

# TM 5-1154

WAR DEPARTMENT TECHNICAL MANUAL

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KETTLE, ASPHALT

165-GALLON

WITH MOTOR-DRIVEN

HAND SPRAY

TRAILER-MOUNTED

LITTLEFORD MODEL 84-HD-3

SERIES P, R, S

WAR DEPARTMENT  
WASHINGTON 25, D. C., *9 April 1943*

TM 5-1154 is published for the information and guidance of all concerned.

[AG 62.11 (25 Mar 43)]

BY ORDER OF THE SECRETARY OF WAR:

OFFICIAL:

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

G. C. MARSHALL  
*Chief of Staff*

## TECHNICAL MANUAL

## Maintenance Manual and Parts Catalog

**KETTLE, ASPHALT, 165 GALLON, WITH MOTOR DRIVEN  
HAND SPRAY, TRAILER MOUNTED, MODEL 84-HD-3  
SERIES P, R, S**

TM 5-1154

CHANGES No. 1

HEADQUARTERS,  
DEPARTMENT OF THE ARMY  
WASHINGTON 25, D.C., 25 June 1963

TM 5-1154, 9 April 1943, is changed as follows:

*CONTENTS Page.* After NUMERICAL PRICE LISTS, add the following:

## APPENDIX I. PREVENTIVE MAINTENANCE SERVICES

*Page 6.* After heading at top of page, add: Perform the preventive maintenance services (Appendix I).

*Page 110.*

**APPENDIX I**  
**PREVENTIVE MAINTENANCE SERVICES**  
(Added)

**1. General**

To insure that the heating kettle is ready for operation at all times, it must be inspected systematically, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary Preventive Maintenance Services to be performed are listed and described in paragraphs 2 and 3. The item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded, together with the corrective action taken, on DA Form 2404 (Equipment Inspection and Maintenance Work Sheet) at the earliest possible opportunity.

## 2. Daily Preventive Maintenance Services

This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by the operator. Daily services retain the same item numbers used in Quarterly Preventive Maintenance Services. Therefore, Daily Preventive Maintenance Services may not be numbered consecutively but should be performed in the numerical sequence as shown to insure complete coverage. Refer to Figure 1 for the Daily Preventive Maintenance Services.

<b>PREVENTIVE MAINTENANCE SERVICES</b>		
<b>DAILY</b>		
TM5-1154	LITTLEFORD BROS. MODEL 84-HD-3	ASPHALT KETTLE
LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER		
ITEM		PAR REF
1	<u>PUMP.</u> Adjust gland nuts to prevent excessive bitumen drip.	
2	<u>SPEED REDUCER.</u> Check oil level. Add oil to full mark. Reference current L.O. (Weekly).	
3	<u>BLOWER HOUSING.</u> Clean screen (Weekly).	
4	<u>GASOLINE TANK.</u> Add fuel as required.	
5	<u>COCKS (3-WAY AND DRAWOFF).</u> Clean clogged valves.	
6	<u>CONTROLS AND INSTRUMENTS.</u> Check the controls and instruments for damage and secure mounting. With the unit operating, check for proper operation. Normal operating readings for instruments should be as follows: Fuel tank pressure gage                      30 psi	
7	<u>TANK AND STRAINER.</u> Clean sediment from strainer (Weekly).	
8	<u>PRESSURE FUEL TANK.</u> Add fuel as required.	
9	<u>BURNER AND VALVE.</u> Clean dirt from regulating valve strainer (Weekly).	

Figure 35. (Added) Daily preventive maintenance services.

ITEM		PAR REF
10	<u>TIRES AND WHEELS.</u> Check tires for correct pressure of 40 psi (Weekly).	
11	<u>MOTOR SPRAY.</u> Clean a clogged spray.	
12	<u>FUEL STRAINER.</u> Tighten thumb nut if leaking (Clean weekly).	
13	<u>OIL LEVEL PLUG.</u> Add oil as indicated by level plug. Reference current L.O.	
	<u>NOTE 1. OPERATION.</u> During operation observe for any unusual noise or vibration.	
	<u>NOTE 2. FIRE EXTINGUISHER.</u> Check for broken seal.	

MSC 1154/35

Figure 35—Continued

### 3. Quarterly Preventive Maintenance Services

a. This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by Organizational Maintenance personnel at quarterly intervals. A quarterly interval is equal to 3 calendar months, or 250 hours of operation, whichever occurs first.

b. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to Figure 2 for the Quarterly Preventive Maintenance Services.

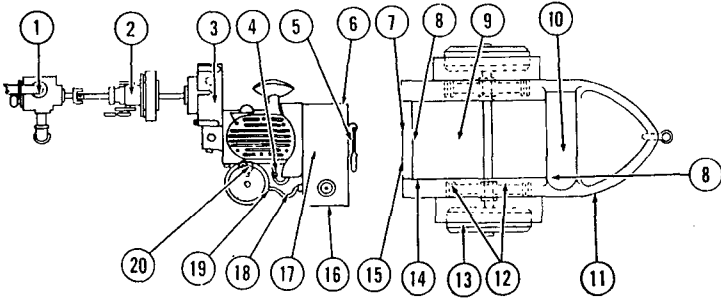
<b>PREVENTIVE MAINTENANCE SERVICES</b>		
<b>QUARTERLY</b>		
TM5-1154	LITTLEFORD BROS MODEL 84-HD-3	ASPHALT KETTLE
		
LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER		
ITEM		PAR REF
1	<u>PUMP.</u> Check pump for secure mounting, leaks, and damage. Adjust gland nuts to prevent excessive bitumen drip.	
2	<u>CLUTCH.</u> Check for secure mounting, damage, and proper adjustment. Adjust as necessary. Reference current L.O.	
3	<u>SPEED REDUCER.</u> Check housing for secure mounting leaks, and damage. Check oil level. Add oil to full mark. Reference current L.O.	
4	<u>SPARK PLUG AND CABLE.</u> Check cable for worn or frayed condition. Check plug for cracked porcelain, burned electrode, carbon deposit, and proper gap of 0.020 inch.	
5	<u>BLOWER HOUSING.</u> Check for secure mounting and dirty condition. Clean a dirty housing and screen.	
6	<u>GASOLINE TANK.</u> Check for leaks.	
7	<u>COCKS (3-WAY AND DRAWOFF).</u> Check for freedom of movement, clogged condition, and damage. Clean and free clogged or binding valves.	

Figure 36. (Added) Quarterly preventive maintenance services.

ITEM		PAR REF
8	<p><u>CONTROLS AND INSTRUMENTS.</u> Check the controls and instruments for damage and secure mounting. With unit operating, check for proper operation. Normal operating readings for instruments should be as follows:</p> <p>Fuel tank pressure gage                      30 psi</p>	
9	<p><u>TANK AND STRAINER.</u> Check tank for sediment collection bottom burn-out, coking and carboning. Clean out bottom sediment while tank is warm. Clean strainer.</p>	
10	<p><u>PRESSURE FUEL TANK, GAGE, AND AIR PRESSURE PUMP.</u> Check tank for secure mounting, leaks, and damage. Check pump for leaks and proper operation. Check gage for secure mounting and damage.</p>	
11	<p><u>BURNER AND VALVE.</u> Check burner for damage and excessive carbon deposits. Clean excessive carbon deposits from burner. Check valves for leaks, damage, and proper operation. Clean dirt from regulating valve strainer.</p>	
12	<p><u>RUNNING GEAR.</u> Check for secure mounting, damage, and adequate lubrication. Reference current L.O.</p>	
13	<p><u>TIRES AND WHEELS.</u> Check tires for correct pressure of 40 psi. Check for excessive wear, cuts, breaks, imbedded foreign matter, and missing valve caps. Check wheel lugs for proper tightness and wheel bearings for proper adjustment.</p>	
14	<p><u>HOSE AND FITTINGS.</u> Check hose and fittings for wear, kinks, and damage.</p>	
15	<p><u>MOTOR SPRAY.</u> Check for leaks, damage, and clogged condition. Clean a clogged spray.</p>	
16	<p><u>FUEL STRAINER.</u> Check for leaks. Clean dirt and water from strainer bowl.</p>	
17	<p><u>MAGNETO.</u> With flywheel removed, check contacts for burning and pitting and proper gap of 0.020 inch. (Check adjustment every 500 hours.)</p>	
18	<p><u>GOVERNOR AND LINKAGES.</u> Check linkages for evidence of wear and binding. Adjust governor if lagging or surging is noted.</p>	
19	<p><u>CARBURETOR.</u> Check for leaks. Adjust carburetor if poor idling or missing at high speed is noted. Drain dirt and water from bowl.</p>	
20	<p><u>OIL LEVEL PLUG.</u> Check engine oil level. Add oil as indicated by level plug. Reference current L.O.</p>	
	<p><u>NOTE 1. OPERATIONAL TEST.</u> During operation observe for any unusual noise or vibration.</p>	
	<p><u>NOTE 2. ADJUSTMENTS.</u> Make all necessary adjustments during operational test.</p>	
	<p><u>NOTE 3. FIRE EXTINGUISHER.</u> Inspect for broken seal. Inspect for full charge by shaking for sound or weight.</p>	

MSC 1154/36

Figure 36—Continued

BY ORDER OF THE SECRETARY OF THE ARMY:

EARLE G. WHEELER,  
*General, United States Army,*  
*Chief of Staff.*

Official:

J. C. LAMBERT,  
*Major General, United States Army,*  
*The Adjutant General.*

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5-54  
5-115  
5-117  
5-237 (5)  
5-262 (5)  
5-267 (1)  
5-278 (5)  
5-279  
5-500 (EA, EB, HF)

NG: State AG (3).

USAR: Units — same as active army except allowance is one copy to each unit.

For explanation of abbreviations used see AR 320-50.

## CONTENTS

Section		Page
I	SPECIFICATIONS	2
II	OPERATING INSTRUCTIONS	6
III	MAINTENANCE MANUAL	29
IV	ENGINE INSTRUCTIONS AND MAINTENANCE MANUAL	36
V	REPAIR PARTS LISTS	72
	NUMERICAL PRICE LISTS	101

This Manual covers Series "S" Kettles and all previous series furnished to the War Department.

P.O. No.	Series No.	No. of Kettles	Registration No.
55401	S	13	
55324	S	26	
55843	S	112	W096680 to W09679
6083	S	3	
54231	R	20	
49811	P	4	

Series letter appearing on the kettle name-plate should always be specified for proper identification of these kettles and parts.

## INDEX

	Page	
I	Shipping and Operating Requirements	2
	Description of Working Parts	4
II	Operating Instructions	6
	Recommendations for operation	6
	Preparation for use of kettle	6
	Thermometer - use of	8
	Loading liquid bitumen	8
	Loading solid bitumen	8
	Draining kettle	8
	Water in bitumen	9
	Operation of parking leg	10
	Oil Burner	10
	Motor Spray	13
	Engine Instructions	36
	Clutch, Care and Adjustment	14
	Bitumen Pump	16
	Control Valve	17
	Strainer, Hose, Spray Bar	17
	Temperature Table & Conversion Tables	20
	Applying Bitumen	18
	Export Packing & Storage Instr.	19
	Mounting Tires	25
	Demounting Tires	26
III	Maintenance Manual	29
	Lubrication	29
	Clutch Repairs	29
	Pump	32
	Relief Valve	32
	Three Way Cock	33
	Oil Burner	33
	Fuel Tank	33
	Kettle	34
	Running Gear	35
IV	Engine Instructions and Maintenance	
	Starting	37
	To stop engine	37
	Lubrication	40
	Gasoline Requirements	37
	Trouble Chart	41
	Carburetor Adjustment	47
	Cross Section of Engine	44

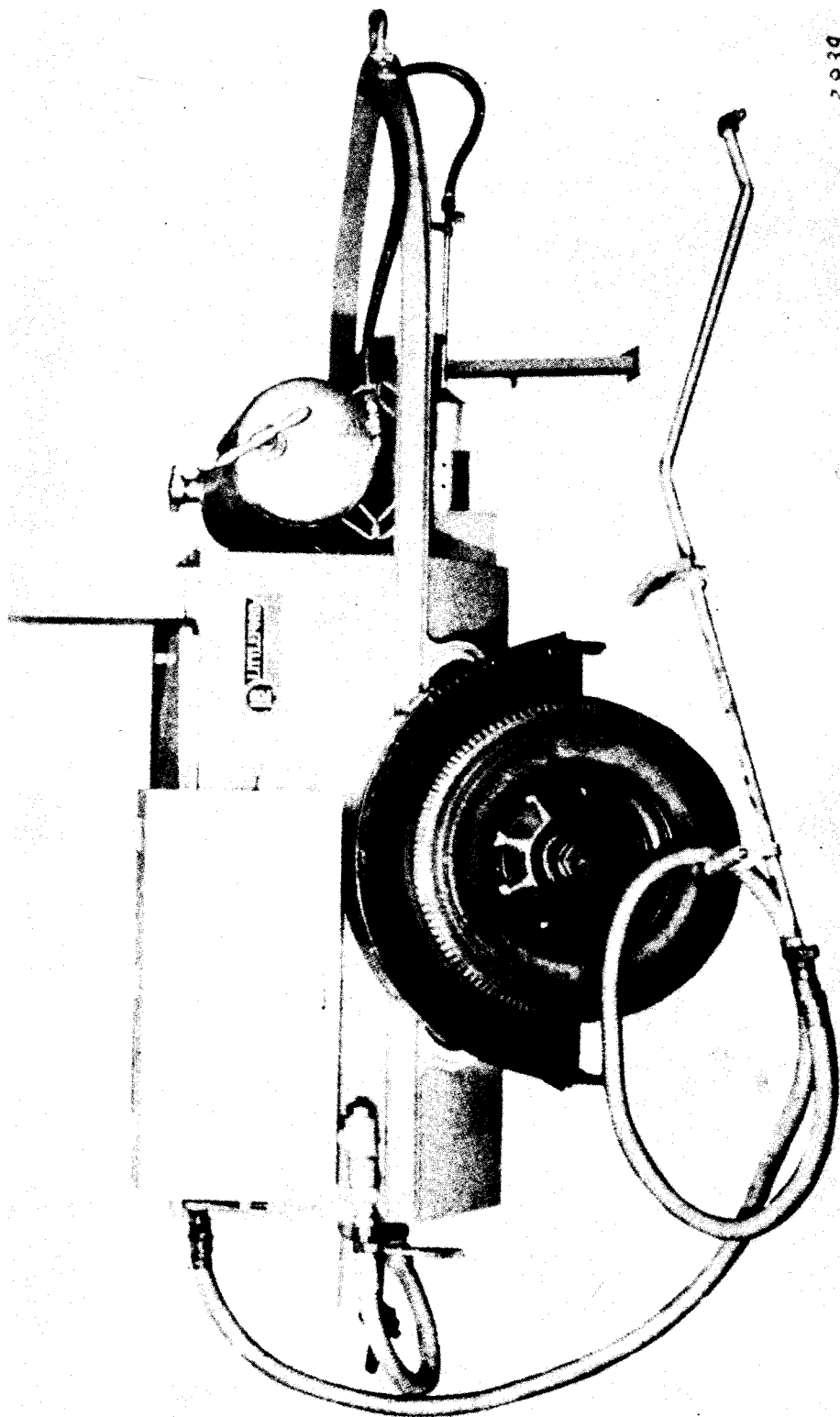
	Page
Clearance Chart	43
Correct Motor Speed	49
Governor	47-52
Ignition system	52-59
Flywheel	54
Adjusting Magneto	56
Compression, Testing	61
Carbon, Removing	61
Cylinder Head	61
Piston and Pin	62
Connecting Rod	64
Crankcase End Plate	65
Crankshaft	65
Valve Clearance and Timing	59
Exhaust Pipe	66
Hand starter	66
Air Cleaner	66
Oil Pump	67
Gear Reduction Assembly	69

#### V Repair Parts Lists

Requisitioning Parts,	
Instructions for	70
Specimen Requisition Form	71
Kettle, Series "S"	72, 74
Kettle, Series "P" and "R"	73
Running Gear	72, 75
Burner	76
Fuel Tank	77
Fuel Hose	77A
Motor Spray	78
Pump and Relief Valve	73, 80, 81
Clutch	83
Engine	
Cylinder	84
End Plate	87, 90
Crankshaft & Governor	85
Connecting Rod Assy.	86
Base	87
Air Cooling system	89
Fuel Tank and Tubing	89
Magneto Ignition System	91, 95
Hand Lever Starter	89, 92
Gear Reduction	91, 93
Carburetor	100

#### Numerical Parts Price Lists

Kettle & Motor Sprayer	101
Engine	105
Magneto & Carburetor	109



2039

FIG. 1

## SECTION I - SHIPPING & OPERATING REQUIREMENTS

### 1. Description

These Littleford No. 84-HD Kettle with Motor Spraying Attachment are designed for melting or heating, and applying bituminous materials used in patching, construction or maintaining roads and airport runways.

### 2. Dimensions and Weight

Set up - 5'-4" wide x 10'-6" long x 5'-6" high  
1500 lbs.

K-D (crated) - 5'-3" wide x 10'-0" long x  
3'-9" (204 cu. ft.), 1950 lbs.

### 3. Specifications

Capacity - 165 gallons

Loading Height - 50"

Capacity Fuel Tank - 20 gallons

Fuel Consumption -  $2\frac{1}{2}$  gallons per hour

Springs - 8 Leaf,  $1\frac{1}{2}$ " wide, 31" c-c of bushings

Axle -  $1\frac{1}{2}$ " dia.

Wheels - 16" dia., Double Disc Type, 4.50 E Rim

Bearings - Timken, Cone #2788, Cup 2720

Track - 53"

Ground Clearance - 12"

Pump - Viking, Ref. CO-257 Model EHX2, 1"

Clutch - Twin Disc Model V-1035, No. X-4985 Spec  
#13593

Power Unit - Lauson Engine, Model RSC-341-1

Capacity, Gasoline Tank on Engine - 1/2 gallon

Capacity, Crankcase - 1/2 quart

Capacity, Gear Reduction - 1/3 quart

### 4. TABLE OF APPROXIMATE CONSUMPTIONS FOR AN EIGHT HOUR DAY

Kerosene - 20 gallons

Gasoline for Engine - 1 gallon

Lubricating Oil - 1/4 quart - OE 30 (SAE 30)  
above 32 degrees F., OE 10  
(SAE 10) under 32 degrees F.  
atmospheric temperature.

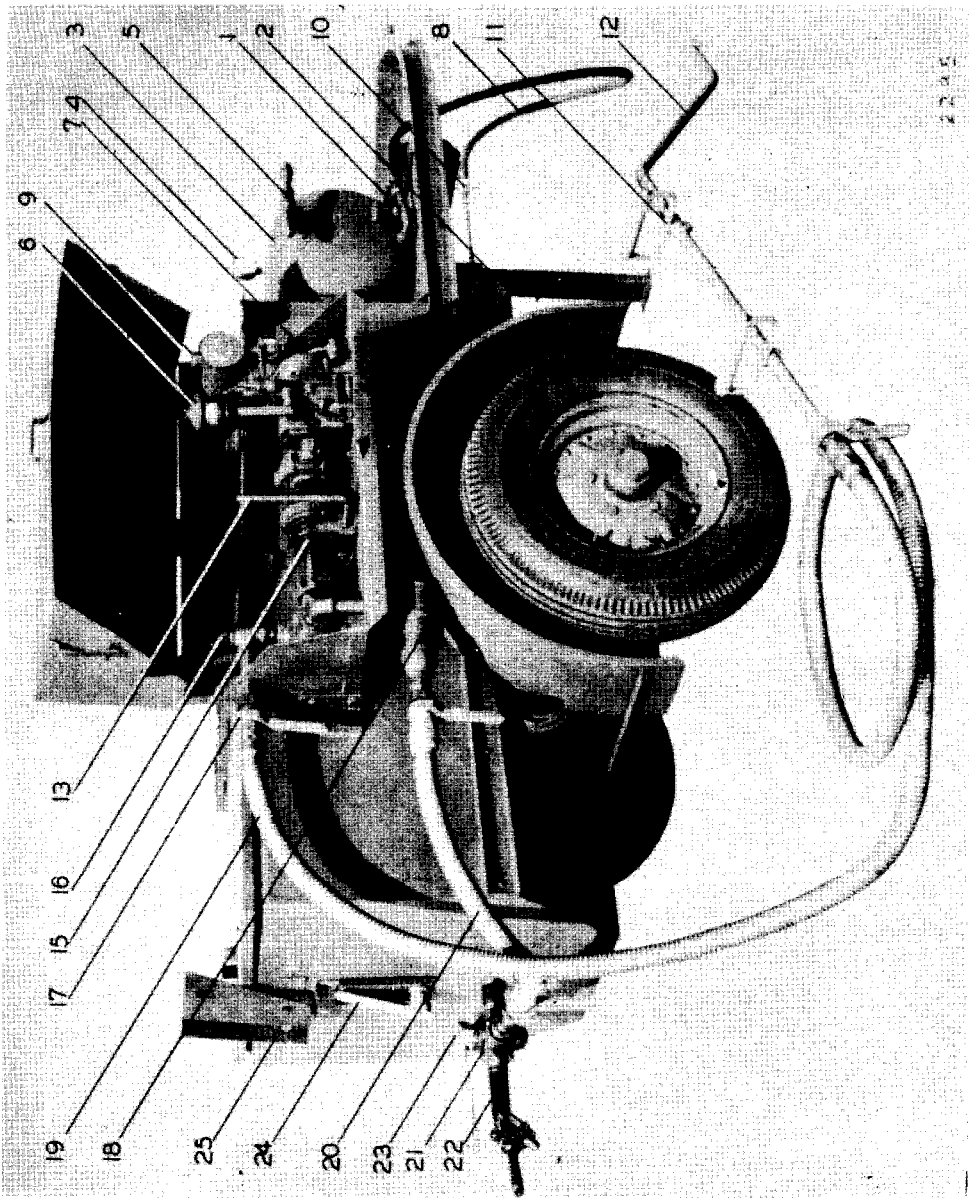


Fig. 2

Description of Littleford No. 84-HD Kettle

(See Fig. 2)

1. Fuel Tank Shut-Off Valve
2. Kerosene Burner
3. Pressure Fuel Tank (20 gallon)
4. Pressure Gauge
5. Air Pressure Pump
6. Oil Bath Air Cleaner
7. Engine Starter Handle
8. Fuel Hose
9. Cap on Gasoline Tank
10. Burner Regulating Valve and Strainer
11. Spray Bar Shut-Off Valve
12. Spray Bar
13. Clutch Operating Lever
14. Fuel Tank Filler Cap
15. Clutch
16. Filler Plug
17. Union Wrench
18. Strainer
19. Insulated Metal Discharge Hose  
(1"x 15' long)
20. Insulated Metal Suction Hose  
(1"x 3' long)
21. Three Way Cock
22. Quick Acting Draw-Off Cock
23. Valve Wrench
24. Angle Type Thermometer
25. Thermometer Guard
26. Pipe Union
27. Vent Stack
32. Wood Handle
33. Viking EHX2, 1" Pump with Relief Valve  
(9 G.P.M. @ 600 R.P.M.)
34. Hinged Cover
35. Lauson RSC-341 Engine, (1.1 H.P. @ 2400  
R.P.M.) with 4-1 gear reduction



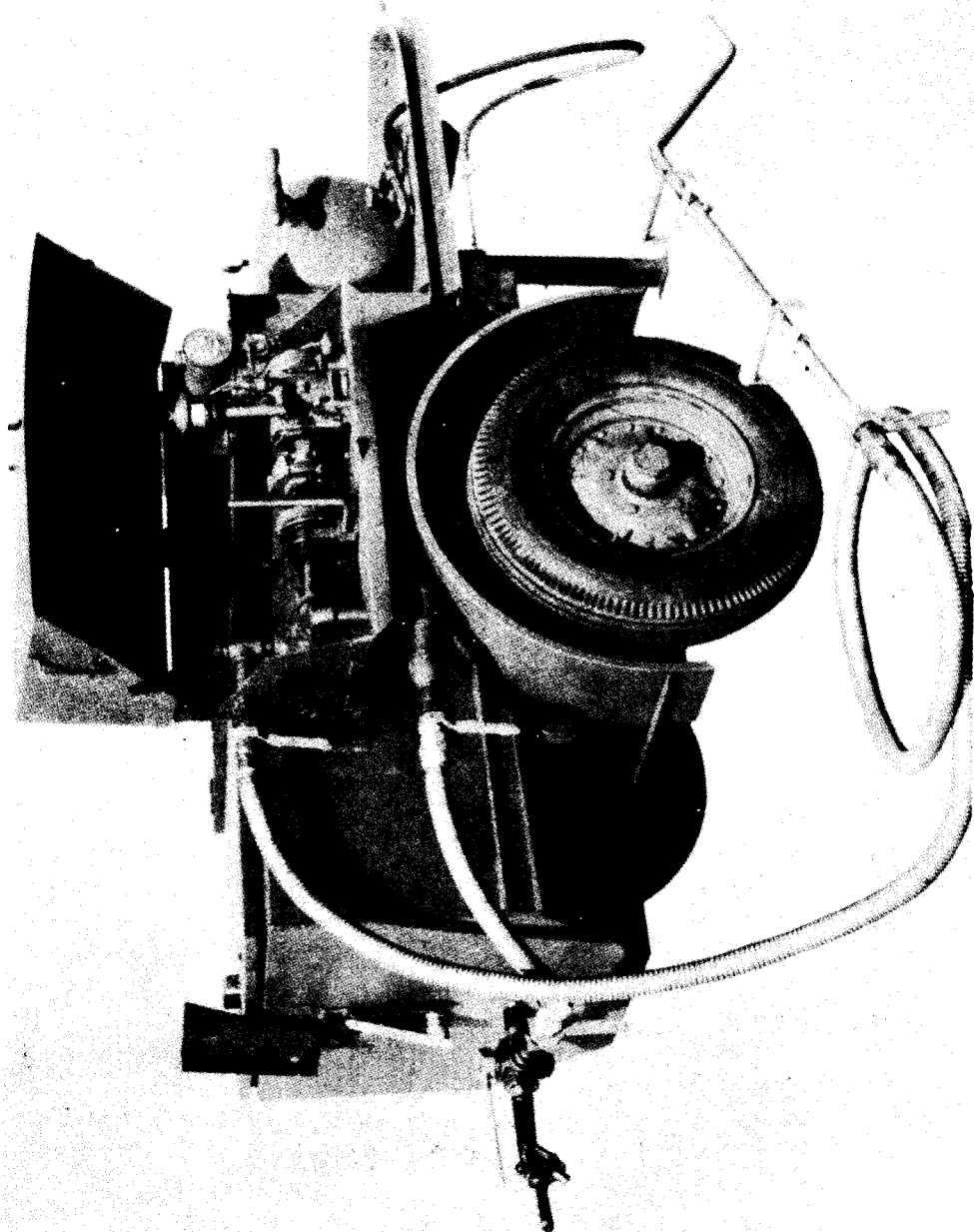


Fig. 3

**SECTION II**  
**OPERATING INSTRUCTIONS**

FOR MOST EFFICIENT OPERATION, THE  
FOLLOWING PROCEDURE IS RECOMMENDED

Always raise cover on outfit when engine is running.

PUMP MUST BE WARM AND FREE BEFORE ENGAGING CLUTCH.

Warm pump till free to turn by hand using burner to heat pump body, being careful not to direct burner toward pump packing or clutch. This must be done or clutch and engine will be damaged.

Do not slip the clutch if the pump is frozen.

Remove spray bar and hose and carefully drain when not in use.

Do not kink, drag or roll over the spray hose.

Clean strainer daily.

Drain pump when not in use.

Insert end of bar in top of kettle and allow material to circulate through pump and hose lines when starting a cold sprayer. This will remove all congealed material from the lines and keep the nozzle from clogging.

Always lower and lock the engine cover at night.

USING THE KETTLE - Preparation for use.

Attach quick-acting draw-off valve, three-way valve and nipples to the coupling welded in the tank head. Connect the three-way valve to the bottom connection of motor spray attachment, using the short (3') length of insulated metal hose which is provided. Attach the long (15') hose to the top connection of motor sprayer, and then attach the hand spray bar to the other end of the hose. (See Fig. 3)

When making hose connections, be sure that all joints are air tight, especially on the suction side of the pump. An air leak here would greatly reduce the efficiency of the motor spray

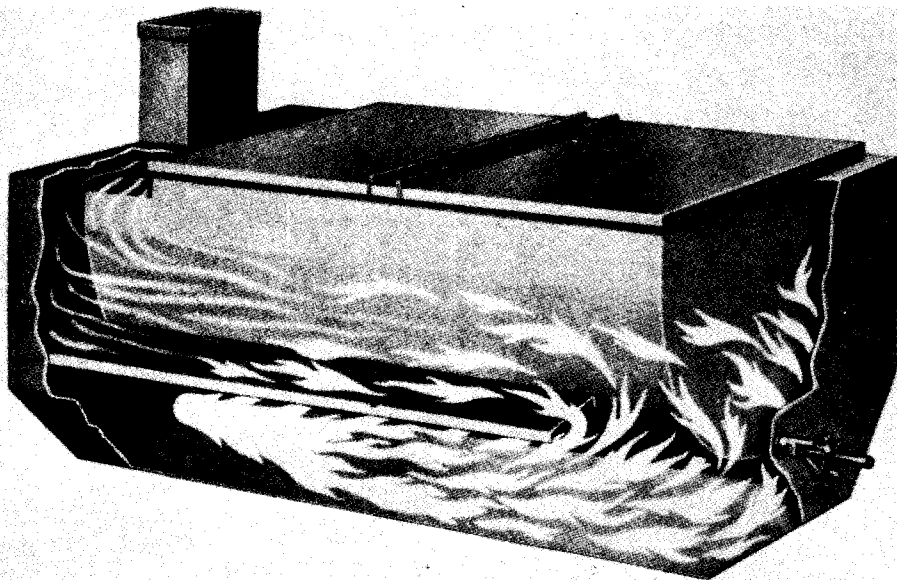


Fig. 3A

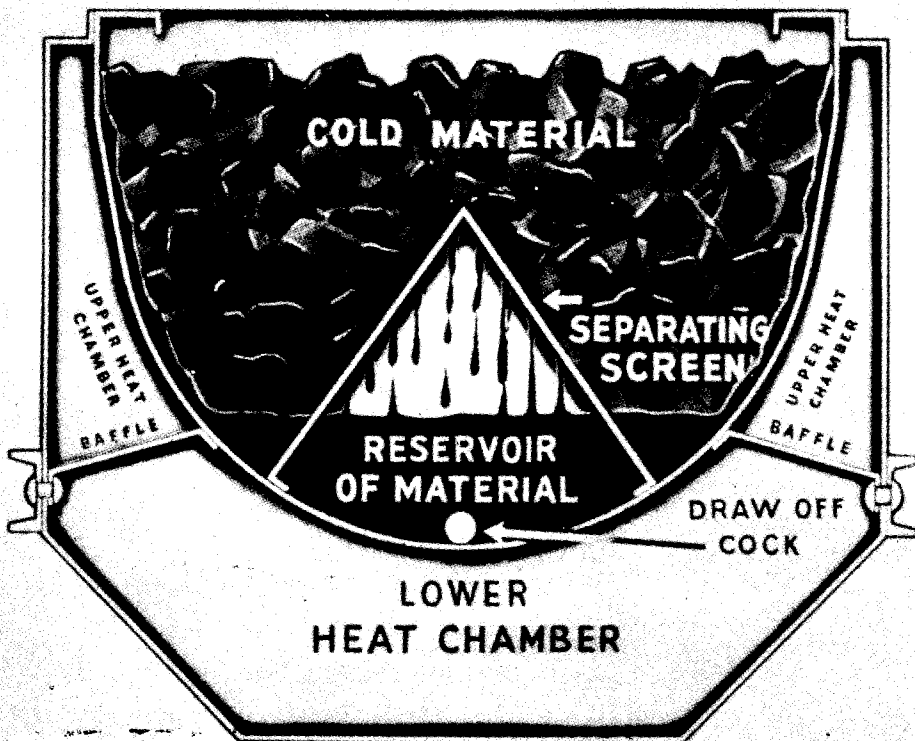


Fig. 3B

attachment, and a real bad leak would probably make the pump fail to work at all. A bad suction leak will make a hissing sound.

Caution: Load or charge the kettle with bituminous material before starting the burner. Do not operate the burner at any time unless the tank contains some bitumen, because the burner flame is very hot (1800 degrees F.) and it would burn out the tank bottom in a short time.

These Kettles consist of a tank placed in a heat chamber which is provided with baffle plates as shown on Fig. 3-A which make the heat produced by the oil burner pass around the inside tank twice before it is discharged out the vent stack. This construction provides more uniform heating of the bitumen and a faster temperature rise.

A barrel grid is provided under the front portion of the hinged cover to hold drums of bitumen which is fluid at atmospheric temperature, so the material can drain out into the kettle. When loading kettle from drums, loosen plugs in both bung openings on the ground so they can be removed easily by hand after being placed on the barrel grid. Use large plug for draining and small plug to permit air to enter drum.

Keep cover closed at all times except when actually loading Kettle with bitumen.

If the bitumen is solid at atmospheric temperature, it should be chopped into small pieces. The ax or cutter used should be oiled frequently to keep the bitumen from sticking to it or binding the tool. A separating screen is provided in the bottom of the kettle to prevent chilling the entire contents as cold material is added, as it must melt before it can pass this screen. (See Fig. 3-B)

To drain the kettle, raise the front end and place a brick or block under the front leg so the Kettle will drain completely and carry any sediment along with the material.

To draw off a few bucketfuls extremely fast, the next morning, raise the supporting leg be-

fore you leave the job and nose the front end of the Kettle down to the ground. This will let the valve opening entirely exposed, and when the Kettle is in level position the next morning, the first melted material will flow immediately through the valve.

THERMOMETER - MAKE IT A HABIT TO CHECK THE TEMPERATURE ON THE THERMOMETER. IT TAKES GUESSWORK OUT OF HEATING THE BITUMEN. FIND OUT THE FLASH POINT OF THE DIFFERENT MATERIALS YOU ARE USING TO PREVENT OVERHEATING IT. (See Page 16)

KEEP GUARD OVER THERMOMETER AT ALL TIMES, EXCEPT WHEN READING TEMPERATURE. (See Fig. 4)

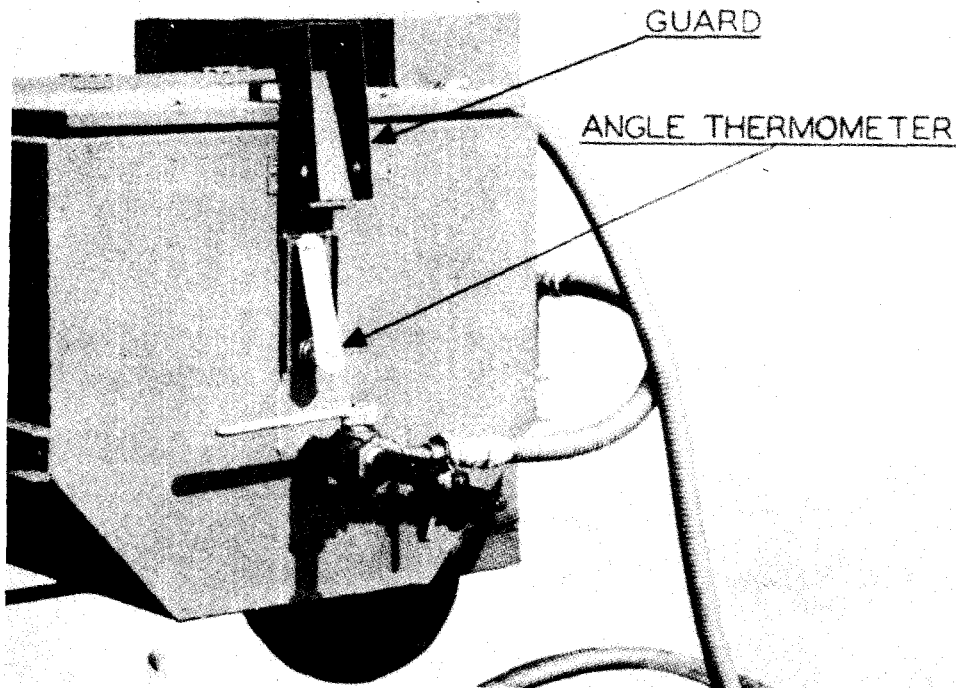


Fig. 4

Should overheated material catch on fire or flash, close the cover immediately. This will quickly snuff out the fire.

If you get bitumen that has water in it, it will foam up when heated to water boiling point

(212 degrees F.) and run out over the top of the kettle, with danger of catching on fire. Turn burner off and open draw-off valve as the kettle will have to be emptied anyway. After material cools and hardens on the ground, it can be shoveled up.

The parking leg on these kettles is operated by lifting up on the towing eye to permit the leg to slide down; so it will clear the top cross angle. Then shove it to the rear between the angles as far as it will go. The handle screw should then be tightened to hold the leg in place so it will not jar loose or fall down when the Kettle is trailed.

TO OPERATE BURNER (See Fig. 5)

The burner and fuel tank should be connected with the rubber hose furnished. The hose couplings have ground seats and do not require gaskets; however, care must be used to be sure they are free of dirt, otherwise, they may leak.

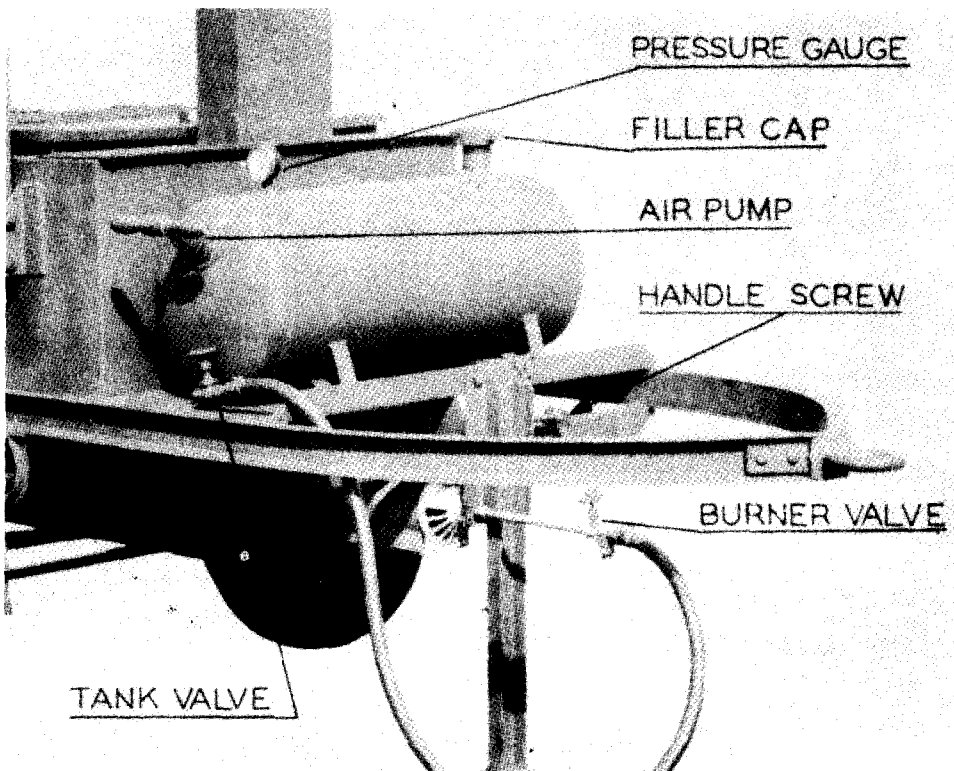


Fig. 5

To fill the fuel tank, be sure that valve on tank outlet is closed. Remove the filler cap; use a hammer or other heavy hard object to loosen the cap. Be sure that funnel and fuel container are clean, because dirt in the fuel tank will clog the strainer valve on the burner. Fill the tank with kerosene to approximately 2" from the top, to leave some air space. Replace filler cap tightly.

The air pump has a locking handle which is released by pushing on it and turning so the lock will pass through an oblong hole in the pump top. Pump air into the tank until the pressure gauge shows 30 lbs. pressure.

Now, open tank valve all the way. Then open burner valve about 1/4 turn, holding a piece of paper or rag over the burner tip until the oil pan is about 1/4 full. Set fire to this oil using rag or paper as a wick. It will require about five minutes preheating until the burner is warm enough to operate properly. When the burner flame starts to pulsate and roar, it is ready to go and burner valve should be opened slowly to a maximum of 1/4 turn.

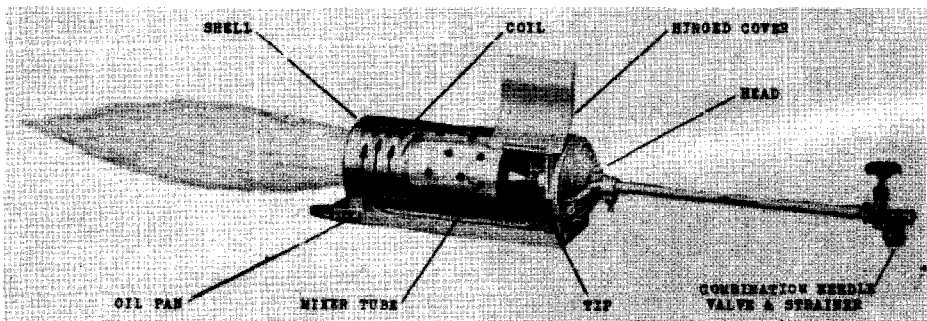


Fig. 6



If the burner throws a stream of oil, it indicates that it is not preheated enough and it will be necessary to shut off burner valve and repeat this process.

If the small hole in the center of the burner tip becomes clogged, the burner will not operate properly and the tip must be cleaned. A cleaning wire is provided with the burner, which should be inserted in the hole in the tip to remove soot, carbon or whatever is clogging the burner tip.

Do not use gasoline as fuel in these burners unless the burner tip is changed to use this fuel. Special tips are available for use with gasoline. The gasoline tips are marked 5G and the kerosene tips are marked 5.

**WARNING:** If gasoline is used as fuel, remove burner when lighting to prevent gasoline explosion in Kettle. Place burner on the ground away from Kettle while it is being preheated.

To stop the burner, close the burner valve.

**CAUTION:** Closing this valve does not stop the flame immediately. The fuel inside the coil must all burn, or the burner must cool off below the flash point of the fuel before the flame will go out.

In order to get the longest service from your burner, it should be blown out at least once every two weeks with high pressure air, if available, or flushed with kerosene. Remove burner plug when doing this and tap on burner to loosen dirt and carbon inside the coil. Clean out the burner plug before replacing in plug holder.

## USING THE MOTOR SPRAY - Engine Instructions

Whenever the Spray Unit is being used, the ENGINE COVER SHOULD BE LEFT OPEN. The engine being air cooled will require all the ventilation possible.

### Getting the Engine Ready to Start -

See Engine Section, Page 37.

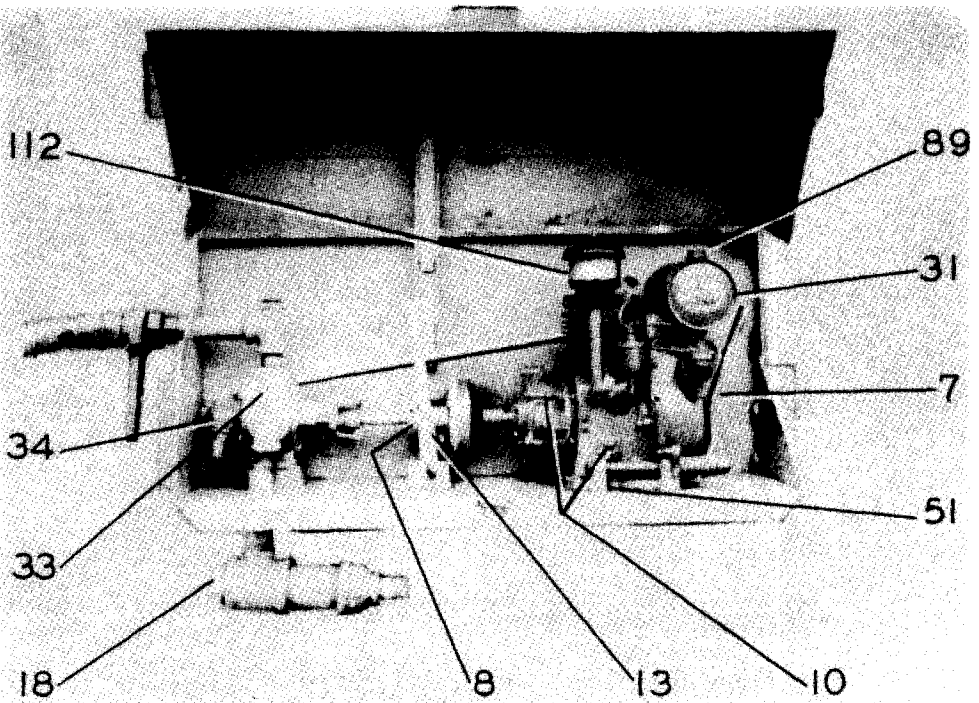


Fig. 7

### CLUTCH INSTRUCTIONS

A Twin Disc friction clutch is provided to drive the pump. To engage clutch, push the operating lever, Ref. 13, toward the engine until the wedge sleeve snaps over center. This will require exerting enough pressure on the lever to force the clutch to engage.

This clutch requires no attention other than an occasional drop of oil on the throw-out collar and adjustment as required to compensate for wear on the drive plate.

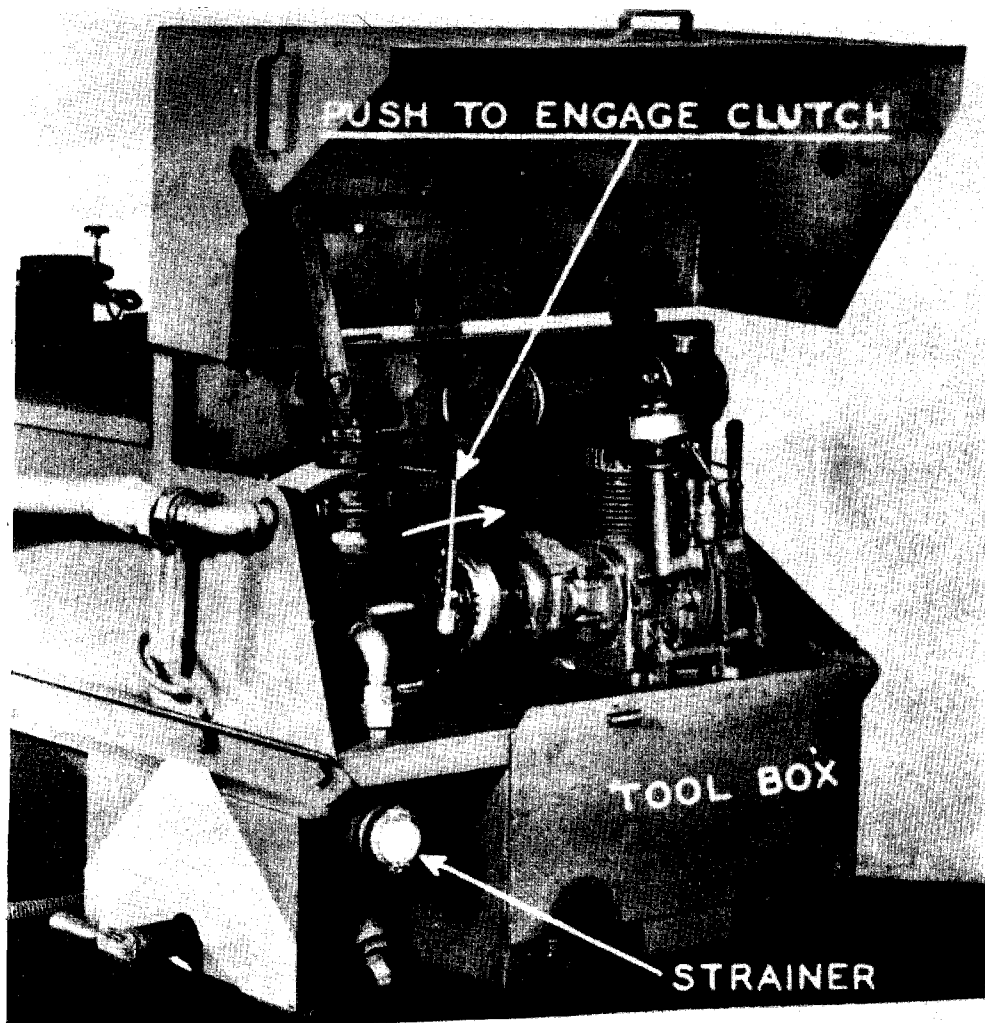


Fig. 8

## OPERATING CLUTCH

If the clutch does not pull, heats, or operating lever jumps out, it must be adjusted.

To adjust the clutch, it must be disengaged. Loosen the set screw in the knurled adjusting nut with a screw driver. Turn knurled nut to the right (clockwise) until clutch engages with a distinct snap and the adjustment is just tight enough to prevent slipping. Do not adjust too tight as this will cause unnecessary wear on the clutch levers and rollers, or the levers may break. Tighten set screw when adjustment is satisfactory.

1.- RELEASE CLUTCH

3.-TURN KNURLED NUT CLOCKWISE TO

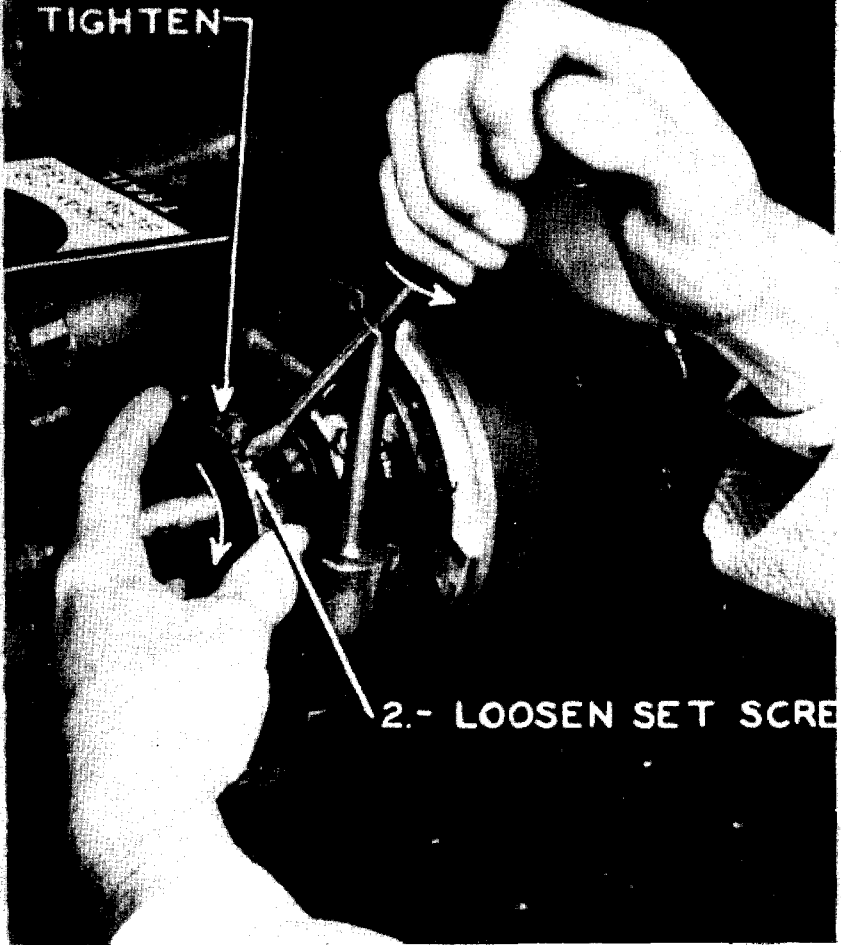


Fig. 9

## ADJUSTING CLUTCH

**CAUTION:** Do not engage the clutch until you are sure that the pump is free to revolve. Always turn the pump over by hand first or engage clutch very lightly to be sure that the pump will revolve freely.

## MOTOR SPRAY INSTRUCTIONS

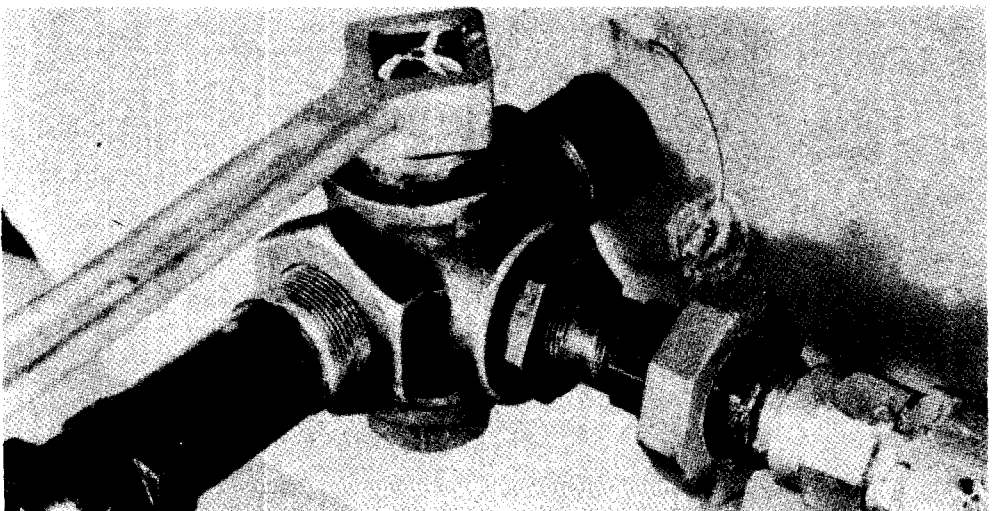
Pump has a relief valve, Ref. 34, in its head which will allow the material to by-pass through the pump when the valve in the spray bar is shut off. This pressure is adjusted by means of the adjusting screw within the relief valve. It is set at approximately 30 lbs. at the factory and should require no adjustment except for special work.

The pump does not require attention other than to carefully drain it when job is finished, and to tighten up the stuffing box, if it leaks enough to cause dripping. Do not make stuffing box too tight or pump shaft may bind and overload the clutch.

The hoses, pump, and piping can be washed out by placing the ends of the hoses in a bucket of fuel oil, with the pump running.

CAUTION - Do not engage clutch until you are sure pump is thawed out, and turns freely.

If pump was not washed out with fuel oil after the last period of use, the bitumen remaining inside of it may become very stiff or freeze solid so the pump cannot revolve until the pump is heated by the engine exhaust to warm the bitumen until it again becomes a liquid. The pump can also be heated by burning a small amount of oil soaked waste or rags around it.



however, if this is done, care should be used to keep the fire away from the clutch and not to overheat the relief valve on the pump head.

A conical shaped, perforated strainer is placed in the pipe line, Ref. 18, under the engine base plate. This strainer must be cleaned regularly. This is done by removing the pipe plug to which the strainer is attached from the tee. This strainer can be burned off if desired.

A three-way cock, Ref. 21, is placed in the line to make it possible to draw material from either the kettle or from some other tank at will, also to drain the pump and connecting hose without draining the kettle.

The handle, Ref. 23, on the three-way cock is removable. This is necessary in order to turn the valve key to produce any desired material flow of operation. The top of the valve key is marked  $\perp$  to indicate the position of the ports or openings in the key. Note the marks on the valve key shown in photo Fig. 10. In the position shown, the kettle and pump both drain. Turn the key  $1/4$  turn to the left to fill the kettle or drain the pump only ( $\top$ ), another  $1/4$  turn to the left will drain the tank only ( $\dashv$ ), a further  $1/4$  turn to the left will permit the material to flow from the tank to the pump ( $\perp$ ) to circulate while heating or spraying. The handle can be moved in any direction to set the key in the positions as shown.

The motor spray is equipped with an insulated metal hose. Be sure to remove and carefully drain the hose when job is finished. If material should congeal in the hose, it can only be thawed out with steam.

The flexible metal hose is tested and inspected at the factory. With a little care, it will last a long time. Do not STRETCH it, KINK it, run over it with Kettle or truck, or let it drag on the ground while you are moving the Kettle. Neither maker or ourselves will be responsible for any failures due to improper handling.

Hand Spray Bar. The hand spray bar is provided with wooden handles to protect the operator from the heat. One handle is directly connected to a shut-off cock, Ref. 11, which can be turned off at will.

The spray bar should be removed from the hose when not in use, and allowed to drain out completely.

### TO APPLY BITUMEN WITH MOTOR SPRAYER

To properly patch, the first step is to clean out the hole. Sweep out all dust, moisture and loose particles.

Next, with the motor sprayer and the proper material, spray the inside of the pot hole thoroughly. This is the prime coat.

It closes the sides of the hole and the bottom against water seepage. It also assures the patch of adhering to the parent materials in the road.

Third, fill the hole with small, dry, clean stones. Do this in two or three stages, depending on the depth of the hole, spraying each stage thoroughly to be certain all the particles are thoroughly coated. The pressure of the spray will penetrate two inches or so of stone, depending on the size.

Fourth, when the hole is level full, give it the last seal coat spraying, then scatter a few more chips over it, tamp it thoroughly until the top is level with the road. This last sprayed coat seals over the top of the patch and also seals the edges where it joins the surface of the existent road against breaking loose or raveling - also against seepage. The few pebbles scattered over the top prevent passing traffic from picking up the soft or unhealed bitumen; they give it a chance to set up without injury.

The motor spraying attachment also enables you to dress long stretches of shoulders, fill

cracks, paint coat large areas for sheet asphalt repairs, or surface treatment and seal coating.

The cock, Ref. 11, in the spray bar will quickly adjust the flow to suit conditions on any job.

When surface treating, the bar should be swung horizontally in an arc while the operator is moving, in order to apply the correct amount of bitumen.



PACKING & STORAGE

Fig. 11

Should it be necessary to pack these kettles for export shipment, the instructions in "Export Manual EM-100" should be followed.

The processing instructions in this Manual should also be followed if the kettles are to be placed in storage for a long time.



# TEMPERATURE CONVERSION TABLE— CENTIGRADE TO FAHRENHEIT

C	F	C	F	C	F
0	32.0	68	154.4	136	276.8
1	33.8	69	156.2	137	278.6
2	35.6	70	158.0	138	280.4
3	37.4	71	159.8	139	282.2
4	39.2	72	161.6	140	284.0
5	41.0	73	163.4	141	285.8
6	42.8	74	165.2	142	287.6
7	44.6	75	167.0	143	289.4
8	46.4	76	168.8	144	291.2
9	48.2	77	170.6	145	293.0
10	50.0	78	172.4	146	294.8
11	51.8	79	174.2	147	296.6
12	53.6	80	176.0	148	298.4
13	55.4	81	177.8	149	300.2
14	57.2	82	179.6	150	302.0
15	59.0	83	181.4	151	303.8
16	60.8	84	183.2	152	305.6
17	62.6	85	185.0	153	307.4
18	64.4	86	186.8	154	309.2
19	66.2	87	188.6	155	311.0
20	68.0	88	190.4	156	312.8
21	69.8	89	192.2	157	314.6
22	71.6	90	194.0	158	316.4
23	73.4	91	195.8	159	318.2
24	75.2	92	197.6	160	320.0
25	77.0	93	199.4	161	321.8
26	78.8	94	201.2	162	323.6
27	80.6	95	203.0	163	325.4
28	82.4	96	204.8	164	327.2
29	84.2	97	206.6	165	329.0
30	86.0	98	208.4	166	330.8
31	87.8	99	210.2	167	332.6
32	89.6	100	212.0	168	334.4
33	91.4	101	213.8	169	336.2
34	93.2	102	215.6	170	338.0
35	95.0	103	217.4	171	339.8
36	96.8	104	219.2	172	341.6
37	98.6	105	221.0	173	343.4
38	100.4	106	222.8	174	345.2
39	102.2	107	224.6	175	347.0
40	104.0	108	226.4	176	348.8
41	105.8	109	228.2	177	350.6
42	107.6	110	230.0	178	352.4
43	109.4	111	231.8	179	354.2
44	111.2	112	233.6	180	356.0
45	113.0	113	235.4	181	357.8
46	114.8	114	237.2	182	359.6
47	116.6	115	239.0	183	361.4
48	118.4	116	240.8	184	363.2
49	120.2	117	242.6	185	365.0
50	122.0	118	244.4	186	366.8
51	123.8	119	246.2	187	368.6
52	125.6	120	248.0	188	370.4
53	127.4	121	249.8	189	372.2
54	129.2	122	251.6	190	374.0
55	131.0	123	253.4	191	375.8
56	132.8	124	255.2	192	377.6
57	134.6	125	257.0	193	379.4
58	136.4	126	258.8	194	381.2
59	138.2	127	260.6	195	383.0
60	140.0	128	262.4	196	384.8
61	141.8	129	264.2	197	386.6
62	143.6	130	266.0	198	388.4
63	145.4	131	267.8	199	390.2
64	147.2	132	269.6	200	392.0
65	149.0	133	271.4	201	393.8
66	150.8	134	273.2	202	395.6
67	152.6	135	275.0	203	397.4

MC-2	Road Mix, Dense graded aggregate, max. dia. 1 inch, severe climate on open texture surfaces, also suitable for primer.	150-200 deg.F.
MC-3	Road Mix, Open graded aggregate, max. dia. 1 inch, high per cent pass 10 mesh, low per cent 200 mesh, also growing in popularity for use with macadam aggregate containing fair amount of fines.  Cold Laid Plant Mix, Dense graded aggregate max. dia. 1 inch, severe climate.	175-250 deg.F.
MC-4	Cold Laid Plant Mix, Open graded aggregate max. dia. 1 inch, high per cent pass 10 mesh, low per cent 200 mesh.	175-250 deg.F.
MC-5	Cold Laid Plant Mix, Open graded aggregate, max. dia. 1 inch, high per cent pass 1/4 inch, very little pass 200 mesh. Must be heated.	200-275 deg.F.
SC-1	Dust Layer	50-120 deg.F.
SC-2	Blotter or Mulch Treatment. Road Mix, Dense graded aggregate, max. dia. 1 inch, dry climate, cool weather.	150-200 deg.F.
SC-3	Road Mix or plant mix. Dense graded aggregate max. dia. 1 inch, dry climate, hot weather.	175-250 deg.F.
SC-4	Cold Laid Plant or Road Mix, Dense graded aggregate max. dia. 1 inch.	200-265 deg.F.

General Conversion Factors

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
U. S. Gallon	.8331	Imperial Gallon
U. S. Gallon	3.785	Liters
Liter	.2642	U. S. Gallon
Liter	.2201	Imperial Gallon
-----		
Square Yards	.8361	Square Meters
Square Meters	1.196	Square Yards
-----		
Meters	1.094	Yards
Yards	.9144	Meters
-----		
Feet per Minute	.01829	Kilometers per hour
Kilometers per hour	54.68	Feet per minute
-----		
Miles	1.609	Kilometers
Kilometers	.6214	Miles
-----		

Grades of Tar Recommended  
Their Uses and Application Temperatures

<u>Grade</u>	<u>Use</u>	<u>Application Temperatures</u>
RT-1	Soil stabilization and occasionally for prime coat.	60-125 deg.F.
RT-2	Prime coat for dense tight surfaces and for ordinary surfaces in cool weather, mastic cushion under brick pavement in cool weather and soil stabilization.	60-125 deg.F.
RT-3	Prime coat for ordinary surfaces in hot weather, mastic cushion under brick pavement in cool weather, surface treatments and soil stabilization.	80-150 deg.F.
RT-4	Prime coat for open surfaces in hot weather, surface treatments and soil stabilization.	80-150 deg.F.
RT-5	Surface treatment, mulch treatment in cool weather, mastic cushion in warm weather and soil stabilization	80-150 deg.F.
RT-6	Surface treatment, mixed in place construction in cool weather, mulch treatment in warm weather and soil stabilization.	80-150 deg.F.
RT-7	Surface treatment, mixed in place construction in cool weather, mulch treatment in warm weather and sand mix in cool weather.	150-225 deg.F.
RT-8	Surface treatment, mixed in place construction in warm weather, sand mix in warm weather and plant mix.	150-225 deg.F.

RT-9	Surface treatment, mixed in place construction in warm weather, sand mix in warm weather, and plant mix.	150-225 deg.F.
RT-10	Surface treatment, plant mix, hot patch and crack filler.	175-250 deg.F.
RT-11	Crack filler, penetration in cool weather, plant mix and hot patch.	175-250 deg.F.
RT-12	Penetration in warm weather and plant mix.	175-250 deg.F.
RTCB-5	Cold patch in cool weather, surface treatment, road and plant mix when desired to use a cold application and quick-setting binder.	60-120 deg.F.
RTCB-6	Cold patch in warm weather, road and plant mix.	60-120 deg.F.

Asphaltic Road Materials  
Recommendations of Asphalt Institute

<u>Grade</u>	<u>Use</u>	<u>Application Temperatures</u>
RC-1	Seal, thin carpet coat with mineral cover. Not a primer.	80-125 deg.F.
RC-2	Cold Patch. Road Mix, open or Macadam Aggregate.	100-175 deg.F.
RC-3	Cold Patch. Road Mix, open or Macadam Aggregate.	150-200 deg.F.
RC-4	Cold Laid Plant Mix, Macadam Aggregate.	175-250 deg.F.
MC-1	Primer - not intended to hold a cover of chips or gravel.	50-120 deg.F.

Keep tires inflated to 40 lbs. recommended pressure.

## HOW TO MOUNT AND DEMOUNT TIRES

Mounting: Carefully inspect the tire and tube to make certain that no foreign materials such as wrapping paper, sand, etc., are present.

Inflate the tube until rounded to facilitate handling, and insert it in the tire. When using a tube on which the valve is mounted off-center, be sure that the valve will be on the proper side of the wheel.

Inspect the tube to detect any folds or buckles that might cause damage when the tire is inflated. Insert the valve through the hole in the rim and apply the first bead by pushing a portion of it into the well and then working the remaining part over the flange (see Fig. 1). Pull the valve from the outside until the base is against the rim surface.

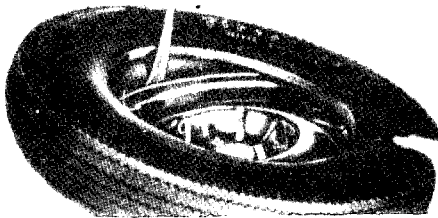


Fig. 1. Work tire bead over flange.

To apply the second bead, force the portion opposite the valve down into the well of the rim and with tire tools work the remainder of the bead over the flange, alternating from right to left to prevent the tire from creeping on the rim (see Fig. 2). Make certain that the beads are out of the well, and in position to seat properly against the flange,

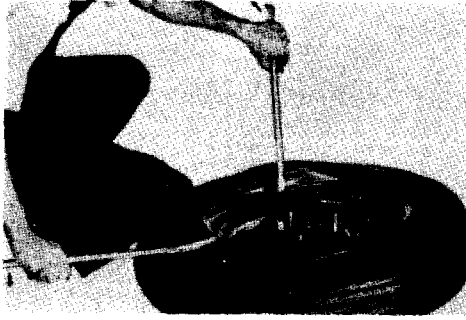


Fig. 2. Use 2 tire tools to work rest of bead over flange.

then pull the valve out so as to hold the base snugly against the rim; and while holding it in this position, inflate the tire until both beads are properly seated, with the centering ribs (when marked on the tire) showing evenly above the rim flange. The tube should be completely deflated to allow for adjustment of position and then again inflated to the recommended pressure for use.

Demounting: To demount the tire, completely deflate by removing the valve core and with the tire tools force the beads loose from the seats. Press the portion of one bead opposite the valve into the well of the rim and then start at the valve and remove the first bead, using the advantage offered by the well to facilitate removal (see Fig. 3).

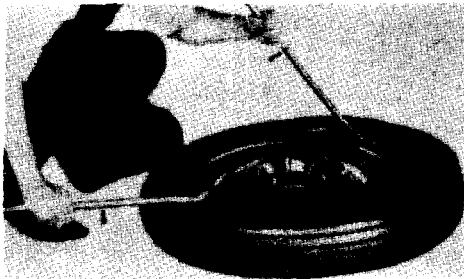


Fig. 3. Force the beads loose from the seats.

Next, remove the tube from the tire and place the tire and rim in a flat position so that the free bead is on the underside.

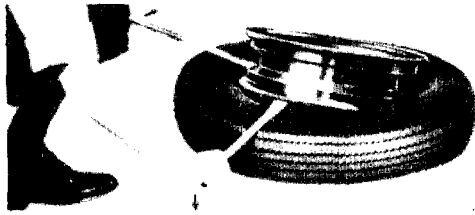


Fig. 4. Force the second bead up from the rim.

With one tire tool, force a section of the second bead up from the rim and by using a second flat tire tool as a lever between the rim and the bead, the rim can be freed from the tire with little difficulty (see Flg. 4).

When mounting or demounting tires, do not use excessive force which may damage the tire or tube. Take small "bites" with the tire tools and use the advantage offered by the well to relieve pressure on the tire.



## NOTES

**SECTION III**  
**MAINTENANCE MANUAL**

## SECTION III

### MAINTENANCE MANUAL

#### 1. LUBRICATION

Engine - Use OE-30 above 32 degrees, OE-10 below 32 degrees F. Add oil regularly. An engine which is run without oil will be ruined within a few minutes. To avoid the possibility of such an occurrence, and the expense which may be involved, always fill the crankcase at the oil filler plug, to the overflow point after each four (4) hours of operation. Capacity of crankcase, 1/2 quart.

Change oil. Drain oil after thirty-two (32) hours running and refill with new oil. Do not flush crankcase with kerosene as some kerosene will be trapped in pockets of the crankcase and when oil is added, this kerosene will dilute or thin the new oil. Draining the oil while the engine is warm will accomplish all that flushing with kerosene can do in the removing of sediment or dirt.

Gear Reduction - Use engine oil. Keep filled to proper height. Change every 128 hours. Capacity, 1/3 quart.

Clutch - Oil throwout collar every 16 hours. Use engine oil.

Chassis - Grease spring hangers (8 fittings) every 1000 miles. Use WB-2. Repack wheel bearings every 5000 miles. Use WB-3.

Miscellaneous - Screws and hinges should be oiled occasionally.

#### 2. CLUTCH REPAIRS

The clutch must be removed from the pump shaft. This should be done as follows:

1. Close valve on engine gasoline strainer. Remove tube coupling nut from strainer fitting.

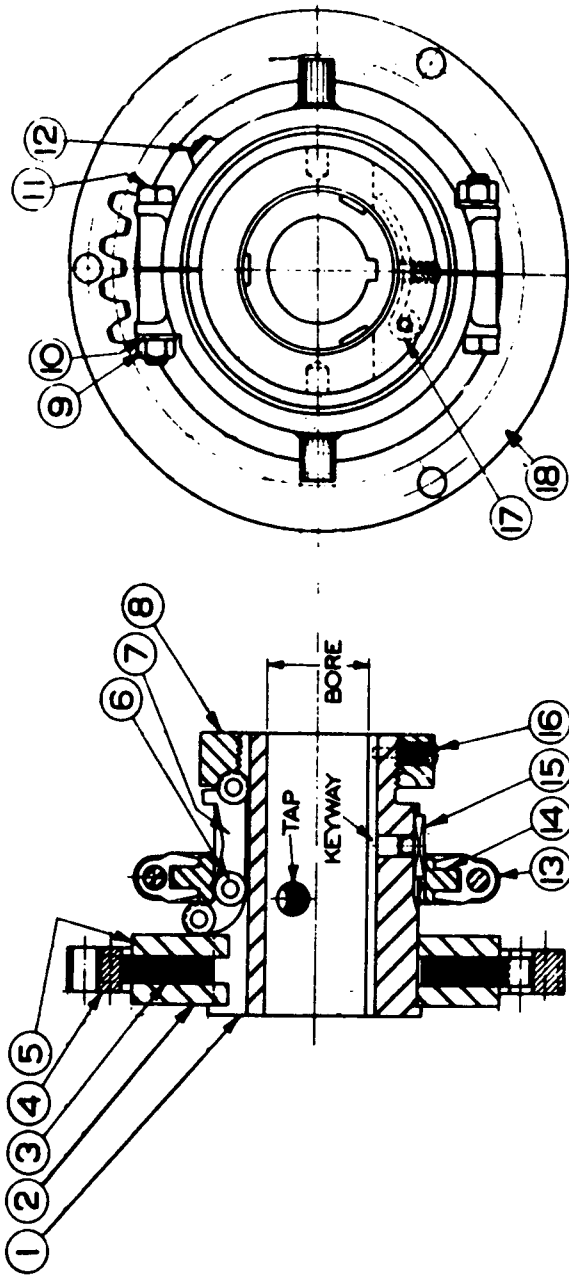


Fig. 12. Cross Section of Clutch

2. Remove 4 bolts holding engine to base.
3. Slide engine away from clutch so the drive plate is disengaged from the drive ring. Be careful that the pilot bearing does not drop down inside the housing. If it does, remove it from the housing; however, if it remains on the pump shaft, it must be removed.
4. Remove set screw holding clutch hub to the pump shaft and slide clutch assembly off the shaft.
5. After repairs are made, reverse these operations to assemble these parts.

To install new clutch levers and rollers, disengage clutch. Loosen set screw #16 with a screw driver and remove adjusting nut #8, being careful not to lose the lock spring which is on the inside of this nut. The levers #7 and sleeve collar assembly #13 can now be slid off the hub. After worn parts are replaced, it will be necessary to install the levers and wedge sleeve at the same time. This can easily be done if the levers and rollers are set in the grooves at an angle, so the outer ends of the levers will clear the inside of the wedge sleeve in the sleeve collar assembly. Pushing this assembly onto the hub will bring the levers and rollers into place against the clamping plate.

To install new clutch, drive plates, follow instructions for removing levers and rollers. Then remove the sleeve key and the clamping plate #5 and the drive plate #3 can slide off the hub. Replace all worn parts and reassemble clutch by reversing the operations just given, and follow those for installing levers above.

To adjust the clutch, disengage the clutch. Loosen set screw #16 with a screw driver, and turn adjusting nut #8 to the right (clockwise) until it requires a distinct pressure to engage clutch and the collar snaps into place. The clutch will require adjustment if it slips or does not pull the load, heats or the operating lever jumps out.

Lubricate throw-out collar (#13) after assembly. Use CG-1.

### 3. PUMP REPAIRS

This pump has only two moving parts, the rotor, and the idler, and will usually require little service beyond an occasional tightening of the stuffing box gland nuts, whenever the bitumen drips off the stuffing box.

Do not make this gland too tight but set it to keep a ring of material around the shaft to keep this part lubricated.

A worn pump will be indicated by excessive end play of the shaft when the stuffing box gland is loose enough to move the shaft in and out of the gland. If the shaft moves more than 1/64", the pump head should be removed and one head gasket should be taken out, or a thinner gasket should be used to reduce the clearance between the pump head and the rotor.

### 4. RELIEF VALVE on pump head.

If the pump does not produce the proper amount of bitumen at the spray nozzle, the trouble may be due to an air leak in the lines to the suction or inlet of the pump. If no hissing noise can be detected at any of these joints, there are probably no leaks bad enough to cause any trouble and the relief valve should be checked to see that the valve poppet is seating properly. Dirt may get under this seat and hold the valve open, permitting the bitumen to go from one side of the pump to the other side continuously instead of going to the spray nozzle.

The relief valve spring may have lost its tension or the spring adjustment may be too low, causing the poppet to seat improperly.

## 5. THREE-WAY COCK - Ref. 21

This is made with a tapered plug held in place by a washer and nut. Tighten up this nut, turn to the right or clockwise, until leak stops.

## 6. OIL BURNER

If the vaporizing coil fills with carbon, the coil must usually be replaced. To remove the coil, it is necessary to remove bolts in the hinged cover from the shell, then remove pan bolts from shell and head. Remove control valve. Now loosen set screw and lock nut, so coil tube can slide through the head. The plug (or tip) holder can now be unscrewed from the coil. Next, slide the coil out of the shell.

Clean carbon out of the plug holder before installing on to new coil.

To assemble the burner, follow the above steps in reverse order. Be sure that the burner plug orifice centers with the mixing tube in the shell. Before tightening the set screw, check the centering again and line up the hole in the plug to center with the mixing tube.

Burner Valve: Clean strainer or burner valve after each 64 hours use. Remove strainer plug, Ref. 10, at least once a week and remove any dirt accumulated in it.

## 7. FUEL TANK

If oil squirts back out of the air pump, it is an indication of either a bad check valve disc, or spring, at the bottom of the pump. The pump must be removed from tank to provide access to these parts. Use a 36" monkey wrench to unscrew the pump, turning from right to left (counter-clockwise). The valve cage has two holes in it to admit air into the tank. This cage should be removed to inspect the seat, removing any dirt.

If the disc is worn, or the spring broken, they should be replaced with new parts.

## 8. KETTLE

The bottom of the inside tank should be kept free of sediment as coke or hard carbon will be formed. This carbon will cause the steel to buckle or burn out quickly. The Kettle should be drained weekly while still warm so the tank bottom can be inspected after removing the separating screen. The sediment should be scraped off the bottom while the Kettle is still warm.

If the bottom of the inside melting tank on the Kettle should burn out, it can easily be repaired by welding a patch plate or section in the bottom.

The inside melting tank should be removed from the Kettle. This can easily be done by disconnecting the flexible suction hose, removing the pipe nipple and valves. Then remove the few bolts in the hinged cover and those which support this melting tank inside the furnace shell.

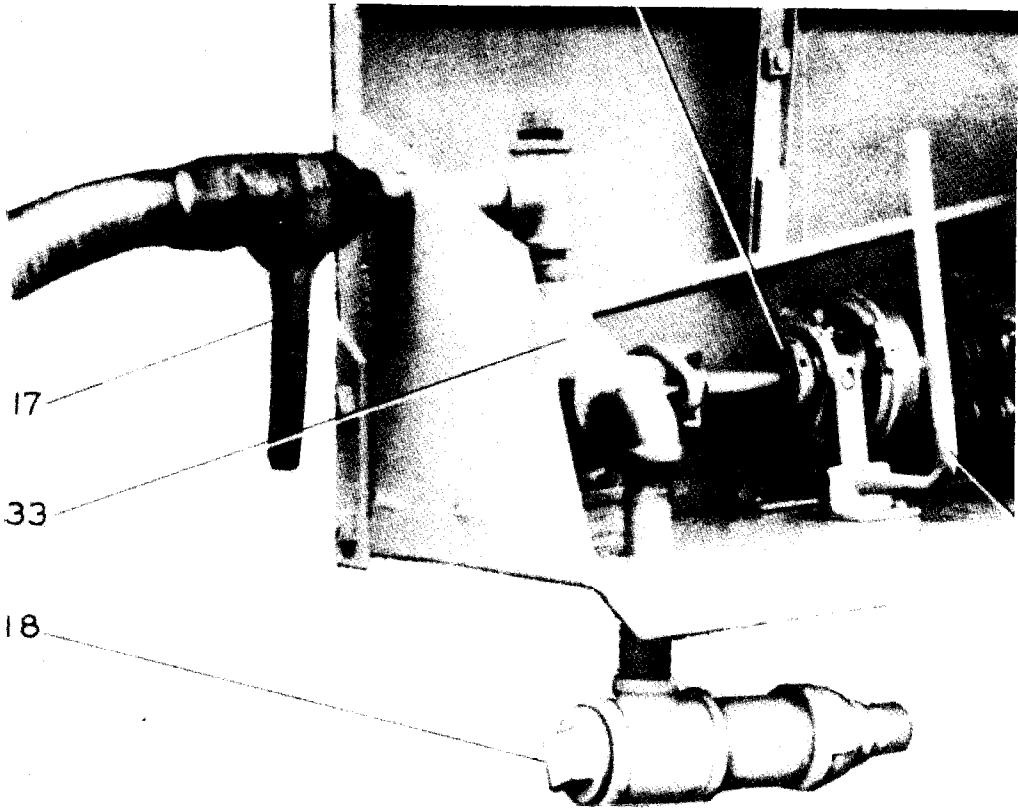
If a hoist or crane is not available, lower the back end of the tank to the ground and stand Kettle up on end so the tank can slide out of the shell. After the tank has been removed, the V shaped separating screen should be taken out and the bitumen residue should be cleaned or burned out before any repairs are made.

Lap welded patch plates are not recommended. The damaged section should be removed with a cutting torch. The patch plate should be made of #10 U.S.S. Gauge steel rolled to 16" inside radius and butt welded inside and out, to undamaged portions of the old bottom.

After bottom is repaired, install inside tank, screen, cover, piping and hose by reversing the above operations.

Remove the plug, Ref. 18, at least once a week and clean out the strainer either by washing in fuel oil or gasoline, or place strainer in a fire to burn off the accumulated dirt.

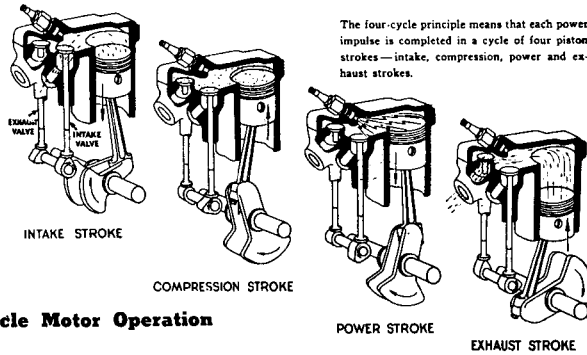




## 9. RUNNING GEAR

Fig. 13

This is a very simple conventional design and the springs or axle can easily be removed when necessary, by blocking the Kettle solidly at front and rear after raising the Kettle to take the weight off the wheels and then remove four bolts holding each part in place. The wheels can easily be removed by putting a jack under the axle to raise the wheel off the ground. Remove the grease cap, cotter pin, castellated nut, and outer washer. Then pull the wheel off the axle. The outer bearing cone will also come off the axle, and care should be used not to lose this or get it dirty. When replacing the wheel, turn the castellated nut as tight as possible, and then turn it back about one-quarter turn until slot lines up with hole in axle. Install new cotter pin through slot and hole to keep nut tight.



**Details of Four-cycle Motor Operation**

This Lauson Engine operates on the conventional four (stroke) cycle principle, as follows:

Intake Stroke - The piston starts at the top. Intake valve is open; exhaust valve closed. The downward stroke of the piston creates a vacuum or suction which draws the gasoline vapor from the carburetor through the open intake valve port, filling the cylinder with gasoline vapor when the piston reaches the bottom.

Compression Stroke - The piston starts at the bottom. Intake and exhaust valves are closed. The upward stroke of the piston compresses the gasoline vapor into the small space left at the top of the cylinder above the piston when it reaches the top of the stroke.

Power Stroke - The piston starts at the top. Intake and exhaust valves are closed. At this point, high tension current from the magneto is released at the spark plug, firing or exploding the compressed gasoline vapor, driving the piston downward - creating the actual power to carry through the other strokes.

Exhaust Stroke - The piston starts at the bottom. Exhaust valve is open; intake valve closed. The upward stroke of the piston forces all of the burnt, spent gases out of the cylinder through the open exhaust valve port. At the top of the stroke, the cylinder is entirely cleared of the old gases and ready for the start of a new cycle.

A New Cycle - At this point, a completely new cycle begins.

**SECTION IV**  
**ENGINE INSTRUCTIONS AND**  
**MAINTENANCE MANUAL**

## ENGINE INSTRUCTIONS

Before starting engine, remove plugs, see page 38. Fill crankcase and gear reduction to overflow point with oil. Use OE-30 (SAE No. 30) above 32 degrees, OE-10 (SAE No.10) below 32 degrees. A heavier oil must not be used. Crankcase holds 1/2 quart; gear reduction holds 1/3 quart. Replace plugs.

Remove filler cap on gas tank. Fill the tank with gasoline. The use of a high test gasoline will decrease the carbon deposits and prolong the life of the engine. Use high test gasoline. Use only clean gasoline from a clean container and use a clean funnel. DO NOT MIX OIL AND GASOLINE. Replace cap.

100 Octane gasoline should not be used continuously in this engine, because it is not designed for its use, but 100 Octane gasoline can be used for very short periods as an emergency fuel.

Fill the oil bath air cleaner, as instructed, level with bead on the body. Use engine oil.

How to Start - Pull up on the choke rod attached to the carburetor to close the air intake. Crank the engine with a quick pull on the handle of the starter. After the motor starts, gradually open the choke lever until the engine runs smoothly with the choke wide open. The needle valve on the carburetor has been set at the factory and does not require adjustment unless it has been tampered with.

Caution - Never run the engine continuously with the choke partially closed.

Failure of Engine to Start - If engine fails to start after a reasonable number of trials, do not make any adjustments until you have read the instructions on page 41.

How to Stop - To stop the engine, press down stopping clip on spark plug, holding down clip until engine comes to complete stop.

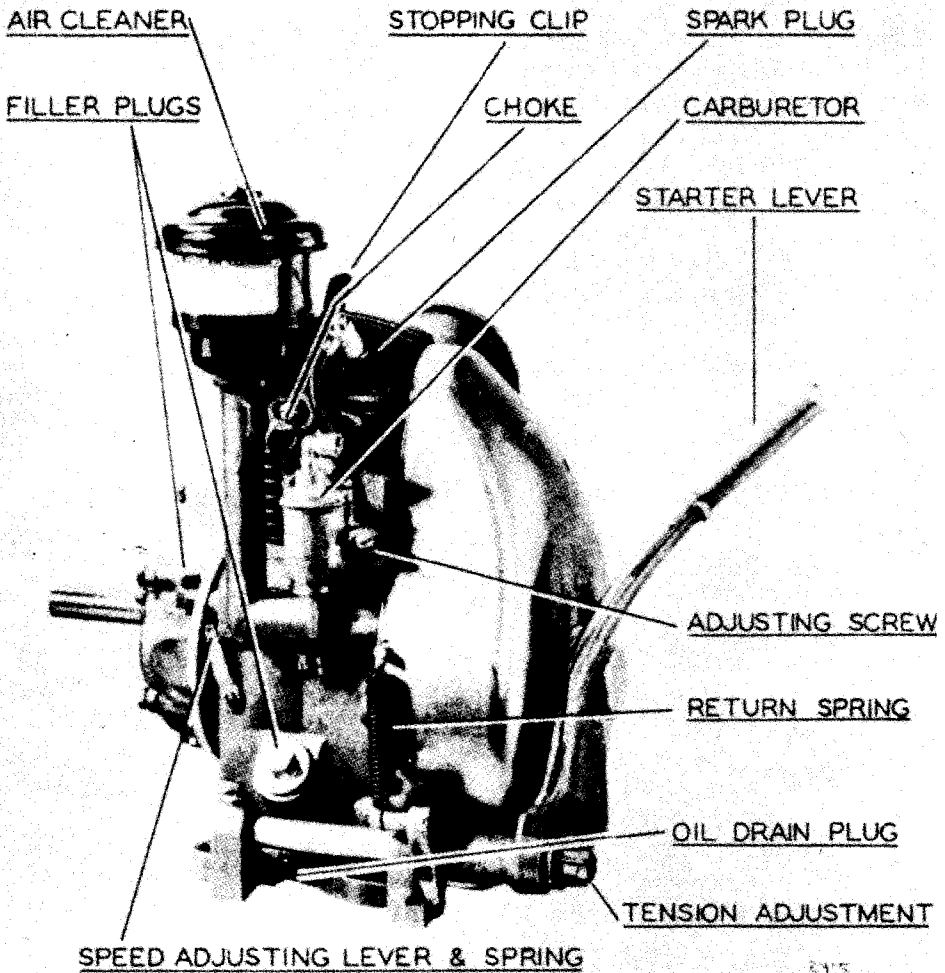
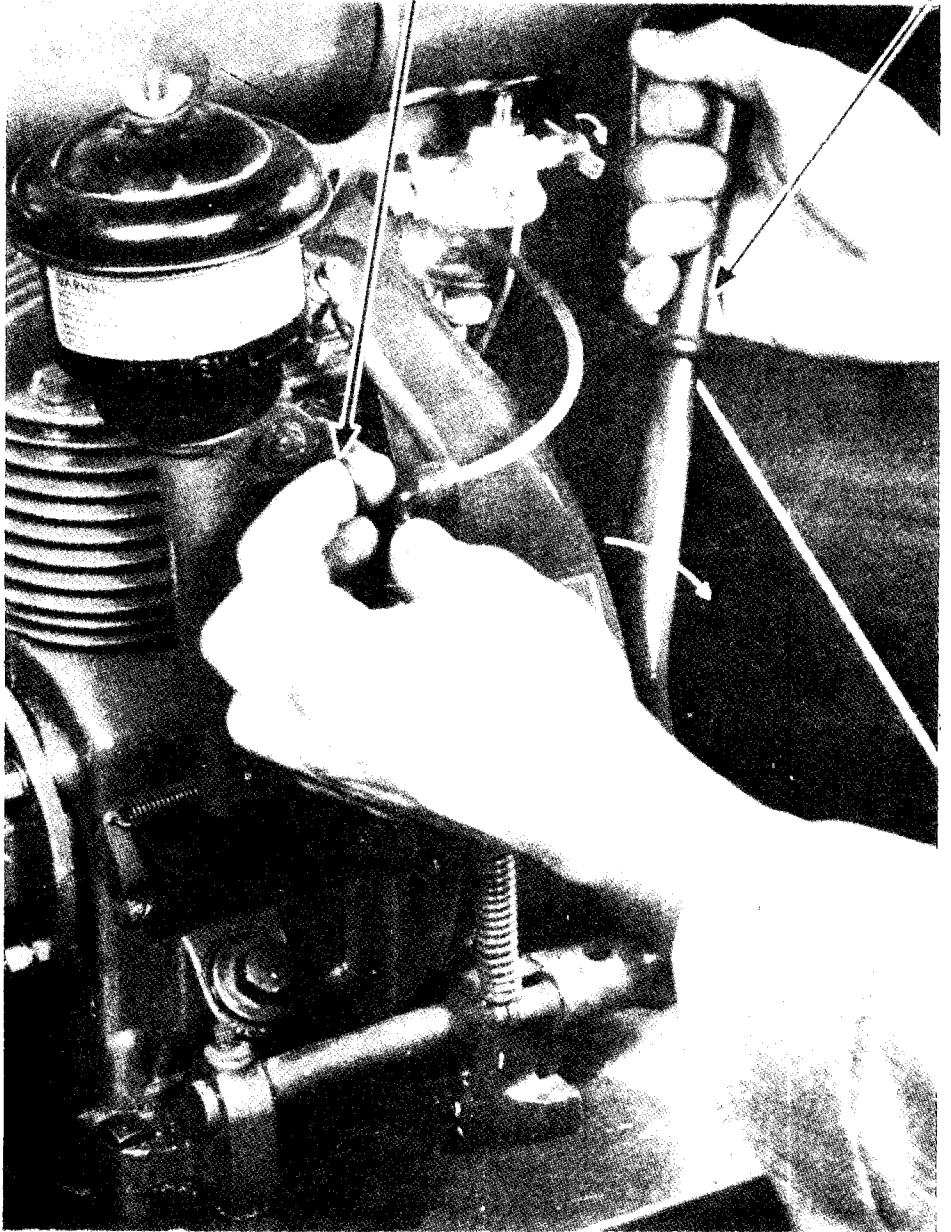


Fig. 14

PULL UP TO CHOKE

QUICK PULL ON  
LEVER TO CRANK



STARTING ENGINE

Fig. 15

General - Your engine will give you better service if you do not tinker with it. This does not mean, however, that it does not require a certain amount of attention. Use the recommended fuel, oil, and care specified in this list of instructions. Keep it clean, both inside and out, and you will have many years of trouble-free service from it.

If you should experience any difficulty, consult the instructions referred to in the service chart on page 41.

Use Right Kind of Oil - Keep the crankcase full of oil. This Lauson Engine is lubricated with a combination pump and splash system. The oil is pumped from the engine base to an oil pan and the long dipper on the end of the connecting rod throws or splashes the oil from this pan through all working parts of the engine. This system gives positive lubrication as the oil splash pan will always be full of oil providing the pump is working properly. See page 67.

Add Oil Regularly - An engine which is run without oil will be ruined within a few minutes. To avoid the possibility of such an occurrence, and the expense which may be involved, always fill the crankcase at the oil filler plug, to the overflow point after each four (4) hours of operation. Capacity of crankcase, one pint.

Change Oil - Drain oil after thirty-two (32) hours running and refill with new oil. Do not flush crankcase with kerosene as some kerosene will be trapped in pockets of the crankcase and when oil is added, this kerosene will dilute or thin the new oil. Draining the oil while the engine is warm will accomplish all that flushing with kerosene can do in the removing of sediment or dirt.

## TROUBLE CHART

### ENGINE HARD TO START:

1. No gasoline in tank.
2. Gasoline flow obstructed.
3. Water in fuel supply
4. Loose or defective wiring.
5. Spark plug cracked.
6. Spark plug fouled.
7. Improper gas mixture.
8. Throttle valve stuck.
9. Defective magneto (See instructions above)
10. Intake manifold leaking.
11. Valve seats bad.
12. Valve sticking.
13. Improper timing.

### ENGINE MISSING:

1. Spark plug fouled.
2. Spark plug cracked.
3. Spark plug gap wrong  
(correct gap .018 to .020).
4. Defective wiring.
5. Ignition breaker points sticking.
6. Cylinder head gasket leaking.
7. Valve tappets improperly adjusted  
(correct clearance .008" to .010"  
when hot).
8. Valves warped or broken.

### ENGINE OVERHEATING:

1. Spark retarded too far.
2. Carburetor choke valve partly closed.
3. Improper gas mixture.
4. Improper timing.
5. Valves leaking.
6. Oil badly diluted.
7. Lack of oil.

### ENGINE LACKS POWER:

1. Valve seats worn,
2. Piston rings weak or worn.
3. Piston rings sticking.
4. Improper gas mixture.
5. Improper timing.
6. Air cleaner needs cleaning.
7. Governor or throttle loose.
8. Oil badly diluted.

### EXPLOSION IN EXHAUST PIPE:

1. Ignition too late.
2. Weak spark.



3. Valves holding open.
4. Exhaust valves warped.

#### ENGINE KNOCKS:

1. Carbon in cylinders.
2. Loose main bearing.
3. Loose rod bearing.
4. Worn pistons and cylinders.
5. Loose valve lifters.
6. Motor overheated.
7. Tight pistons.
8. Loose flywheel.
9. Lack of oil.

#### FAULTY CARBURETION:

1. Carburetor improperly adjusted.
2. Valve leaking.
3. Intake manifolds leaking.
4. Gaskets leaking.
5. Shut off valve closed.
6. Using too much fuel.
7. Water in fuel.
8. Sediment in fuel tank.

#### EXCESSIVE SMOKE FROM EXHAUST:

1. Too much oil in crankcase.
2. Carburetor needle valve open too far.
3. Carburetor float sticking or leaking.
4. Lubricating oil too thin to seal  
pistons.

#### BACKFIRE THROUGH CARBURETOR OR INTAKE MANIFOLD:

1. Gas mixture too lean.
2. Intake valves sticking.
3. Cylinder head gasket leaking.
4. Intake valve springs weak.
5. Intake manifold leaking.
6. Intake valves warped or broken.
7. Intake tappets set too close.
8. Incorrect timing.

#### POOR COMPRESSION:

1. Valves not seating.
2. Valves sticking.
3. Cracked spark plug.
4. Valve tappets set too close.
5. Piston rings worn or broken.
6. Worn piston and cylinder.
7. Piston rings sticking.
8. Loose spark plug.
9. Cylinder head loose.
10. Cylinder head gaskets leaking.
11. Oil too thin to seal pistons.
12. Scored cylinders.

## MOTOR STOPS

1. Out of Gasoline.
2. Out of oil.
3. Dirt or gum in fuel system.
4. Motor overheated.
5. Motor overloaded.
6. Spark plug fouled.
7. Breaker points together.
8. Condensor failure.
9. Valve stem tight in guide.
10. Carbon under valve seats.
11. Broken valve spring.

## MAINTENANCE

Proper maintenance of this engine will add greatly to its life and performance. Check oil frequently and keep to the proper level.

Remove carbon at regular intervals. Use only good grade white gasoline if possible. Keep the spark plug gap at the proper distance.

## NORMAL FACTORY CLEARANCE of New Motors

Valve Clearance	.008"
Breaker Point Clearance	.020"
Spark Plug Gap	.020"
Crank Pin Bearing	.001" -.0015"
Piston Pin Bushing	.0002"-.0008"
Piston Ring Gap	.010" -.015"
Valve Stem	.002" -.0025"
Piston Clearance	.0045"-.0065"
Piston Pin Hole in Piston	.0001"-.00015"
Rocker Arm Stud	.001" -.0015"
Camshaft	.001" -.0015"

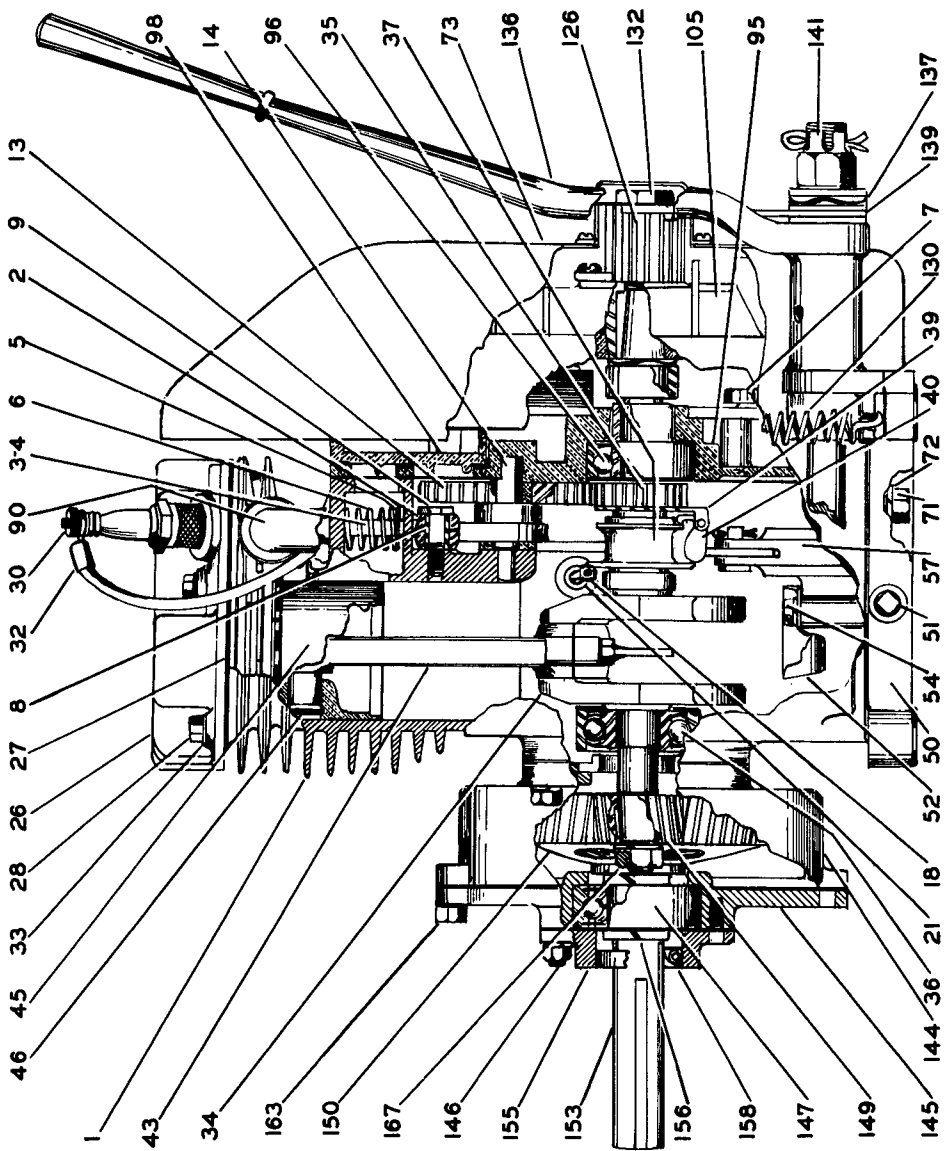


Fig. 16. Cross Section of Engine

## SECTIONAL VIEW

- |                               |                           |
|-------------------------------|---------------------------|
| 1. Cylinder                   | 39. Yoke, Governor        |
| 2. Arm, Valve Rocker          | 40. Weights, Governor     |
| 3-4. Valves, Intake & Exhaust | 43. Connecting Rod        |
| 5. Washer, Valve Spring       | 45. Piston & Pin          |
| 6. Spring, Valve              | 46. Ring, Retainer        |
| 7. Stud                       | 50. Base, Engine          |
| 8. Sleeve, Rocker Arm Stud    | 51. Plug, Drain           |
| 9. Stud, Rocker Arm           | 52. Pan, Oil Splash       |
| 13. Cam & Gear                | 54. Nut, Oil Pump         |
| 14. Shaft, Cam & Gear         | 57. Pump, Oil             |
| 18. Shaft, Governor Throttle  | 71. Screw, Base           |
| 21. Bearing, Throttle Shaft   | 72. Washer, Lock          |
| 26. Head, Cylinder            | 73. Housing, Blower       |
| 27. Gasket Cylinder Head      | 90. Carburetor            |
| 28. Screw, Cylinder Head      | 95. Plate, End Bearing    |
| 30. Plug, Spark               | 96. Bearing, Ball         |
| 32. Clip Terminal             | 98. Plate, Cover          |
| 33. Washer, Lock              | 105. Flywheel Magneto     |
| 34. Crankshaft                | 126. Gear, Starter        |
| 35. Gear, Crankshaft          | 130. Spring, Lever Return |
| 36. Bearing Crankshaft Ball   | 136. Lever, Hand Starter  |
| 37. Collar, Governor          | 137. Washer, Wave         |

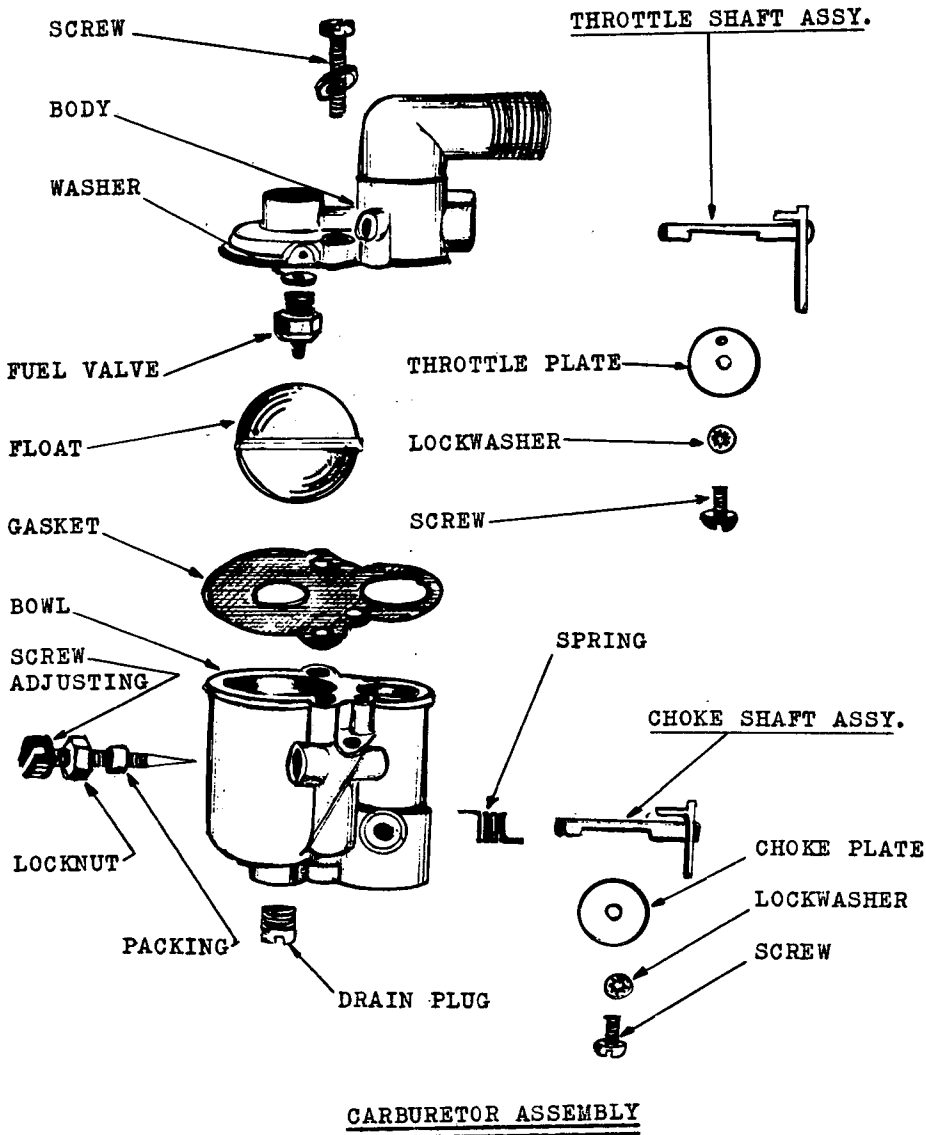


Fig. 17

### To Adjust Carburetor

This carburetor has only one adjustment, the needle valve. It has been carefully adjusted at the factory for best results, and further adjustment should not be necessary. It may, however, have been tampered with during shipment and the proper adjustment lost. In such a case, it should again be adjusted.

Completely close the needle valve by turning to the right, or clockwise, as far as possible. Do not screw up too tight or use force when closing needle valve as the seat or taper of the needle valve may become damaged. From closed position, open needle valve one complete turn, after motor has been started and warmed up and the choke wide open, make final adjustment by closing needle valve to a point at which engine operates most satisfactory under full load.

### To Clean Carburetor

Close shut-off valve on the strainer. Remove the two screws holding fuel bowl and clean out bowl. Remove needle valve assembly. Be sure that fuel jet is open. (Never screw needle valve too tight on seat.)

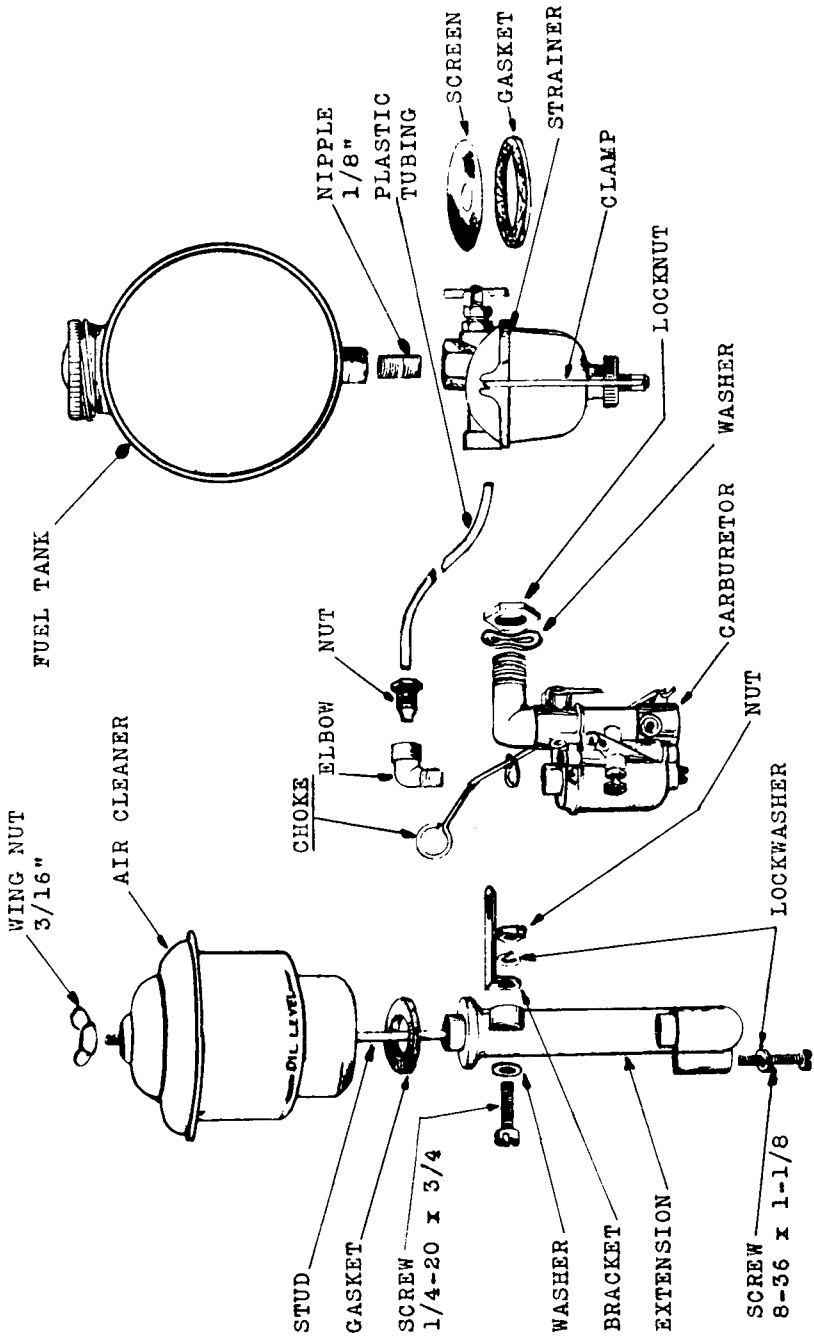
### To Clean Gasoline Strainer

Close the shut-off valve. Turn thumbwheel counter-clockwise until wire clamp assembly will clear the glass bowl while holding the bowl with one hand to keep it from falling off the cover. Clean out sediment.

Inspect strainer and remove any dirt or gum accumulated on it. A hard deposit of gum can be removed with acetone or other similar solvent.

### Governor - Correct Motor Speed

The speed of the model RS engine is automatically maintained under varying loads by a mechanical flyball governor. It is operated



FUEL SYSTEM

Fig. 18

by small weights which swing out by rotation of the crank shaft. The governor was carefully adjusted at the factory to maintain normal speed (2400 revolutions per minute) under load. Do not re-adjust unless absolutely necessary. To adjust speed, move governor speed adjusting lever in direction to increase the tension of the governor spring. Releasing the tension of the governor spring decreases the speed. Be sure governor speed adjusting lever screw is tight after making adjustment. See Fig. 19.

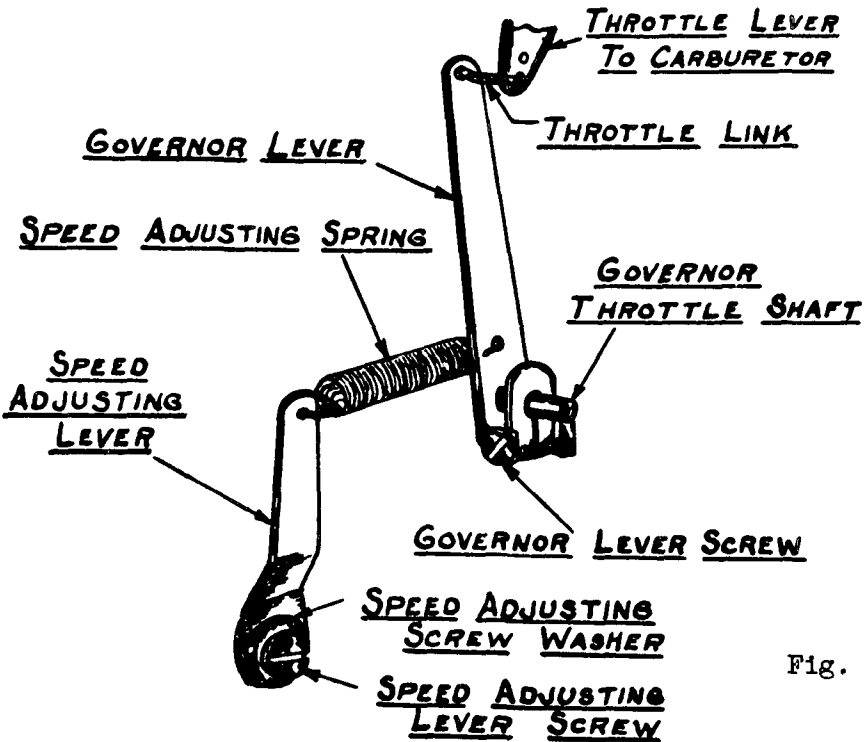


Fig. 19

### The Governor Throttle Shaft

The governor throttle shaft is mounted in the crankcase across the crankshaft. It is an offset shaft. The off-set part of the shaft bearing against the governor collar so that the movement of the governor collar will tend to rotate the governor throttle shaft moving the governor throttle lever on its end which controls the engine speed through its connection to



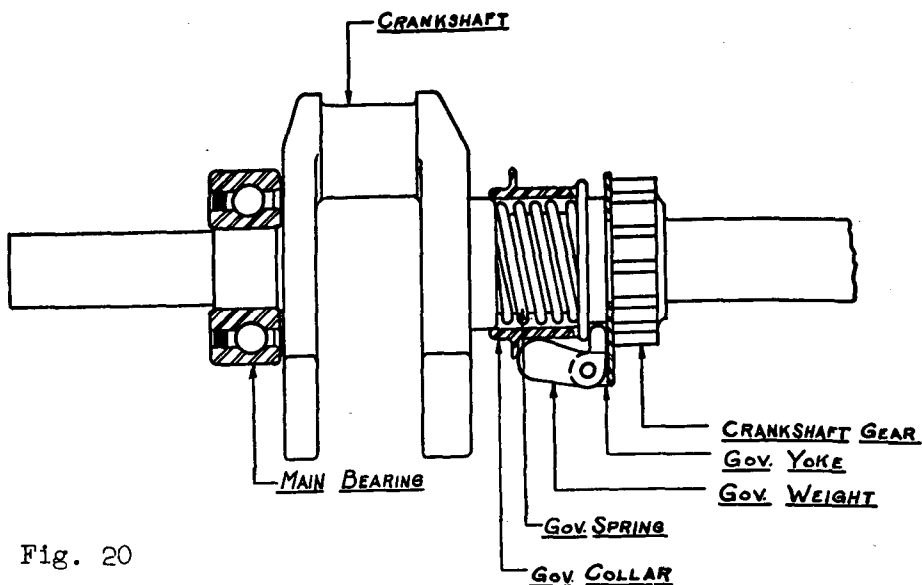


Fig. 20

the carburetor throttle. To remove the governor throttle shaft, it is necessary to first remove the governor throttle lever. Then loosen and remove the governor throttle shaft bearing which holds it in place on the opposite sides of the crankshaft. By removing the governor shaft bearing, the governor throttle shaft can be removed through the throttle shaft bearing opening. In re-assembling the governor throttle shaft, caution should be taken to properly place governor throttle shaft in its correct position. To do this, when inserting the governor throttle shaft through the bearing opening in the crankcase, the off-set part of the throttle shaft should be turned toward the crankshaft and placed so that it rests against the governor collar. The bearings then may be placed on the governor throttle shaft, and tightened in place. After re-assembling the governor throttle lever on the governor throttle shaft, the governor should again be properly adjusted. See subject on Governor Adjustment-External and Internal.

### Internal Governor Adjustment

The governor assembly on the crankshaft consists

of a governor spring, collar, weight and yoke assembly. This is held in position on the crankshaft by the crankshaft gear which is pressed in place on the shaft against the governor weight yoke and shoulder of the shaft. A broken governor weight spring or a sticking governor collar in which the spring is placed may be the cause of the governor not operating properly. The governor collar should snap back after depressing it against the spring. Failing to do so may indicate a broken spring or a sticking condition. To replace the governor weight spring, it is necessary to remove the crankshaft gear by inserting a screw driver or wedge between the governor collar shoulder and the governor yoke, prying the gear off the crankshaft. In re-assembling the governor assembly, it is important that the small arms of the governor weight rest against the edge of the governor collar and that the governor weight yoke and crankshaft gear are in position on the woodruff key in the crankshaft. The crankshaft gear should be tight against the yoke and shoulder of the shaft. (See diagram Fig. 21.)

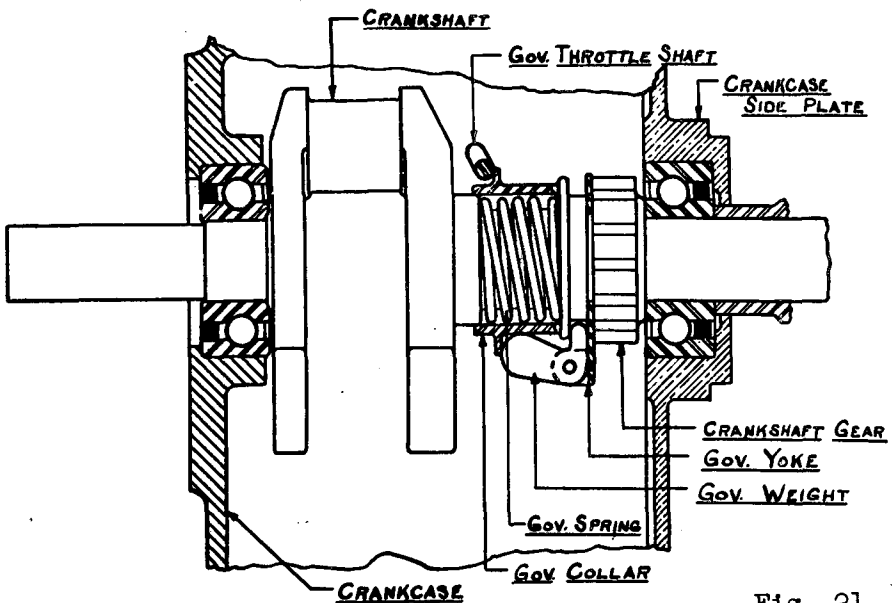


Fig. 21

## External Governor Adjustment

To correctly adjust the governor, the governor throttle lever must be connected to the carburetor throttle lever, and the adjustment spring must be hooked in its position in governor throttle lever, so that it will be in its farthest position from the carburetor, due to the spring tension. Loosen the governor throttle lever locking screw which will permit the governor throttle shaft to turn in the governor throttle lever. Grasp the end of the governor throttle lever shaft with a pair of pliers turning to the left or anti-clockwise as far as it will turn. Then tighten the governor throttle lever screw. This will then permit the governor weight and yoke assembly inside the engine to control a full working range of the governor throttle lever. The speed of the engine is changed by moving the governor speed adjusting lever in the direction to increase spring tension, away from the carburetor, and increasing the engine speed, moving the lever in the direction to decrease the spring tension, toward the carburetor, will decrease the speed of the engine. Be sure to tighten the speed adjusting lever screw.

The proper engine speed is 2400 revolutions per minute.

## Magneto-Ignition System

The spark is produced by a high tension magneto. This is a simple self-contained system which is very reliable. The ignition current is sent into the engine cylinder through the ignition cable and spark plug. The magneto itself as well as the cable and spark plug, must all be in proper condition and adjustment to insure a good hot spark. There is only one simple adjustment necessary to get ignition in the magneto, the adjustment of the contact points. This should be done by an experienced mechanic as it is necessary to remove the flywheel. See page 54

## To Check for Spark

To find whether a proper spark is being delivered by the magneto or battery ignition breaker system, remove the ignition cable from the plug. Hold ignition cable terminal about 1/8" from the metal body of the plug. (CAUTION: Keep hand on insulated part of the cable to avoid a shock.) Turn engine over with starter, and if the spark jumps this gap the entire ignition system, with exception of the spark plug, is O.K. See Fig.22. If no spark, check cable, and refer to page 54.

## Spark Plug

Spark plugs should be cleaned occasionally and points reset to twenty thousandths (.020"). Points burn away in service. The porcelain is to prevent the spark from jumping anywhere except at the gap, and if cracked or broken, it will prevent plug firing. Water or moisture on the outside of the spark plug may permit the high voltage current to leak or jump over the surface of the open part of porcelain. Dirt or carbon on it will do the same thing. Always keep a new plug on hand. We recommend use of a Champion No. J-8 or its exact equivalent.

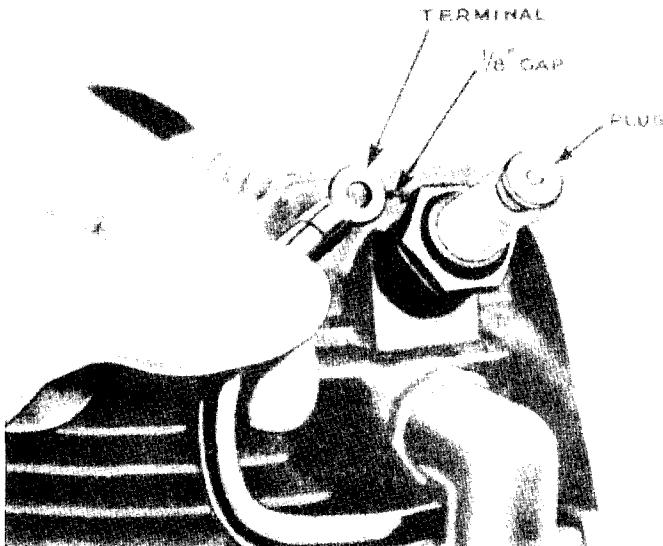


Fig. 22

## When Spark Plugs Foul Frequently

Frequent fouling of spark plugs is caused by too rich a mixture turned on at the carburetor. See paragraph No. 1, Carburetor Adjustment.

## Ignition Cable

The insulation must not be broken or soaked with oil or water, or grounded in any way where it touches the engine, or it will interfere with proper ignition.

## To Inspect and Adjust Magneto Contact Points

The flywheel is tapered shaft mounted with keyway. To remove the flywheel, the use of a flywheel puller is recommended. The flywheel has three small screw holes placed around the hub to mount the flywheel puller. To install the flywheel, use a flywheel driving tool. If removed or replaced without puller or driver, both the flywheel and shaft may become damaged.

To remove flywheel, mount puller plate on flywheel hub with the three puller plate screws. Then insert puller screw, pointed end toward flywheel, turning up with handle until flywheel is removed from shaft. Remove puller screw from puller plate and puller plate from flywheel.

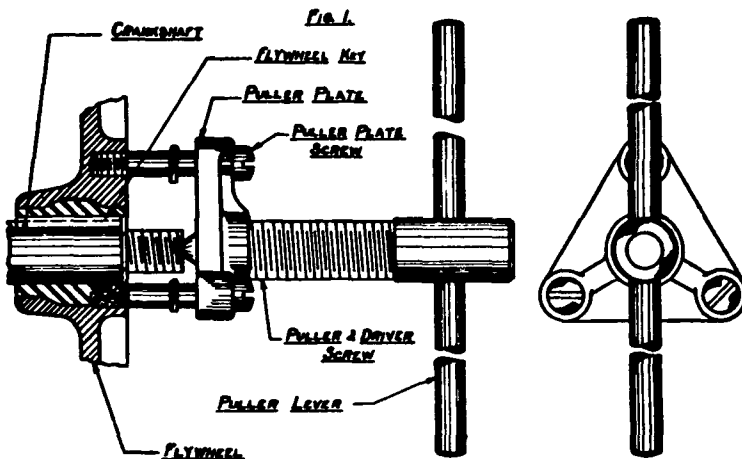


Fig. 23

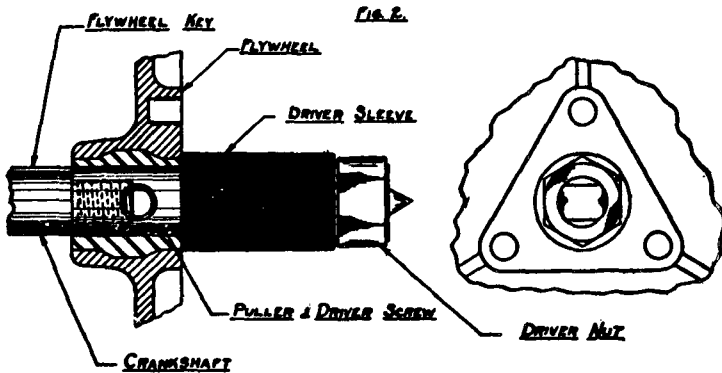


Fig. 24

To install flywheel, place flywheel in position on key in shaft as far as possible by hand. Then screw flywheel driver and puller screw on shaft as far as possible, place driver sleeve over puller and driver screw and with hexagon driver nut, drive flywheel onto shaft as far as possible. Loosen flywheel driver nut and remove driver sleeve and puller and driver screw.

The flywheel can also be removed by loosening the flywheel nut and removing the starter pulley or starter gear, replacing flywheel nut on crankshaft, leaving a space between the crankshaft nut and flywheel.

Strike the end of crankshaft nut a sharp blow with a hammer and the flywheel will then jar loose from taper on crankshaft.

To check gap, proceed as follows: Remove spark plug. Rotate crankshaft slowly in normal operating direction until Breaker Lever fibre rests on highest part of cam, approximately  $1/8$ " past breaking edge, or 30 degrees beyond ignition point. Check gap with  $.020$ " feeler gauge. See Fig. 25.

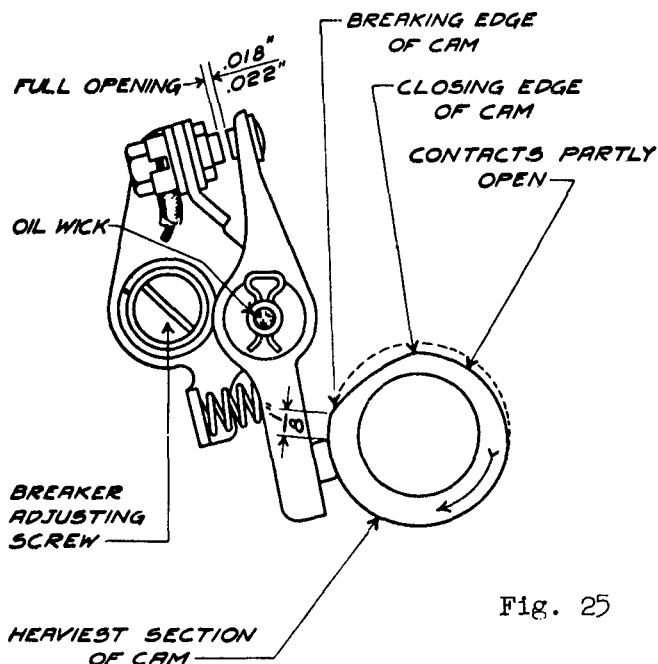


Fig. 25

To check point of ignition for the proper timing of engine. The breaker arm or contact points should just break or start to open when the piston is  $3/16$ " from the top face of cylinder or before top dead center. If the engine fires late, loosen cap screws holding magneto plate to engine and turn plate to the left; if too early, turn to the right.

Although the Contact Points remain open during entire travel of cam from breaking edge to closing edge, being closed only while the flat section of cam is passing the breaker lever fibre, the cam must be positioned as illustrated, when gauging contact point gap. The heavy section of cam is slightly eccentric, and the contact points are not fully separated when closing edge of cam approaches the breaker lever fibre.

If necessary to adjust gap; (1) Loosen slightly the screw which fastens breaker plate to stator plate. (2) Move the entire breaker mechanism toward cam to increase gap, or away from cam to decrease gap. (3) Tighten breaker plate fastening screw securely. Do not loosen lock nut on stationary contact screw.

The entire breaker assembly pivots on breaker lever bearing pin, which permits adjustment of gap without altering relationship between contact point surfaces.

**CAUTION:** The contact points should be cleaned and should touch squarely.

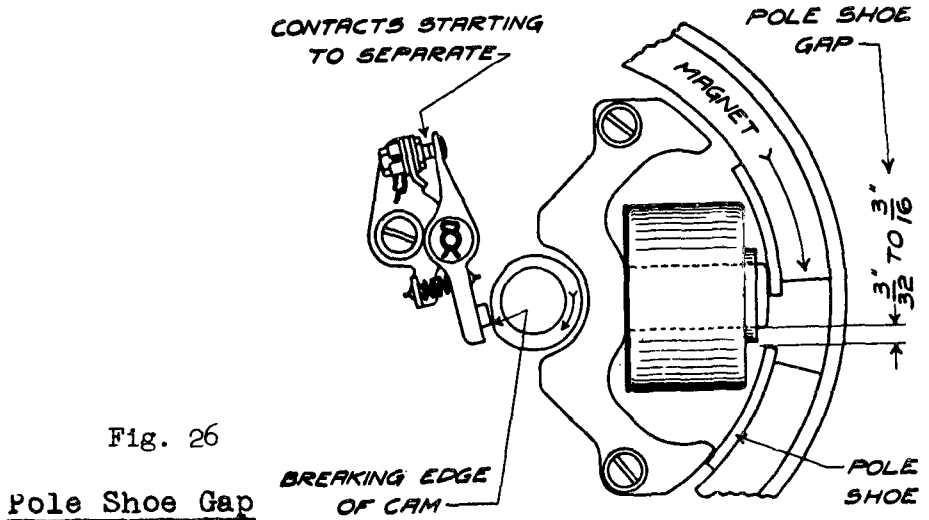


Fig. 26

Pole Shoe Gap

The synchronism of contact point interruption and Pole Shoe Gap is illustrated in drawing, Fig. 26.

At the instant of spark, which occurs when contact points first separate, the edge of leading Pole Shoe should be  $\frac{3}{32}$ " to  $\frac{3}{16}$ " away from center leg of winding core in the direction of rotation, with the edge of trailing Pole Shoe centered over winding.

It is vitally important to maintain the correct Pole Shoe Gap, and this can be accomplished only by maintaining the contact point opening within the specified limits of .018" to .022".

If contact point opening is adjusted to less than .018", the effect is to increase the Pole Shoe Gap; and if contact point opening is adjusted to more than .022", a reduction in Pole Shoe Gap results - with consequent impaired performance of magneto which evidences itself in hard starting of engine.

If breaker cam is removed from crankshaft, replace with arrow (indicating rotation) on the outside.

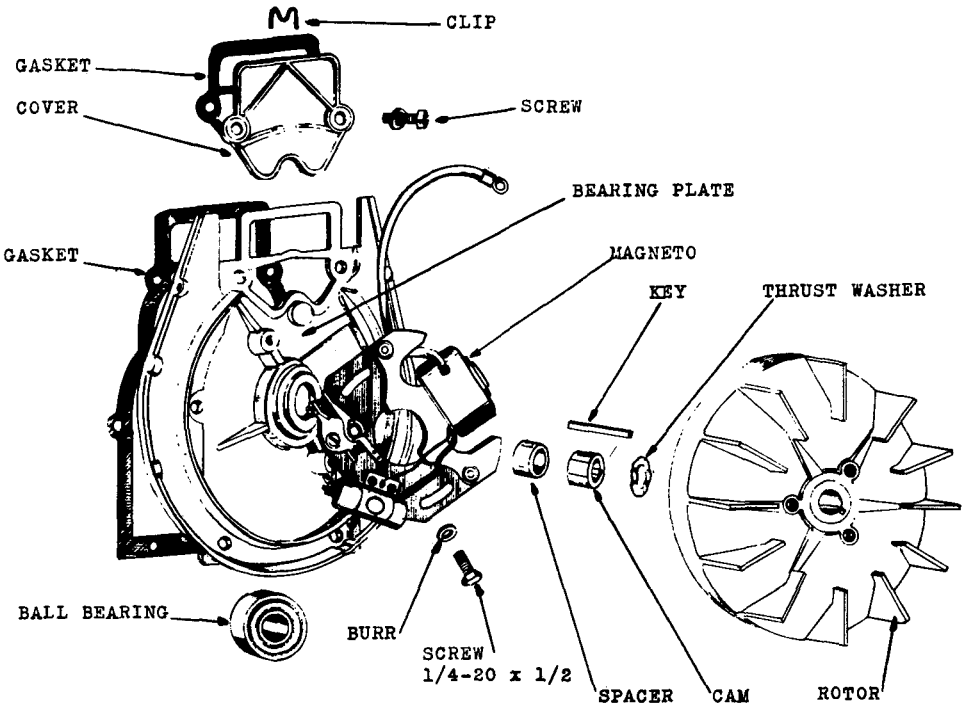


## Dressing Contact Points

Uneven or pitted contact points can be restored to a true, even condition by using a special carborundum stone sold for this purpose; after which all dust particles should be removed with a dry cloth. Do not use a steel file on contact point surfaces. Stiff paper or cardboard will remove the oxide formation on contact points, resulting from long idleness. Points should be adjusted after dressing.

## To Change Condenser and Coil

To change the condenser, remove primary wire leading to breaker point bracket, remove screw holding condenser to back plate. When replacing condenser, be sure to include grounding wire leading to coil.



CYLINDER END PLATE, MAGNETO & FLYWHEEL ASSEMBLY

Fig. 27

To renew the coil, it is necessary to remove stator plate from the engine. Unhook the secondary or spark plug wire from coil before removing. Before pulling coil from the pole shoe assembly, bend the laminated clip holding coil in place.

Should the magneto still be weak, have an authorized service station check on the complete magneto.

### Replacing Cables

Install eyelet terminal at spark plug end. Strip other end 3/16", twist strands together and attach to winding. It is unnecessary to solder Cable to Winding.

### Magnet

A sharp hammer blow or other severe shock, excessive heat (above 250 degrees F.), or subjection to a strong opposed magnetic field, will partially discharge magnet; but no appreciable discharge occurs in normal service.

### Lubrication

The magneto should require no lubrication for a long period of service. Frequent removal of flywheel from crankshaft for this purpose alone is not recommended. But if it becomes necessary to remove flywheel, apply one (1) drop of crankcase oil to concealed oil wick in breaker lever bearing pin and spread a light coating of "Sta-Put" grease or vaseline over breaker cam.

### How to Check Valve Clearance

Remove the fuel tank (on the Model RSC-341-1 only), flywheel housing, flywheel, cylinder head, and valve spring cover plate. This will expose the valve spring chamber. Turn engine over until piston is flush with top of cylinder and both valves are closed. Try a feeler gauge between the valve lifter roller and the

valve lifter cam. If the clearance is less than .008", it will be necessary to file or grind off from end of stem until the proper clearance is obtained. If the clearance is more than .020", it will be necessary to replace the valve.

While checking for valve clearance, it is advisable to remove valve springs and check the valve face and seat. If necessary, grind them in with valve grinding compound.

Note: Do not use a coarse grade of compound.

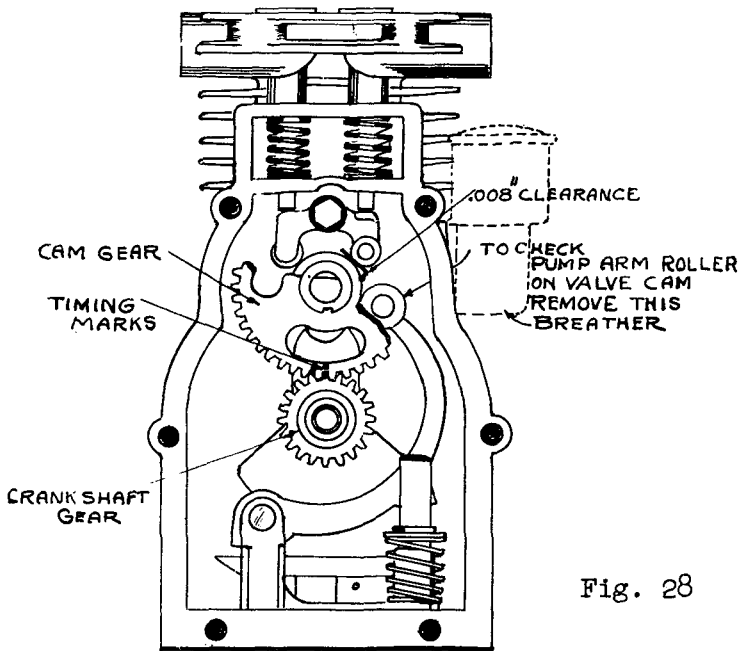


Fig. 28

### How to Check Timing of Valves

The valves when properly timed should be closed when the piston is on top dead center. If not, it will be necessary to remove the bearing plate.

Note the marking on the cam gear and crank shaft gear. The cam gear has a notch which must match the beveled tooth on the crank shaft gear.

See above sketch for detail and correct clearance of valve.

## Compression

Proper compression is obtained when valves seat properly, cylinder head gasket and spark plug gasket do not leak, and piston and piston rings are properly fitted. To check compression, turn engine over slowly and if a point of good resistance is met at every other revolution, compression should be satisfactory. If engine turns over without compression resistance, a worn piston, piston rings, cylinder wall, leaky valves, or leaky gaskets are present. Check cylinder head gasket and see that cylinder head cap screws are drawn up tight. Check spark plug gaskets and see that plug is drawn up tight.

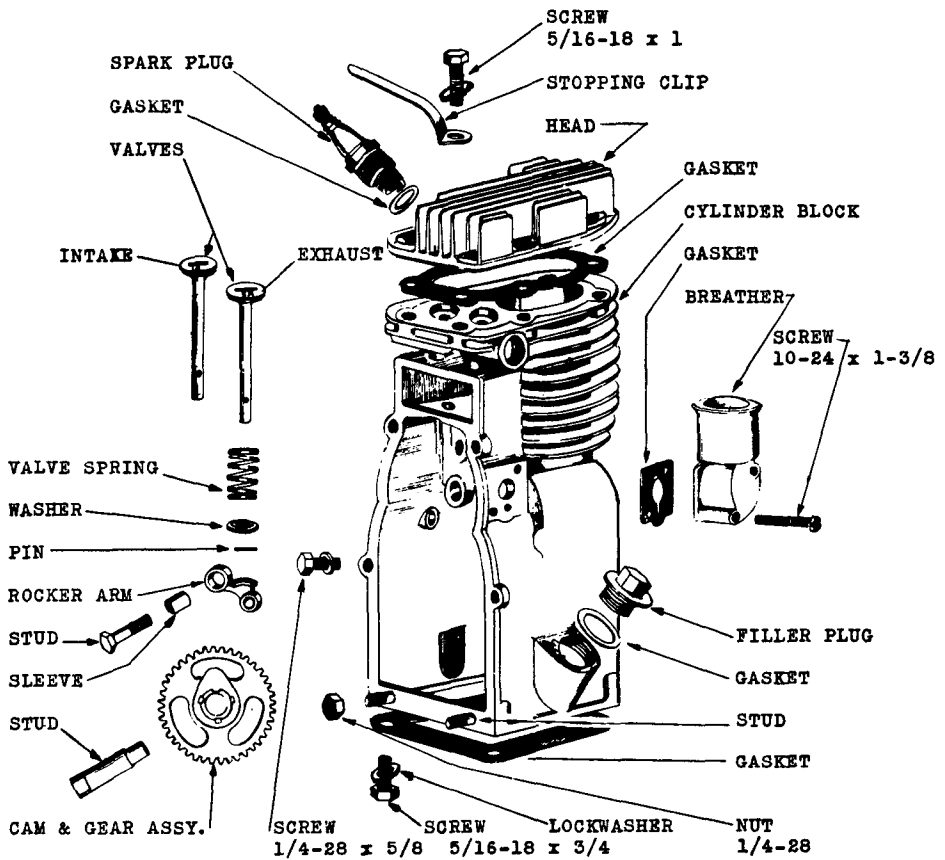
## Carbon in the Cylinder

Excessive carbon in cylinders is caused by running the engine with needle valve on carburetor opened too far, or worn piston and rings. Carbon will cause pre-ignition and a noise similar to pounding called "pinging". In such a condition, the head should be removed and carbon scraped from cylinder head and the top of piston.

## To Remove Cylinder Head

To remove cylinder head, it is necessary to loosen the cap screws holding it in place. When the cylinder head has been removed for the purpose of cleaning carbon, care should be taken in replacing it. Use a new gasket, if possible. Otherwise, clean the old one and coat both sides with cup grease. We do not recommend the use of shellac on cylinder head gaskets. Tighten each cylinder head cap screw a little at a time so that cylinder head is pulled down evenly. Retighten after engine is warmed up. See Fig. 29

It is advisable to check the valve seats while the head is off. Squirt a little kerosene or oil under the valves and turn valves several times while down on seat. This will remove any carbon particles and will brighten up the seats.



CYLINDER ASSEMBLY

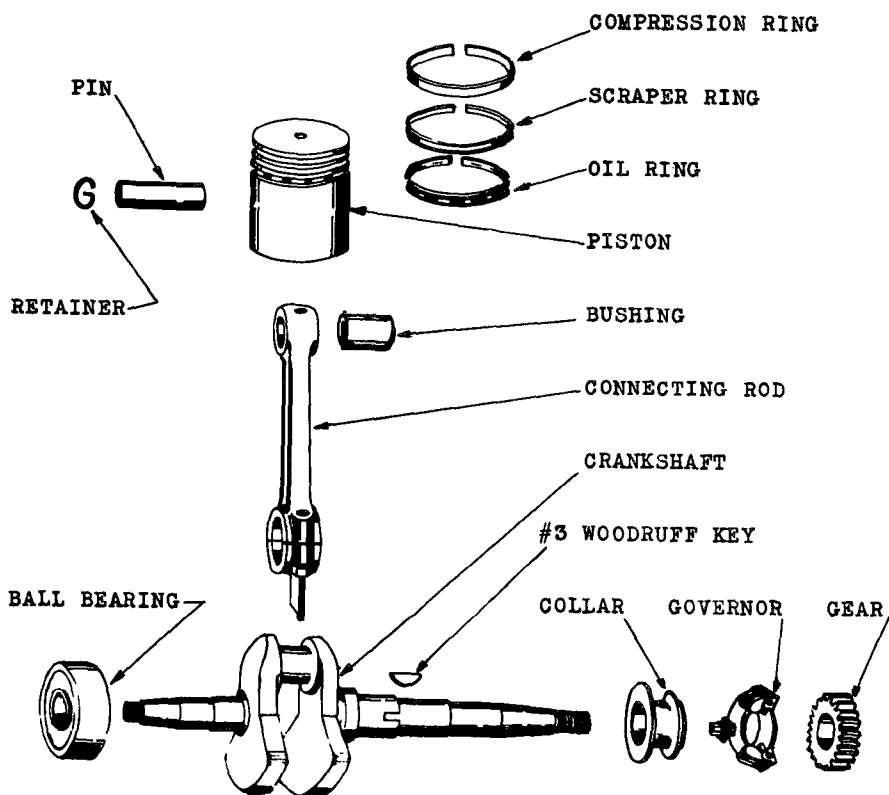
Fig. 29

The Piston and Piston Pin

To remove the piston, it is necessary to remove the cylinder head, separate base from cylinder and disconnect the connecting rod. The piston can now be pushed out of the top of cylinder (use a hammer handle for this operation).

The piston pin is a push fit both in the piston and in the connecting rod. To remove the piston pin, it is first necessary to remove the piston pin spring retainers. Remove or replace with small nose pliers, being careful that retainer rings snap fully into piston grooves.

If rings show wear, replace with new ones. Be sure ring grooves are free of all carbon so that rings work freely in groove.



CONNECTING ROD & PISTON ASSEMBLY

Fig. 30

The ring set up consists of a compression ring in top groove, a scraper ring in middle groove (be sure sharp edge of this ring faces downward toward piston pin) and an oil ring in bottom groove.

The piston pin is furnished only in standard size. Consult clearance chart when necessary to renew the pin.

Then heat piston in boiling water for a few minutes and piston pin can then be removed by driving it out of the piston with a small wooden plug and hammer. Care should be exercised not to damage piston when doing this. To install a new piston pin, reverse the above operations.

In replacing piston, be sure to stagger the split in the rings evenly around the piston (never have them in line).

Be careful not to damage piston rings when entering cylinder bore. Never use a screw driver to collapse rings. Instead use a ribbon of light sheet steel about 3/4" wide, fold two ends outward about 1/2". This makes an ideal ring collapser. Collapse rings, tap top of piston lightly, be sure rings enter freely.

After engine is assembled with base, remove the breather from engine. This will expose the valve cam.

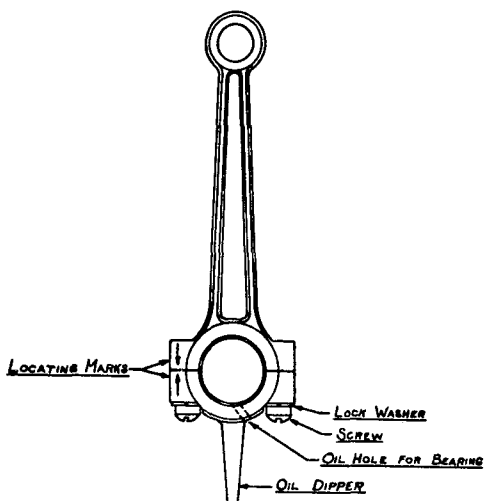
Carefully Note: Be sure oil pump arm roller is riding on cam next to cam shaft boss on cylinder.

Caution: Be sure to replace cotter pins in connecting rod bolts.

Note: Consult clearance chart on page 43 as to piston and ring clearance.

### The Connecting Rod - See Fig. 31

The connecting rod bearing is adjustable by filing the connecting rod bearing cap a small amount at a time until it fits within .001 to



.0015 to the shaft. Great care should be taken not to file off too much. The connecting rod side clearance on the shaft should be from .010 to .015. The piston pin is a push fit in the rod, no more than .001 clearance.

Important: Note locating marks on connecting rod (refer to diagram) being careful that the marks correspond and that the hole in connecting rod cap locates in operation against the oil supply when installing on crankshaft.

Caution: Never attempt to secure the proper adjustment of the connecting rod bearing by adjusting the screws. This is dangerous and may wreck the engine, for the screws, if not tight, may work loose.

### How to Remove Bearing Plate

Drain oil from engine, remove starter handle, blower housing, flywheel key, breaker cam and stator plate. Remove screws holding plate to cylinder. It may be necessary to tap the plate lightly with a wooden block or hammer. To remove bearing from plate, heat the plate in boiling water. This will expand the metal enough so that ball bearing can be tapped out without damage to the bearing. To replace bearing, heat the plate and insert bearing. (A wooden block may be used to drive bearing to place.)

Note: Never use a steel hammer on any ball bearing.

### How to Remove Crankshaft

Drain the oil from crank case. Remove starter handle, blower housing, magneto, flywheel key, breaker cam, cam spacing collar, bearing plate, cam and gear, cylinder head, governor control shaft and engine base. Next remove bolts and cap from connecting rod.

Note: Use a hammer handle or wooden stick for this operation. Remove the crankshaft from cylinder by driving on the end of shaft with a



wooden block and hammer or a piece of lead.

To remove either gear or ball bearing, use a wheel puller. If none is available, clamp the crankshaft in a vise. The best clamping place on the crankshaft is on the crank bearing end under the balance weight, a brass rod or hard wood stick such as a piece of broom handle should be used. To drive off either gear or bearing remove evenly by tapping lightly.

When reassembling crankshaft into cylinder, enter ball bearing straight into hole; when started, tap lightly with a brass bar or hard wood stick. Tap on evenly around bearing edge.

On reassembling engine, be sure to fasten connecting rod bolts securely, also see that pump arm roller is on the valve operating cam.

Remove the breather assembly on the side of the cylinder to check the pump arm roller.

### Exhaust Pipe

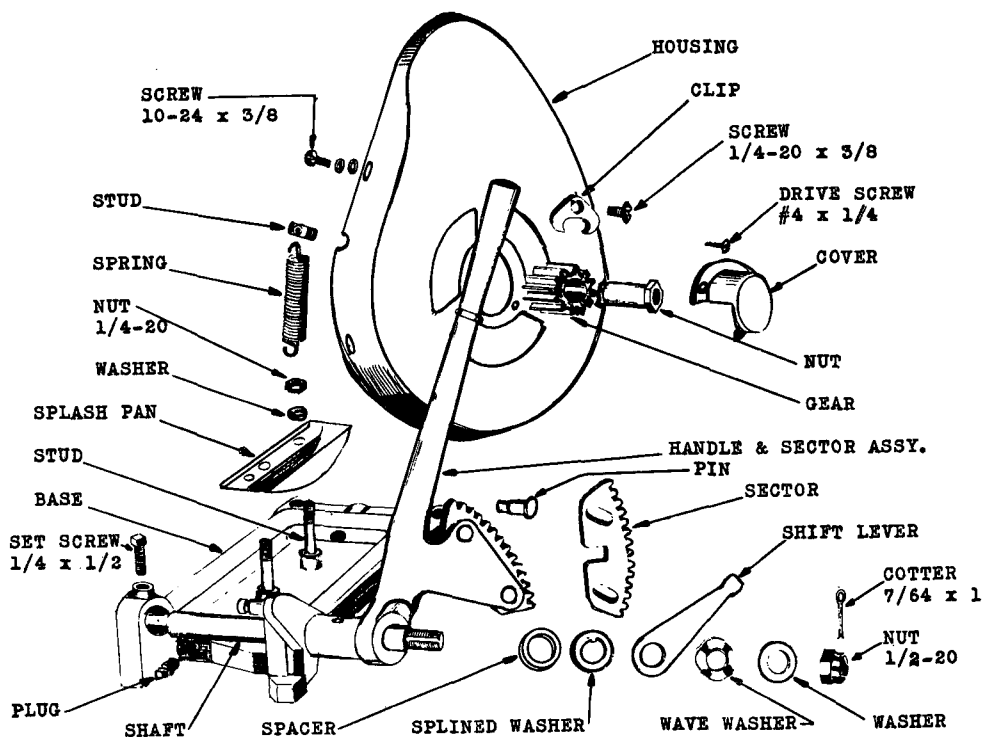
Due to long periods of operation, it is possible that the exhaust pipe will become clogged with soot and reduce engine power. Remove it and clean out any deposit of dirt or soot, also do the same to cylinder hole in which it fits. Be sure pipe is open.

### The Starter

This engine is equipped with hand lever starter, the lever return spring should be properly hooked up. This type of starter operates by the sector teeth engaging with the starter gear on the crankshaft when pedal or lever is moved. Therefore, it is necessary to have a tension on the sector shift lever. By adjusting castellated nut on end of starter lever shaft, this tension can be changed. The starter moving parts must be properly lubricated with a light oil so that all parts move freely.

### Air Cleaner

Add oil weekly or daily under severe dusty con-



HAND STARTER

Fig. 32

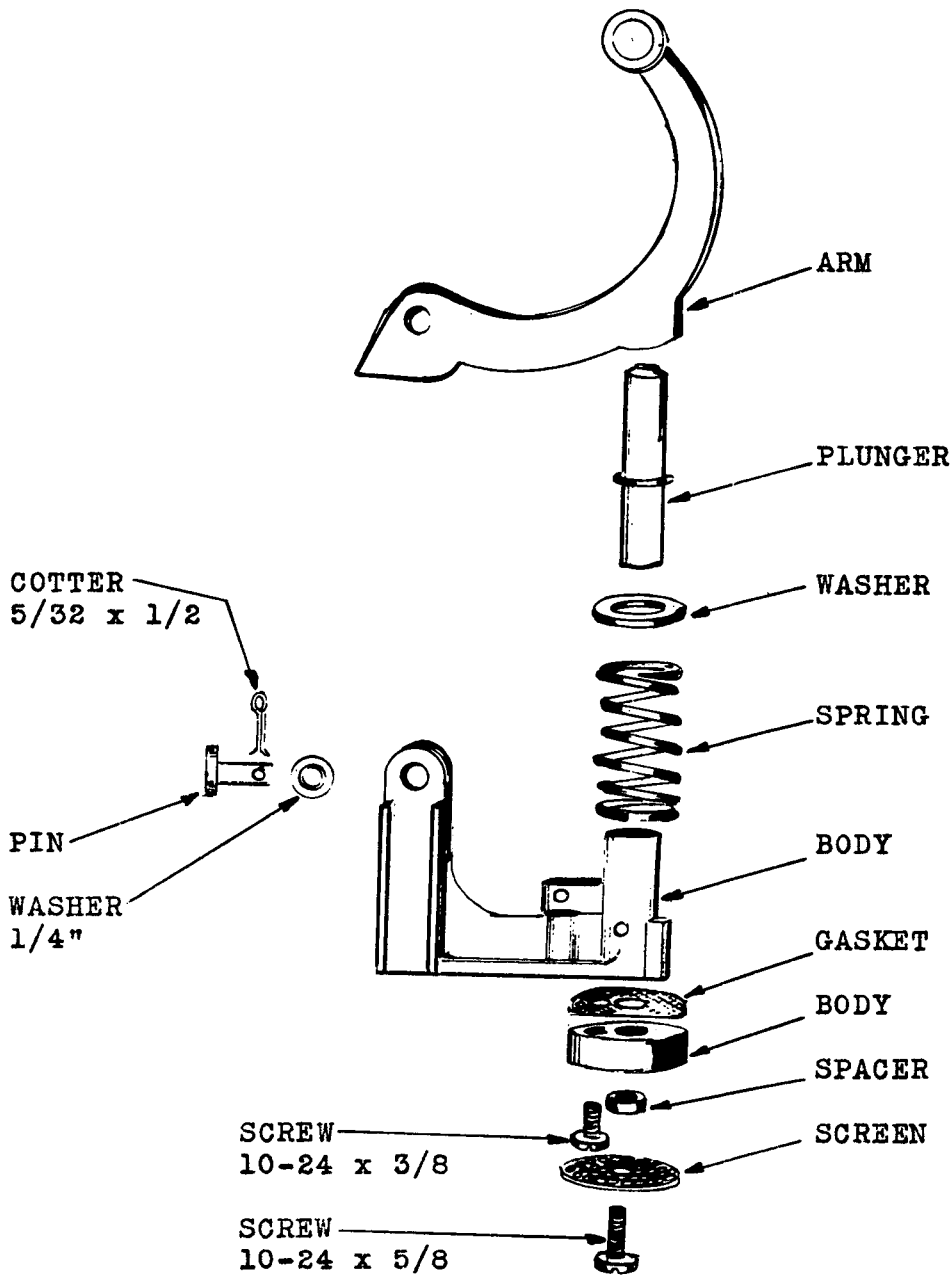
ditions. Drain, clean out and refill whenever crankcase is drained.

### Oil Pump

To check oil pump, remove engine base. Fill base with oil but empty the splash pan. Work the plunger arm up and down. A stream of oil will be forced out of the plunger into the splash pan if the pump is in good operating condition. If no oil is forced into the splash pan, remove plunger and check the pump to be sure there is no gum or dirt in the oil passages. Clean the strainer and other parts in kerosene or gasoline. If the pump still does not work after it is reassembled, it should be replaced.

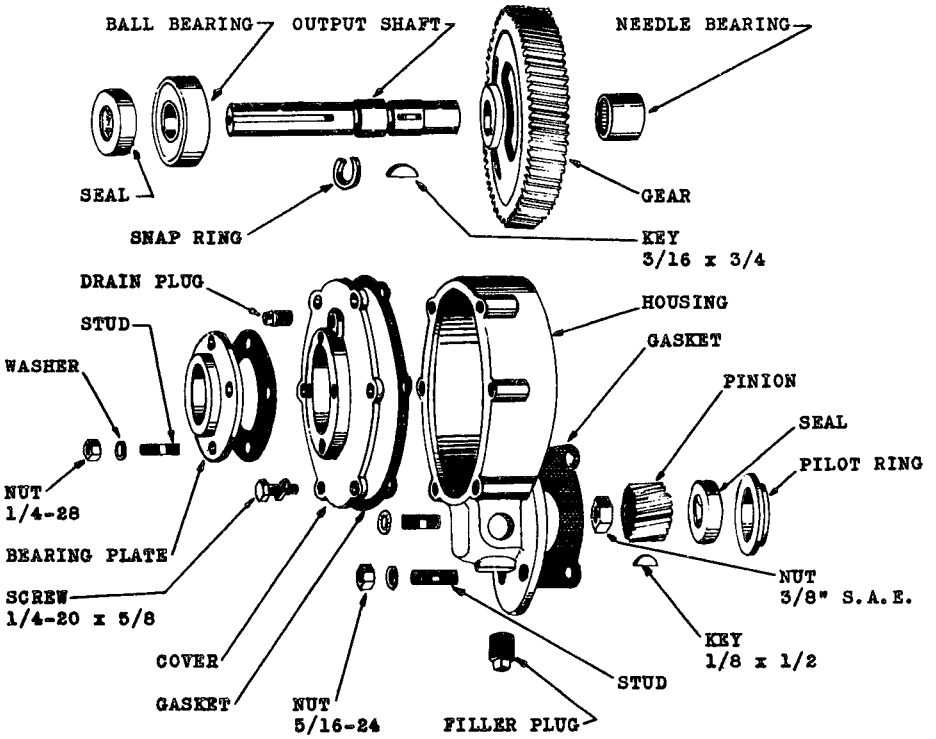
See Fig. 33

When reassembling engine, be sure that pump arm roller rides on the valve operating cam next to the cam shaft boss. Remove breather to check this.



OIL PUMP ASSEMBLY

Fig. 33

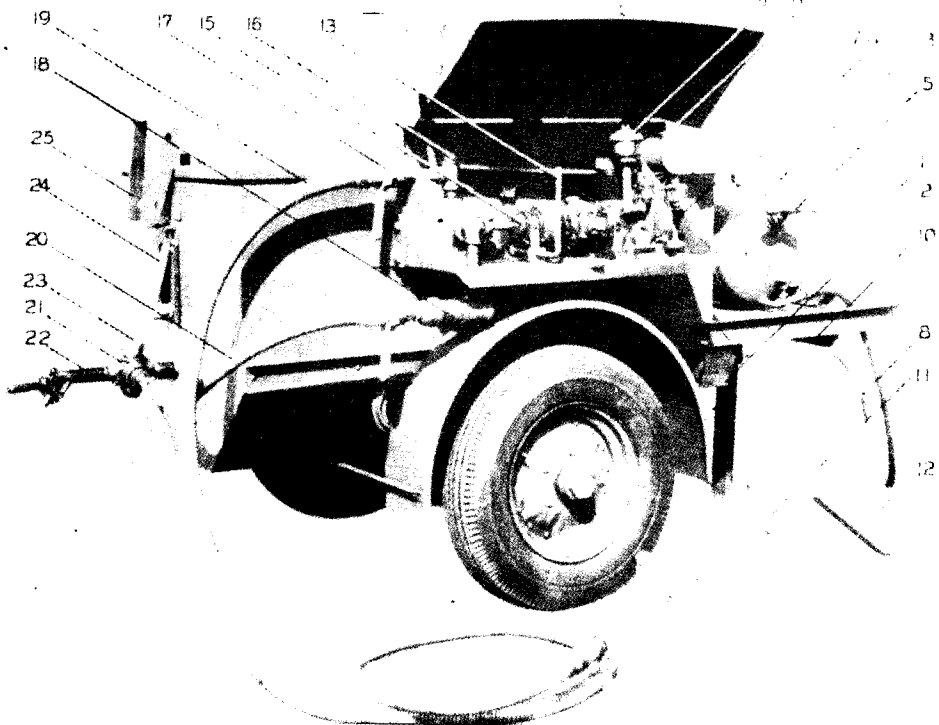


GEAR REDUCTION ASSEMBLY

Fig. 34

## NOTES

**SECTION V**  
**REPAIR PARTS LISTS**



KETTLE PARTS      Series "S"

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>No. Req.</u>
2	5	Burner, complete assy.	1
3	AM-21	Tank, complete assy.	1
8	AM-1	Hose, with couplings	1
22	A-21	Valve, quick acting draw-off	1
24	A-5	Thermometer	1
25	KM-1133	Guard	1
27	KM-953	Stack	1
28	KM-1219-A1	Cover	1
29	KM-1219-C	Guard, Heat or Fender	2
30	P-2	Wheel, with bearings	2
31	650-16-6	Tire, 6.50 x 16" - 6 ply	2
	650-16-T	Tube, 6.50 x 16"	2
36	DM-1327-S	Screw, Hand	1
38	K-1039	Eye, Towing	1

SERIES "R" KETTLES

These have parts all the same as Series "S" except they were shipped with solid rubber tires instead of pneumatics and a barrel hoist was provided. No motor spray attachment or angle thermometer furnished.

<u>Part No.</u>	<u>Description</u>	<u>No.Reg.</u>
P-896	Wheel, 32"x3" Solid Rubber Tire	2

BARREL HOIST

KM-399	Davit	1
KM-400	Tongs, Barrel	1
K-3	Block, Chain 1/2 ton 7-ft. lift	1
K-976	Support, Davit Patt. 1909	1
KM-1968-B	Support, Davit (Channel)	1
KM-1968-C	Support, Davit (top)	1
BT-516-1	Bolt 5/16 x 1 USS	3
BT-12-1	Bolt 1/2 x 1 USS	2

(Purchase Order #54231 - 20 Kettles)

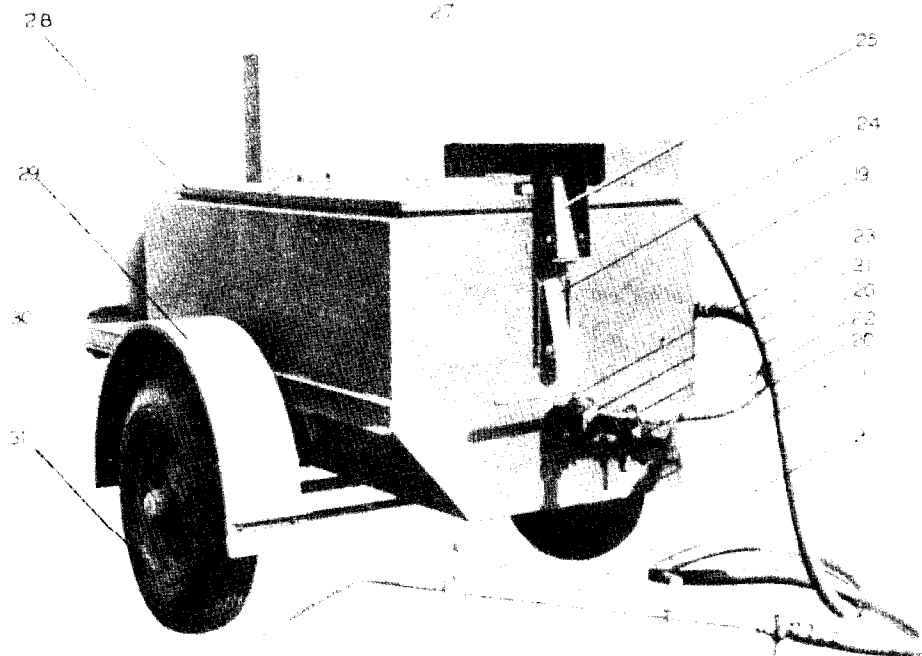
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SERIES "P" KETTLES

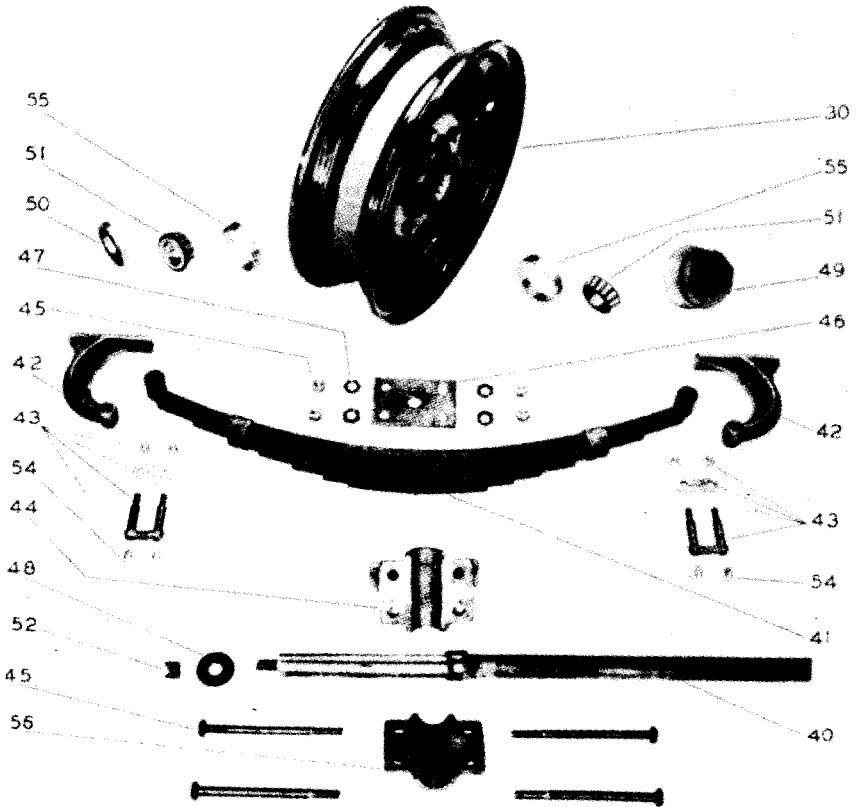
These are the same as Series "S" except they were also equipped with a barrel hoist.

(Purchase Order #49811 - 4 Kettles)

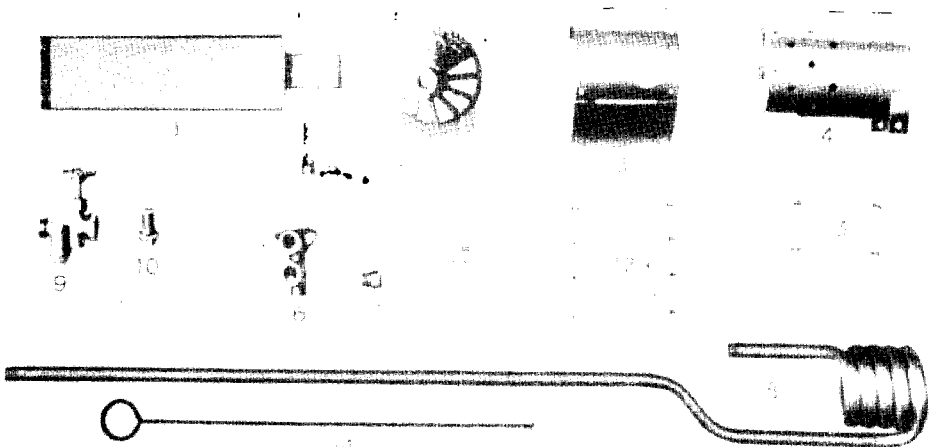




56	BT-516-34	Bolts, 5/16"x3/4" USS machine	47
57	BT-12-1	Bolts, 1/2"x 1" USS machine	4
58	BT-516-1	Bolts 5/16" x 1" USS machine	4
59	LW-516	Washers, 5/16" Lock	4
60	KM-1219-T	Tank, Inside Melting	1
61	KM-938-C	Screen, Separator (set of 2)	1
62	KM-1219-D	Grid, Barrel	1
63	KM-1219-L	Leg, Supporting	1
64	A-87	Name Plate, LB porcelain 4"x12"	1
65	A-83	Name Plate, Patent 1-1/4" x 3"	1
66	A-81	Name Plate, Model 3-1/4"x6-1/4"	1
67	KM-470-A	Strainer #69	1

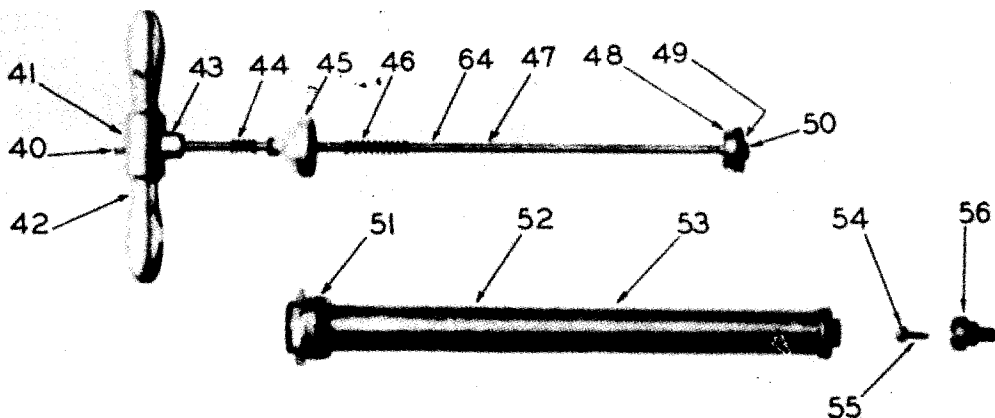


40	KM-1219-B2	Axle	1
41	A-57	Spring	2
42	AM-1218	Hanger, Spring	4
43	A-14	Shackle, with bolts, nuts, and cotters assy.	4
44	K-899-A	Chair, spring	2
	KM-899-B	Clamp, Axle	2
45	BT-12-612	Bolts, 1/2"x 6-1/2" USS machine	8
46	KM-1219-P	Plate, spring clip	2
47	K-1219-L	Palnut	8
48	KM-3	Washer, Outer	2
49	P2-C	Cap, Grease	2
50	KM-909	Washer, Inner	2
51	A-2788	Cone, Bearing, Timken #2788	4
52	HN-58SC	Nut, 5/8" SAE Castle	2
53	CP-18-112	Cotter Pin, 1/8" x 1-1/2"	2
54	HF-18-90	Fitting, 1/8" Hydraulic Angle	8
55	A-2720	Cup, Bearing, Timken #2720	4



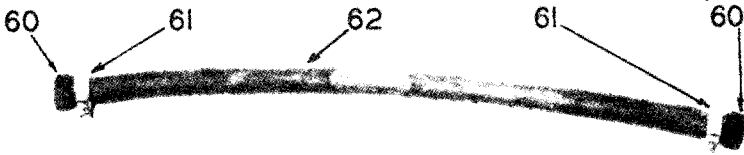
BURNER PARTS

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>No. Req.</u>
1	5-1	Pan	1
2	5-2	Head	1
	5-2T	Head (Tapped for spare tip)	1
3	5-3	Cover	1
4	5-4	Shell	1
5	5-5	Tip, for kerosene	1
	5-5G	Tip, for gasoline	1
6	5-6	Holder, Tip	1
7	7	Plug	1
8	5-8	Coil	1
9	9	Valve and Strainer, Combined	1
10	10	Strainer	1
11	11	Screw, Set, 5/16" x 1" with lock nut	1
12	12	Bolts, 3/16" x 1/2" Stove, round head USS	8
13	13	Bolts, 1/4" x 1/2" Stove, round head USS	4
14	14	Cleaner, Tip	1

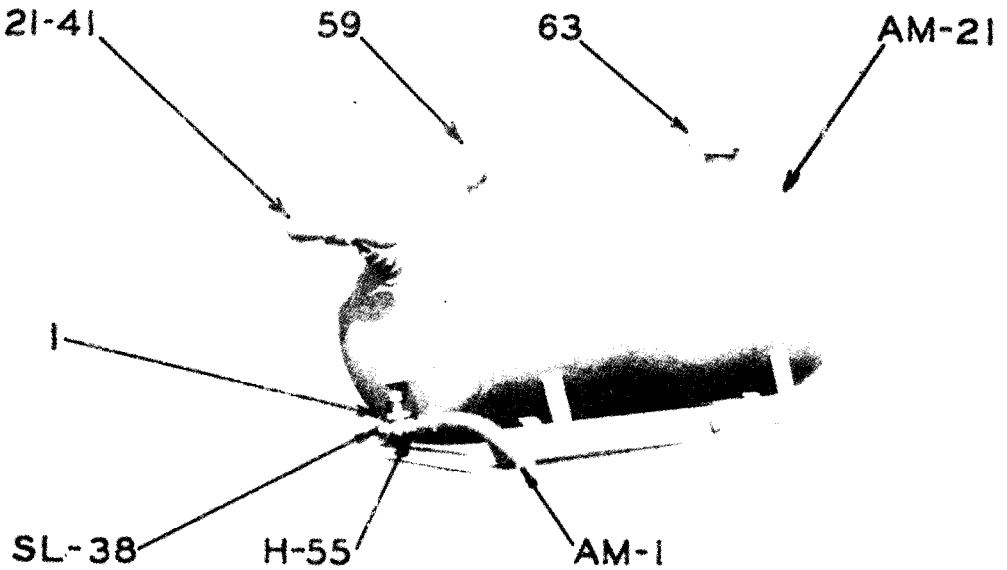


### FUEL TANK PARTS

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>No. Req.</u>
40	21	Nut	1
41	22	Washer	1
42	23	Handle	1
43	24	Nut, Lock	1
44	25	Spring	1
45	26	Cap	1
46	27	Spring	1
64	28	Rod	1
47	29	Support	1
48	30	Washer, Cup	1
49	31	Washer	1
50	32	Nut	1
51-53	35-37	Barrel, Pump - complete	1
	38	Disc	1
54	39	Valve, Check, with disc	1
55	40	Spring	1
56	41	Cage	1
	21-41 incl.	Pump, complete	1
59	H-46	Gauge	1
1	H-42	Valve, Tank Shut-Off	1
	H-55	Coupling, Special Brass	1
	NC-38	Nipple, 3/8" close	1
	SL-38	Elbow, 3/8" street	1

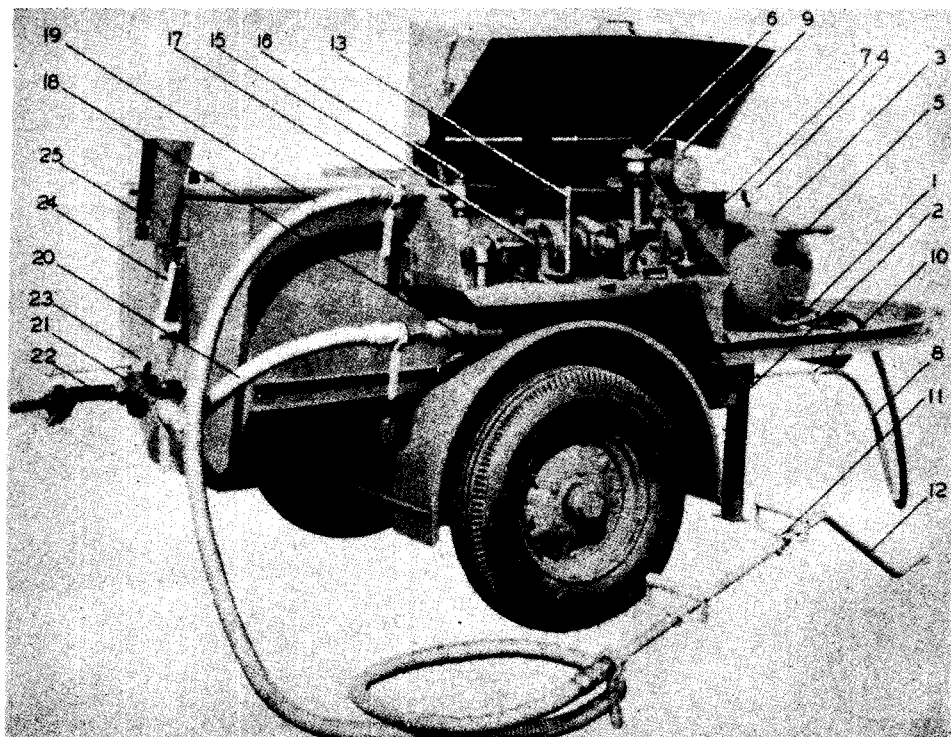


60	52	Coupling	2
61	51	Clamp	2
62	50	Hose. per ft.	*



63	H-58	Assy., Cap & Tube (H59-62)	1
	H-59	Disc for Cap	1
	H-60	Cap only	1
	H-61	Nipple	1
	H-62	Screw	1

\*Specify length wanted.



MOTOR SPRAY PARTS

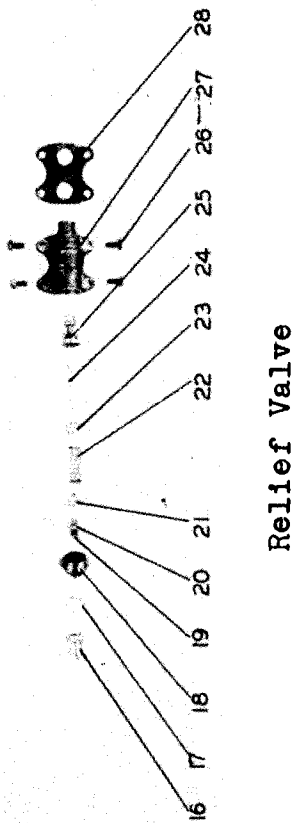
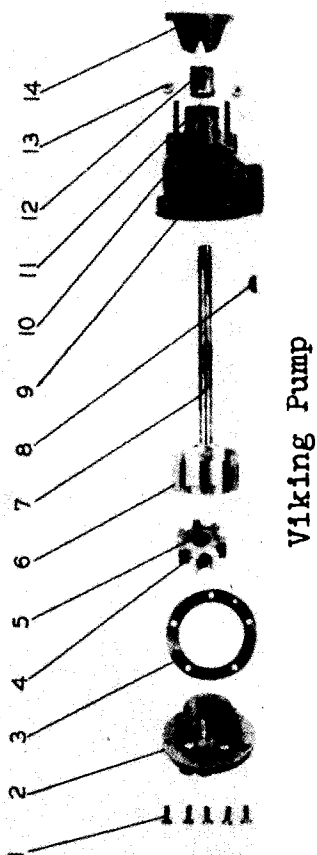
<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>No. Req.</u>
11	N-591	Cock, Spray Bar, 3/4", Walworth #591	1
12	NM-1191	Bar, Spray, with nozzle	1
13	NM-1652-AL	Lever, Clutch Control (replaced by NM-2373)	1
24	NM-1652-H	Housing, Clutch	1
25	N-1652-B	Bearing, SKF-1203 or 6203	1
15	N-1652-C	Clutch, Twin Disc Y-1035, X-4985, Spec. 13593 with drive ring A-1538	1
16	PP-1	Plug, 1" Pipe	1
	PT-1	Tee, 1" Pipe	1
	NP-1-2	Nipple, 1"x 2"	1
	NP-1-S	Nipple, 1"x 5"	1
17	A-1203	Handle, Wrench	4
18	NM-1652-S	Strainer, complete with bolt	1

	SL-1	Elbow, 1" street	1
	NP-1-6	Nipple, 1"x 6"	2
	RT-2-1	Tee, 2"x 2"x 1"	1
	NP-2-4	Nipple, 2"x 4"	1
	CR-2-1	Coupling, Reducing, 2"x1"	1
	NS-1	Nipple, 1" Short	1
17	UN-1R	Union, 1" RR, Pipe - #7712	4
19	A-115	Hose, 1"x 15', insulated with fittings	1
20	A-13	Hose, 1"x 3', insulated with fittings	1
21	N-661	Cock, 3 way 1 $\frac{1}{2}$ ", Walworth #661	1
	NP-112-3	Nipple, 1 $\frac{1}{2}$ " x 3"	1
18	NM-1652-P	Plug for strainer, complete with nut	1
	PB-112-1	Bushing, Reducing 1 $\frac{1}{2}$ "x 1"	1
23	N-661-H	Handle, Cock, Walworth #15	1
	BS-516-138	Studs, 5/16"x 1-3/8" USS	4
	HN-516	Nut, 5/16" hex. USS	4
	BT-516-114	Bolts, 5/16"x 1-1/4" USS machine	4
	LW-516E	Lockwashers, Everlock Internal 5/16"	8
	LW-14E	Lockwashers, Everlock Internal 1/4"	4
	BT-12-212	Bolt, 1/2"x 2-1/2" USS machine	1
	BR-14-34	Bolt, 1/4"x 3/4" R.H. stove	4
	BT-12-1	Bolt, 1/2"x1" USS machine	4
	NM-1652-PS	Spacer, Pipe 1/2"x 1-5/8"	1
	NM-1191-A	Bracket, with holes	1
	NM-1191-B	Bracket, with slot	1
32	N-1191-C	Handle, wood	2
37	AM-2131-3	Nozzle, spray	1
33	N-1348	Pump, Viking, CO-257, complete assy. with N-1348-R relief valve	1
34	N-1348-R	Relief Valve, complete assy. for Viking CO-257	1
35	N-1652-E	Engine Complete Assy., Lauson RSC-341-1	1
	NM-1652-L	Latch, Motor Spray Cover	1
	NM-1652-B	Base, pump	1
	SL-38	Ell, 3/8" street	1
	PO-38-19	Pipe, 3/8"x 19" T.O.E.	1

N-1191-E  
 BT-38-7  
 RI-34-12  
 PB-1-34

"U" Bolt with nuts  
 Bolt, 3/8"x 7" machine USS  
 Elbow, reducing 3/4"x 1/2"  
 Bushing, Pipe 1"x 3/4"

1  
 2  
 1  
 1



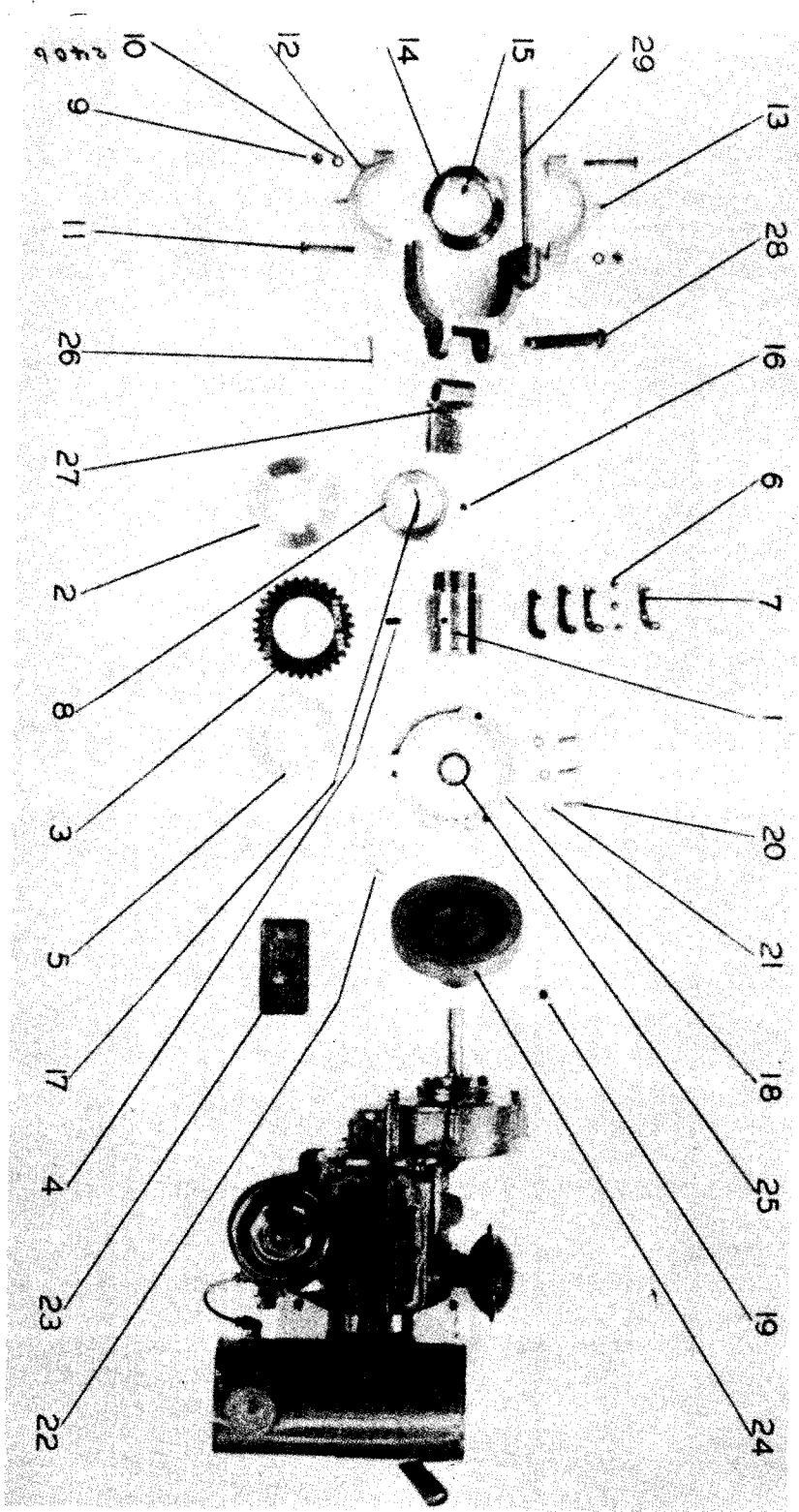


N-1348 PUMP (VIKING MODEL EHX2 - 1" Ref. Co. 257)

<u>Ref. No.</u>	<u>L.B. No.</u>	<u>Viking No.</u>	<u>Description</u>	<u>No. Req.</u>
1	CS-516-34		Screw, cap 5/16" x 3/4" hex. USS	5
2	N-1348-3	H-200, H-93	Head with Pin	1
3	N-1348-HG	H-23	Gasket, Head	2
4	N-1348-2	H-92, H-95	Idler with Bushing	1
5	N-1348-10	H-95	Bushing, Idler	1
6	N-1348-11	H-96, H-463	Rotor with shaft	1
7	N-1348-7	H-463	Shaft (available only with rotor)	1
8	WK-15		Key, Woodruff #15	1
9	N-1348-12	H-69, H-13	Case with bushing	1
10	N-1348-1	H-13	Bushing, case	1
11	N-1348-P	HV-379-13	Packing #1 Allpax (1 oz.)	set
12	N-1348-5	J-51	Gland, packing	1
13	HN-516		Nut, Gland Stud, 5/16" hex. USS	2
14	N-1348-4	J-52	Plate, Packing Gland	1
15	N-1348-6	H-93	Pin, Idler	1
	BS-516-214		Stud, 5/16"x2 1/4" USS	2

N-1248-R RELIEF VALVE (VIKING MODEL 17 - HLR2)

16	N-1348-R6	HV-379-12	Cap	1
17	N-1348-R8	HV-379-9	Washer, lead	1
18	N-1348-R1	HV-379-7	Centerpiece	1
19	N-1348-R5	HV-379-11	Screw, set	1
20	N-1348-R10	HV-379-10	Nut, Lock	1
21	N-1348-R9	HV-379-6	Disc, upper	1
22	N-1348-R4	HV-379-5	Spring	1
23	N-1348-R7)	HV-379-4	Disc, lower	1
24	N-1348-R7)	HV-379-3	Stem	1
25	N-1348-R3	HV-379-1	Poppet (or seat disc)	1
26	CS-516-34		Screw, cap 5/16" x 3/4" hex. USS	4
27	N-1348-R2	HV-379-2	Body	1
28	N-1348-13	H-197	Gasket	1

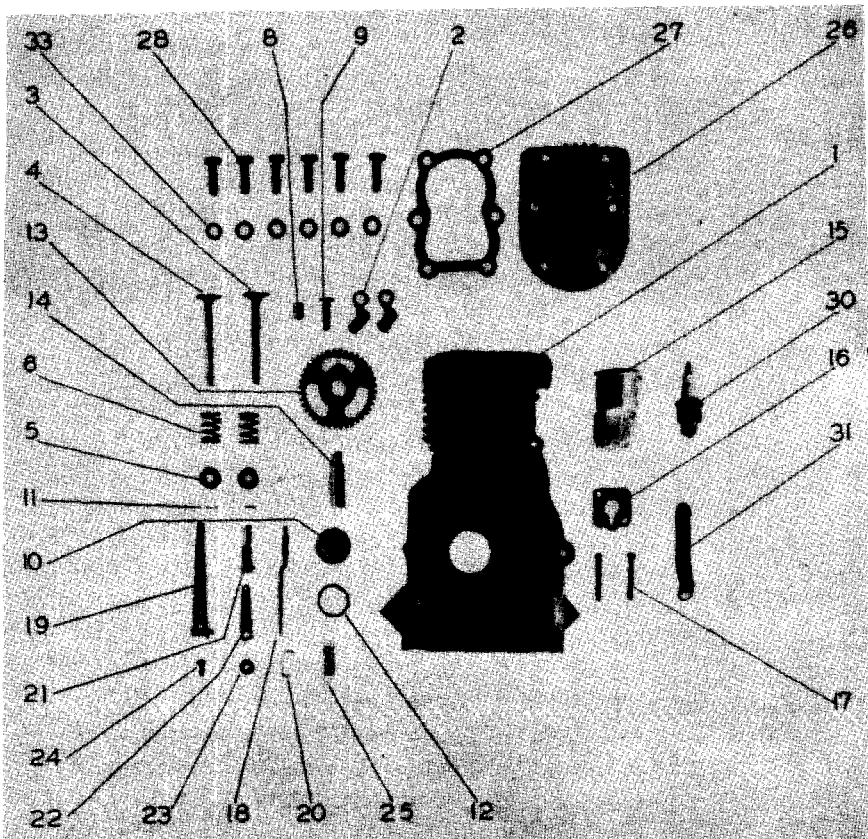


CLUTCH PARTS

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>No. Req.</u>
1	4989B	Hub	1
		Bore .750-.749, Ky.1/4x1/8	
4	M129	Hdless Dog. Pt. Set Screw	1
3	A1537	Driving Plate	1
13	4201A	Sleeve Collar Assembly	1
		Comprising: (Ref. No.9-13)	
11	M496	2 Fill. Hd. Cap Screws	2
10	M101	Lock Washers (1/4)	2
9	M497	Hex. Nuts	2
12	M503	Alemite Fitting	1
14	A1539B	Wedge Sleeve	1
5	A1536	Clamping Plate	1
7	4957	Levers	6
6	A1494	Lever Rollers	9
8	A1540A	Adjusting Nut	1
16	A1523	Adjusting Nut Screw	1
17	A2260	Lock Spring	1
2	A1536C	Back Clamping Plate	1
15	1711	Key	1
23	A1791	Instruction Plate	1
18	A1538	Driving Ring	1
19	SS-14-14A	Set Screw, Allen 1/4"x 1/4"	1
20	CS-14-78	Cap Screw, 1/4"x 7/8 hex. USS	3
21	LW-14E	Lock Washer, 1/4" Everlock	3
22	SK-316-1	Key 3/16" x 1"	1
26	CP-18-1	Pin, Cotter 1/8 x 1	1
27	NM-2373-HB	Bracket, Hinge	1
28	NM-2373-R	Rivet, 1/2"x 3"	1
		(drilled for cotter)	1
29	NM-2373-Y	Yoke, Clutch Operating	1
30	NM-2373-H	Handle for yoke	1

(NOTE: Items 26 to 30 Replace Part NM-1652-AL)

NM-2373-YA	Assembly, yoke	1
	(items 26 to 30 incl.)	

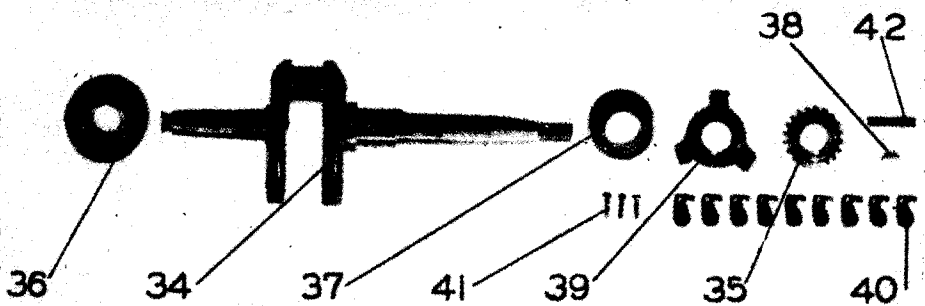


LAUSON ENGINE

MODEL RSC-341-1 (and RSC-558-1)

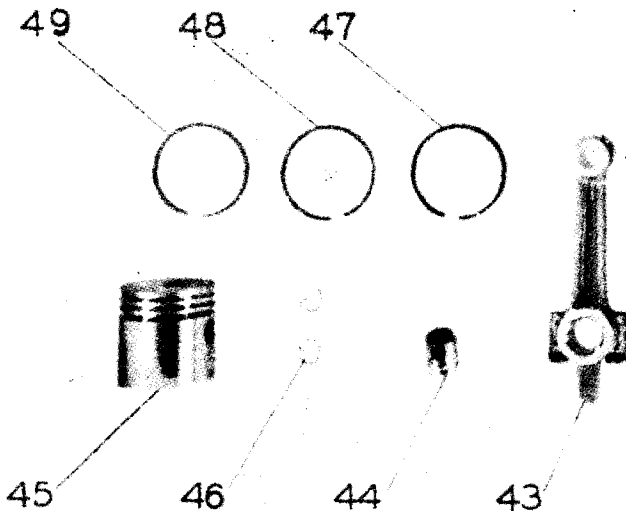
<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>No. Req.</u>
	RS-1001-35	CYLINDER ASSEMBLY	
		A to B inclusive	1
1	RS 1-3	(A) Cylinder	1
2	RS 1065-3	Rocker Arm Assembly	2
3	RS-20	Valve, Intake	1
4	RS-66	Valve, Exhaust	1
5	RL-50	Washers, Valve Spring	2
6	RL-57-1	Springs, Valve	2
7	RL-61-A	Studs, Bearing Plate	2
8	RL-67	Sleeve, Rocker Arm Stud	1
9	RL-78-D	Stud, Rocker Arm	1
10	RL-85	Plug, Oil Filler	1

11	RL-258	Pins, Valve Spring Washer	2
12	RL-86-A	(B) Washer Oil Filler Plug	1
13	RL-2009	Cam and Gear Assembly	1
14	RL-28-A	Stud for Cam and Gear	1
15	RL-1393-4	Breather Assembly	1
16	RL-397-A	Gasket, Breather	1
17	500-10-22	Screws, Fillister Head Machine, Breather 10-24 x 1-3/8	2
18	RL-1052	Shaft, Governor Throttle	1
19	RL-1055-4	Lever, Governor Throttle	1
20	RL-490-3	Link, Throttle	1
21	RL-175-B	Bearing	1
22	RL-184	Lever, Speed Adjusting	1
23	RA-92	Washer, Speed Adjusting Screw	1
24	500-10-6	Screw, Fillister Head Machine 10-24 x 3/8, Speed Adjusting Lever	1
25	TL-562-2	Spring, Speed Adjusting Lever	1
26	RS-4-3	Head	1
27	RS-114	Gasket, Head	1
28	5C8	Screw, H.H.C.Head 5/16-18 xl	6
30	RL-359 Champion J8	Plug, Spark & RL 360 - Gasket	1
31	RL-172-1	Clip, Shorting	1
32	RL-487-2	Clip, Spark Plug Wire	1
33	RA-261	Washers Cylinder Head Stud	6

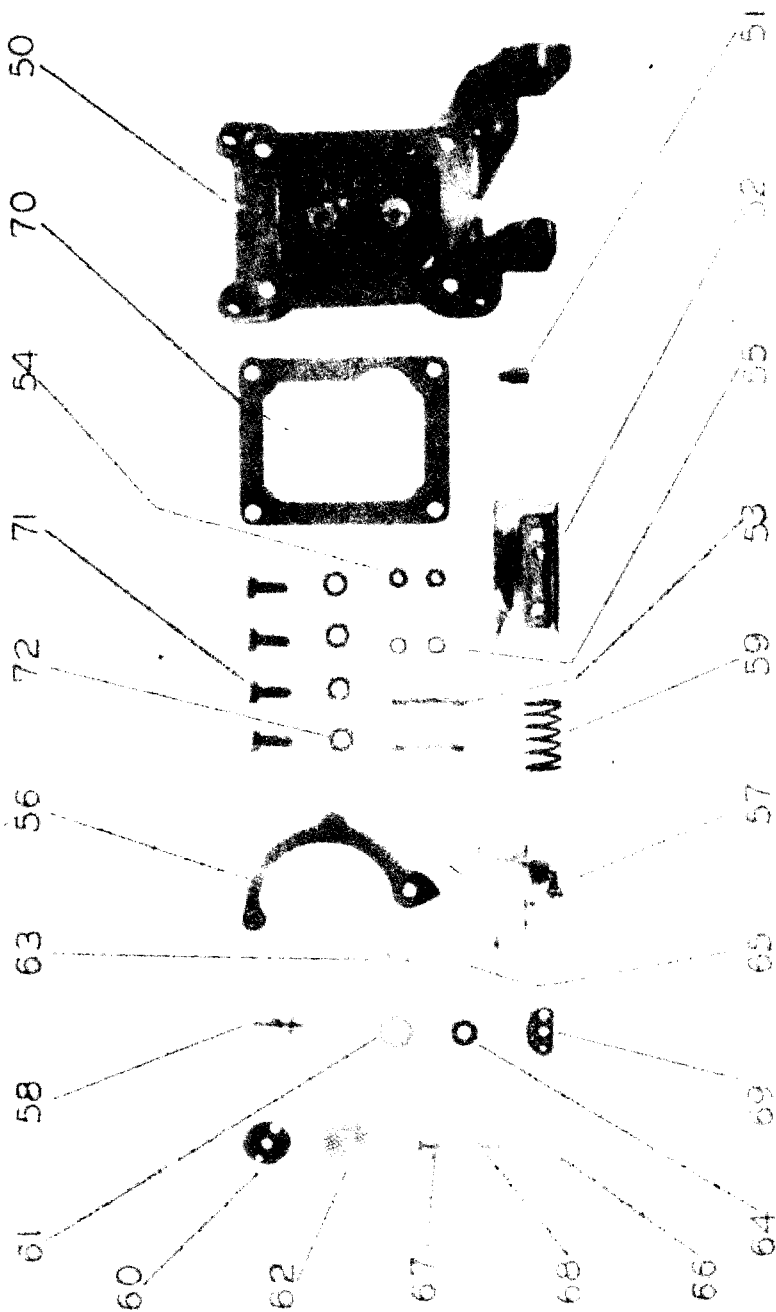


	RS-1024-64	CRANKSHAFT ASSEMBLY, C to D inclusive	1
34	RS-24-29	(C) Crankshaft	1
35	RL-12	Gear. Crankshaft	1

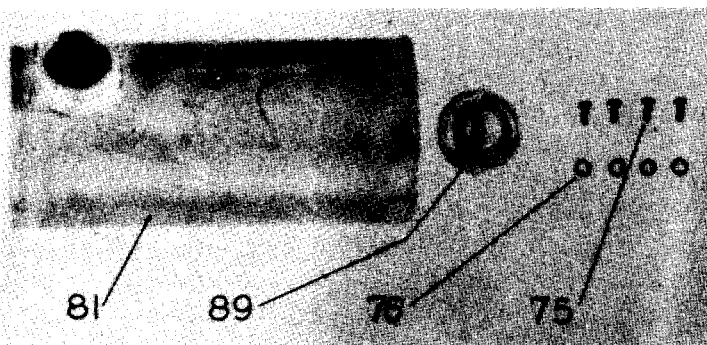
36	RS-428	Bearing, New Departure WC-87603	1
37	RL-472-C	Collar, Governor	1
38	AN 280-405	Key, Woodruff #5	1
	RL-1010-3	(D) Governor Assembly, a and b inclusive	1
39	RL-56-A	(a) Yoke Governor	1
40	RL-10	Weights, Governor	9
41	RR-764-12	(b) Rivets, R.H.Governor 7/64 x 1/2 R.H.	3
42	RL-88-C	Flywheel Key	1



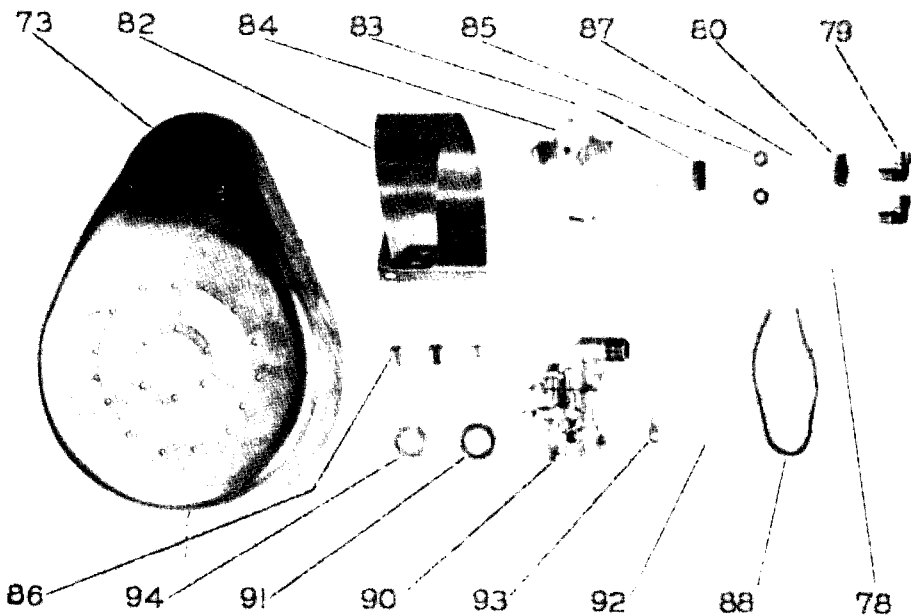
	RS-2005-8	CONNECTING ROD & PISTON ASSEMBLY A to B inclusive	1
43	RS-1025-8	(A) Connecting Rod Assembly	1
44	RS-48	Bushing, Connecting Rod	1
45	RS-5-1	Piston and Pin	1
46	RS-23	Retainer Rings for Piston	2
47	RS-14	Ring, Compression	1
48	RS-484	Ring, Oil Scraper	1
49	RS-111	(B) Ring, Oil	1



	RS-1015-1	BASE ASSEMBLY, A to B inclusive	1
50	RS-15-26	(A) Base	1
51	1Z	Plug, Drain, 1/8" Std.Pipe	1
52	RL-362-A	Pan, Oil Splash	1
53	RL-375	Studs, Oil Pump	2
54	AN-315-416	Nuts, Oil Pump, 1/4-28	2
55	AN-935-416	Lockwashers, Pan Stud 1/4	2
	RL-1361-1	(B) Oil Pump Assembly, c to d inclusive	1
56	RL-1363	(c) Arm, Oil Pump	1
57	RL-2361	Oil Pump Body Assy.	1
58	RL-1364	Plunger Pump Body Assy.	1
59	RL-356	Spring	1
60	RL-365	Body Strainer	1
61	RL-366	Washer	1
62	RL-369-1	Screen, Strainer Body	1
63	RL-374	Pin, Oil Pump Arm	1
64	RL-401	Spacer, Strainer	1
65	AN 380-5-2	Cotter Key, 3/32x1/2	1
66	AN 935-416	Lockwasher, 1/4	1
67	500-10-6	Screw, Fillister Head Machine Strainer, 10-24 x 3/8	1
68	500-10-10	Screw, R.D. Fillister Head Machine Strainer 10-24 x 5/8	1
69	RL-367	(d) Gasket, Strainer	1
70	RS-132	Gasket, Base	1
71	5C06	Screws, H.H.C.5/16-18x3/4	4
72	AN 935-516	Lockwashers, Split 5/16	4

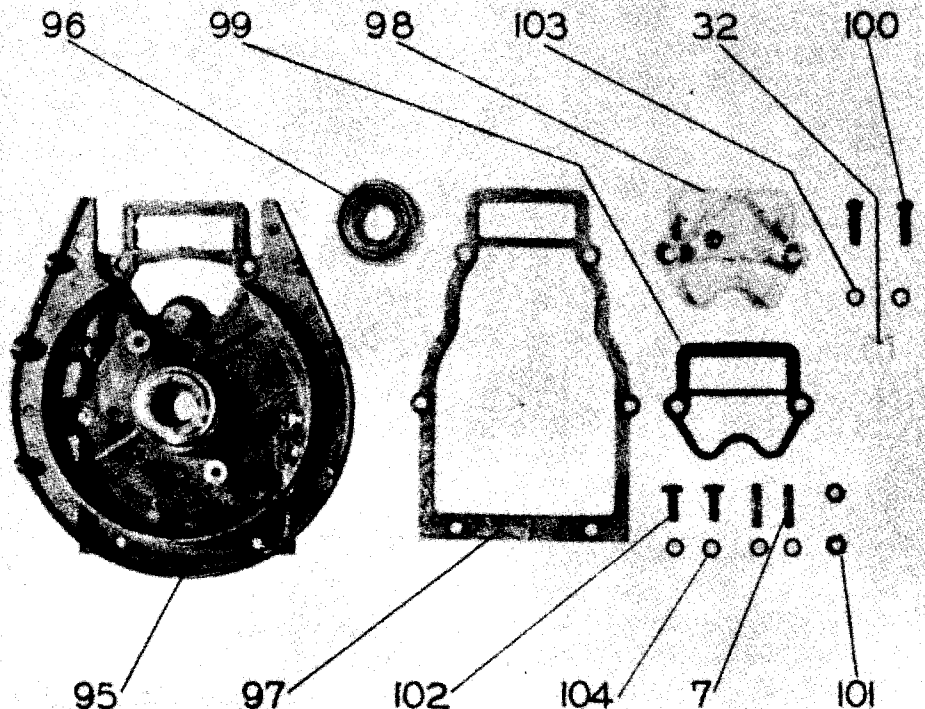




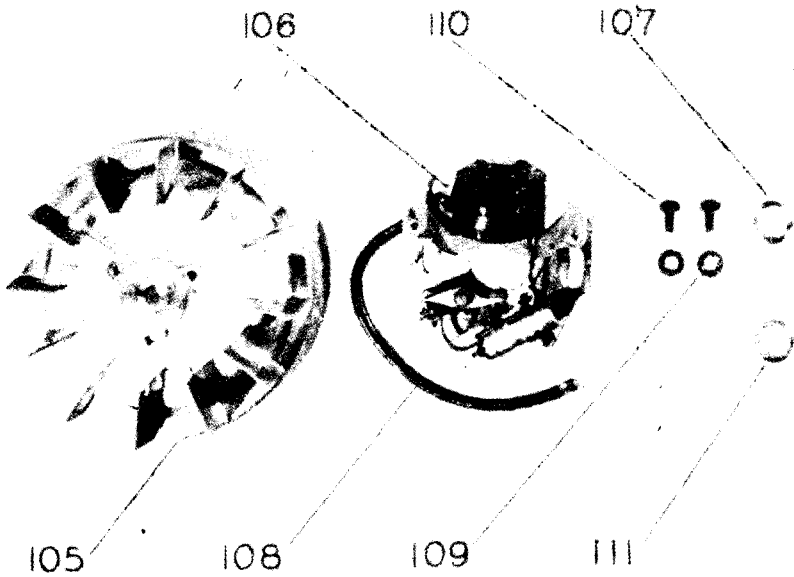


73	RL-1104-19	BLOWER HOUSING ASSEMBLY, RSC-341-1 only	1
75	500-10-6	Screws, Blower Housing, 10-24 x 3/8	4
76	10-S.P.	Lockwashers	4
78	RL-1115-41	Fuel Line, 3/16" copper	1
81	RL-2116-81	Fuel Tank Assembly	1
82	RL-409-D	Strap Tank	1
83	NC-18	Nipple Tank to Strainer, 1/8" Std. Close Nipple	1
84	RA-650	Strainer Fuel, Tillotson OW-418	1
85	RL-984-A	Nut Compression - fuel line, Doyle A-710	2
86	AN-526-420-6	Screws, R.H.M. Tank Strap 1/4 - 20 x 3/8	3
87	RL-985A	Sleeve Compression, Doyle A-710	2
89	RL-1312-7	Cap fuel filler assembly	1

90	RL-202-F	Carburetor, Zenith 59B3, Outline 9470. See attached list.	1
91	RL-389-A	Washer, Wave	1
92	RL-351	Choke Wire	1
93	RL-226-1	Choke Bracket	1
94	RL-315-A	Locknut Intake Pipe	1
	RL-1202-1	Carburetor Assembly with Choke (90-94)	1



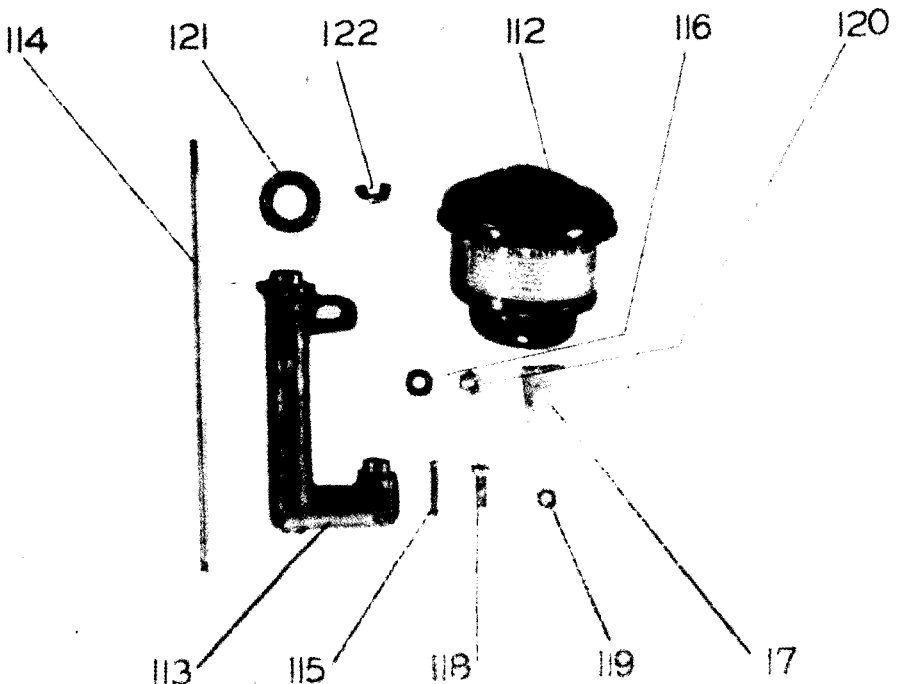
	RL-1109-22	BEARING PLATE ASSEMBLY A to B inclusive	1
95	RL-109-10	(A) Bearing Plate	1
96	RL-428	(B) Bearing-Bearing Plate, New Departure, WC-87503	1
97	RL-126	Casket-Bearing Plate	1
98	RL-19-1	Cover Plate	1
99	RL-217-2	Gasket, Bearing Cover Plate	1
100	RL-89	Screws, Bearing Plate	2
101	AN-315-4R	Nuts, Bearing Plate, 1/4-28	2
102	5D05	Screws, Bearing Plate, 1/4-28 x 5/8	2
103	(AN-935-416)	Lockwashers-Inspection Cover Plt.	2
104	(1/4-Split)	Lockwashers, Bearing Plate	4



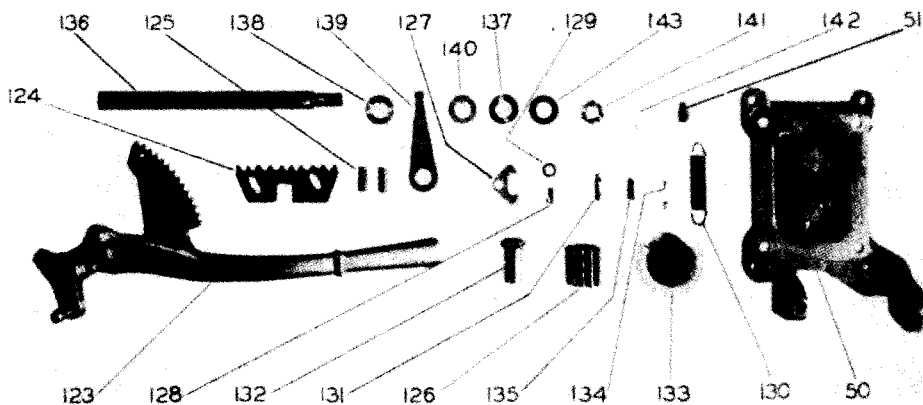
RL-358-H

MAGNETO, EISEMANN, Model 61 DA,  
Part #23370, A to B, inclusive 1

105	#23271	(A) Flywheel	1
106	#23231	Stator Assembly	1
107	#23372	Breaker Cam	1
108	#23076	(B) Wire, High Tension	1
109	AN-960-416	Bearing Plate, 5/8x17/64x16ga.	2
110	4C04	Screws Stator Plate, 1/4x20x1/2	2
111	RL-430	Cam Spacer	

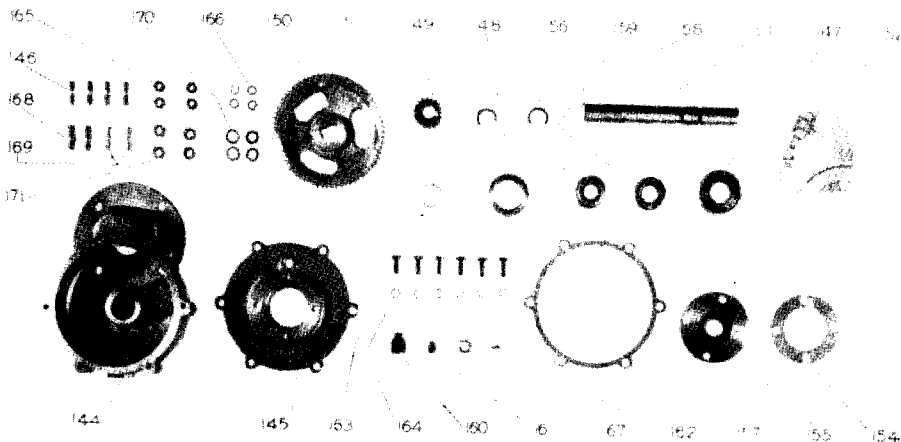


112	RL-413-E	Air Cleaner, Oil Bath, United H30-11190	1
113	RL-1113-4	Extension, Air Cleaner	1
114	RL-129	Stud, Air Cleaner	1
115	8AQ10	Screws, Fillister Head Machine, Air Cleaner Extension 8-36x 1-1/8	1
116	935-8	Lockwasher, Air Cleaner Extension #8	1
117	RL-120	Bracket, Air Cleaner Extension	1
118	500-416-10	Screw, Air Cleaner Extension, 1/4-20 x 3/4	1
119	AN-935-416)	Lockwashers, Air Cleaner 1/4 Split ) Extension	1
120	AN-335-4	Nut, Bracket Screw	1
121	RL-293-1	Gasket Air Cleaner	1
122	WN-316	Wing Nut, 3/16-24	1



123	RL-1190-10	HANDLE & SECTOR ASSEMBLY (Hand Lever Starter)	1
124	RL-271-D	Sector Starter	1
125	RL-638-A	Pins, Sector Slide	2
126	RL-275-C	Gear Shaft	1
127	RL-305	Clip, Gear	1
128	AN-526-420-6	Screw, R.H.M. for clip, 1/4-20 x 3/8	1

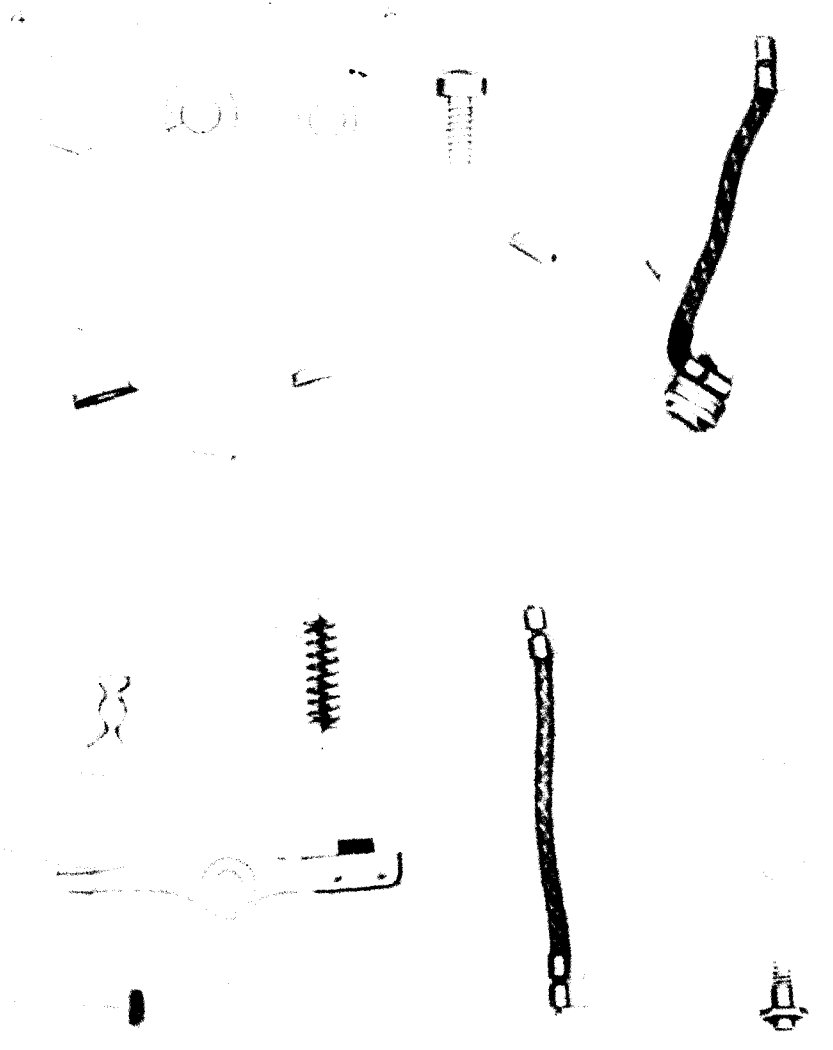
129	AN-935-416) 1/4 Split )	Lockwasher, Clip Screw	1
130	RL-182-C	Spring, Return	1
131	RL-272	Stud Return, Spring	1
132	RL-146-B	Nut, Flywheel	1
133	RL-279-A	Cover, Gear	1
134	A0-44	Screw, Parker Kalon, Pinion Cover #4x1/	2
135	560-4-8) 1/4x1/2)	Set Screw, Square Head	1
136	RL-278-F	Shaft, Foot Pedal	1
137	RL-639	Washer, Wave	1
138	RL-640	Washer, Splined	2
139	RL-641	Lever, Shift Sector	1
140	RL-645	Washer, Kick Starter	1
141	AN-315-8R	Nut, Shaft of Starter 1/2-20	1
142	AN-380-3-4	Cotter Key, 7/64 x 1	1
143	RL-288	Washers, Spacing	1



	RS-1808-1	Speed Reducer 4:1 Reduction (9 o'clock)	1
144	RS-808-1	Housing	1
145	TL-809	Cover	1
146	RL-61-A	Studs	4
147	TL-427	Bearing, New Departure	1

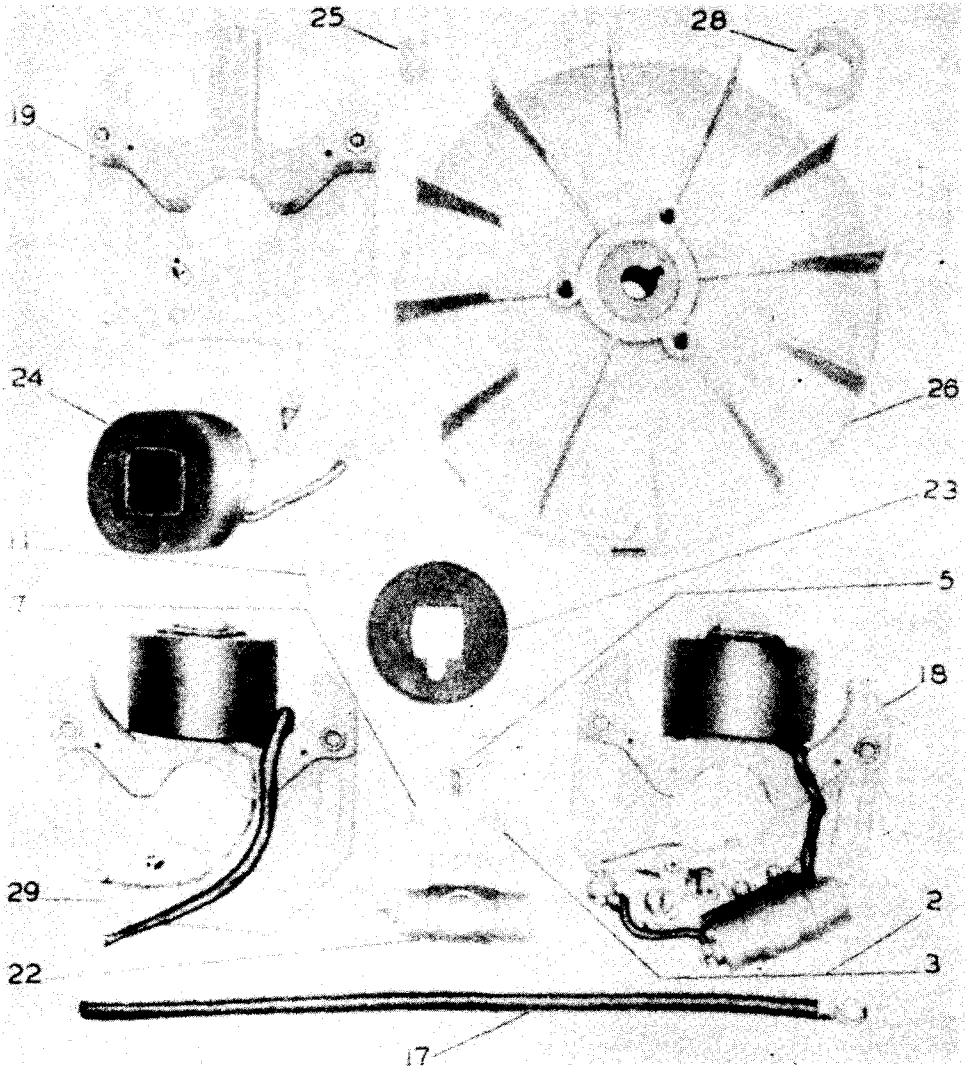
WE87604

148	RS-807	Pilot Ring	1
149	RS-810	Pinion	1
150	TL-811	Gear	1
151	TL-812	Needle Bearing, Torrington B 1212X	1
152	RS-813	Gasket for cylinder	1
153	TL-814-1	Shaft	1
154	TL-815	Gasket Cover	1
155	TL-816	Plate	1
156	TL-817	Rings, Snap	2
157	TL-818	Gasket, Housing	1
158	VW-835	Oil Seal, National 50023	1
159	RS-835	Oil Seal, National 50023	1
160	3Z	Plug, Pipe, 3/8"	1
161	1Z	Plug, Pipe	1
162	AN-280-606	Key, Woodruff, 3/16 x 3/4	1
163	4C05	Screws, H.H.C. Cover, 1/4-20 x 5/8	6
164	AN-935-416	Lockwashers, Cover, 1/4"	6
165	AN-315-416	Nuts, Cover Plate, Hexagon 1/4-28	4
166	AN-935-416	Lockwashers, 1/4	4
167	AN-315-6R	Nut on Crankshaft, Hexagon 3/8 SAE	1
168	TL-61-1	Studs	2
169	TL-61-2	Studs	2
170	AN-935-516	Lockwashers, Shake-proof 5/16	4
171	AN-315-5R	Nuts, Hexagon, 5/16-24	4



PARTS LIST FOR MODEL 61-DA MAGNETO  
 (Clockwise Lauson Part No. RL-358-H)

<u>Ref.</u> <u>No.</u>	<u>Part No.</u>	<u>Description</u>	<u>No.</u> <u>Req.</u>
1	9317	Washer 5/32" thick, 1/16" I.D. 3/8" O.D. for 17393 Screw	1
2	9407	Washer 3/64" thick, 11/64" I.D. 19/16" O.D. for 20131	1
3	15126	1/32" Lock Washer #6. For 17183 Screw	2



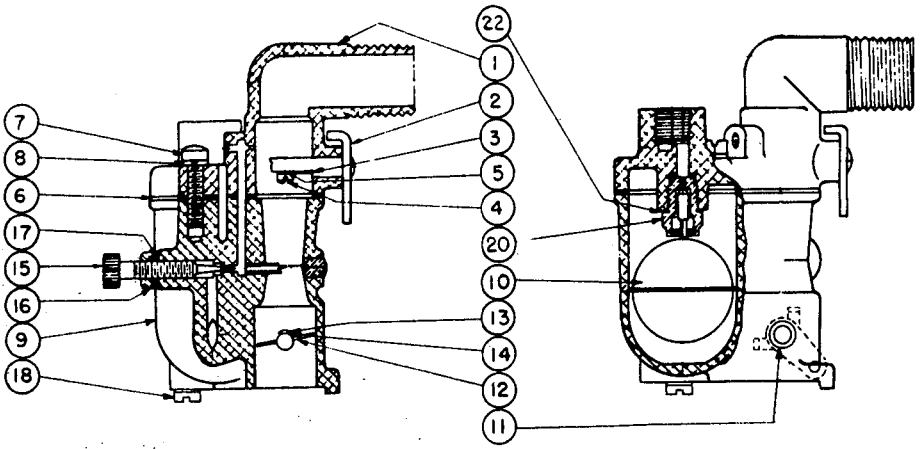
4	15298	#12x24 Nut. For 17393 Screw	1
5	17183	#6x32 Screw. For Mounting Condenser	2
6	17393	#12x24 Screw. For Breaker Plate	1
7	20131	#8 Hexagon Nut. For Condenser Plate	1
8	20476	Retaining Spring. For Breaker Lever	1
9	20481	.050" Spacing Washer.	As
		For Breaker Lever	Needs
10	20484	Oil Wick. For Breaker Lever	
		Bearing Pin	1
9	20485	.006" Spacing Washer.	As
		For Breaker Lever	Needs
11	20490	Eyelet Terminal for primary	
		ground lead	1
9	20547	.016" Spacing Washer.	As
		For Breaker Lever.	Needs



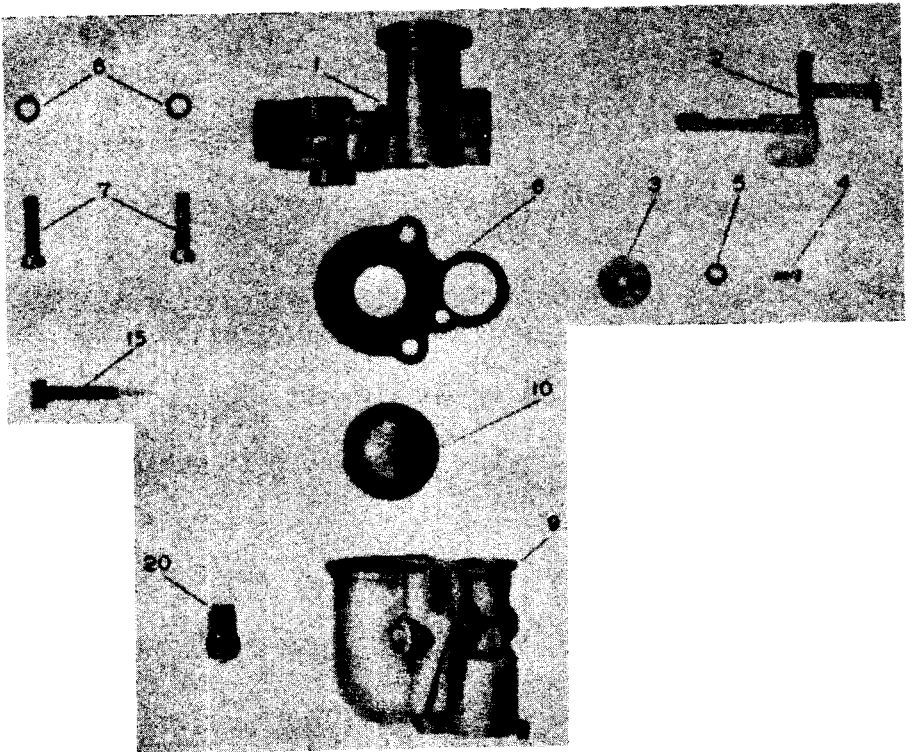
10	20975	#12 Lock Washer. For 17393 Screw	1
11	22066	Tension Spring. For Breaker Lever	1
12	22615	1/32" Lock Washer No.6.	
		For 22944 Nut	1
13	22671	Breaker Lever with Tungsten Contact Point	1
14	22887	Screw with Tungsten Contact Point	1
15	22944	No.6 Hexagon Nut. For 22887 Screw	1
16	22985	Insulation Washer. For 22887 Screw	2
17	23076	High Tension Cable with Eyelet Terminal	1
18	23231	Complete Stator Assembly	1
19	23232	Stator Plate with core laminations	1
20	23240	Breaker Plate with contact screw and lead	1
21	23241	Breaker Plate only. Less contact screw	1
22	23242	Condenser with 20131 Hexagon Nut	1
23	23263	End Washer. For Ignition Coil	1
24	23265	Ignition Coil	1
25	23268	Insulation Strip. For 23265 Coil	1
26	23271	Rotor with ring magnet. Clockwise	1
27	23280	Primary Conductor with Eyelet Terminals	1
28	23372	Breaker Cam. Clockwise Rotation	1
29	23374	Stator Plate with Winding and Breaker Pin	1
	23399	Thrust Washer (not shown) For Breaker Cam	1
30	23509	Insulation Washer. For 22887 Screw	1

TOOLS RECOMMENDED FOR DEPOT SHOPS

RL-1987 Puller, Flywheel  
 RL-980 Tool, Flywheel Holding



Cross Section of Carburetor



## PARTS ZENITH CARBURETOR #O-9470

## LAUSON PART #RL-202-F

<u>Ref.</u> <u>No.</u>	<u>Part No.</u>	<u>Description</u>	<u>No.</u> <u>Req.</u>
1	C2-32A	Assemble, Throttle Body (Spec. #9)	1
2	C29-16	Assemble, Throttle Shaft and Lever	1
3	C21-22	Plate Throttle	1
4	T11S3-3	Screw, Throttle Plate	1
5	T45-3	Washer, Plate Screw Lock	1
6	C152-12	Gasket, Bowl to body	1
7	T1S8-10	Screw, Bowl to body	2
8	T41-8	Washer, Assembly Screw Lock	2
9	B3-25C (B)	Assembly, Fuel Bowl	1
10	C85-17	Assembly Float	1
11	C108-55	Assembly Air Shutter Shaft and Lever	1
12	C102-40	Plate, Air Shutter	1
13	T11S3-3	Screw, Air Shutter Retaining	1
14	T45-3	Washer, Retaining Screw Lock	1
15	C46-33	Needle, Adjusting	1
16	CT58-1	Nut, Adjusting Needle	1
17	CT58-1	Packing Adjusting Needle	1
18	C138-39	Plug, Bowl Drain Channel	1
	C117-4	Spring, Air Shutter Return	1
20	C81-8	Assembly, Fuel Valve and Seat (Spec. #20)	1
22	T56-4	Washer, Fibre	1



NUMERICAL PARTS LISTSKETTLE & MOTOR SPRAYER

<u>Part No.</u>	<u>Page No.</u>	<u>No. Req'd</u>	<u>Price Each</u>
AM-1	72	1	\$ 3.25
NS-1	79	1	.06
PP-1	78	1	.05
PT-1	78	1	.23
SL-1	79	1	.20
UN-1R	79	4	.60
NP-1-2	78	1	.06
NP-1-5	78	1	.13
NP-1-6	79	2	.15
PB-1-43	80	1	.07
P-2	72	2	16.50
P-2C	75	2	1.00
CR-2-1	79	1	.40
RT-2-1	79	1	.76
NP-2-4	73	1	.18
K-3	73	1	16.00
KM-3	75	2	.15
5	72	1	27.50
A-5	72	1	18.00
5-1	76	1	1.65
5-2	76	1	3.85
5-2T	76	1	3.85
5-3	76	1	1.54
5-4	76	1	6.60
5-5	76	1	.83
5-5G	76	1	.83
5-6	76	1	2.75
7	76	1	.25
9	76	1	2.75
10	76	1	1.21
11	76	1	.04
12	76	8	.01
BT-12-1	73, 74, 79	10	.04
BT-12-212	79	1	.06
BT-12-612	75	8	.10
13	76	4	.01
A-13	79	1	16.50
14	76	1	.28
A-14	75	4	.50
SS-14-14A	83	1	.06

<u>Part No.</u>	<u>Page No.</u>	<u>No. Req'd</u>	<u>Price Each</u>
LW-14E	79,83	7	.01
BR-14-34	79	4	.01
CS-14-78	83	3	.02
WK-15	80	1	.03
HF-18-90	75	1	.01
CP-18-1	83	8	.15
CP-18-112	75	2	.01
21	77	1	.05
A-21	72	1	3.75
Am-21	72	1	44.00
21-41	77	1	8.25
22	77	1	.05
23	77	1	.44
24	77	1	.60
25	77	1	.11
26	77	1	1.65
27	77	1	.16
28	77	1	.55
29	77	1	.49
30	77	1	.11
31	77	1	.05
32	77	1	.05
RL-34-32	80	1	.15
35-37	77	1	4.47
38	66	1	.11
NC-38	77	1	.05
SL-38	77,79	2	.10
BT-38-7	80	2	.07
PO-38-19	79	1	.20
39	77	1	.55
40	77	1	.11
41	77	1	.55
H-42	77	1	1.54
H-46	77	1	2.20
50	77A	per ft.	.40
51	77A	2	.17
52	77A	2	.55
H-55	77	1	.77
A-57	75	2	3.50
H-58	77A	1	2.50
H-59	77A	1	.55
H-60	77A	1	1.20
H-61	77A	1	.70
H-62	77A	1	.10
A-81	74	1	.60

<u>Part</u> <u>No.</u>	<u>Page</u> <u>No.</u>	<u>No.</u> <u>Req'd</u>	<u>Price</u> <u>Each</u>
A-83	74	1	.05
A-87	74	1	.80
M-101	83	2	.01
PB-112-1	79	1	.11
NP-112-3	79	1	.11
A-115	79	1	32.00
M-129	83	1	.12
SK-316-1	83	1	.05
KM-399	73	1	10.00
KM-400	73	1	4.95
KM-470A	74	1	.35
M-496	83	2	.03
M-497	83	2	.01
M-503	83	1	.10
HN-516	79, 70	6	.01
LW-516	74	4	.01
LW-516-E	79	8	.01
BT-515-1	73, 74	9	.02
BT-516-34	74	47	.02
CS-516-1	80, 81	9	.02
BT-516-114	97	4	.02
BS-516-138	79	4	.02
BS-516-214	80	2	.10
N-591	78	1	2.47
650-16-6	72	2	----
650-16-T	72	2	----
N-661	79	1	5.50
N-661-H	79	1	.70
P-896	73	2	38.50
K-899-A	75	2	1.00
KM-899-B	75	2	1.00
KM-909	75	2	.75
KM-938-C	74	1	9.00
KM-953	72	1	3.50
K-976	73	1	1.00
KM-1039	72	1	3.20
KM-1133	72	1	2.30
NM-1191	78	1	10.00
NM-1191-A	79	1	.60
NM-1191-B	79	1	.60
N-1191-C	79	2	.50
N-1191-E	78	1	.10
A-1203	78	4	.30
AM-1218	75	4	2.20
K-1219-L	75	8	.10
KM-1219-A1	72	1	12.50
KM-1219-B2	75	1	8.75
KM-1219-C	72	2	8.25

<u>Part No.</u>	<u>Page No.</u>	<u>No. Req'd</u>	<u>Price Each</u>
KM-1219-D	74	1	3.25
KM-1219-L	74	1	3.50
KM-1219-P	75	2	.25
KM-1219-T	74	1	49.50
DM-1327-S	72	1	.35
N-1348-P	79	1	34.00
N-1348-HG	80	2	.14
N-1348-P	80	set	.42
N-1348-R	79	1	9.35
N-1348-1	80	1	.69
N-1348-2	80	1	2.80
N-1348-3	80	1	3.51
N-1348-4	80	1	.69
N-1348-5	80	1	.69
N-1348-6	80	1	.42
N-1348-10	80	1	.84
N-1348-11	80	1	8.40
N-1348-12	80	1	4.45
N-1348-13	81	1	.20
N-1348-R1	81	1	.69
N-1348-R2	81	1	3.08
N-1348-R3	81	1	.69
N-1348-R4	81	1	.36
N-1348-R5	81	1	.44
N-1348-R6	81	1	.42
N-1348-R7	81	1	.27
N-1348-R8	81	1	.07
N-1348-R9	81	1	.07
N-1348-R10	81	1	.07
A-1494	83	9	.06
A-1523	83	1	.11
A-1536	83	1	1.10
A-1536-C	83	1	1.10
A-1527	83	1	.80
A-1538	83	1	.88
A-1539-B	83	1	3.30
A-1540-A	83	1	1.10
NM-1652-AL	78	1	3.50
N-1652-B	78	1	2.10
NM-1652-B	79	1	.75
N-1652-C	78	1	16.50
N-1652-E	79	1	71.00
NM-1652-H	78	1	5.00
NM-1652-L	79	1	.65
NM-1652-P	79	1	.50



<u>Part No.</u>	<u>Page No.</u>	<u>No. Req'd</u>	<u>Price Each</u>
NM-1652-PS	79	1	.15
NM-1652-S	78	1	1.75
1711	83	1	.22
A-1791	83	1	.22
KM-1968-B	73	1	.50
KM-1968-C	73	1	.75
AM-2131-3	79	1	.50
A-2260	83	1	.05
NM-2373-H	83	1	.50
NM-2373-HB	83	1	1.00
NM-2373-R	83	1	.10
NM-2373-Y	83	1	3.50
NM-2373-YA	83	1	5.00
A-2720	75	4	1.17
A-2788	75	4	1.95
4201-A	83	1	1.93
5957	83	6	.28
4989B	83	1	3.90

### ENGINE PARTS

RS-1-3	84	1	7.50
1Z	88, 94	2	.25
3Z	94	1	.05
RS-4-3	85	1	1.25
4C04	91	2	.05
4C05	94	6	.05
RS-5-1	86	1	2.80
5C06	88		
5C8	85		
5D05	90	2	.05
8AQ10	92	1	.05
10-SP	89	4	.01
RL-10	86	9	.10
RL-12	85	1	.60
RS-14	86	1	.35
RS-15	88	1	1.50
NC-18	89	1	.05
RL-19-1	90	1	.20
RS-20	84	1	.75
RS-23	86	2	.05
RS-24-29	85	1	7.50
RL-28-A	85	1	.20
A044	93	2	.03
RS-48	44	1	.25

<u>Part</u> <u>No.</u>	<u>Page</u> <u>No.</u>	<u>No.</u> <u>Req'd</u>	<u>Price</u> <u>Each</u>
RL-50	84	2	.05
RL-56-A	86	1	.25
RL-57-1	84	2	.20
RL-61-A	84, 93	6	.05
TL-61-1	94	2	.05
TL-61-2	94	2	.05
RS-66	84	1	.75
RL-67	84	1	.10
RL-78-D	84	1	.15
RL-85	84	1	.15
RL-86-A	85	1	.05
RL-88-C	86	1	.10
RL-89	90	3	.02
RA-92	85	1	.02
RL-109-10	90	1	1.50
RS-111	80	1	.35
RS-114	85	1	.15
RL-120	92	1	.20
RL-126	90	1	.15
RL-129	92	1	---
RS-132	88	1	.10
RL-146-B	93	1	.40
RL-172-1	85	1	.20
RL-175-B	85	1	.20
RL-182-C	93	1	.20
RL-184	85	1	.10
RL-202-F	90	1	6.50
RL-217-2	90	1	.05
RL-226-1	90	1	.05
RL-258	85	2	.05
RA-261	85	6	.05
RL-271-D	92	1	.25
RL-272	93	1	.05
RL-275-C	92	1	.75
RL-278-F	93	1	.35
RL-279-A	93	1	.25
AN-280-405	86	1	.10
AN-280-606	94	1	.10
RL-288	93	1	.05
RL-293-1	92	1	.05
RL-305	92	1	.15
RL-315-A	90	1	.10
AN-315-4R	90	2	.05
AN-315-5R	94	4	.05

<u>Part No.</u>	<u>Page No.</u>	<u>No. Req'd</u>	<u>Price Each</u>
AN-315-6R	94	1	.05
AN-316-8R	93	1	.05
AN-315-416	88, 94	6	.05
WN-316	92	1	.05
AN-335-4	92	1	.02
RL-331	90	1	.05
RL-356	88	1	.25
RL-358-H	91	1	17.50
RL-359	85	1	.65
RL-360			
RL-362-A	88	1	.15
RL-365	88	1	.10
RL-366	88	1	.05
RL-367	88	1	.05
RL-369-1	88	1	.10
RL-374	88	1	.10
RL-375	88	2	.10
AN-380-3-4	93	1	.02
AN-380-5-2	88	1	.02
RL-389-A	90	1	.05
RL-387	85	1	.05
RL-401	88	1	.05
RL-409-D	89	1	.35
RL-413-E	92	1	3.00
TL-427	93	1	3.40
RL-428	90	1	2.25
RS-428	86	1	2.25
RL-430	91	1	.20
RL-472-C	86	1	.70
RS-484	86	1	.35
RL-487-2	85	1	.05
RL-490-3	85	1	.05
500-10-6	85, 88, 89	6	.05
500-10-10	88	1	.05
500-10-22	85	2	.05
500-416-10	92	1	.05
AN-526-420-6	89, 92	4	.05
560-4-8	93	1	.05
TL-562-2	85	1	.10
RL-638-A	92	2	.15
RL-639	93	1	.10
RL-640	93	2	.10
RL-641	93	1	.15
RL-645	93	1	.03
RA-650	89	1	1.10

<u>Part No.</u>	<u>Page No.</u>	<u>No. Req'd</u>	<u>Price Each</u>
RR-764-12	86	3	.03
RS-807	94	1	2.00
RS-808-1	93	1	7.50
TL-809	93	1	1.50
RS-810	94	1	.50
TL-811	94	1	1.75
TL-812	94	1	.65
RS-813	94	1	.05
TL-814	94	1	2.00
TL-815	94	1	.05
TL-816	94	1	.45
TL-817	92	2	.05
TL-818	84	1	.05
VW-835	94	1	1.00
RS-835	94	1	1.00
936	92	1	.03
AN-935	88, 90, 92, 93, 94	21	.03
AN-935-516	88, 94	8	.02
AN-960-416	91	2	.03
RS-980	97	1	1.00
RS-984-A	89	2	.05
RL-985-A	89	2	.05
RS-1001-35	84	1	12.00
RL-1010-3	86	1	1.25
RS-1016-1	88	1	4.50
RS-1024-64	85	1	11.25
RS-1025-8	86	1	2.50
RL-1052	85	1	.20
RL-1055-4	85	1	.20
RS-1065-3	84	2	.75
RL-1104-19	89	1	1.75
RL-1109-22	90	1	3.75
RL-1113-4	92	1	----
RL-1115-41	89	1	.50
RL-1190-10	92	1	3.25
RL-1202-1	90	1	6.50
RL-1312-7	89	1	.35
RL-1361-1	88	1	2.90
RL-1363	88	1	.40
RL-1364	88	1	.25
RL-1393-4	85	1	1.00
RL-1808-1	93	1	15.00
RL-1987	97	1	3.00
RS-2005-8	86	1	6.35
RL-2009	85	1	1.90
RL-2116-81	89	1	2.50
RL-2361	88	1	1.00

MAGNETO PARTS

<u>Part No.</u>	<u>Page No.</u>	<u>No. Re'd</u>	<u>Price Each</u>
9317	95	1	.05
9407	95	1	.05
15126	95	2	.05
15298	96	1	.05
17183	96	2	.05
17393	96	1	.05
20131	96	1	.05
20476	96	1	.05
20481	96	as needed	.05
20484	96	1	.05
20485	96	as needed	.05
20490	96	1	.05
20547	96	as needed	.05
20975	97	1	.05
22066	97	1	.10
22615	97	1	.05
22671	97	1	1.25
22887	97	1	.50
22944	97	1	.05
22985	97	2	.10
23076	91,97	1	.25
23231	91,97	1	8.50
23232	97	1	1.50
23240	97	1	.75
23241	97	1	.25
23242	97	1	1.00
23263	97	1	.20
23265	97	1	3.50
23268	97	1	.10
23271	91,97	1	7.00
23272	91,97	1	1.00
23274	97	1	5.00
23280	97	1	.15
23399	97	1	.10
23509	97	1	.10

CARBURETOR PARTS

T1S8-10	99	2	.05
C2-32A	99	1	1.50
B3-25C	99	1	2.00
T1S3-3	99	2	.05

<u>Part No.</u>	<u>Page No.</u>	<u>No. Req'd</u>	<u>Price Each</u>
C21-22	99	1	.50
C29-16	99	1	.60
T41-8	99	2	.05
T45-3	99	2	.05
C46-33	99	1	.25
T56-4	99	1	.05
CT58-1	99	1	.05
C74-7	99	1	.10
C81-8	99	1	.75
C85-17	99	1	.50
C102-40	99	1	.10
C108-55	99	1	.40
C117-4	99	1	.10
C138-39	99	1	.05
C142-12	99	1	.10