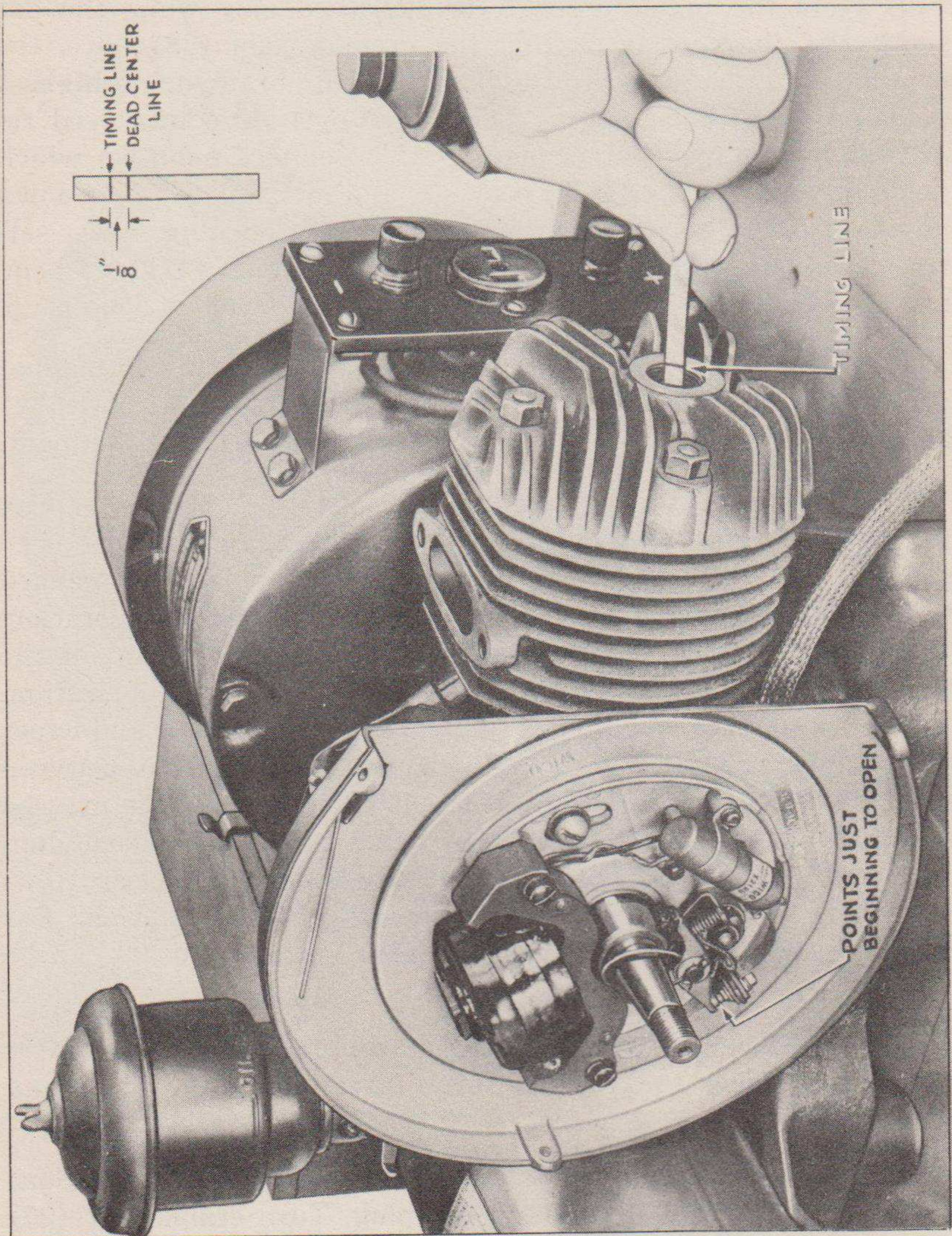


FIG. 13. MAGNETO TIMING

another line up $\frac{1}{8}$ " from dead center mark (see Fig. 13, page 26). Next turn engine in opposite direction of rotation (to the left) about one-quarter turn.

(3) The rod should again be inserted through spark plug hole until it touches top of piston. Then turn engine in direction of rotation (to the right) until top mark on rod is flush with top of spark plug hole.

(4) Move stator plate (50) until points just begin to break. Tighten plate by means of the two round head screws, which lock plate in place. Recheck to determine if piston is $\frac{1}{8}$ " from top dead center when magneto points just begin to open. If setting is exactly as described, a spark should occur when piston is $\frac{1}{8}$ " from top dead center.

(5) Replacing high tension wire.—A chafed or broken cable (45) which is cause for continuous or intermittent misfiring, should be replaced. Strip back the high tension cable about $\frac{1}{2}$ " on the magneto end, twist strands together and slip through hole in bracket attached to coil. Bend strands around bracket so cable cannot work out (see Fig. 12, page 24). It is essential that the bare end be kept close to each surface after cable is in place. (Do not solder cable to coil.)

(6) Coil and Condenser.—If no spark or a weak spark occurs after adjusting the contact points, the trouble is likely to be in the coil (48) or condenser (42) although failure of these parts is not a common cause of difficulty. Replace either one or both only after checking the spark plug, high tension wire connection, and magneto contact points. (Coil is furnished as assembly only with laminated coil.) In replacing the coil assembly, the three machined faces of the laminations must line up exactly with the three machined bosses of the stator. Screws must be tightened securely.

(7) Magnet.—Integrally cast in the rim of the rotor (49) is the magnetic unit which concentrates a powerful magnetic charge within a small volume. By virtue of its ability to retain indefinitely this high magnetic concentration, the unit is able to provide the magneto with extraordinary high spark output through its entire life. Therefore, no trouble should be experienced with the magnet.

(8) Lubrication.—The magneto should require no lubrication for a long period of service. For cam lubrication add a little

vaseline or petrolatum to the breaker arm shoe after approximately 200 hours of operation. Do not use oil or a fluid lubricant as either can get on the breaker points and short them out.

d. Carburetor.—The carburetor needle valve is correctly set at the time of assembly and should require no attention for some time. However, if, for any reason the needle valve must be removed, follow these directions:

(1) Hold adjustment knob (93) with one hand, then loosen and remove hex acorn-nut (87) atop the knob with a wrench or pair of pliers. Unscrew adjustment valve (89) by turning in counter-clockwise direction (to the left).

(2) When reassembling valve (89) to carburetor, turn it in a clockwise direction (to the right) in seat as far as it will go. Do not tighten hard against seat or damage might occur to seat and valve.

(3) With valve in seat as far as it will go, turn it back about one-quarter turn from this closed position. Replace spring (77) and valve adjustment knob with wing of knob against left hand side of stop. Screw on acorn-nut and tighten making sure valve does not move while this is being done.

If engine idles improperly or will not keep running, first check the fuel mixture for correct ratio of oil to gasoline; then check muffler, exhaust and intake port holes for carbon accumulation. (See Para. 14, page 31, and Figs. 14-15, pages 30-32.)

If there is no restriction due to carbon and the carburetor, spark plug, and magneto points are properly adjusted, remove the air cleaner (102) and examine air check (101) located in carburetor bowl to see that small particles of foreign matter are not preventing the valve from closing. Should the air check valve be functioning properly, remove the carburetor and examine the reed valve (73) attached to carburetor at back side. Make certain no foreign matter prevents this valve from closing fully or seating properly. If valve is bent out of shape, straighten or replace with a new one.

In reattaching carburetor make sure all connections are tight to prevent air leakage.

e. Air Cleaner.—The air cleaner prevents dust and grit from entering the engine and causing wear to moving parts. If equipment is operated under extremely severe and dusty conditions,

the cleaner should be removed and oil emptied out after about 30 hours of operation. Following this, the cleaner should be thoroughly washed out in gasoline, naphtha, or acetone. Refill to level indicated by marking on cleaner body with same viscosity of oil used in engine.

f. Governor.—No adjustments should be necessary to the governor, as it is correctly set for the requirements of the unit when assembled. No attention should be required except if governor housing (88) is removed for spring (97) replacement.

To remove governor housing and install new spring, follow these directions:

(1) Remove governor link guard (109) by taking out the two screws holding it to magneto back plate.

(2) Disconnect fuel line (69).

(3) Uncouple governor link (107) and remove four screws holding carburetor to crankcase. Take off carburetor.

(4) Loosen headless set screw (92) in governor spring barrel (88) with wrench (152) and slip assembly from throttle shaft (99).

(5) In replacing governor spring, insert one end of spring into hole in governor housing. Slide the housing onto throttle shaft. Then line up other end of spring with hole in knurled speed adjusting wheel (94). Next hold throttle lever (99) extension up against stop or in wide open position. Then tighten headless screw in governor housing.

Check governor housing to determine no bind exists. It should move freely through entire range of travel.

If engine speed requires changing turn knurled speed regulator (94) toward cylinder (counter-clockwise) to increase speed; the opposite direction (clockwise) to decrease speed.

g. Carbon Removal.—It is advisable to make a periodic check of the engine exhaust, intake port holes, and muffler assembly, to determine that no carbon has built up at those points to restrict scavenging of exhaust gases from the cylinder and reduce power output. To check and remove carbon, follow these directions:

(1) Remove spark plug to avoid pulling against compression when turning engine over by hand.

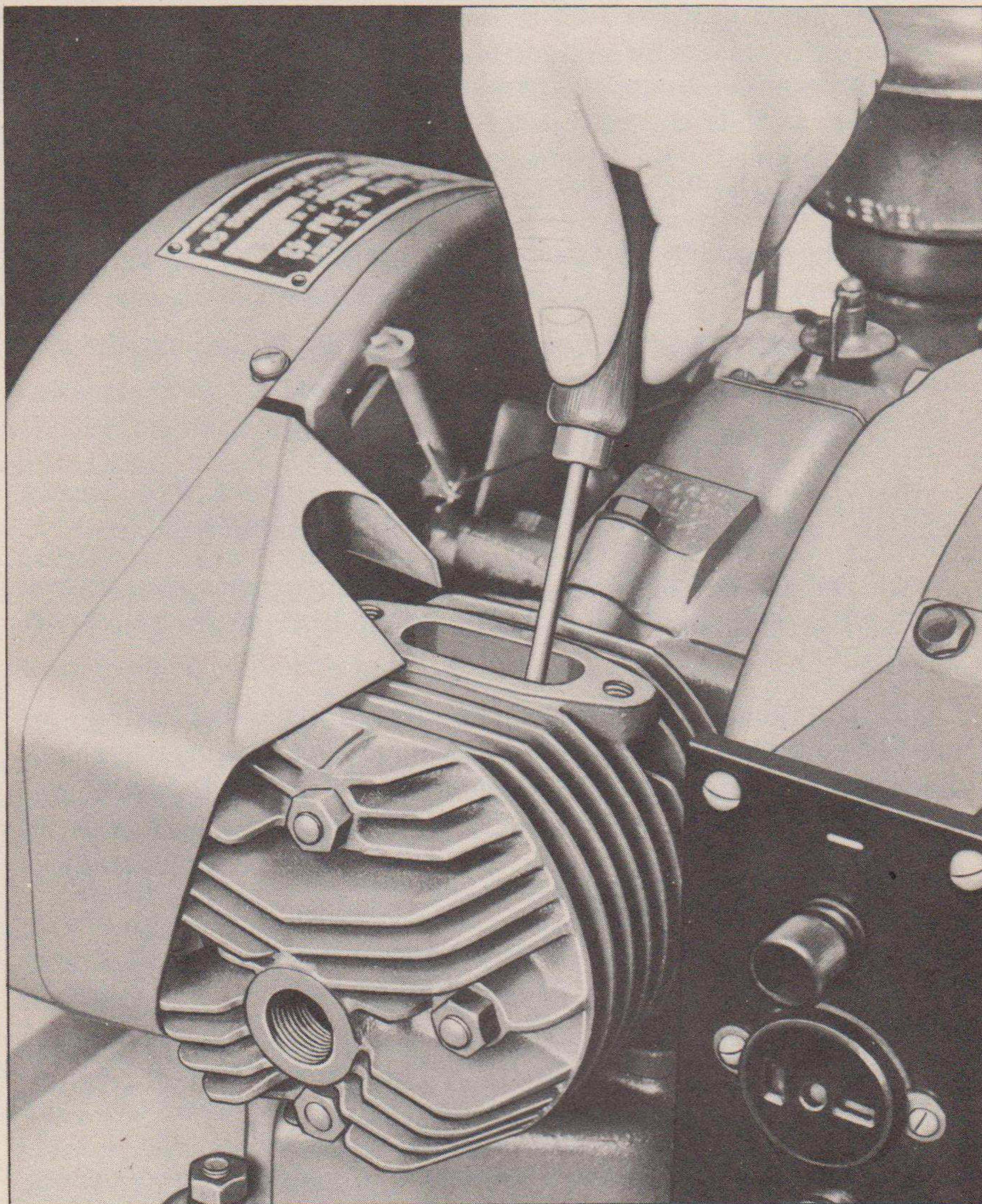


FIG. 14. CARBON REMOVAL—EXHAUST PORTS

(2) Remove muffler.

(3) Turn engine over by hand until piston reaches bottom dead center. Examine exhaust ports. Carbon and lead deposits in the exhaust ports can be removed with tool. (See Fig. 14, page 30.) Be careful not to damage piston when removing the deposits from ports.

(4) It is preferable when exhaust ports are found partially closed by carbon and lead deposits, to make a thorough check of the piston, intake ports, and cylinder head. The following should be done:

(1) Remove the fan housing (52).

(2) Remove the cylinder head (7).

(3) Scrape off carbon and lead deposits from cylinder head, inside of cylinder and top of piston. Use carbon scraper (149) for this work.

(4) Remove carbon and lead deposits from intake ports. (See Fig. 15, page 32.)

(5) Before reassembling the cylinder head make sure all loose particles of carbon and lead are removed from the engine. To avoid breakage to cylinder head, be sure to pull up retaining nuts evenly.

Note: Small particles of carbon and lead if left in the engine may foul and short out the spark plug when restarting.

(5) The muffler (55) can be disassembled by removing nut (214) and washer (241) then separating body (56) from head (59). Scrape out carbon from inside the head of muffler body. Clean carbon out of all inner and outer holes of shell. Make certain gasket (57) is all right before reassembly of muffler.

(6) Crank engine a few times before reinstalling muffler to give carbon chips an opportunity to pass out of engine.

h. When engine fails to start.—If, at any time, the engine should fail to start, check the following possibilities:

(1) Make sure there is at least one inch of fuel in the gasoline tank.

(2) Make sure that fuel line shut-off (67) is open.

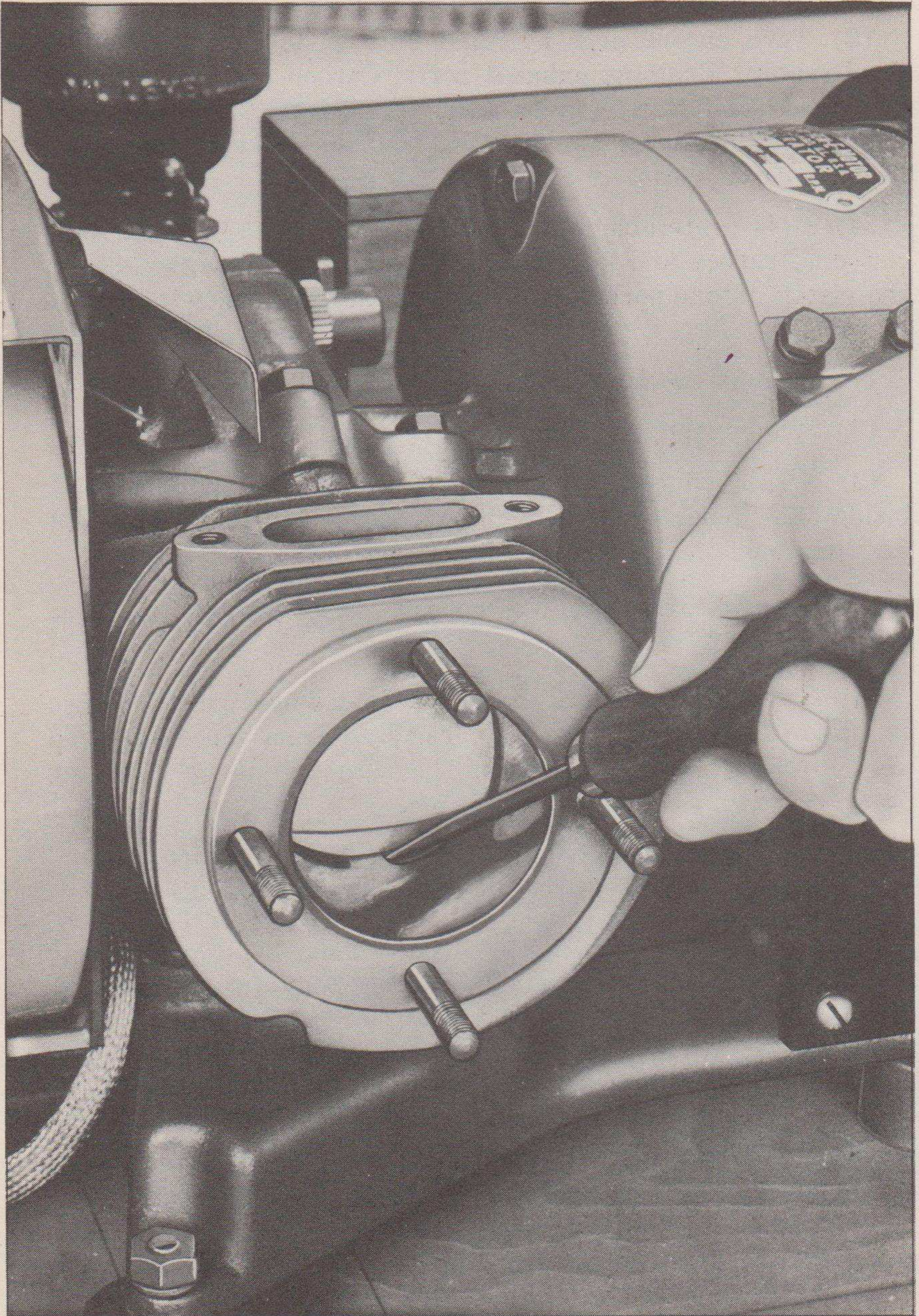


FIG. 15. CARBON REMOVAL—INTAKE PORTS

(3) Damaged or dirty spark plug: Remove the spark plug. Lay it on the engine with high tension wire (45) connected and spin engine to check spark. If no spark occurs at the points, clean out plug or replace it with a new one. The spark plug points should be gapped to .035".

(4) Weak or intermittent spark: A weak spark is generally due to improper adjustment of the magneto points. Check point adjustment as directed in magneto adjustment instructions. (Para. 14, page 25.)

(5) Loose gasoline line connection: Fuel line packing nuts and all connections must be absolutely tight as an air leak will prevent a full charge of gasoline from entering the engine and will affect carburetion. Check all connections including fuel line shut-off. Periodically tighten all connections. Draw up packing nuts of fuel line and shut-off if necessary.

15. Generator.—

The generator of Power Unit PE-43-HK will require very little attention with the exception of replacement of the brush and spring assembly (125) (see Fig. 16, page 34) and occasional examination of the commutator to make sure there is a good electrical contact between it and the brushes. Oil, grease or dirt will affect the output of the generator and also cause sparking at the brushes. The generator may be inspected simply by removing the end cover (138) which is fastened to the generator frame by three machine screws (193).

a. To clean commutator.—The commutator can be cleaned by touching very lightly with a fine grain sandpaper or crocus cloth while the armature is rotating. (See Fig. 17, page 35.) Stop the unit and use a pen knife or similar instrument to remove oil, dust, or carbon from between the bars of commutator.

b. To replace brushes.—The brush and spring assembly can be taken out by removing lock wires holding brush and spring in holder. (See Fig. 16, page 34.) Disconnect brush pigtail from brush holder. To install brush and spring assembly reverse the above procedure, being careful that the brushes seat firmly against the commutator, and move freely in the holders. New brushes should be fitted to have 100 percent effective surface contacting the commutator. To obtain this it is necessary to sand the brushes. This is accomplished by cutting a strip of 00 or 000

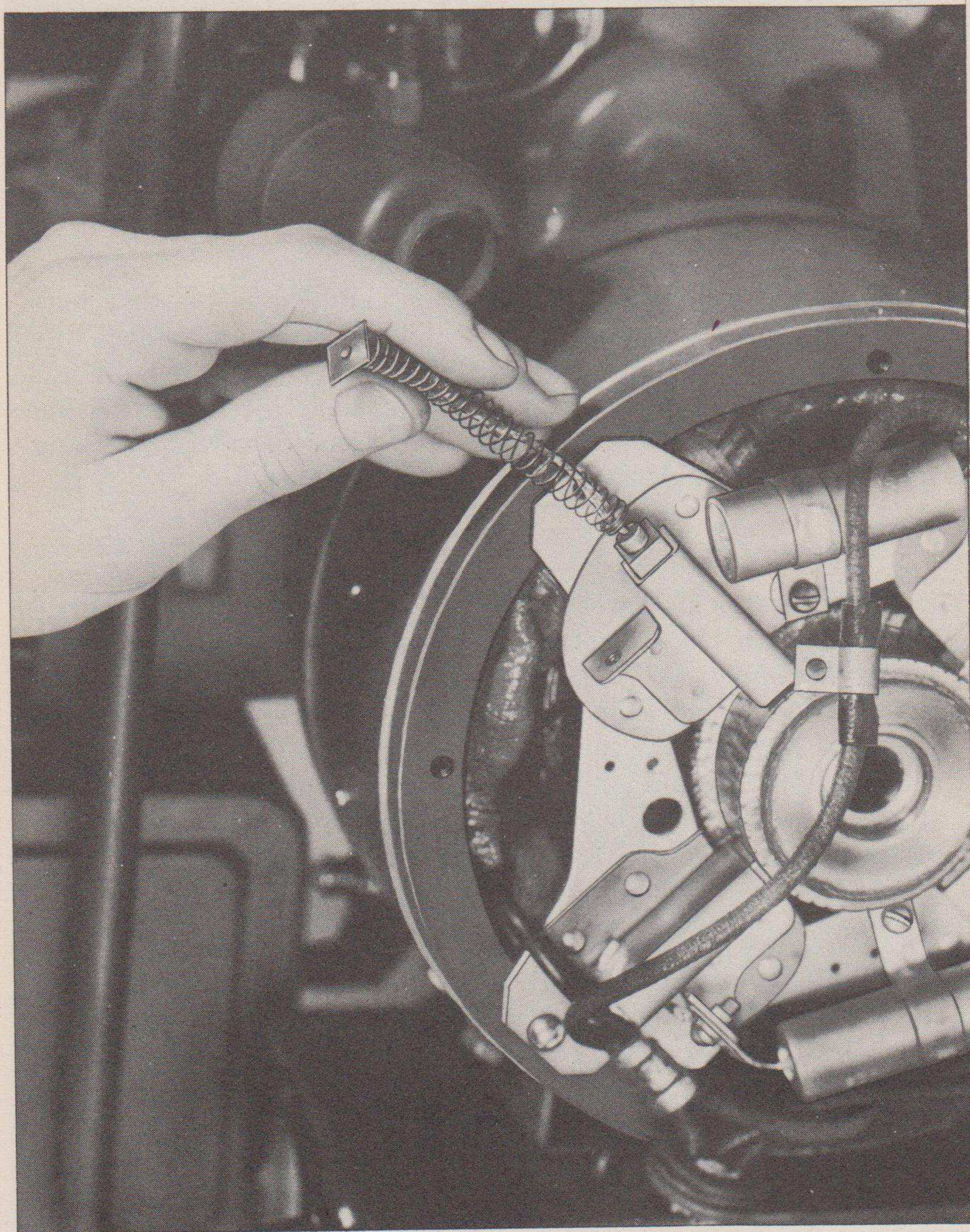


FIG. 16. BRUSH REMOVAL

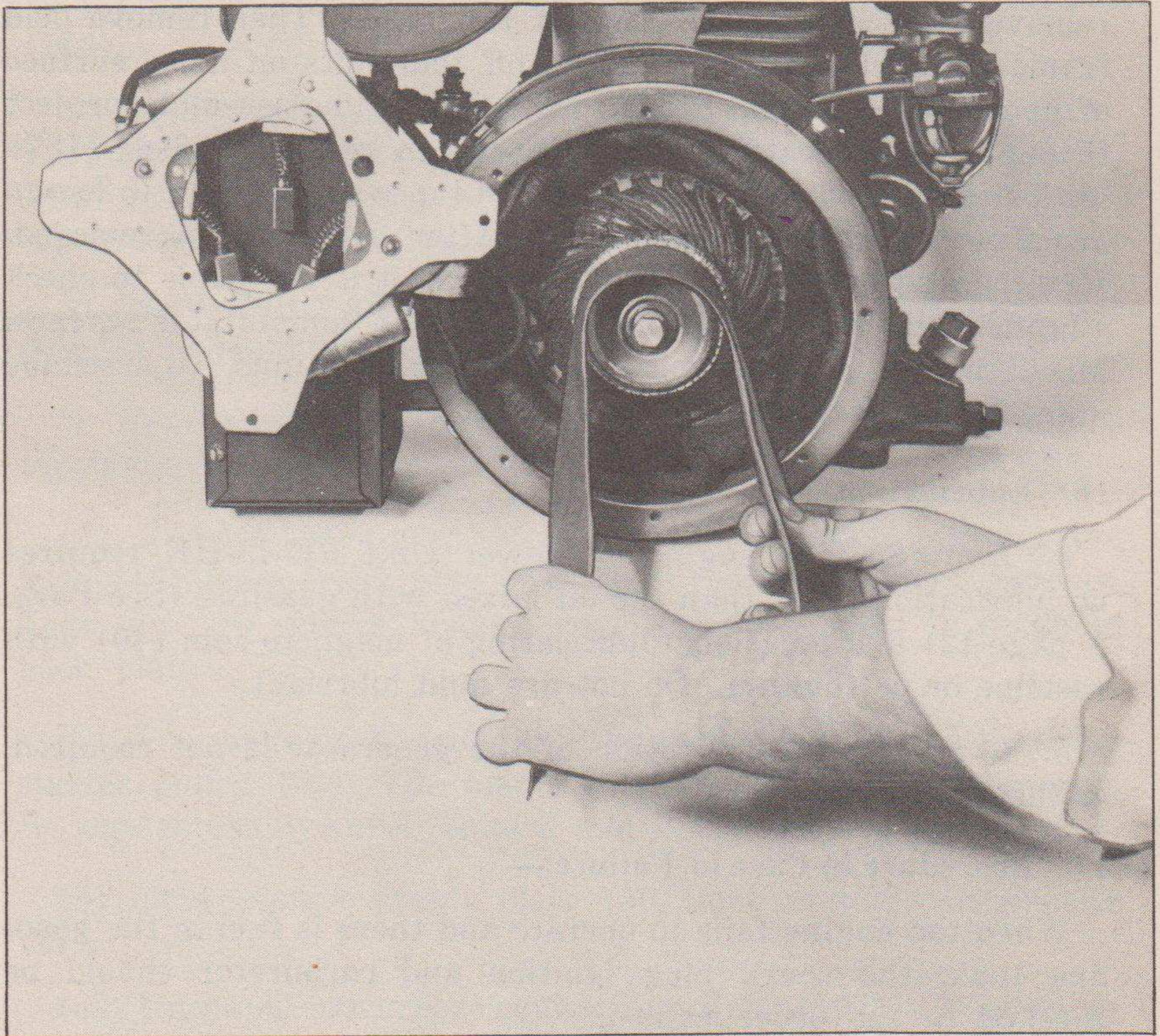


FIG. 17. DRESSING COMMUTATOR

sandpaper the exact width of the commutator. The strip is then wrapped around the commutator with the sanded side out, and the brushes are then dressed by turning the armature slowly in a clockwise direction (to the right). After dressing, be sure to blow carbon dust out of generator.

c. To remove armature.—To remove armature, take out screws holding end cover (138) in place. Remove housing. Loosen and remove cap screw (137). Tap off fan (136). Then remove field frame assembly (112) by taking off four nuts on inner surface of generator end bell. Studs in the field frame assembly project through the generator end bell. Screw in crankshaft bolt (137) until it is almost fully in place. Then tap with hammer to loosen armature from crankshaft (20). After armature is removed, serviced and reassembled to crankshaft, it is advisable to check alignment by using a dial indicator on the commutator surface. Misalignment must not exceed .0015 plus or minus. To assemble items removed, reverse above procedure.

16. Lubrication.—

a. Engine.—The engine of Power Unit PE-43-HK requires no lubrication other than the oil mixed with gasoline (See Para. 8, page 12) and occasional lubricating of magneto cam (40) with vaseline or petrolatum. Do not use fluid lubricant.

b. Generator.—Lubrication of the generator is not required, as there are no bearings.

17. Procedure in Case of Failure.—

When the engine fails to operate and there is fuel in the gasoline tank, the spark plug ignition and carburetor should be checked in the order named.

In locating engine trouble, replace the spark plug. If this does not correct the difficulty, leave it in place while checking further. Failure of the spark plug may be due to improper point gap or a cracked or dirty porcelain. Correct point gap is .035. Carbon or lead deposits on points will cause failure by shorting the spark plug.

Spark plugs are made in a variety of heat ranges to fit the requirements of different engines. For maximum operating efficiency it is important that the same type plug furnished with equipment (Champion J6) or equivalent be used.

18. Dismantling.—

a. Generator.—To disassemble the engine for major repairs it is first necessary to remove the generator. This is accomplished by removing generator end cover (138). Loosen and remove cap screw (137). Tap off fan (136). Next take out screws holding cover plate in position. Then remove field frame assembly (112) by taking off four nuts on inner surface of generator end bell (110).

Screw in crankshaft bolt (137) until it is almost fully in place. Then tap with hammer to loosen armature from crankshaft (20). After armature is removed take out four flat head screws holding end bell to engine crankcase. Tap off end bell.

In reassembling after engine is remounted the procedure just described should be reversed.

b. Engine.—With generator removed follow these directions for engine disassembly:

(1) Remove spark plug shield (1), then magneto high tension wire (45) from spark plug (5). Next remove muffler assembly. Take out two screws holding governor link guard to magneto back plate.

(2) The magneto housing (52) is next removed and then the starter pulley (53). The magneto rotor (49) is then removed. Be sure to use flywheel removal tool (142) for this operation.

(3) Next remove stator plate (50) and magneto back plate (27).

(4) Uncouple governor connecting link (107). Disconnect fuel line (69). Remove gas tank from mounting base. Take out four screws holding carburetor to crankcase and remove carburetor.

(5) Remove four nuts holding cylinder head in place. Remove head and gasket.

(6) Take out cap screws and crankcase mounting stud nut that holds crankcase to cylinder. Tap crankcase to separate from cylinder. Piston and crankshaft assembly can now be withdrawn from cylinder in one unit. If it is desired to remove engine cylinder from mounting base (63) take out cap screws holding cylinder in place.

(7) Should removal of cylinder mounting base from crate base be required, remove nuts (218) holding these parts together and lift cylinder base up to clear studs.

(8) In disassembling piston and connecting rod assembly from crankshaft, remove two screws (19) from connecting rod cap. The piston is removed from connecting rod by straightening out the bulge in cotter pin, then withdrawing pin. Tap piston pin from piston from either end.

When reinstalling piston in connecting rod a new cotter pin should be used. Be sure to spread the center of the cotter pin with a sharp V-shaped tool. The piston pin should be a tap fit in the piston. If the piston pin is loose, it will shear the cotter pin, which in turn will permit side movement of the piston pin to the extent it will contact and cut grooves in the cylinder wall. Should the connecting rod ever become loose on the crankshaft pin and require taking up, it will be necessary to file the bearing cap. The connecting rod cap should be fitted to the crankshaft, just tight enough so the piston and rod assembly will drop of its own weight when released from semi-vertical position.

In reassembling piston assembly to cylinder, be sure the hump or intake side of piston is on the same side as the intake port holes in the cylinder. This is the opposite side to that on which the muffler is attached. To break in new piston rings, the engine should be run at least one hour before applying any load.

Piston rings should make contact with the cylinder wall all around its circumference. If the ring end gap when piston rings are in the cylinder, exceeds .020" or if the rings are stuck in their respective grooves, they should be replaced. Before installing new rings be sure piston ring grooves are clean and free of carbon. End gap of new rings should be approximately .010". Side clearance in grooves for new rings should be .002" to .003".

While the engine is disassembled, all carbon and lead deposits should be removed from exhaust and intake ports, as well as from top of piston and the cylinder head. Be sure all gaskets are in good condition or replace them before unit is reassembled.

19. Assembly.—

In reassembling engine and generator, reverse the sequence described in the instructions covering disassembly of each one.

SECTION V**SUPPLEMENTARY DATA****20. List of Replaceable Parts.—****21. Names and addresses of Manufacturers.—**

20. TABLE OF REPLACEABLE PARTS

Ref. No.	S. C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
ENGINE GROUP						
See Fig. 18						
1		1	Spark Plug Shield Assembly	To Shield Radio Interference	A-2236	10
2		1	Spark Plug Shield Body		2587	10
3		1	Spark Plug Shield Cap		2559	10
4		1	Spark Plug Shield Cap Retainer		05237	10
5		2	Fillister Hd. Machine Screw	See Ref. #196	C-1616	10
6		2	Lockwasher	See Ref. #226	C-2530	10
7		1	Spark Plug	To provide Spark to Engine	05030	1
8		1	Radio Shielding Assembly	Eliminates Radio Interference	A-2211	10
9		1	Cylinder Head	Compressed Gas Vapor Chamber	2582	10
10		4	Cylinder Head Stud	Mounts Cylinder Head to Cylinder	03577-A	10
11		4	Cylinder Head Nuts	Mounts Cylinder Head to Cylinder	C-484	10
12		1	Cylinder Head Gasket	Seal for Cylinder Head and Cylinder	05530	10
13		1	Cylinder & Crankcase Assembly	Main Assembly	A-2157	10
14		1	Crankcase Mounting Stud	Mounts Crankcase Cover to Cylinder	05529	10
15		1	Crankcase Sealing Washer	Prevents Leakage from Crankcase	05546	10
16		1	Pipe Adapter	Extension for Crankcase Draincock	05477	10
17		1	Crankcase Drain Assembly	To Drain Crankcase	A-2223	10
		1	Piston Assembly	Compresses Gas Vapor	A-2255	10
		3	Piston Rings	Seals Compression of Vapor	2086-A	10
		1	Piston Pin	Connection between Crankshaft and Piston	05342	10
		1	Cotter Pin	See Ref. #247	C-2400	10
		1	Connecting Rod Assembly	Connecting Arm Between Connecting Rod & Piston	A-2159	10

FIG. 18. POWER UNIT PE-43-HK PARTS DIAGRAM

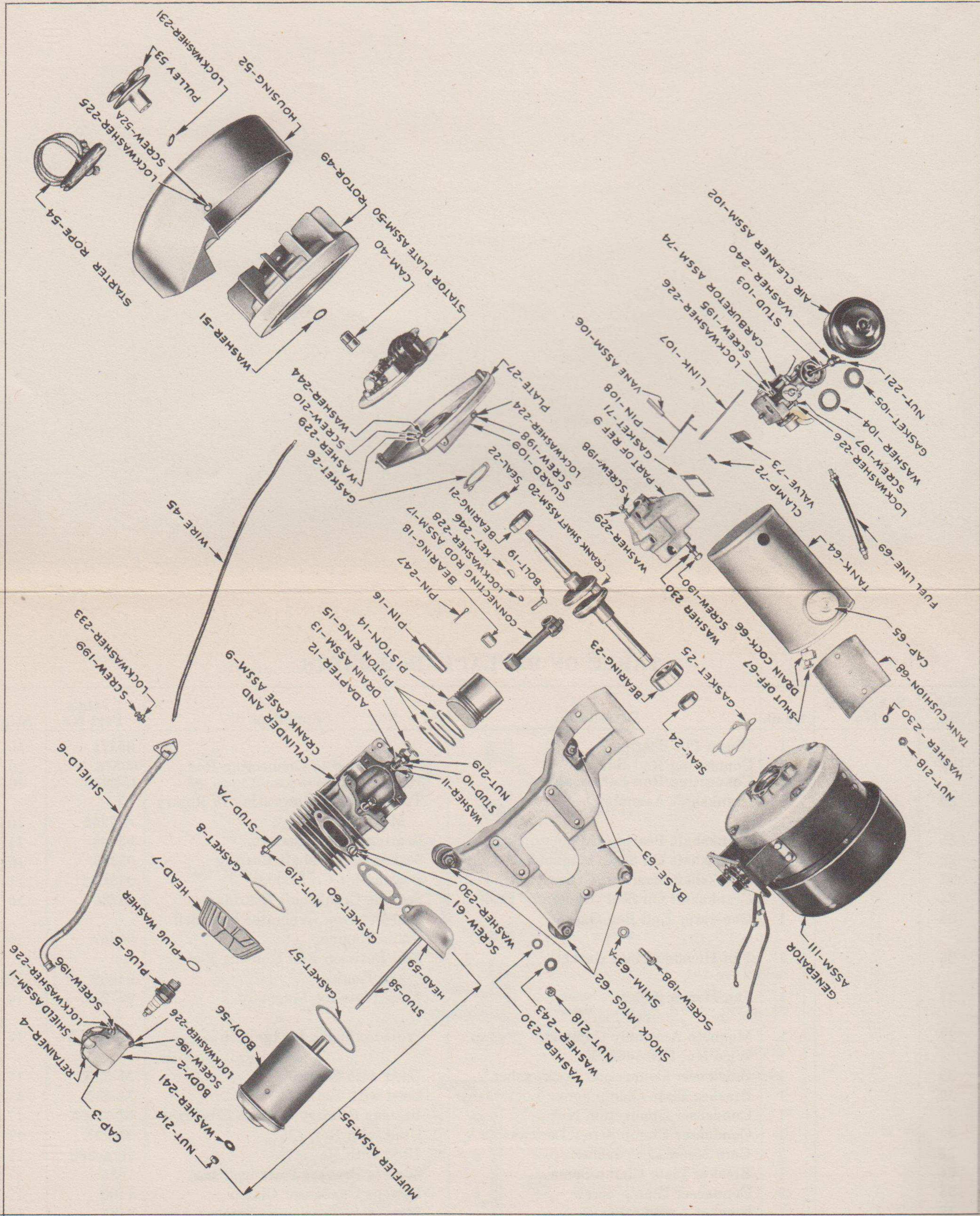


TABLE OF REPLACEABLE PARTS

Ref. No.	S. C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
18		1	Piston Pin Bearing	Fastens Cap to Connecting Rod See Ref. #228 To convert Reciprocating to Rotary Motion	05374	10
19		2	Connecting Rod Bolts		03576	10
		2	Connecting Rod Lockwasher		C-2480	10
20		1	Crankshaft Assembly		A-2202	10
21		1	Crankshaft Bearing (Magneto End)	Bearing for Crankshaft Seal for Crankshaft Bearing Bearing for Crankshaft Seal for Crankshaft Bearing Seal Between Generator End Bell and Engine	03566	11
22		1	Crankshaft Oil Seal (Magneto End)		05439	10
23		1	Crankshaft Bearing (Generator End)		05513	11
24		1	Crankshaft Oil Seal (Generator End)		04736	10
25		1	Generator End Bell Gasket		05357	10
26		1	Fan Housing Plate Gasket	Seal Between Fan Housing Plate and Engine Back Plate for Magneto	04059	10
27		1	Fan Housing Plate		2272-A	10
28		1	Magneto Assembly Complete Wico No. FW 1662-B	Provides Spark for Ignition	A-1335-A	17
29		1	Condenser Connection Lockwasher	Used with Ref. #31 Used with Ref. #34	M-52X	17
30		1	Breaker Plate Clamp Screw Lockwasher		M-58X	17
31		1	Condenser Connection Nut	Fastens Primary Wire to Condenser Used with Ref. #35 Used with Ref. #39	M-71XA	17
32		1	Condenser Clamp Screw Lockwasher		M-90X	17
33		2	Core Screw Lockwasher	Secures Breaker Plate in Place Fastens Condenser Clamp	iKA-362	17
34		1	Breaker Plate Clamp Screw		1085	17
35		2	Condenser Clamp Screw	Maintains Tension to Breaker Arm Mounts Fixed Contact & Breaker Arm Spring	1100	17
36		1	Breaker Arm Spring		2145	17
37		1	Breaker Plate Group		X2146	17

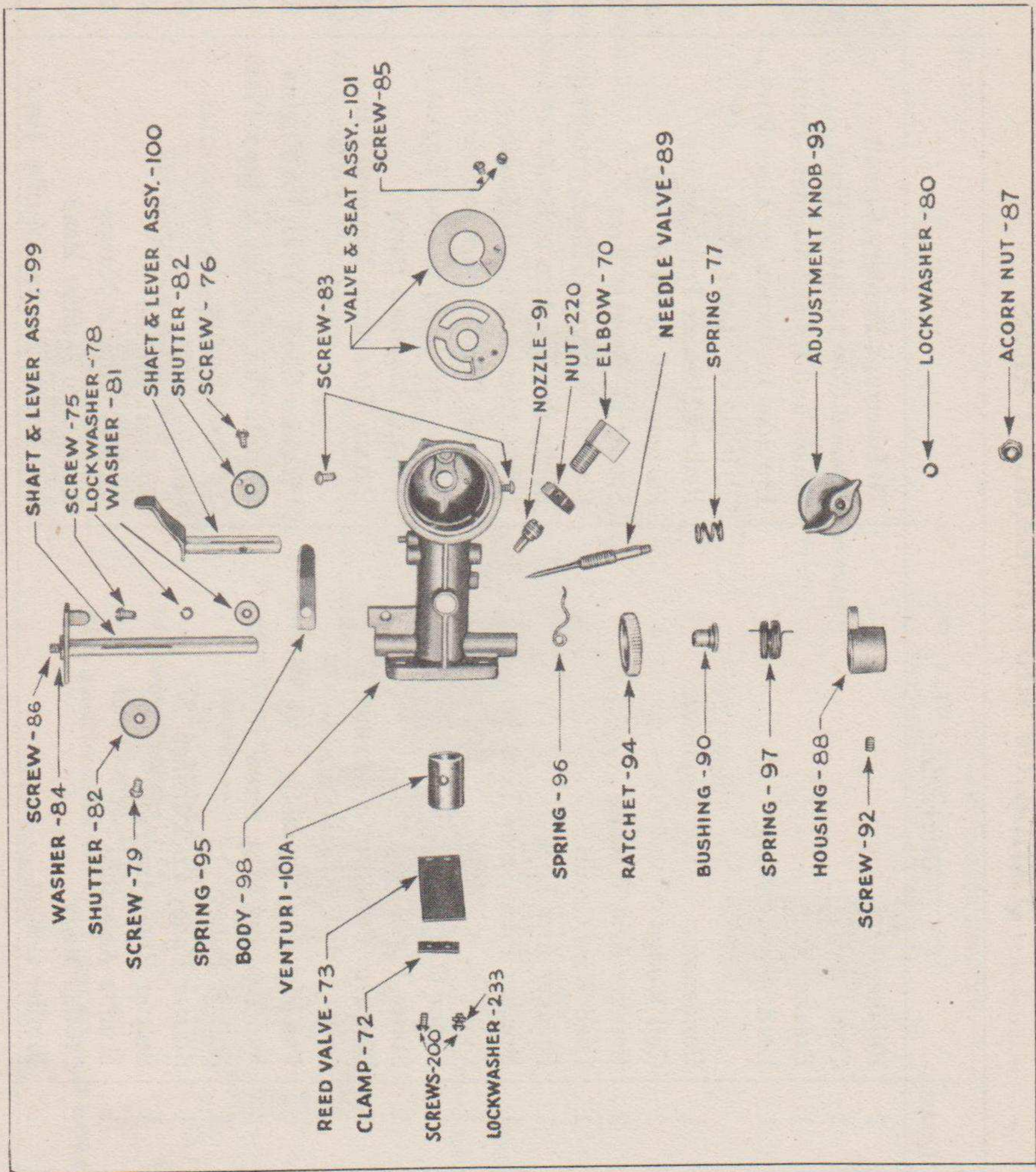


FIG. 19. CARBURETOR PARTS

TABLE OF REPLACEABLE PARTS

Ref. No.	S. C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
38		1	Breaker Arm	To Interrupt Primary Circuit	X2151	17
39		2	Core Screw	Mounts Core to Stator Plate	2157	17
40		1	Breaker Cam	Makes and Breaks Magneto Points	2176B	17
41		1	Lead Wire Bushing	Provides Insulation for Lead Wire		
				Group on Stator Plate	2179	17
42		1	Condenser	Reduce Breaker Point Arcing	X2186	17
43		2	Coil Wedge	Fastens Coil to Field	2264A	17
44		2	Breaker Arm Washer	Spacer for Breaker Arm	2357	17
45		1	Lead Wire Group	Conduct Electrical Energy to Plug	X3377	17
46		1	Breaker Arm Lock	Locks Breaker Arm to Shaft	4585	17
47		1	Breaker Plate Screw	Locks Breaker Plate to Stator	4589	17
48		1	Coil	Induces High Voltage to Spark Plug	X4943	17
49		1	Rotor (7 ³ / ₄ ")	Creates Air Blast to Cool Engine	Y5093	17
50		1	Stator Plate Unit	Mounts Magneto Parts	X5095	17
51		1	Magneto Cam Spring Washer	Retain Tension to Magneto Cam	03950	10
			See Fig. 18			
52		1	Fan Housing Assembly	Provides Cooling Draft for Engine	A1409-C	10
52A		3	Fan Housing Mtg. Screw	Mounts Fan Housing to Back Plate	04260	10
53		1	Starter Pulley	To Start Engine	2591	10
				See Ref. #231	C2483	10
54		1	Starter Pulley Lockwasher	To Start Engine	A2170	10
55		1	Starter Rope Assembly	Muffles Exhaust Noises	A2160	10
56		1	Muffler Assembly	Mounts to Muffler Head	05345-A	10
57		1	Muffler Body	Seal for Muffler and Muffler Head	05344	10

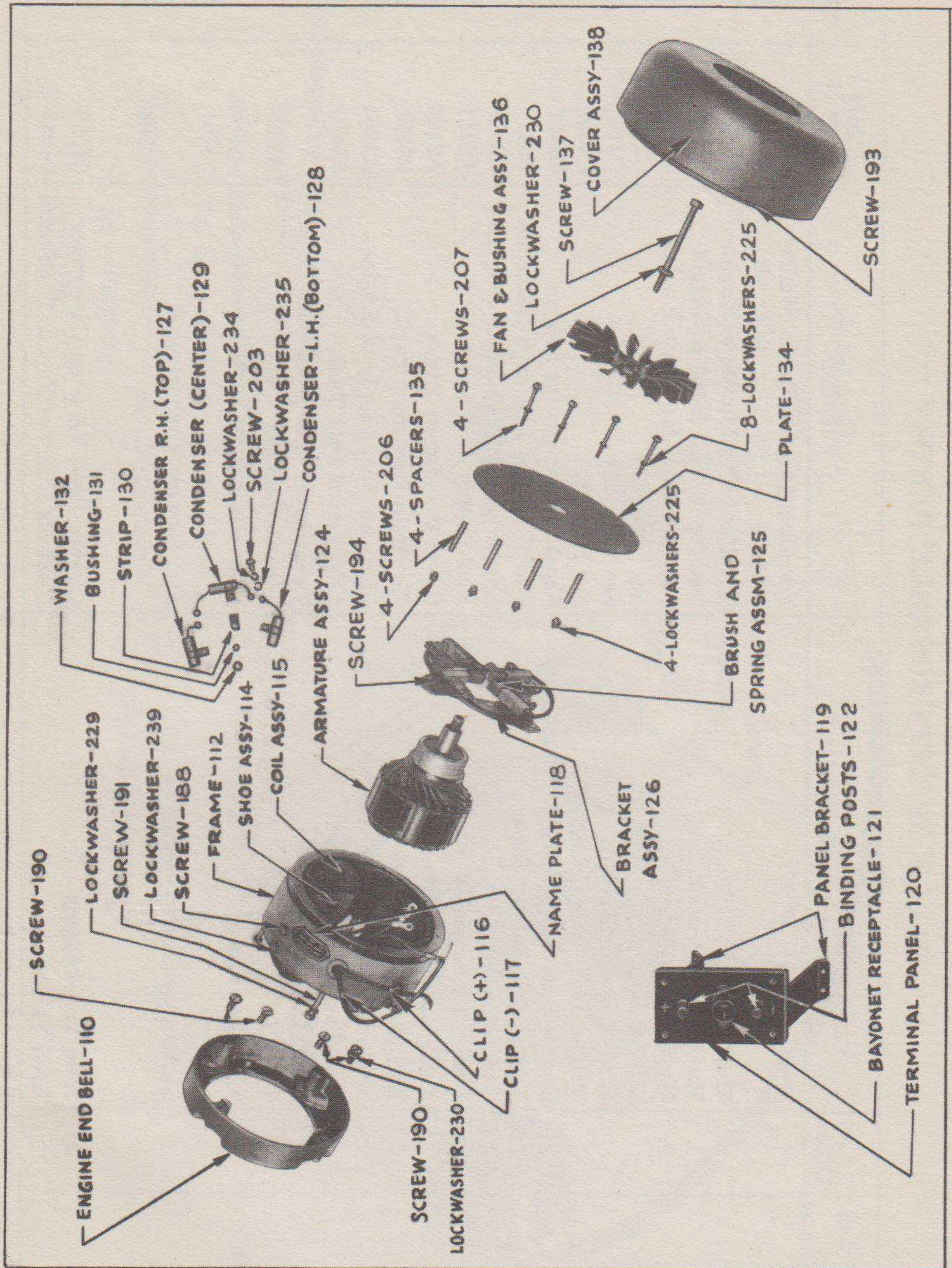


FIG. 20. GENERATOR ASSEMBLY

TABLE OF REPLACEABLE PARTS

Ref. No.	S. C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
58		1	Muffler Stud	For Mounting Muffler to Muffler Head	05343	10
59		1	Muffler Head	For Mounting Muffler to Engine	2585	10
60		1	Muffler Mtg. Gasket	Seal for Muffler Head & Engine	03579	10
61		2	Muffler Mtg. Screw	For Mounting Muffler to Engine	05495	10
			Muffler Mtg. Screw Washer	See Ref. #230	C2496	10
			Muffler Body Mtg. Nut	See Ref. #214	C470	10
			Muffler Body Mtg. Washer	See Ref. #241	C4402	10
62		1	Engine Base Rubber Shock Mountings	Shock Mountings for Engine	05347	10
63		4	Engine & Generator Base	For Mounting Engine & Generator	2586	10
63A		1	Generator Shim	Spacer between Generator and Base	05346	10
64		1	Fuel Tank Assembly	Fuel Supply for Engine	A2161	10
65		1	Fuel Tank Filler Cap Assembly	Cover Opening in Tank	A2162	10
66		1	Fuel Tank Drain Cock	To Drain Fuel from Tank	05459	10
67		1	Shutoff Valve & Screen Assembly	Shuts off Fuel Supply to Engine	A2254	10
68		1	Fuel Tank Cushion Strip	Cushion for Fuel Tank	05476	10
69		1	Fuel Line Assembly	Fuel Supply Line from Fuel Tank to Carburetor	A2201	10
70		1	Fuel Line Elbow	Connection from Carburetor to Fuel Line	2515	10
71		1	Carburetor Gasket	Seal between Carburetor & Crankcase Cover	04060	10
72		1	Reed Valve Clamp	Clamps Reed Valve on Carburetor	04050	10
73		1	Reed Valve	Controls Entry of Fuel to Crankcase	04049-A	10

See Fig. 19

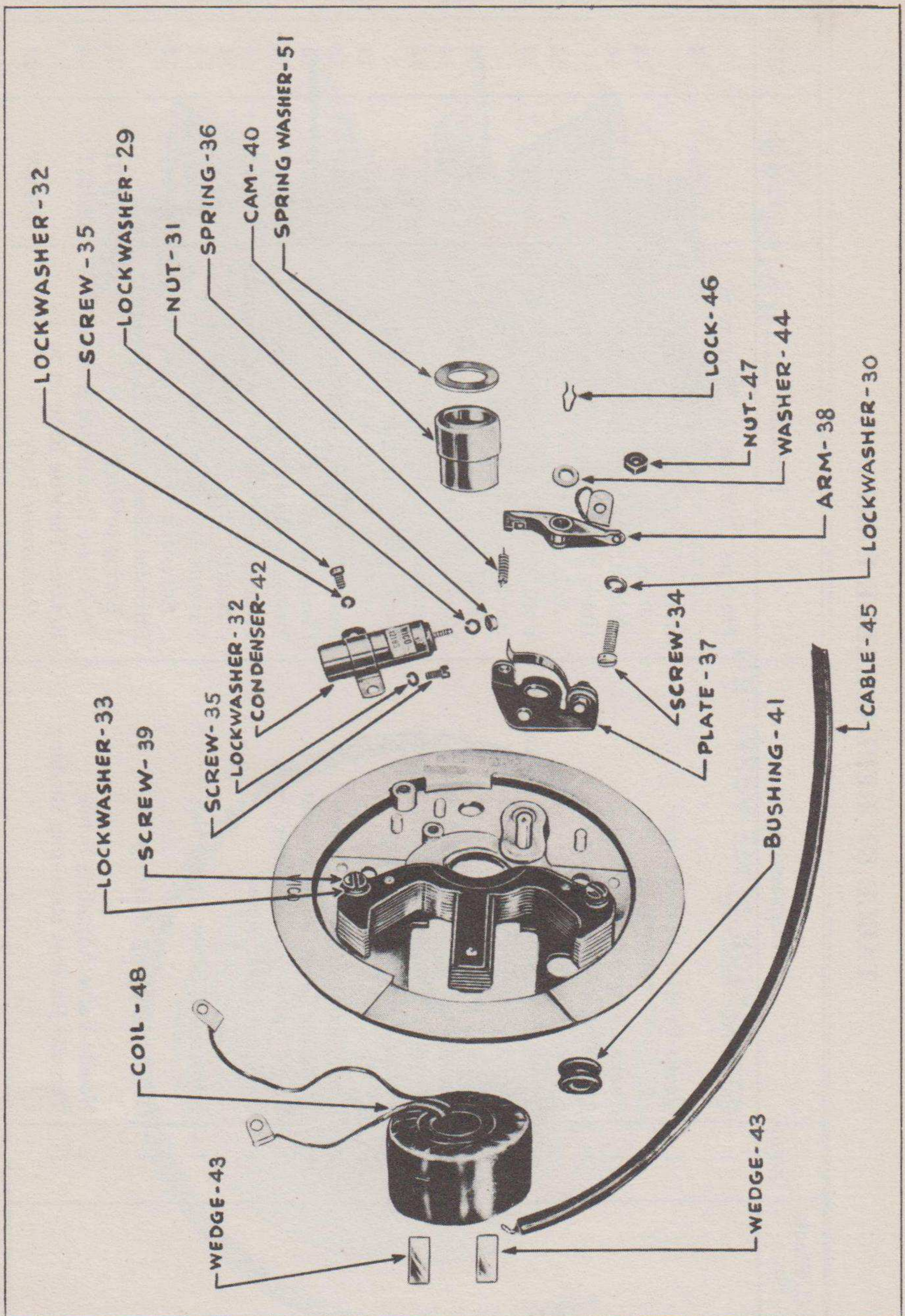


FIG. 21. MAGNETO STATOR PLATE ASSEMBLY

TABLE OF REPLACEABLE PARTS

Ref. No.	S. C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
74		1	Carburetor Assembly	Provides Combustible Mixture of Gas and Air to Engine	A-1999-A	14
75		1	Choke Friction Spring Screw	Holds Choke Friction Spring in Place	056T	14
76		1	Choke Shutter Screw	Holds Choke Shutter to Shaft	0120T	14
77		1	Adjustment Screw Spring	Holds Needle Valve in Proper Adjustment	0737T	14
78		1	Choke Friction Spring Screw Lockwasher	Used with Ref. #76	0992T	14
79		1	Throttle Shutter Screw	Holds Throttle Shutter to Throttle Shaft	01462T	14
80		2	Lockwasher for 06953T & 06804T	Used with Ref. #86 & #89	01675T	14
81		1	Choke Friction Spring Screw Washer	Retains Friction Spring	04920T	14
82		2	Throttle & Choke Shutter	Facilitates starting & Controls Flow of Air to Engine	05200T	14
83		2	Check Valve Retaining Screw	Holds Check Valve in Place	05204T	14
84		1	Governor Lever Screw Washer	Used with Ref. #87	05413T	14
85		2	Check Valve Seat Retainer Screw	Fastens Check Valve to Seat	06303T	14
86		1	Governor Lever Screw	Fastens Governor Lever to Throttle Shaft	06804T	14
87		1	Adjustment Screw Acorn Nut	Fastens Adjustment Knob to Adjusting Screw	06924T	14
88		1	Governor Spring Housing	Provides Means to Hold Governor Spring to Shaft	06945T	14
89		1	Needle Valve Adjusting Screw	To Adjust Carburetor Setting	06953T	14
90		1	Throttle Ratchet Retaining Bushing	Retains Throttle Ratchet to Carburetor Body	06956T	14

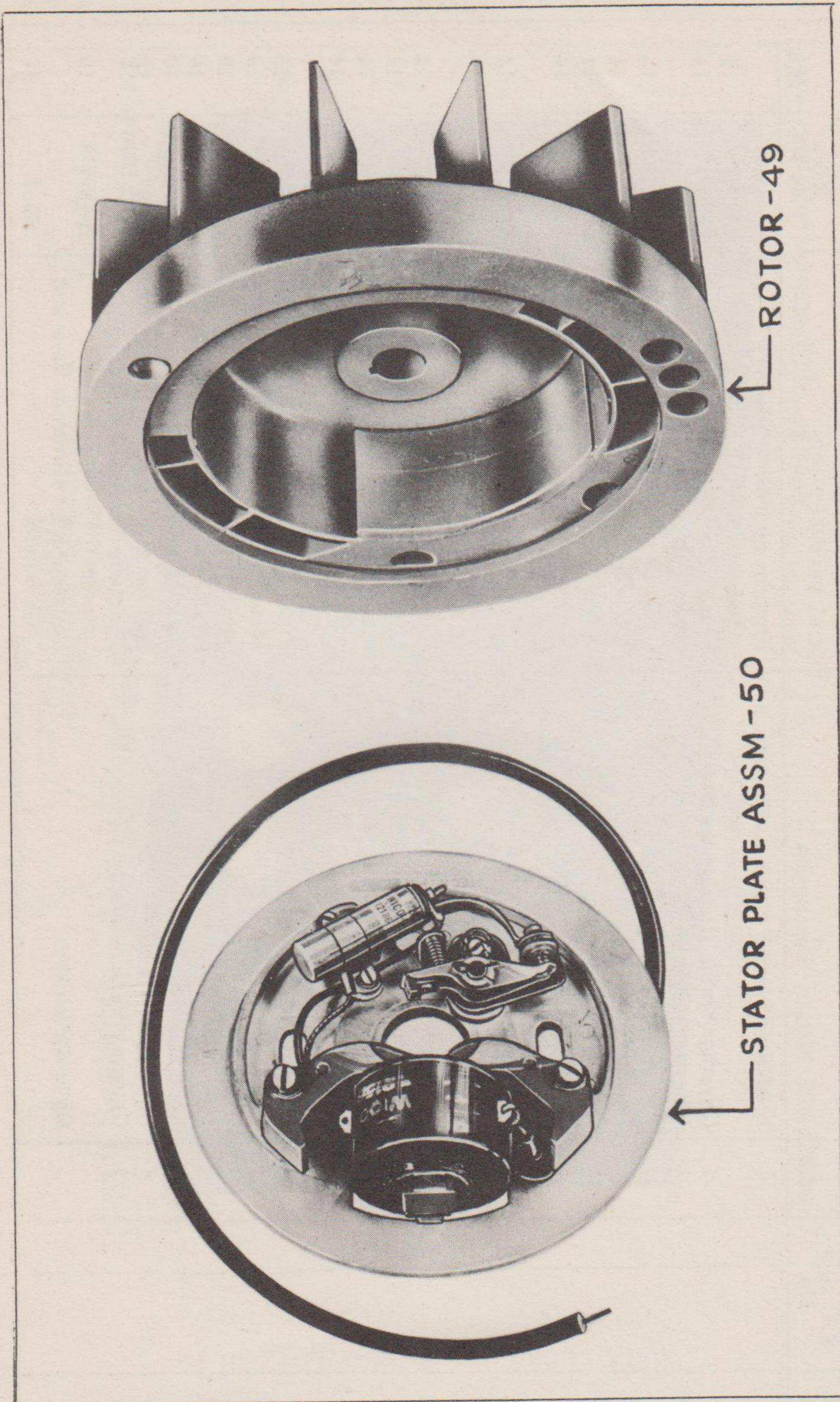


FIG. 22. MAGNETO ASSEMBLY

TABLE OF REPLACEABLE PARTS

Ref. No.	S. C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
91		1	Nozzle	Provides Seat for Adjusting Needle Valve	06966T	14
92		1	Governor Spring Housing Set Screw	Fastens Governor Housing to Shaft	06969T	14
93		1	Adjustment Screw Knob	Used for Hand Adjustment of Needle Valve	07360T	14
94		1	Throttle Ratchet	Provides Adjustment for Speed	07362T	14
95		1	Choke Friction Spring	Holds Choke in Position	07365T	14
96		1	Throttle Ratchet Spring	Maintains Speed Adjustment	07366T	14
97		1	Governor Spring	Balance Air Pressure in Governor Vane	07367T	14
98		1	Body (only)	Carburetor Parts Mount to Same	07368T	14
99		1	Throttle Shaft and Governor Lever Assembly	Mounts Throttle Shutter and Governor Shaft	07386T	14
100		1	Choke Shaft and Lever Assembly	Mounts Choke Shutter	07387T	14
101		1	Check Valve and Seat Assembly	Meters Air to Carburetor	07388T	14
101A		1	Venturi	Aids in Proper Mixture of Fuel	07425T	14
102		1	Air Cleaner Assembly	Filters Air to Carburetor	A1364	15
103		1	Air Cleaner Stud Washer	Mounts Air Cleaner to Carburetor	04061-A	10
104		1	Air Cleaner Retainer Washer	See Ref. #240	C4401	10
105		1	Air Cleaner Gasket	See Ref. #221	C587	10
106		1	Governor Vane Assembly	Base for Sealing Washer	04379-A	10
107		1	Governor Link	Seal for Air Cleaner to Carburetor Maintains Predetermined Engine Speed Connection for Governor Vane and Carburetor	04367 A-1697-A 05081	10 10 10

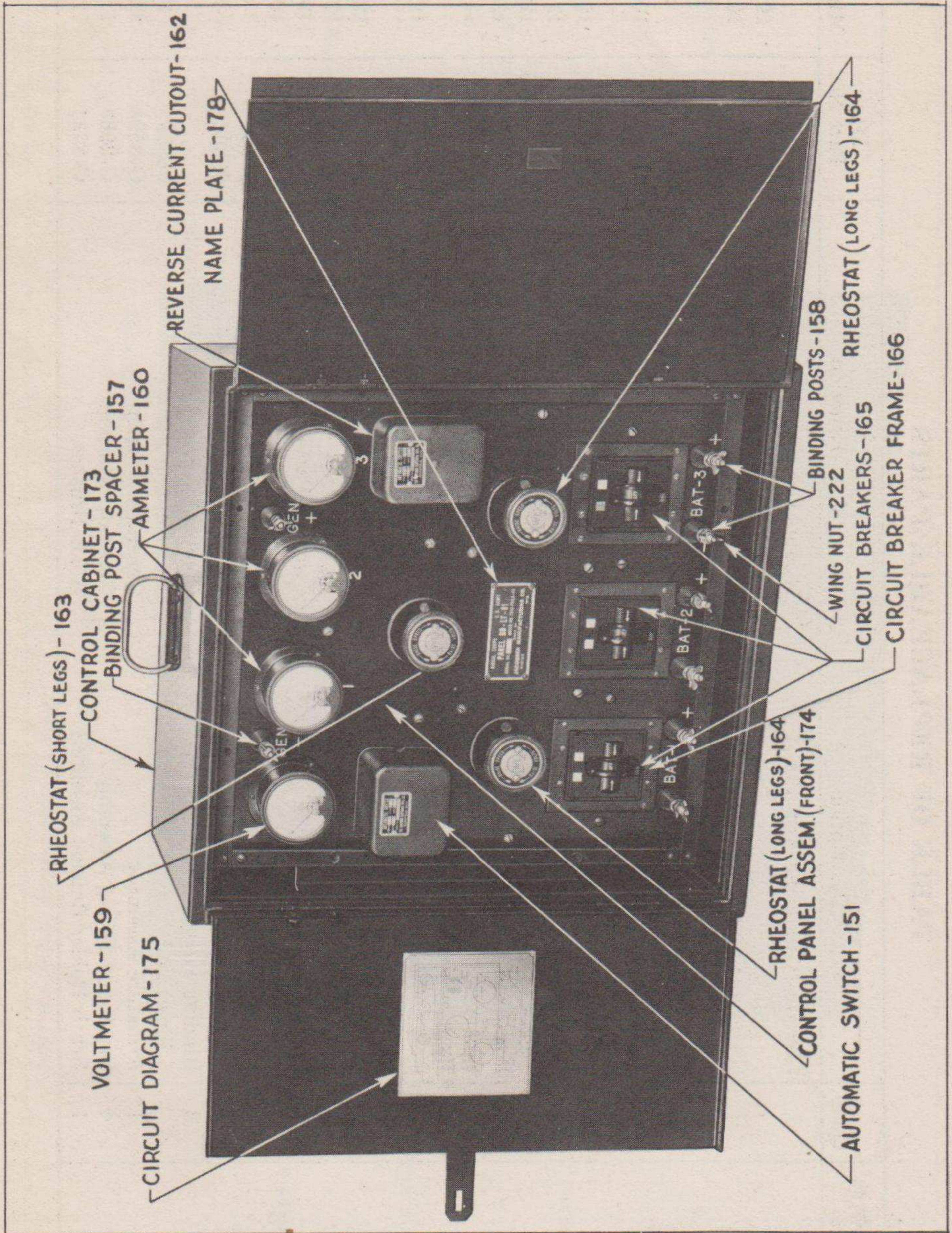


FIG. 23. PANEL BOARD FRONT VIEW

TABLE OF REPLACEABLE PARTS

Ref. No.	S. C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
108		1	Governor Mounting Arm Pin	Mounts Governor Vane to Magneto Back Plate	04455	10
109		1	Governor Link Guard	To Protect Governor Link	05267	10
			GENERATOR GROUP			
			See Fig. 20			
110		1	Generator End Bell	Mounts Generator to Engine	2588	10
111		1	Generator Complete	Provides Current for Battery Charging		
112		1	Field Frame	Holds Generator Parts	G-3594	12
113		4	Field Shim—Not Illustrated	Spacer for Pole Shoe Assembly	P-5746	12
114		4	Pole Shoe Assembly	Hold Field Coils	SMA-6175	12
115		1	Coil Assembly	Generates Current	G-1610	12
116		1	Polarity Clip (Positive)	Identification for Generator	G-3599	12
117		1	Polarity Clip (Negative)	Wire Connection	P-1762	12
118		1	Name Plate	Identification for Generator	P-1763	12
119		2	Panel Bracket Assembly	Wire Connection	05355	12
120		1	Terminal Panel Assembly	Supports Panel	A-2167	10
121		1	Bayonet Receptacle	Receptacle for Power Cord	A-2168	10
122		2	Binding Posts	Current Outlet (Female Section)	05363	8
123		2	Binding Post Conductor Strip—not illustrated	Connecting Posts to Generator	05364	3
124		1	Armature Assembly	Conducts Current from Receptacle to Binding Posts	05365	8
125		4	Brush and Spring Assembly	Generates Current	G-3596	12
126		1	Brush Holder Bracket Assembly	Generates Current	G-2963	12
				Holds Brushes	G-3731	12

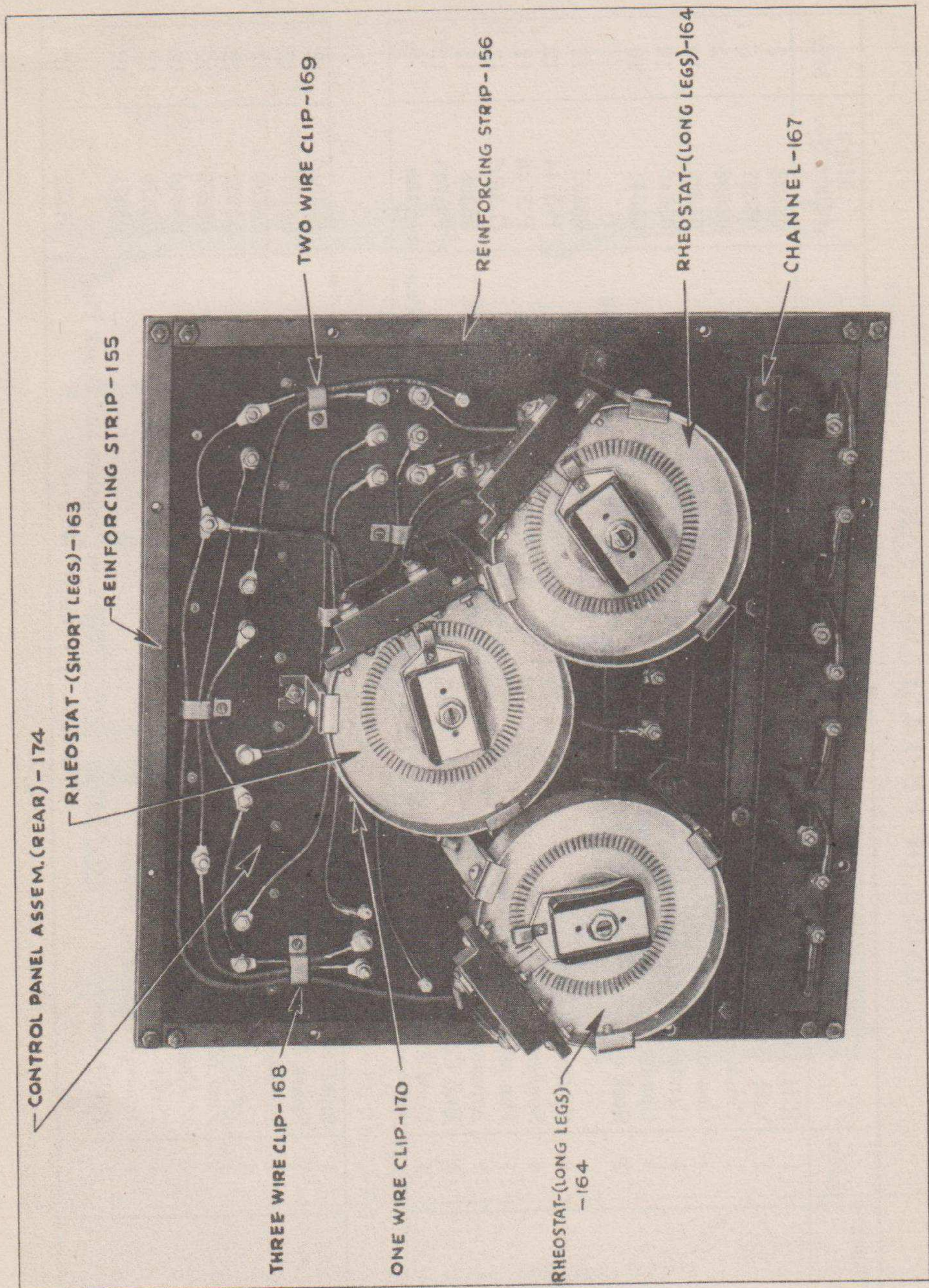


FIG. 24. PANEL BOARD REAR VIEW

TABLE OF REPLACEABLE PARTS

Ref. No.	S. C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
127		1	R.H. Condenser .5 MFD	Radio Filtering	05536	5
128		1	L.H. Condenser .5 MFD	Radio Filtering	05537	5
129		1	Condenser .1 MFD	Radio Filtering	05538	5
130		1	Condenser Insulating Strip	To Insulate Condenser	05539	10
131		1	Condenser Insulating Bushing	To Insulate Condenser	05540	10
132		1	Condenser Insulating Washer	To Insulate Condenser	05541	10
133		2	Stak on Terminals C-26	Connects Lead Wires to Binding Posts	05359	12
134		1	Cover Plate	Enclose Parts	P-5744	12
135		4	Spacers	Spaces Cover Plate	P-5745	12
136		1	Fan and Bushing Assembly	Cool Generator	G-3597	12
137		1	Armature Mounting Screw	Fastens Armature to Crankshaft	05358	12
138		1	End Cover Assembly	Enclose Parts	P-5743	12
139		1	Cord Assembly See Fig. 5	Power Line from Generator to Panel	A2169	2

TOOL GROUP

See Fig. 25

140		1	Small Screw Driver	To Remove Spark Plug	C-4830	12
141		1	Spark Plug Wrench	To Remove Spark Plug	05247	12
142		1	Flywheel Puller	To Remove Flywheel	05250	12
143		1	$\frac{7}{16}$ — $\frac{3}{8}$ " Open End Wrench	Mix Fuel	05252	12
144		1	Fuel Mixing Can 1 Qt. Size		05255	12
145		1	8" Crescent Wrench		05369	12
146		1	Pliers		05370	12
147		1	$\frac{1}{2}$ — $\frac{9}{16}$ " Open End Wrench		05371	12
148		1	Feeler Gauge Set	To gauge Magneto and Spark Plug Gaps	05372	12

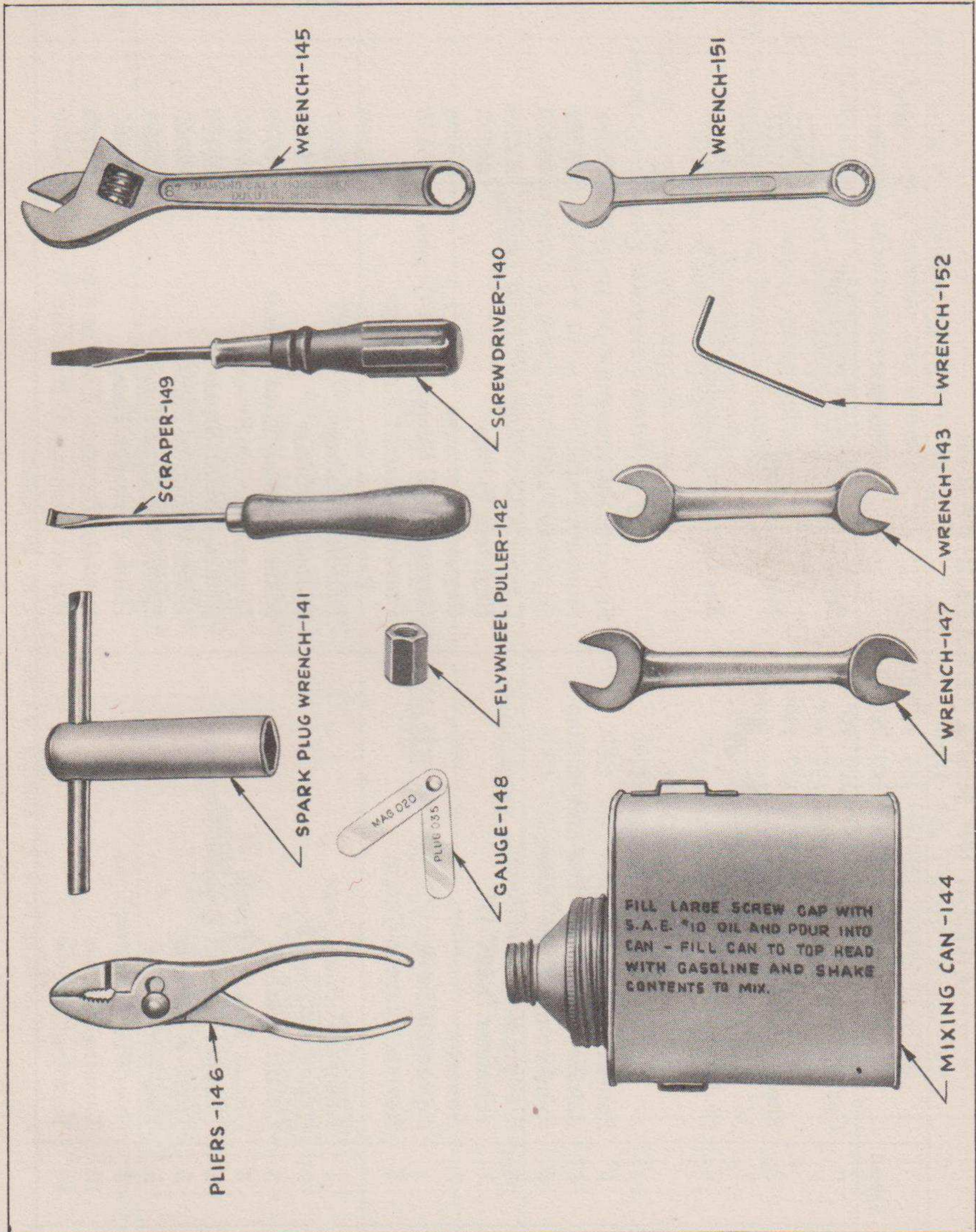


FIG. 25. TOOLS

TABLE OF REPLACEABLE PARTS

Ref. No.	S. C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
149		1	Carbon Scraper	Scrape Carbon from Ports and Piston	05373	12
150		2	Sheets Crocus Cloth 9 x 11"	Not illustrated	05375	12
151		1	1/2" Box and 1/2" Open End Wrench		05484	12
152		1	#8 Allen Wrench	For Governor Housing Set Screw	C5403	12
			PANEL GROUP See Fig. 23 and 24			
154		1	Panel Board Only	Supports Instruments	05388	13
155		4	Reinforcing Strips—Top and Bottom	Supports Panel	05389	13
156		4	Reinforcing Strips—Sides	Supports Panel	05390	13
158		8	Binding Post Stud Assm.	Connects Incoming and Load Leads	A2265	3
159		1	Voltmeter 0-50V-DC	Registers Voltage	05393	4
160		3	Ammeter	Registers Amperes	05394	4
161		1	Automatic Switch	Carries High Current from Generator	05395	6
162		1	Reverse Current Cutout	Prevents Current Flow from Battery to Set	05396	6
163		1	Rheostat—Short Legs	Indicates Voltage	05397	16
164		2	Rheostat—Long legs	Indicates Voltage	05398	16
165		3	Circuit Breakers	Make or Break Load Circuit	05399	7
166		3	Circuit Breaker Frame	Mounts Circuit Breaker	05400	13
167		1	Channel (Circuit Breaker Support)	Attach Circuit Breakers	05402	13
168		5	Three-Wire Clips	Holds Wiring to Panel	05403	13
169		5	Two-Wire Clips	Holds Wiring to Panel	05404	13
170		3	One-Wire Clip	Holds Wiring to Panel	05405	13
171		10	Terminal Sleeves	Insulate Terminal Ends and to	05429	13
172		44	Terminal Sleeves	Protect Fraying of Braid on Wiring	05430	13

TABLE OF REPLACEABLE PARTS

Ref. No.	S.C. Stock No.	Quan.	Description	Function	Mfg's Part No.	Mfg.
173.		1	Control Cabinet	Encloses Panel Supports all Instruments Wiring Diagram	A-2180	9
174		1	Control Panel Complete		A-2181	13
175		1	Panel BD-61 Circuit Diagram See Fig. 31		05482	10
176		1	Carrying Crate Base	Mounts Power Unit Cover for Power Unit Identification of Panel Board	A-2171	9
177		1	Carrying Crate Top		A-2172	9
178		1	Name Plate		05401	13

TABLE OF NUTS, SCREWS, WASHERS, & PINS

Ref. No.	Quan.	Size	Lgth.	Thread	Description	Function
187	8	1/4	1 1/4	20	Screw, Hex. Hd. Cap	Mounts Panel to Panel Box
188	8	1/4	1 1/8	28	Screw, Hex. Hd. Cap	Mounts Field Assembly to Shell
189	4	5/16	7/8	18	Screw, Hex. Hd. Cap	Mounts engine to Base
190	9	5/16	1 1/4	18	Screw, Hex. Hd. Cap	5 Mounts Crankcase Cover to Cylinder
191	4	1/4	1 1/2	28	Screw, Hex. Hd. Cap	4 Mounts Generator End Bell to Engine
192	1	3/8	1 1/4	24	Screw, Hex. Hd. Cap	Mounts Generator to End Bell
193	3	#8	5/16	32	Screw, Fillister Hd. Mach.	Supports Generator on Base
194	4	#10	1/4	32	Screw, Fillister Hd. Mach.	Mounts Spinning Cover Assembly to Shell
195	3	#12	5/8	24	Screw, Fillister Hd. Mach.	Mounts Brush Holder to Bracket
196	2	#12	7/8	24	Screw, Fillister Hd. Mach.	Mounts Carburetor to Engine
197	1	#12	1	24	Screw, Fillister Hd. Mach.	Mounts Spark Plug Shield to Spark Plug
198	2	1/4	3/4	20	Screw, Fillister Hd. Mach.	Mounts Carburetor to Engine
199	2	#4	1/4	40	Screw, Rd. Hd. Mach.	Mounts Fan Housing Plate to Engine Mounts Radio Shielding to Back Plate

TABLE OF NUTS, SCREWS, WASHERS, & PINS

Ref. No.	Quan.	Size	Length	Thread	Description	Function
200	2	#6	1/4	32	Screw, Rd. Hd. Mach.	Mounts Reed Valve to Carburetor
201	2	#6	3/8	32	Screw, Rd. Hd. Mach.	Mounts Receptacle to Terminal Panel
202	1	#8	3/16	32	Screw, Rd. Hd. Mach.	Mounts Governor Link Guard to Back Plate
203	3	#8	1/4	32	Screw, Rd. Hd. Mach.	Mounts Condenser to Generator Brush Plate
204	12	#8	5/16	32	Screw, Rd. Hd. Mach.	Mounts Frame to Circuit Breaker
205	12	#8	7/8	32	Screw, Rd. Hd. Mach.	Mounts Frame to Panel
206	8	#10	3/8	32	Screw, Rd. Hd. Mach.	4 Mounts Brush Holder Bracket to Generator Shell
207	4	#10	2	32	Screw, Rd. Hd. Mach.	4 Mounts Terminal Panel to Mtg. Bracket
208	8	1/4	1 1/8	20	Screw, Rd. Hd. Mach.	Mounts Cover Plate to Generator Stator
209	4	1/4	3 1/2	20	Screw, Rd. Hd. Mach.	Mounts Reinforcing Strip to Panel
210	3	1/4	1/2	20	Screw, Rd. Hd. Cap	Mounts Frame to Panel
211	13	#8	3/8		Type "Z" Binder Head P-K Drive Screw	1 Plug for Carburetor 2 Mounts Magneto to F. H. Plate
212	12	#8		32	Nut, Hex. Steel 1/8 thick	Mounts Clips to hold Wiring on Panel
213	4	#10		32	Nut, Hex. Brass 1/8 thick	Mounts Frame to Panel
214	1	1/4		20	Nut, Hex. Brass	Mounts Binding Post Conductor Strip
215	16	1/4		20	Nut, Hex. Steel	Mounts Muffler Body to Muffler Head 8 Mounts Channel Iron to Panel
216	8	1/4		20	Nut, Hex. Brass 7/32" thick	8 Mounts Reinforcing Strip to Panel
217	16	1/4		20	Nut, Hex. Brass 1/8" thick	Mounts to Binding Post Mounts to Binding Posts
218	10	5/16		18	Nut, Hex. Steel	8 Mounts Rubber Shock Mtg. to Engine Base 2 Mounts Fuel Tank to Engine Base
219	5	5/16		24	Nut, Hex. Steel	4 Mounts Cylinder Head to Cylinder 1 Mounts Crankcase Cover to Cylinder

TABLE OF NUTS, SCREWS, WASHERS, & PINS

Ref. No.	Quan.	Size	Lgth.	Thread	Description	Function
220	1	5/16		24	Nut, Hex. Jam Steel	Mounts Fuel Line Elbow to Carburetor
221	1	12		24	Nut, Wing Steel	Mounts Air Cleaner to Carburetor
222	8	1/4		20	Nut, Parker-Kalon Brass Wing	Mounts Terminals to Binding Posts
223	2	#4			Lockwasher Light Section Split Type	Mounts Radio Shielding to Magneto Back Plate
224	1	#8			Lockwasher Light Section Split Type	Mounts Governor Link Guard to Back Plate
225	15	#10			Lockwasher Std. Section Split Type	Mounts Fan Housing to Back Plate
226	6	#12			Lockwasher, Light Section Split Type	Mounts Cover Plate to Generator Stator
227	8	1/4			Lockwasher, Heavy Section Split Type	Mounts Brush Holder Bracket Assembly to Shell
228	2	1/4			Lockwasher, Light Section Split Type	Mounts Carburetor to Crankcase
229	8	1/4			Lockwasher, Std. Section Split Type	Mounts Spark Plug Shield to Spark Plug
230	21	5/16			Lockwasher, Std. Section Split Type	Mounts Control Panel to Panel Box
231	1	7/16			Lockwasher, Light Section Split Type	Mounts Connecting Rod and Cap
232	1	3/8			Lockwasher, Std. Section Split Type	Mounts Fan Housing Plate to Engine
233	6	#6			Lockwasher, Type 12 Internal Shakeproof	Mounts Magneto to Fan Housing Plate
						Mounts Generator to End Bell
						Mounts Crankcase Cover to Cylinder
						Mounts Generator End Bell to Engine
						Mounts Engine to Base
						Mounts Rubber Shock Mountings to Base
						Mounts Fuel Tank to Base
						Mounts Muffler to Engine
						Mounts Pulley to Crankshaft
						Mounts Generator to Base
						Mounts Name Plate to Panel
						Mounts Reed Valve to Carburetor

TABLE OF NUTS, SCREWS, WASHERS, & PINS

Ref. No.	Quan.	Size	Length	Thread	Description	Function
234	28	#8			Lockwasher, Type 12, Internal Shakeproof	12 Mounts Frame to Circuit Breaker 12 Mounts Frame to Panel 2 Mounts Condenser to Brush Back Plate
235	2	#8			Lockwasher, Type 11 External Shakeproof	Mounts Condenser to Brush Back Plate
236	2	#10			Lockwasher, Type 12 Bronze Internal Shakeproof	Mounts Binding Post Conductor Strip to Terminal Panel
237	12	#14			Lockwasher, Type 14 Shakeproof	8 Mounts Reinforcing Strip to Panel 4 Mounts Channel Iron to Circuit Breaker Support
238	32	#14			Lockwasher, Type 19 Shakeproof Bronze	Mounts Binding Posts to Panel
239	8	1/4			Lockwasher, Everlock	Mounts Field Assembly to Shell
240	1	3/16			Washer, Std. Wrot Iron	Mounts Air Cleaner to Carburetor
241	9	1/4			Washer, Std. Wrot Iron	Mounts Muffler Body to Muffler Head
242	4	5/16			Washer, Std. Wrot Iron	Mounts Control Panel to Panel Box Mounts Rubber Shock Mountings to Crate Base
243	32	1/4			Washer, 9/32 O.D. x .260 I.D. x .040 Thick Brass	Mounts Binding Posts to Panel
244	2	1/4			Burr, Std. Iron	Mounts Magneto to Fan Housing Plate
245	12	7/16			Washer, 1 1/64 O.D. x .035 Thick	Mounts Frame to Panel
246	1	#7			Woodruff Key	Mounts Magneto to Crankshaft
247	1	1/8	1		Cotter Pin	Locks Piston Pin in Piston
248	8	.066	1/8		Rivet, Brass Tubular	Mounts Name Plate to Fan Housing Mounts Instruction Plate to Fan Housing

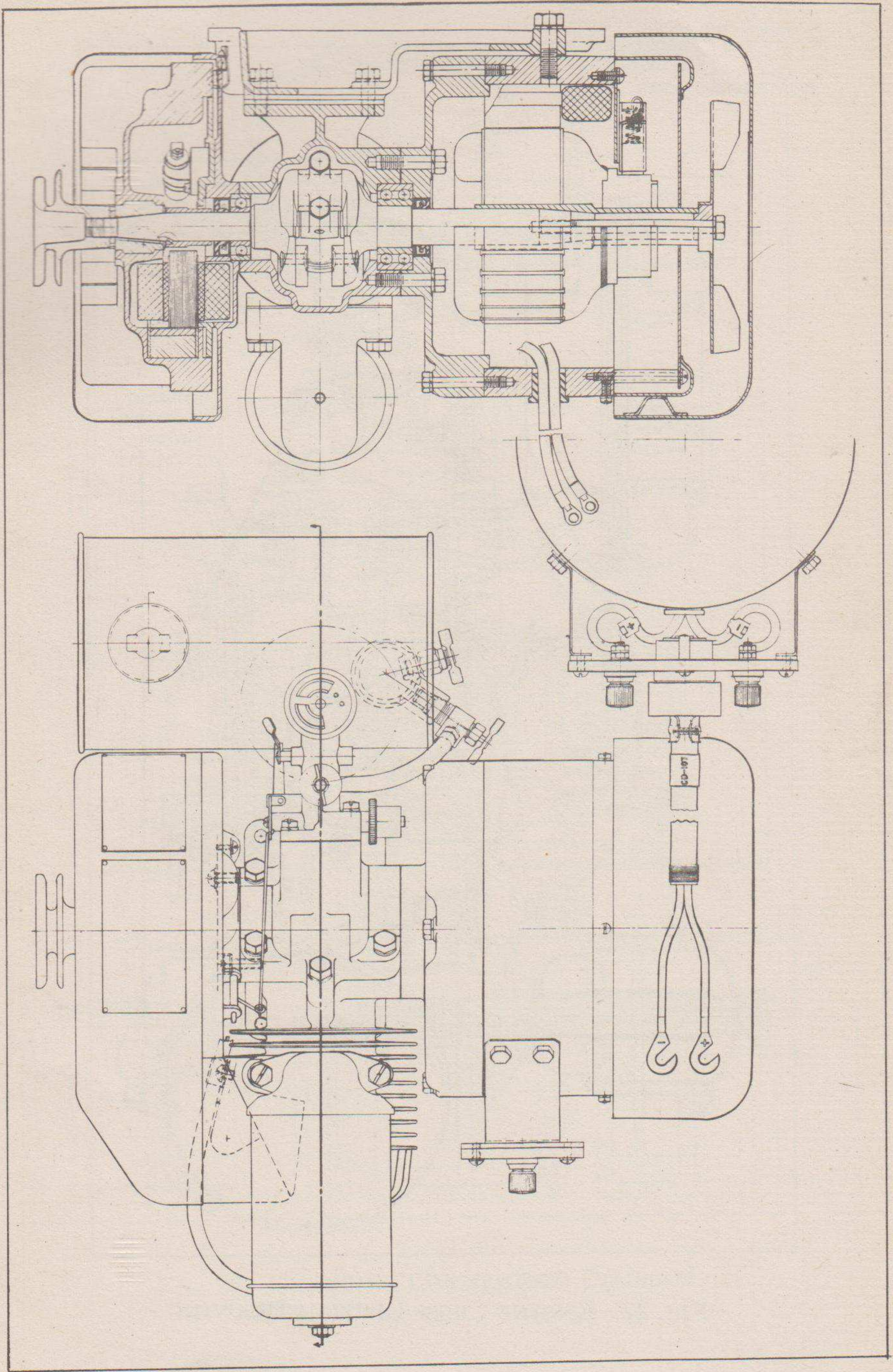


FIG. 26. POWER UNIT CROSS SECTION DRAWING

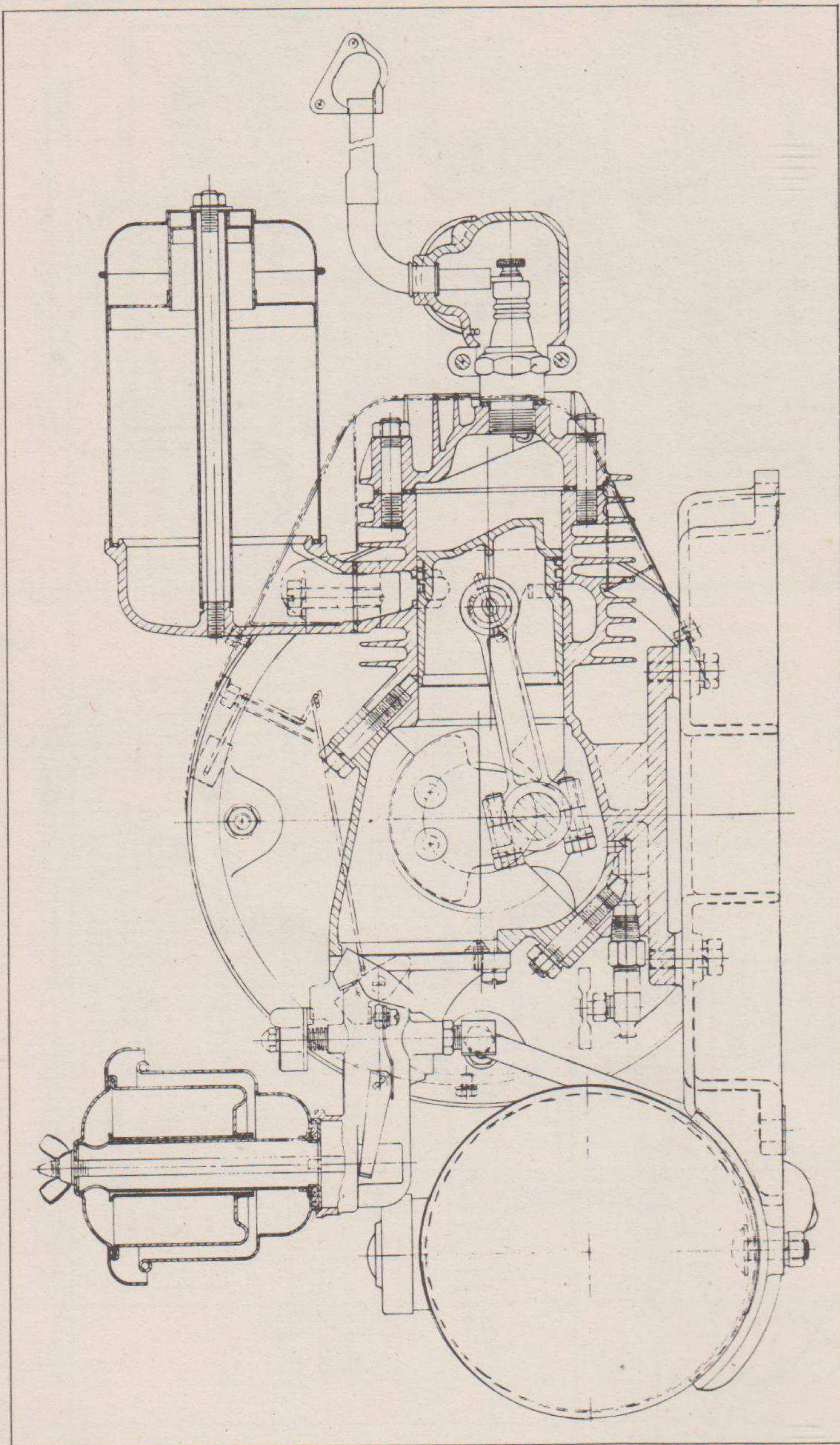


FIG. 27. ENGINE CROSS SECTION DRAWING

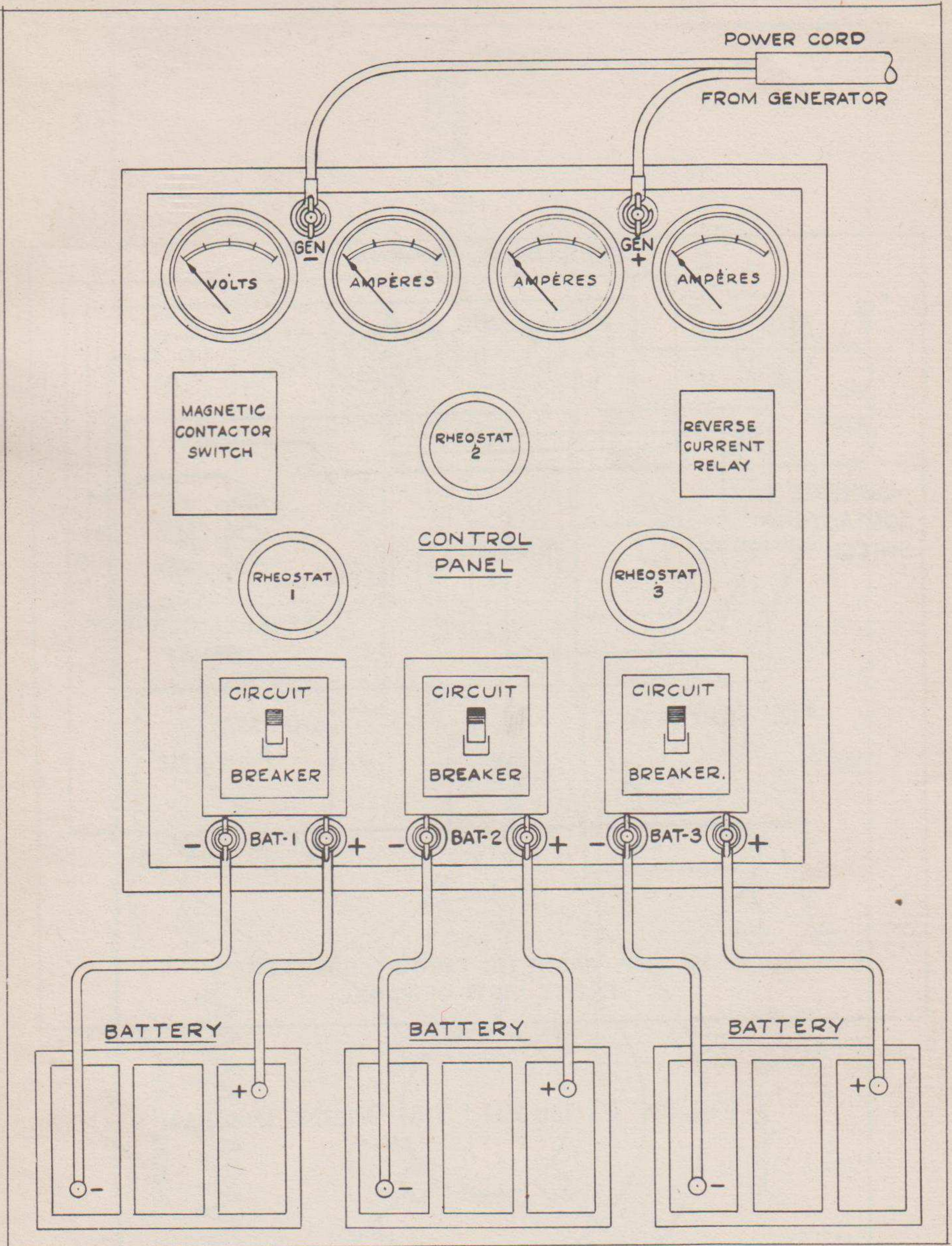


FIG. 28. CHARGING CONNECTION DIAGRAM

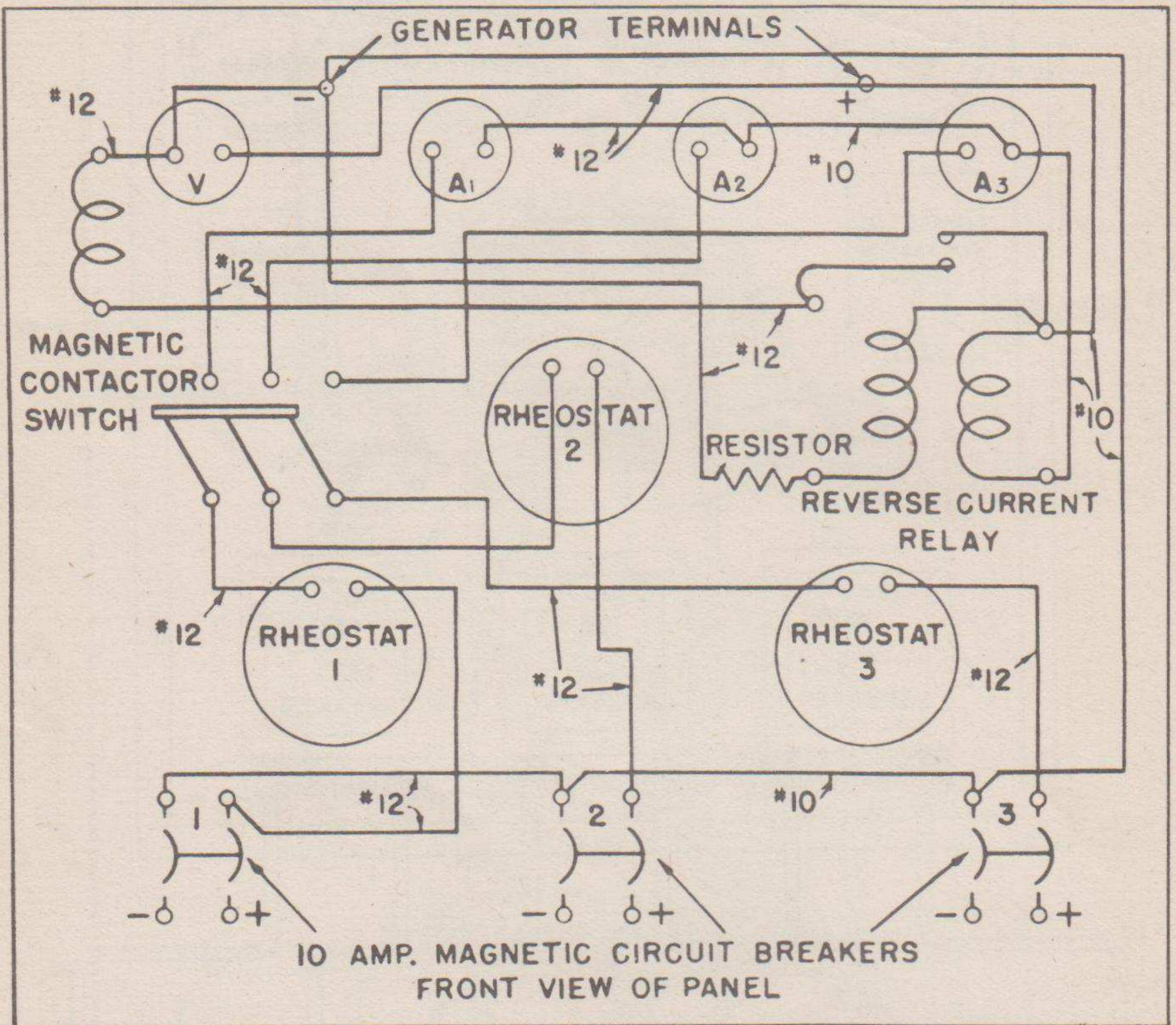


FIG. 29. PANEL BD-LT-61 WIRING DIAGRAM

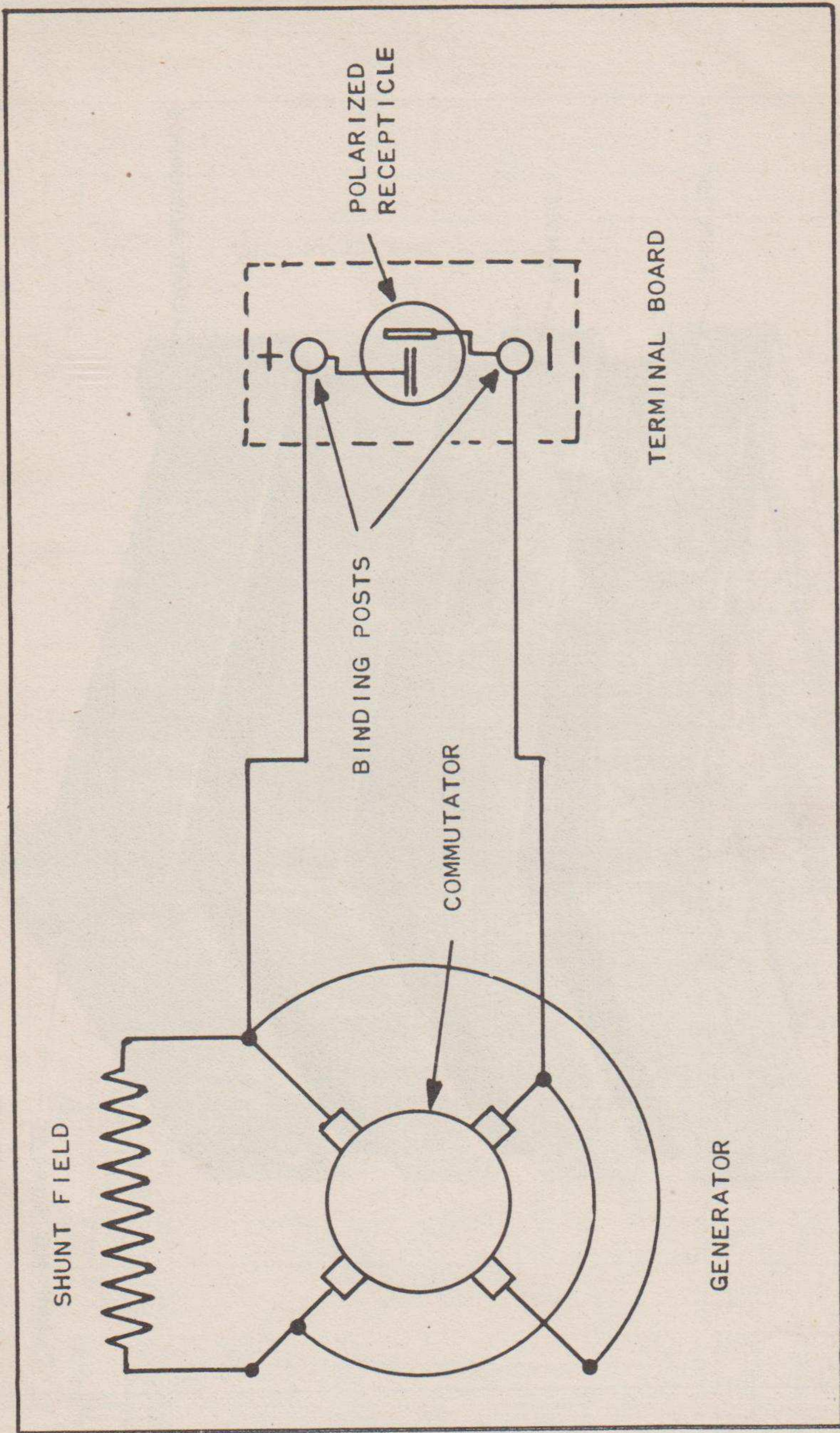


FIG. 30. POWER UNIT PE-43-HK CONNECTION DIAGRAM

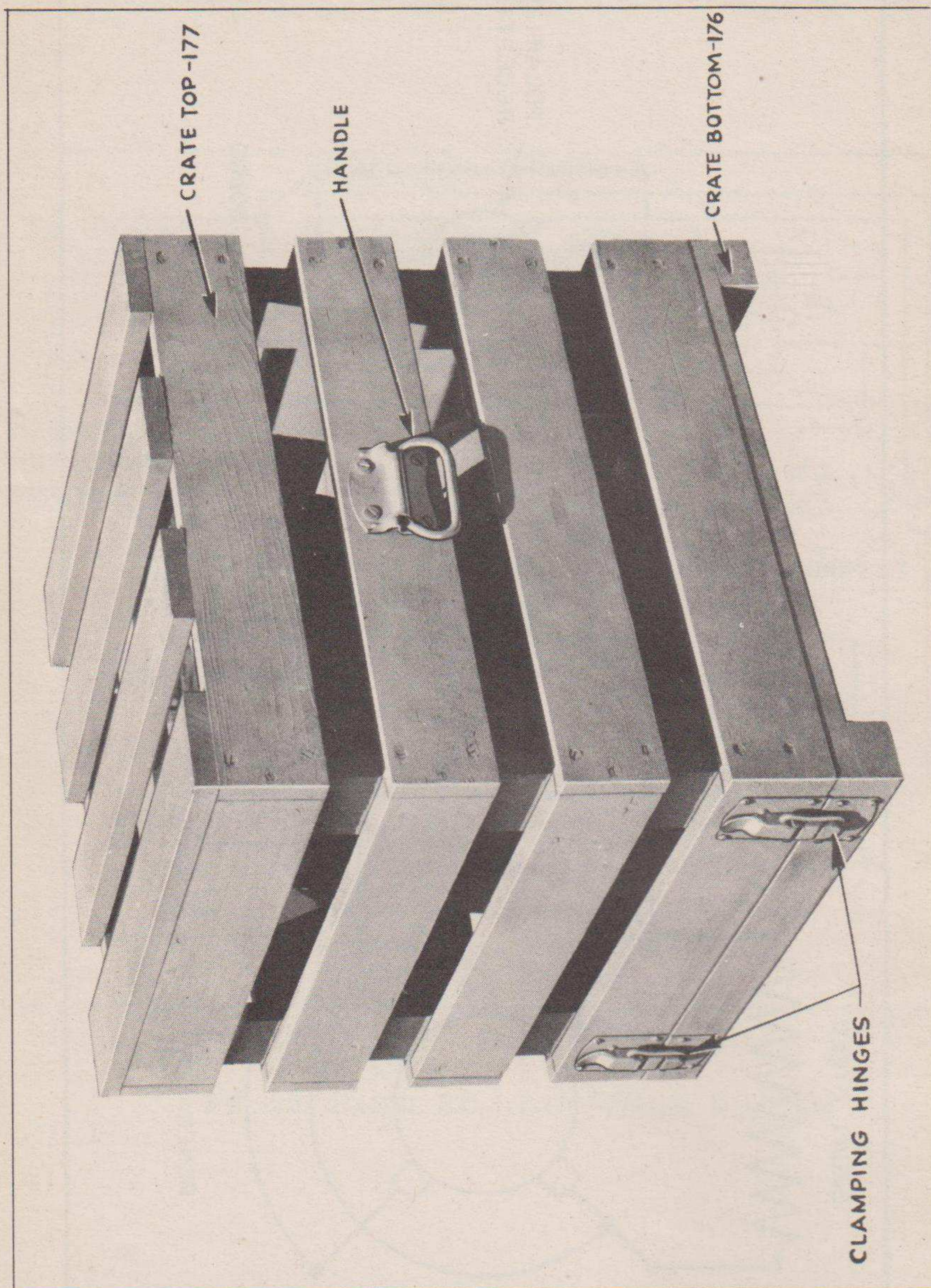


FIG. 31. CRATE ASSEMBLY

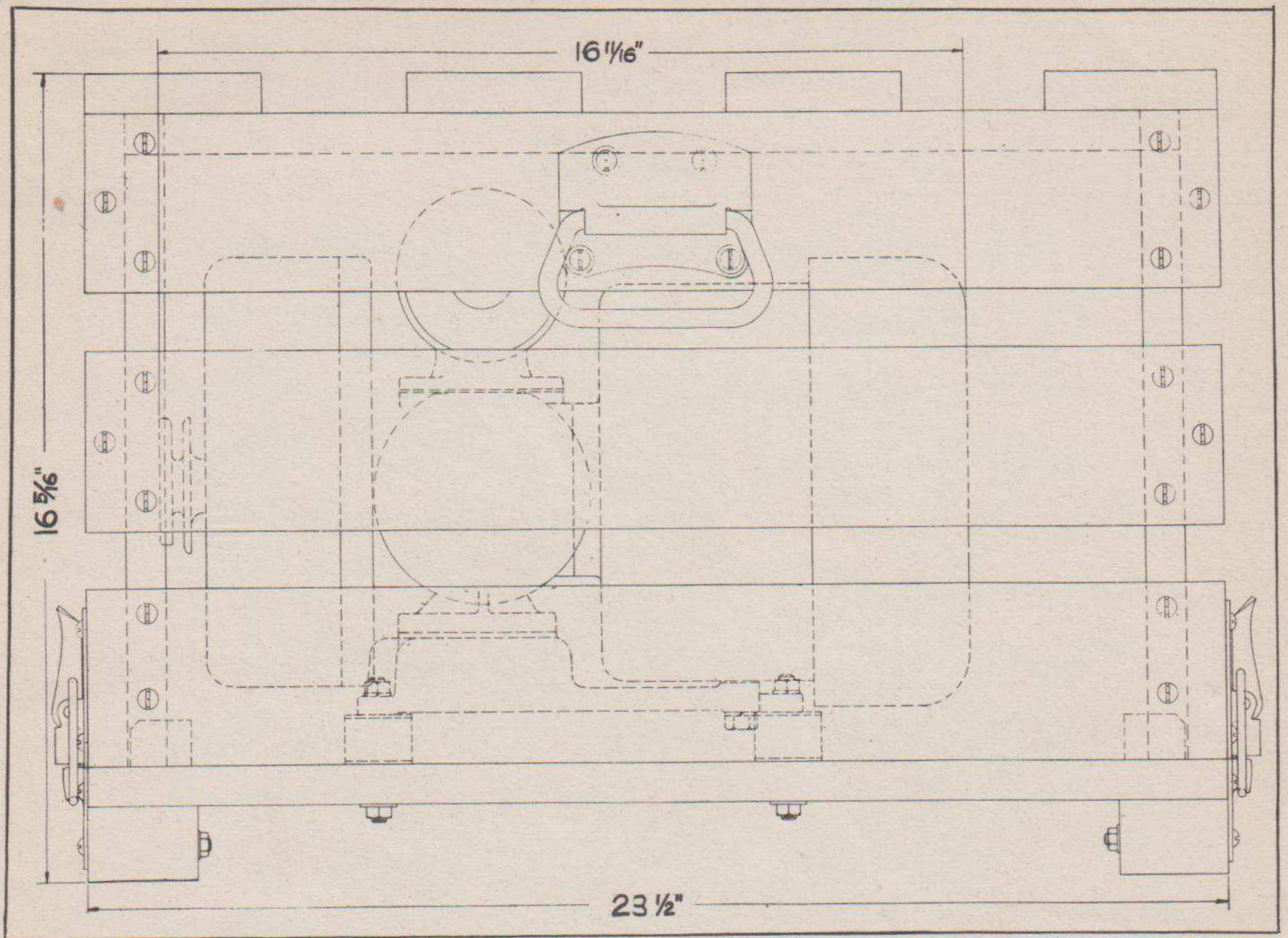


FIG. 32. POWER UNIT PE-43-HK OVERALL DIMENSIONS
FRONT VIEW

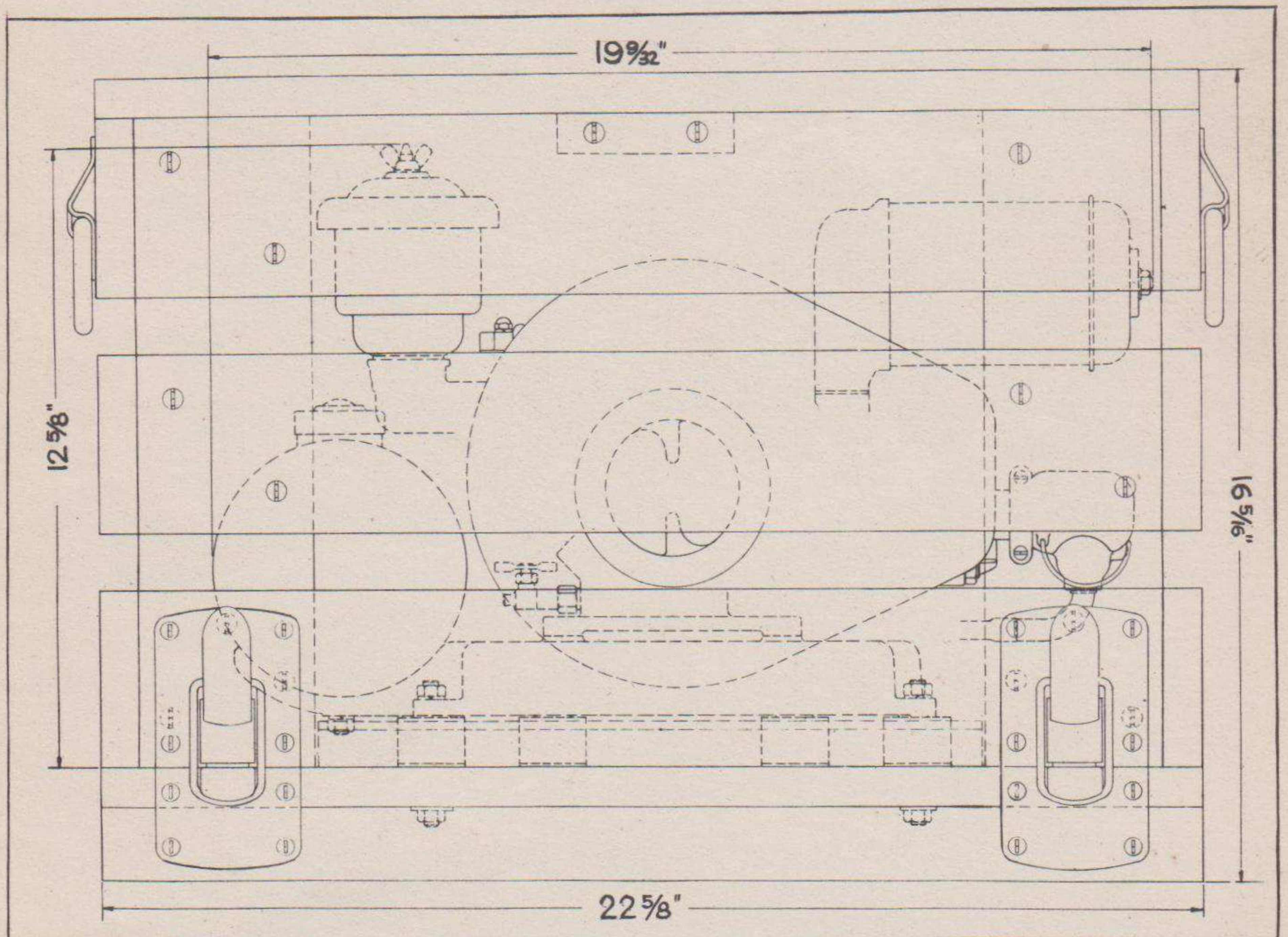
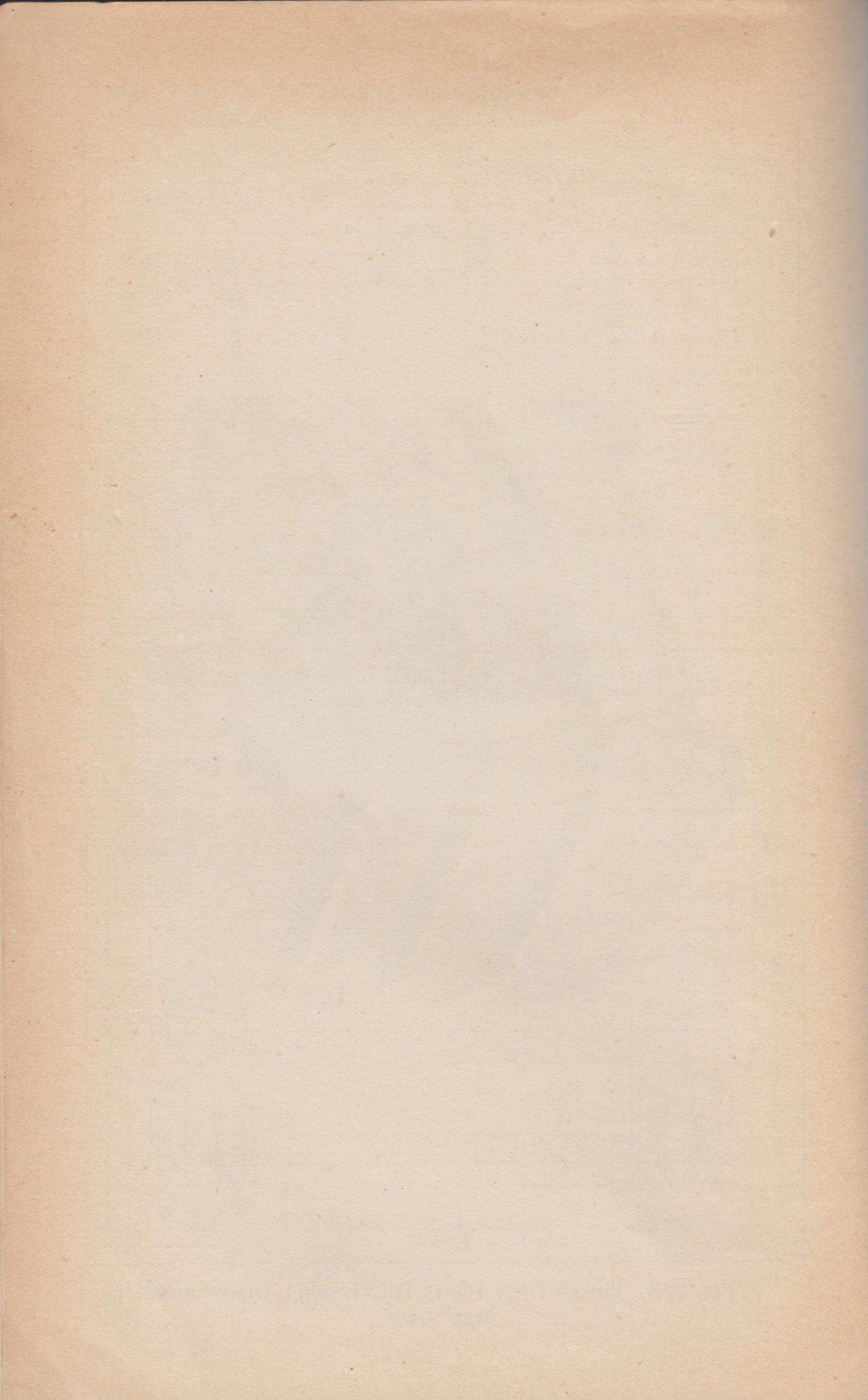


FIG. 32A. POWER UNIT PE-43-HK OVERALL DIMENSIONS
SIDE VIEW



21. Names and Addresses of Manufacturers.—

1. Champion Spark Plug Co. Toledo, Ohio
2. Diamond Wire & Cable Co. Chicago Heights, Illinois
3. Hugh H. Eby Co. Philadelphia, Pennsylvania
4. General Electric Co. Schenectady, N. Y.
5. Gudeman Co. Chicago, Illinois
6. Hartman Electrical Mfg. Co. Mansfield, Ohio
7. Heinemann Circuit Breaker Co. Trenton, N. J.
8. Harvey Hubell, Inc. Bridgeport, Conn.
9. James Mfg. Co. Fort Atkinson, Wisconsin
10. Jacobsen Mfg. Co. Racine, Wisconsin
11. New Departure Co. Bristol, Connecticut
12. Pioneer-Gen-E-Motor Corp. Chicago, Illinois
13. Reliance Automatic Lighting Co. Racine, Wisconsin
14. Tillotson Mfg. Co. Toledo, Ohio
15. United Specialty Co. Chicago, Illinois
16. Ward-Leonard Electric Co. Mount Vernon, N. Y.
17. Wico Electric Co. Springfield, Massachusetts

[A.G.300.7 (9, August, 1943.)]

By Order of the Secretary of War:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION: X

(For explanation of symbols see FM21-6)