

# INSTRUCTIONS No. 2417D

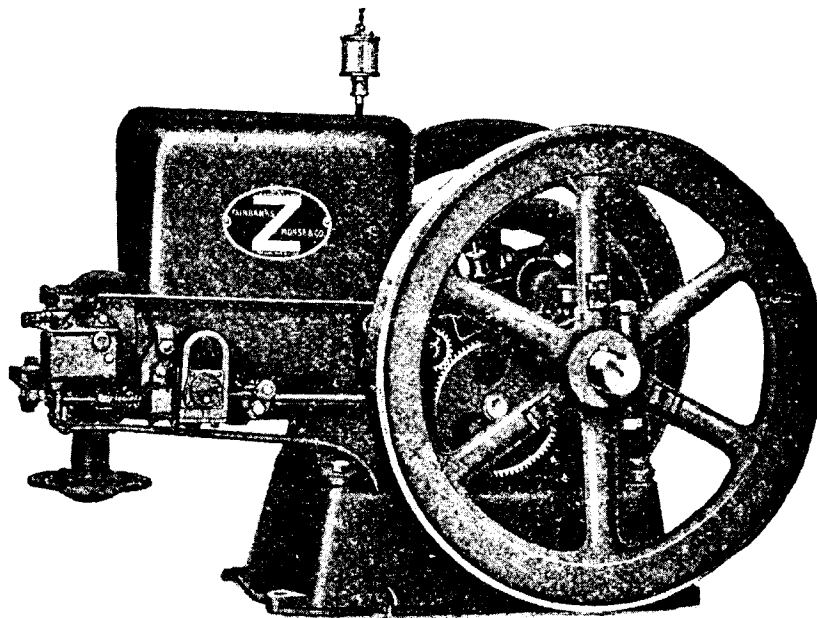
FOR SETTING UP AND OPERATING

## Fairbanks-Morse

3 H. P. **“Z”** 6 H. P.

## Throttling Governor Oil Engine

This book should be carefully read before attempting to do anything with the engine



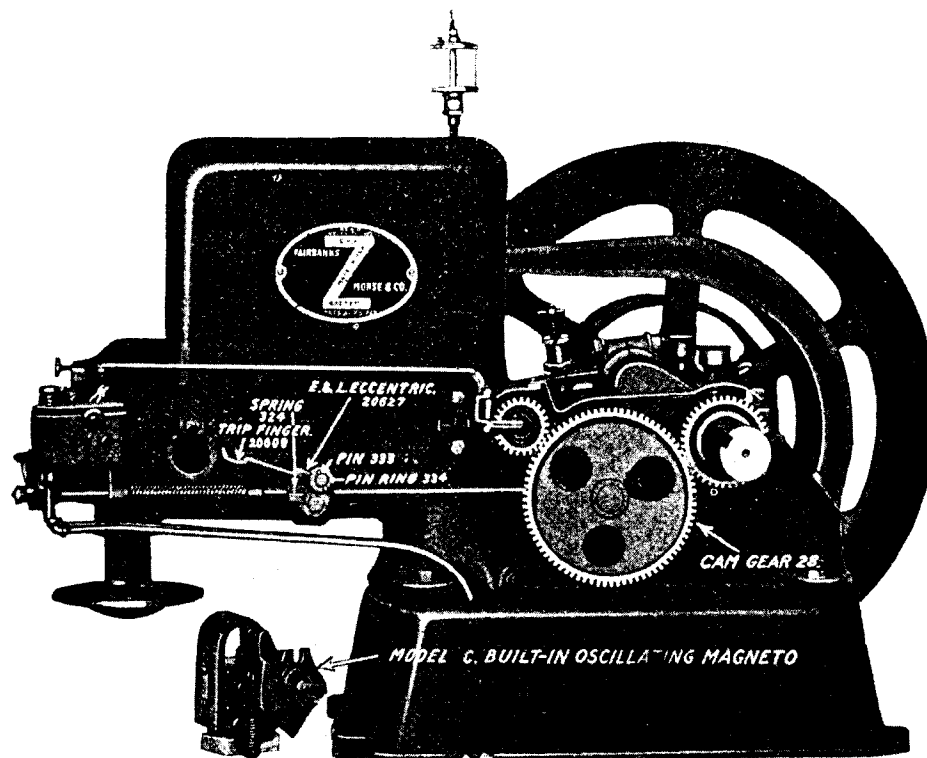
(3371G)

6 H. P. Type "Z" Oil Engine

### FAIRBANKS, MORSE & CO.

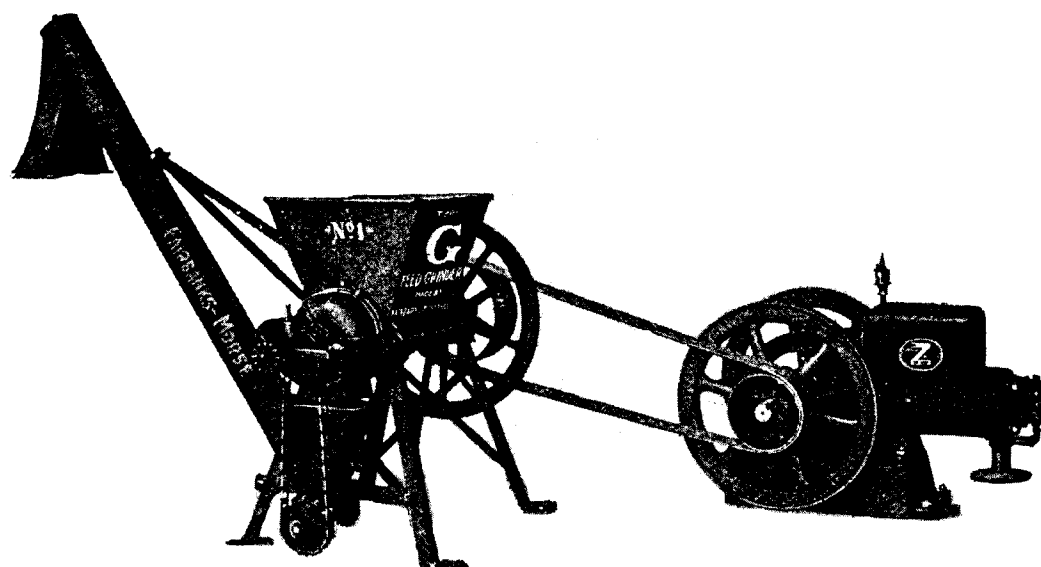
(INCORPORATED)

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(3376G)

6 H. P. Type "Z" Engine with Built-in Oscillating Magneto removed.



(3243G)

6 H. P. Type "Z" Engine Belted to No. 1 Type "G" Feed Grinder

## INSTRUCTIONS No. 2417D

### For Setting Up and Operating Fairbanks-Morse 3 and 6 H. P. Type "Z" Oil Engines

1. Remove engine from crate, being very careful to avoid damage.

When Engine  
is Received.

In the bundle of parts is the cylinder oil cup which is to be placed on the cylinder oil pipe (on the "Closed Jacket" Engines a nipple is included which is to be screwed into the cylinder). Put the pulley on the side opposite the governor using the bolts sent. With the Steel Pulleys small clips are furnished to catch inside the rim so the bolts will hold fast. When it is desired to place the pulley on the governor side, it will be necessary to reverse the small dog in the starter crank so as to use it on the other side, the direction of motion always being as shown in Fig. 3375, page 3.

2. If engine is to be located on a foundation, follow the regular foundation plans, leaving two or three feet of room all round.

Foundation.

3. If the engine is installed in a building the silencer (26A, page 8) may be removed and the exhaust pipe attached and carried outside. It should be short and with few bends. The silencer must be attached to end of the pipe. Water may collect in long exhaust pipes so a small hole or other drain should be provided at the lowest place. When the pipe is long (20 feet) or has several elbows (4) the pipe should be increased in size and better results will be observed if a cast iron exhaust pot is installed near the engine.

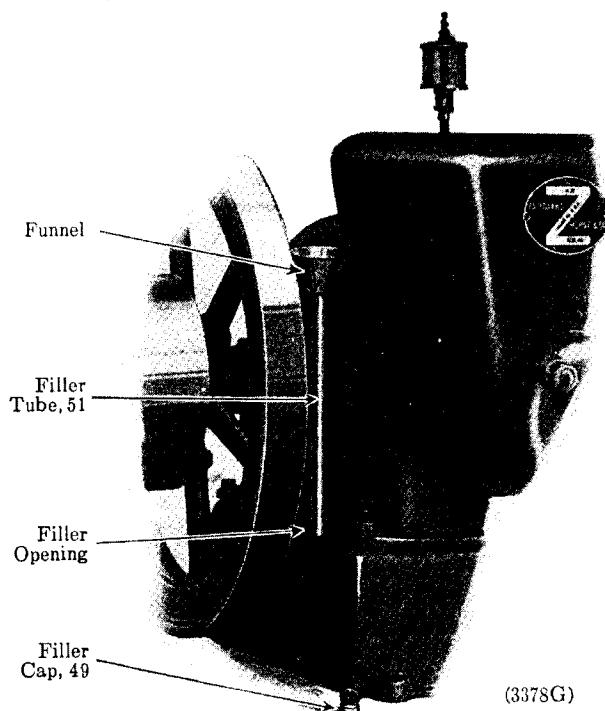
If Located in  
a Building.

4. These engines can use as fuel, Gasoline, Motor Spirits, Kerosene and some varieties of Power Distillate. In this book we will call the fuel "oil fuel."

Fuel.

5. Read the tags on the engine but do not remove them until you are familiar with its operation.

Read Tags.



#### WHAT TO DO BEFORE STARTING.

6. Fill fuel tank with the oil fuel to be used regularly, using the tube (51 at the left) and funnel that is packed in the crate. Remove funnel and tube after filling tank.

Fill Fuel Tank

7. Put water in hopper but only enough at first to cover top of cylinder. This can be seen through the hole in top of hopper. In cold weather hot water will make the engine easier to start.

Cooling Water

Tighten Cylinder Head Nuts.

Tighten Nuts.

8. Fill oil cup (527, page 8) with good Gas Engine Oil (we recommend Hytest), and adjust oiler to feed 12 drops per minute on 3 H. P., 20 drops per minute on 6 H. P. See that the plug in the filling opening is provided with good gasket and screwed in tight to prevent the oil being blown back.

Oiling.

Gradually cut down the amount as the engine becomes worn in until in a month one-half the above quantities are used.

Fill the four grease cups. Two (505, page 9) are on main bearings, a small one is on the cam gear hub (506, page 9). These should be screwed down one or two turns until grease is forced freely into bearings. The fourth one (509, page 9) is on the crank pin bearing.

9. With a hand oil can go over the engine and oil the governor and all other places where there are oil holes, and where one part moves against another.

Oil by Hand.

# Instructions—Fairbanks-Morse Type "Z" Oil Engines

## TO START ENGINE.

Starting and  
Fuel Reservoir

Lock-Out  
Lever.

Fuel Valve.

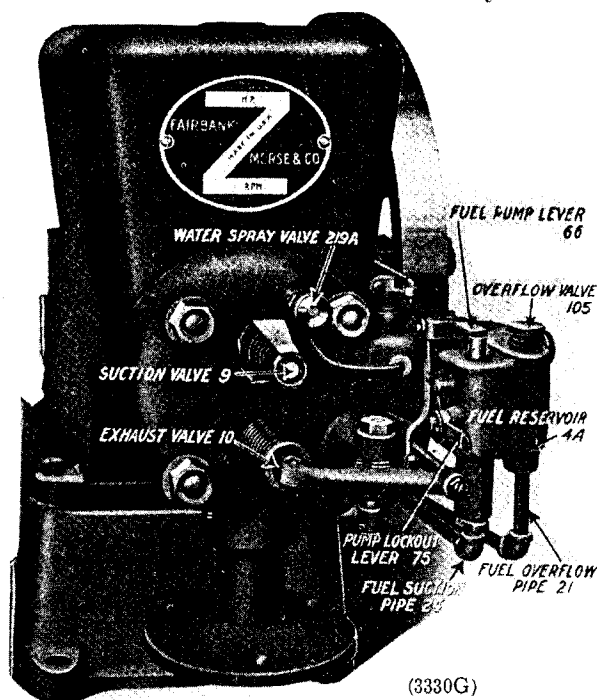
Starting.

10. Drain the oil fuel from the fuel reservoir (4A, page 2) by unscrewing the overflow valve (105, page 2) one or two turns, until the oil fuel runs back to tank. Open cover to see when it is drained. When empty close the overflow valve tightly. Fill the reservoir with gasoline for starting and throw the fuel pump out of action by pushing the pump lever (66, below) back away from its driving screw on the exhaust rod, by means of the lock out lever (75, below). This is located on the cylinder head side of the fuel reservoir.

11. Open fuel throttle valve (76A, page 9) about one turn.

12. Set the "Early and Late" pin (333, page 3), with the mark "L" up, indicating late ignition.

13. Holding the suction or upper valve open with the left hand, with the starter crank spin the engine. After getting the engine in motion, release the suction valve and half close the air inlet opening in bottom of reservoir with fingers of left hand **for one revolution only**, and then remove fingers while still continuing to crank. If held longer too much fuel will be drawn in. The mixture will not ignite if there is too much fuel in it, and the fuel must be forced out by cranking.



## AFTER ENGINE IS STARTED.

14. After the engine takes its first impulse remove the starter crank. The igniter should be set on running position with the mark E up—this is the point of early ignition. The throttle should be again adjusted to give as little fuel as the engine will run on. After the engine is running nicely adjust the throttle valve. The position at final test on distillate was with the mark straight down, but it should be adjusted to give as little fuel as the engine will run on. The position varies with the fuel and the temperature.

Running on  
Oil Fuel.

Water Spray.

Fill Hopper.

15. The engine will usually run on oil fuel after using one reservoir full of gasoline. When engine is warm enough to run on oil fuel the fuel pump should be thrown into action by throwing out lock-out lever (75 above).

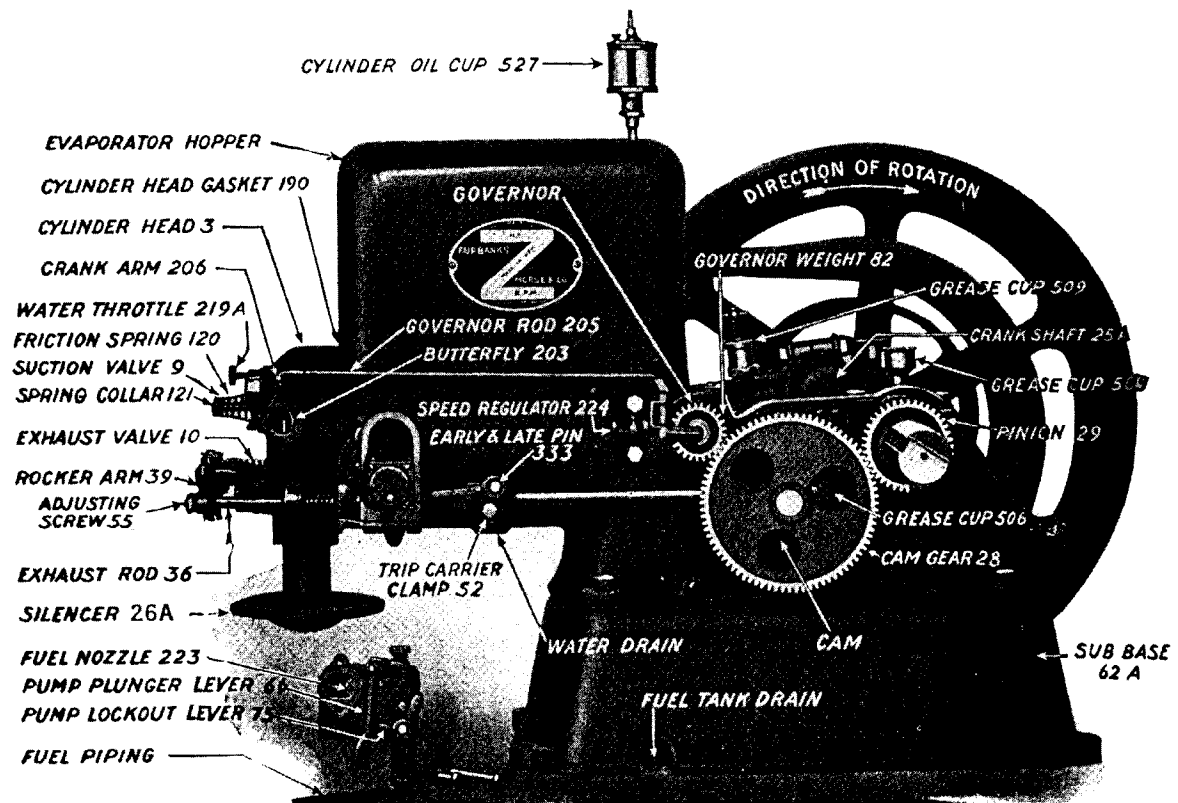
16. The water throttle valve (219A above) on cylinder head should not be opened except to quiet hard explosions which may be noticed when engine is on heavy continuous load, and only enough to serve the purpose. This valve must be closed a few minutes before stopping engine so that the interior of the cylinder will be dry. The valve is on 6 H. P. engines only.

17. Fill water hopper two-thirds full and replenish this water as it evaporates. It is expected to boil away.

## TO STOP ENGINE.

To Stop.

18. To stop engine, first close water throttle valve (219A), then close throttle valve (76A), then close cylinder oiler (527, page 8), and in freezing weather, drain out the water.



(3375G)

### DESCRIPTION OF PARTS OF ENGINE AND MANNER OF ADJUSTMENT.

19. The cam gear is marked with two center punch marks on face of tooth. The pinion (29 above) on crank shaft has one tooth with two center punch marks. This tooth should come between the two marked ones on the large gear. (28 above).

If engine is taken apart and the marks on gears cannot be found, or if old gear is replaced by a new one, the engine should be timed as follows:

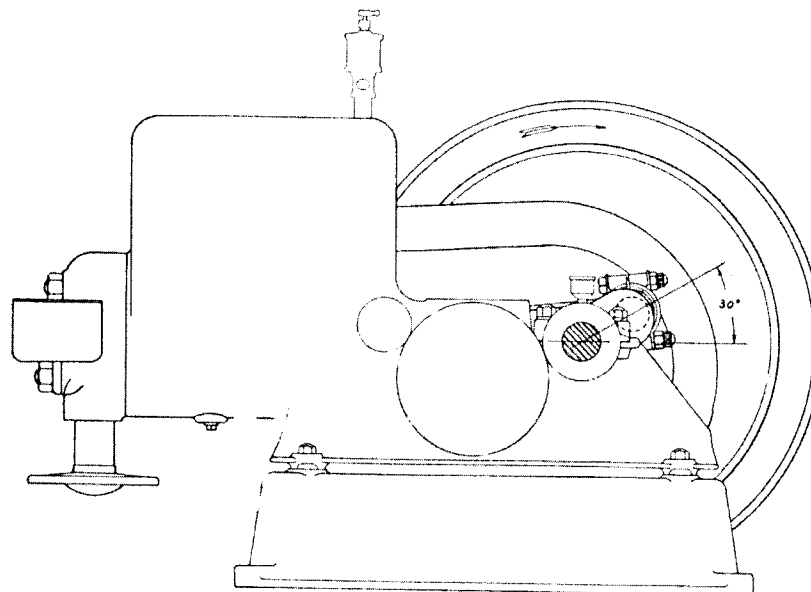


Fig. 1

(1833GN)

At this position of the crank on the exhaust stroke, the exhaust valve begins to open.

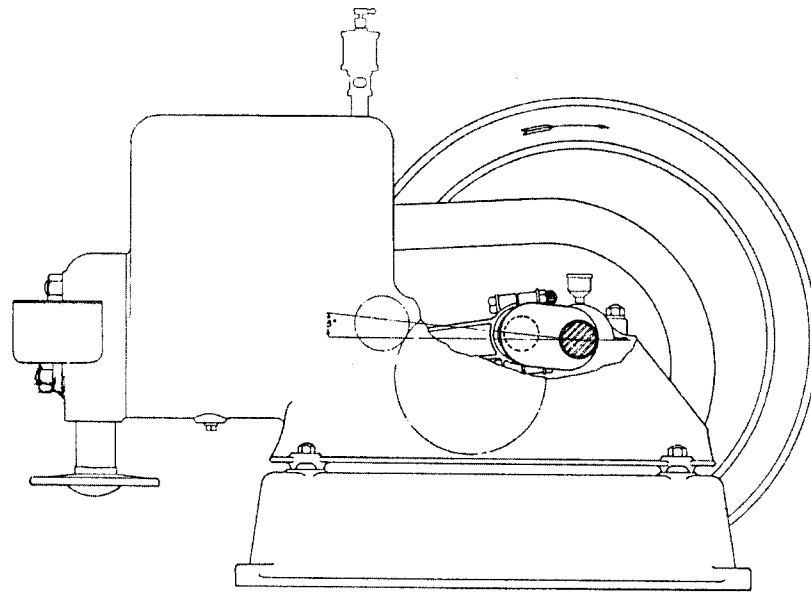


Fig. 2

(1834GN)

At this position of the crank on the suction stroke, the exhaust valve closes.

- Setting Gears.** Place the crank (25A page 9) in a vertical position and pointing up. Then set the cam gear with the nose of the cam straight up. Next see that there is about 1/16" clearance between end of exhaust rod and adjusting screw in the valve rocker arm. Such a setting should bring the valve timing very nearly as described in paragraph 20 below.
- Valve Timing.** 20. The cam should begin to open the exhaust valve 30° to 35° before outer dead center (Fig. 1833GN). The cam should close the exhaust valve when the crank AB is in the position shown in Fig. 1834GN, or about 5° above the inner dead center. The valve can be turned with the fingers the instant it is lifted from its seat.
- Temperature of Cooling Water.** 21. While operating engine the hopper should not be filled more than three-fourths full of water, otherwise water will splash out more or less when it boils. The water should never be allowed to fall as low as the top of the cylinder wall, as the cylinder will then get too hot. It is to be expected that the water will boil under heavy load and the engine will work properly when the water is boiling. Put in more water as it evaporates.
- Engine Jacket Broken by Freezing.** 22. The engine jacket is liable to be broken by freezing if water is left in during cold weather unless non-freezing solution is used.
- Non-Freezing Solution.** 23. A non-freezing mixture of calcium chloride and water may be used in the jacket. Three pounds of calcium chloride to each gallon of water will not freeze solid at zero Fahrenheit. It is advisable, however, to drain the jacket in freezing weather when the engine is not in use.
- Fuel Supply.** 24. Each engine is regularly equipped with a cast iron sub-base (62A, page 3) containing a galvanized steel fuel tank (15A, page 8) which is sent out piped up complete. The filler opening (page 1) in tank is on side of engine opposite governor. In filling, use the tin funnel and filler tube (51, page 1) supplied with engine. Replace cap (49, page 1) after filling to prevent water and foreign matter entering and keep small vent hole in cap open. Water will separate from the oil fuel and remain at the bottom, so the tank should be drained occasionally to remove the water.
- Suction Valves** 25. The suction valve (9, page 2) is an ordinary check valve, automatic in its action and has a lift of about three-eighths of an inch. The lift is limited by means of a spring (310, page 8) on the valve stem. This valve is also fitted with a friction spring (120, page 8) causing a friction on the suction valve spring collar (121, page 8) thus retarding the rapid motion of the valve and preventing noise. Oil friction spring.
- Exhaust Valve.** 26. The exhaust valve (10, page 3) like the suction valve, lies in a horizontal position with the stem extending through a guide in the cylinder head. A spring held under compression by a washer and pin on both the suction and exhaust valves holds these valves to their seats. If valve stem shows tendency to stick, squirt a little kerosene on the stem and work it back and forth. Then oil with lubricating oil.

27. Should the engine at any time on starting turn too easily or have lost its compression, it is evident that a leak is taking place, and the suction valve as well as exhaust valve should be examined; they may not seat properly. If they do seat properly examine piston (see paragraph 34 below).

Lost  
Compression.

28. If it is necessary to reseat the suction or exhaust valve the cylinder head (3, page 8) must be removed and the valve ground with fine abrasive, such as ground glass or emery and oil. Revolve valve on its seat in alternate directions, lifting from its seat frequently to distribute the abrasive. Carefully clean both valve and seat with gasoline before replacing.

Cleaning and  
Regrinding  
Valves.

29. Asbestos gaskets hold better if covered with linseed or lubricating oil when applied. After putting on new gasket (190, page 3) the nuts should be tightened again when engine is hot.

Gaskets.

30. The governor located on the side of the engine base driven from the cam gear (28, page 3), controls the movement of the butterfly valve (203, page 3) located in the suction passage in the cylinder head. The governor is fitted with a friction spring (33, page 8) the purpose of which is to steady the governor action. The force of the spring can be easily adjusted by small screw. If there is too much tension the governor will be slow to respond to change in load. If not enough tension, the engine will race.

Action of  
Governor.

31. If it is necessary for any reason to reset the butterfly crank arm (206, page 8) it will be well to remove the reservoir first so that the butterfly (203) can be seen. Take cotter pin out of butterfly crank end of governor rod (205, page 3) remove end of governor rod (205) from crank (206, page 3). Pull one governor weight (82) out as far as it will go and then put a wedge under it to hold it in that position. Slightly loosen clamp screw of crank (206). Close butterfly with finger and set crank so that governor rod lacks  $\frac{1}{16}$ " from dropping in hole of crank. Remove wedge from under governor weight. Tighten clamp screw of crank (206) and reassemble parts removed. If the above instructions are followed the engine can, under no condition, run away.

Butterfly  
Valve.

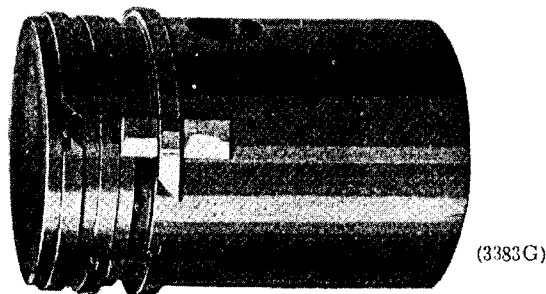
32. The governor normally holds the engine at its rated speed, but each engine is provided with a speed regulator which decreases the speed by screwing the knurled head screw (224, page 3) in.

Decreasing  
Engine Speed.

### REMOVING FUEL PIPING

33. If it should be necessary to remove fuel piping, be careful in swinging reservoir and piping out for removal or in replacing same be careful not to bend the fuel nozzle (223, page 3) on the reservoir. The fuel nozzle should be straight. The engine would not run properly if the relative position of this nozzle with the governing butterfly valve were changed.

Piping.



### CLEANING PISTON AND RINGS

34. After some months of use the piston may be removed to clean the rings. To do this take off oil shield and unbolt crank bearings. Turn crank to extreme out position. The piston may now be withdrawn. Replace piston in its **original position**, and all parts in the **reverse order** from which they were removed. The piston may be cleaned with kerosene or a hot solution of lye and water, the rings loosened and the grooves cleaned. Oil piston well before replacing. In replacing piston turn it bottom side up so that the stop pins can be seen, otherwise the rings may be broken. Be sure to turn it right side up before connecting up connecting rod otherwise the pin will get no oil.

To Remove  
Piston.

The rings can be removed from piston by taking three strips of tin about one-half inch wide and six inches long; slip one piece of tin under the middle of the ring and over the ring groove, then with the help of a screw driver the other strips can be slipped under the ends and the rings in turn slipped off the piston.

## REPAIR PARTS LIST

For Fairbanks-Morse 3 and 6 H. P. Throttling Governor  
Type "Z" Oil Engines

This list covers 3 H. P. engines after No. 268918, and 6 H. P. engines after No. 267230.

When ordering parts, always give the size, type and **Shop Number** of the engine. The Number is **very important**. It is stamped on the top of the cylinder and cylinder head flanges. **Do not fail to give it.**

Parts may be ordered individually or in groups.

A **GROUP NUMBER** printed in **HEAVY TYPE**, followed by the letter "**C**," such as "**3-C**" covers all items in that paragraph down to the first horizontal line, thus———. An ordinary repair number printed in light type (such as "3"), covers that one part only.

A group may be ordered **less** certain specified parts, for example "**3-C less Nos. 9-C and 10-C.**"

Any part without a repair number is listed directly after the numbered part with which it is used.

For repairs on 3 H. P. engines previous to No. 185864 and 6 H. P. engines previous to No. 185978, see repair parts and price list No. 9417.

For repairs on 3 H. P. engines between 185864 and 268918, and 6 H. P. engines between 185978 and 267250 see Instructions 2417C.

Repair Nos. Arranged Numerically	The Group Number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group.		Included in Group Number	No. of Pieces used for 3 or 6 H. P.
1-C	1	<b>1-C Cylinder and Base</b>		1
	327	Cylinder and base always fitted with.....		
	328	Cylinder drain plug.....		
	301	Base drain plug.....		
	312	Igniter clamp stud (1).....		
	313	Cylinder to head long stud (1).....		
1	12	Cylinder to head short studs (3).....		
	126	Main bearing caps (2).....	1-C	1
	195	Main bearing cap cap screws (4).....		
	22	Main bearing cap cap screw lock washers (4).....		
	23	Main bearing shims (set of 8).....		
		Name plate.....		
		Name plate rubber washers (2).....		
		Name plate brass machine screws (2).....		
		Main bearing upper liners.....		2
		Main bearing lower liners.....		2
		Cylinder to Sub-base Cap Screw.....		4
3-C	3	<b>3-C Cylinder Head</b>		1
	203	Cylinder head—always fitted with.....		
3	204	Butterfly valve.....	3-C	1
		Butterfly valve shaft.....		
		Butterfly valve shaft screws (2).....		
		Butterfly valve shaft screw lock washers (2).....		
	9-C	Suction valve—complete.....		1
	10-C	Exhaust valve—complete.....		
	217-C	Water throttle fitting—complete, 6 H. P. only.....		
4A-C	4A	<b>4A-C Combination Fuel Reservoir</b>		1
4A	223	Reservoir body, always fitted with.....	4A-C	1
		Reservoir nozzle and bushing.....		
		Reservoir pipe plug.....		
		Reservoir cotter (through boss for 75 lockout lever).....		
	60	Reservoir cover.....		1
	314	Reservoir cover spring.....		1
	65-C	Reservoir fuel pump plunger complete.....		1
	66	Reservoir fuel pump plunger lever.....		1
	67	Reservoir fuel pump plunger lever fulcrum pin with cotter.....		1
	75	Reservoir fuel pump plunger lever lockout lever.....		1
	76A	Reservoir needle valve.....		1
	311	Reservoir needle valve spring.....		1
	105	Reservoir overflow valve.....		1
	302	Reservoir pump valve.....		1
	300	Reservoir plunger spring.....		1

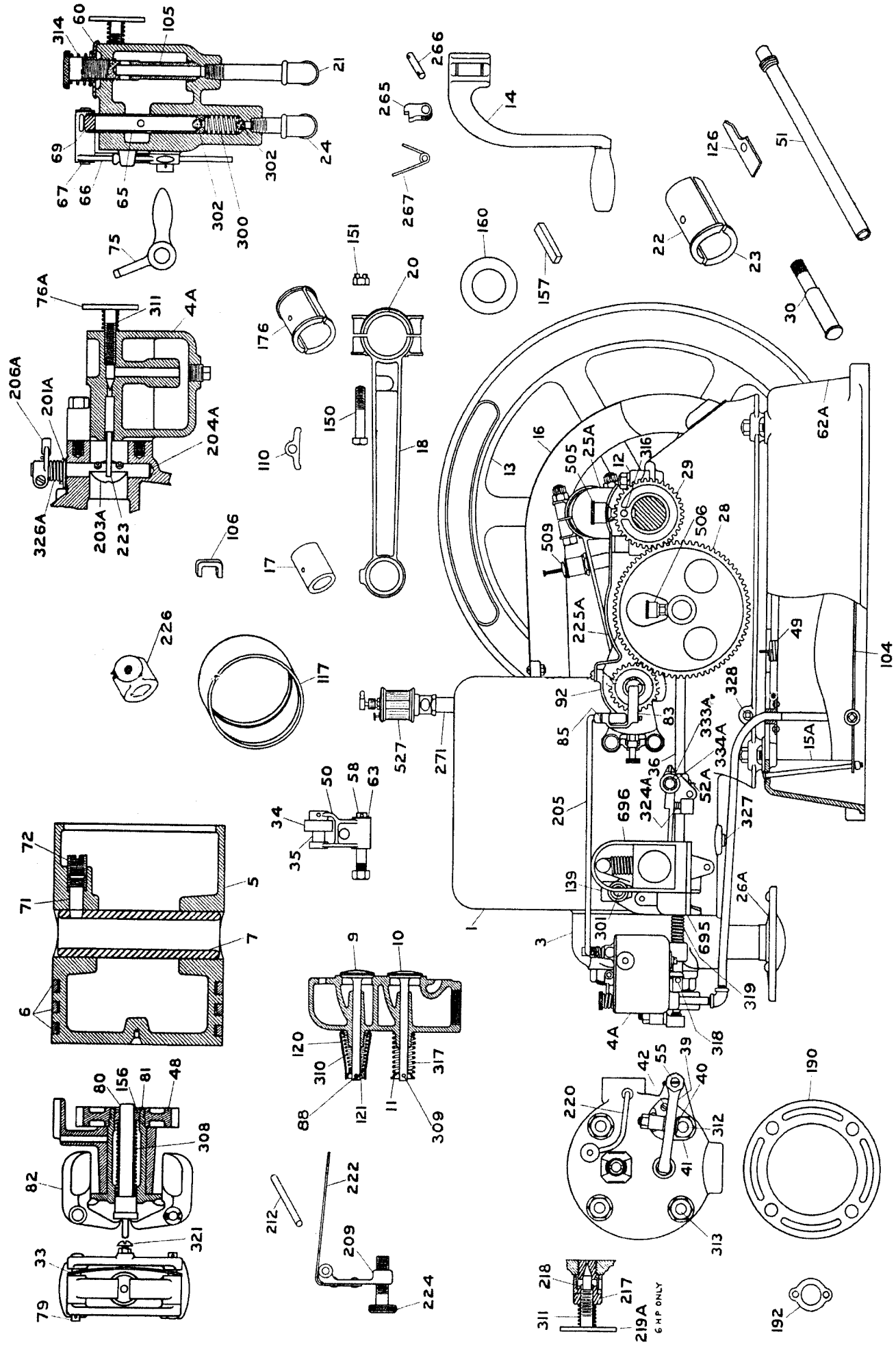


# Repair Parts List—Fairbanks-Morse Type "Z" Oil Engines

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2417D

Repair Nos. Ar- ranged Numer- ically	The Group Number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group.		Included in Group Number	No. of Pieces used for 3 or 6 H. P.
		Reservoir pipe plug .....	4A-C	1
		Reservoir to cylinder head short cap screw .....		1
		Reservoir to cylinder head long cap screw .....		1
5-C		<b>5-C Piston</b> .....		1
5	5	Piston, always fitted with .....	5-C	1
		Piston ring stop pins (3) (not furnished separately) .....		
6	6	Piston rings .....	5-C	3
7	7	Piston pin .....	5-C	1
	71	Piston pin taper lock pin .....		1
	72	Piston pin taper lock pin screw .....		1
		Piston pin taper lock pin lock washer .....		1
9-C		<b>9-C Suction Valve</b> .....	3-C	1
9	9	Suction valve .....	9-C	1
	120	Suction valve friction spring .....		1
	121	Suction valve spring collar .....		1
	88	Suction valve spring collar pin .....		1
		Suction valve spring collar pin tie wire .....		1
	310	Suction valve spring .....		1
10-C		<b>10-C Exhaust Valve</b> .....	3-C	1
10	10	Exhaust valve .....	10-C	1
11	11	Exhaust valve spring washer .....	10-C	1
	309	Exhaust valve spring washer pin .....		1
	317	Exhaust valve spring .....		1
12		Main bearing cap .....	1-C	2
		Main bearing cap cap screw .....	1-C	4
		Main bearing cap cap screw lock washer .....	1-C	4
13	13	Flywheel (opposite governor side), always fitted with .....		1
		Flywheel clamp bolt .....		
13A	13A	Flywheel (governor side), always fitted with .....		1
		Flywheel clamp bolt .....		
	316	Crankshaft pinion drive pin .....		
		Flywheel clamp bolt .....	13 and 13A	2
14-C		<b>14-C Starter Crank</b> .....		1
14	14	Starter crank .....	14-C	1
	265	Starter crank pawl .....		1
	266	Starter crank pawl fulcrum pin with (two) cotters .....		1
	267	Starter crank pawl spring .....		1
15A	15A	Fuel tank always fitted with .....		1
	49	Fuel tank Filler cap .....		
		Fuel tank drain pipe plug .....		
16		Oil shield .....		1
17		Oil shield to cylinder stove bolt with lock washer .....		1
		Connecting rod piston pin bushing .....	18-C	1
18-C		<b>18-C Connecting Rod</b> .....		1
18	18	Connecting rod, always fitted with .....	18-C	1
	17	Connecting rod piston pin bushing .....		
		Connecting rod piston pin bushing dowel .....	18-C	1
	20	Connecting rod cap .....		1
	176	Connecting rod crank pin bearings (halves) .....		2
	110	Connecting rod crank pin bearing shims (set of four) .....		1 set
	150	Connecting rod bolts with cotters .....		2
	151	Connecting rod bolt castle nuts .....		2
20		Connecting rod cap not furnished separate .....	18-C	
21		Fuel return pipe reservoir to tank complete .....		1
22		Main bearing upper liner .....	1-C	2
23		Main bearing lower liner .....	1-C	2
24		Fuel suction pipe, pump to tank complete .....		1
25A		Crank shaft .....		1
26A		Silencer complete with nipple .....		1
28		Cam gear .....		1
29		Crank shaft pinion .....		1

# Repair Chart for Fairbanks-Morse 3 and 6 H. P. Type "Z" Oil Engines



Repair Chart, 3 and 6 H. P. Type "Z" Engines

REPAIR CHART  
3 & 6 H. P. TYPE "Z" ENGINES

30ZB3  
30ZB3

# Repair Parts List—Fairbanks- Morse Type "Z" Oil Engines

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2417D

Repair Nos. Arranged Numerically	The Group Number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group.		Included in Group Number	No. of Pieces used for 3 or 6 H. P.
30-C	30	<b>30-C Cam Gear Pin</b> .....		1
		Cam gear pin.....	30-C	1
30		Cam gear pin nut.....	30-C	1
		Cam gear pin lock washer.....	30-C	1
33		Governor weight friction spring.....	92-C	1
34		Exhaust rod rocker roller.....	50-C	1
35		Exhaust rod rocker roller pin, with cotter.....	50-C	1
36	{ 36 318	Exhaust rod, always fitted with.....	}	1
		Fuel pump plunger lever drive screw.....		
		Fuel pump plunger lever drive screw lock washer.....		
39C	39	<b>39-C Exhaust Valve Rocker Arm</b> .....		1
		Exhaust valve rocker arm.....	39C	1
		Exhaust valve rocker arm adjusting screw.....		1
		Exhaust valve rocker arm adjusting screw nut.....		1
		Exhaust valve rocker arm adjusting screw lock washer.....		1
	329	Exhaust valve rocker arm return spring.....		1
40		Exhaust valve rocker arm fulcrum pin.....		1
		Exhaust valve rocker arm fulcrum pin nut.....		1
41		Exhaust valve rocker arm bracket.....		1
42		Exhaust valve rocker arm bracket dowel.....		1
48		Governor gear.....	92-C	1
49		Fuel tank filler cap.....	15A	1
50-C	50	<b>50-C Exhaust Rod Rocker</b> .....		1
		Exhaust rod rocker.....	50-C	1
		Exhaust rod rocker fulcrum pin—complete.....		1
		Exhaust rod rocker roller.....		1
		Exhaust rod rocker roller pin, with cotter.....		1
51		Fuel tank filler tube.....		1
52A-C	{ 52A 333A 334A 324A	<b>52A-C Oscillating Magneto Trip Carrier</b> .....		1
		Oscillating Magneto trip carrier—always fitted with.....	52-C	1
		Oscillating Magneto trip fulcrum pin.....		1
		Oscillating Magneto trip fulcrum pin ring.....		1
		Oscillating Magneto trip spring.....		1
		Oscillating Magneto trip carrier clamp screw.....		1
55		Exhaust valve rocker arm adjusting screw.....	39-C	1
		Exhaust valve rocker arm adjusting screw nut.....	39-C	1
		Exhaust valve rocker arm adjusting screw lock washer.....	39-C	1
58-C	58	<b>58-C Exhaust Rod Rocker Fulcrum Pin</b> .....	50-C	1
		Exhaust rod rocker fulcrum pin, with cotter.....	58-C	1
		Exhaust rod rocker fulcrum pin nut.....	58-C	1
	63	Exhaust rod rocker fulcrum pin washers (set of five).....		1 set
60	62A	Reservoir cover.....	4A-C	1
		Engine sub-base.....		1
63		Exhaust rod rocker fulcrum pin washers (set of five).....	58-C	1 set
65-C	65	<b>65-C Fuel Pump Plunger</b> .....		1
		Fuel pump plunger.....	65-C	1
		Fuel pump plunger ball valve.....		1
		Fuel pump plunger cap.....		1

# Repair Parts List—Fairbanks-Morse Type "Z" Oil Engines

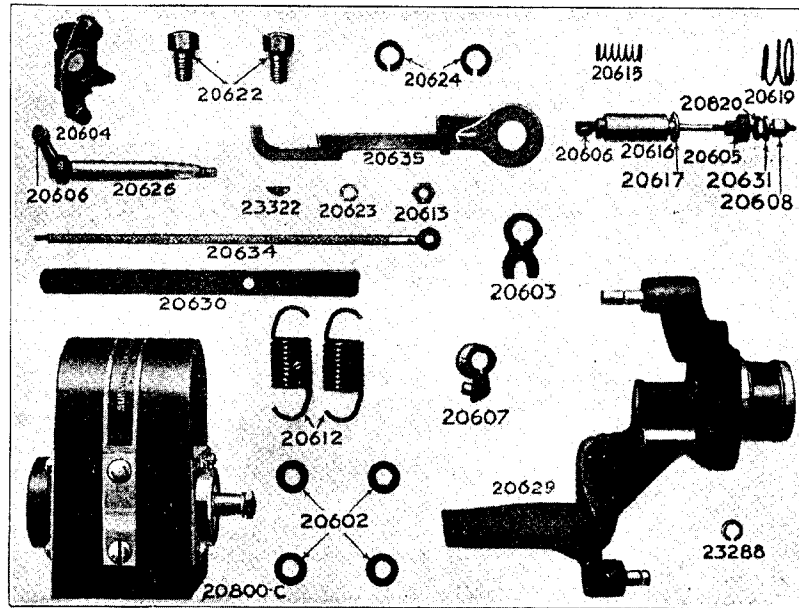
Repair Nos. Ar- ranged Numer- ically	The Group Number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group.		Included in Group Number	No. of Pieces used for 3 or 6 H. P.
66		Fuel pump plunger lever.....	4A-C	1
67		Fuel pump plunger lever fulcrum pin, with cotter.....	4A-C	1
69		Fuel pump plunger cap.....	65-C	1
71		Piston pin taper lock pin.....	5-C	1
72		Piston pin taper lock pin screw.....	5-C	1
		Piston pin taper lock pin lock washer.....	5-C	1
75		Fuel pump plunger lever lockout lever.....	4A-C	1
76A		Fuel throttle valve.....	4A-C	1
79		Governor weight fulcrum pin, with (two) cotters each.....	92-C	2
80		Governor plunger pin.....	92-C	1
81		Governor hub.....	92-C	1
82		Governor weight.....	92-C	2
83		Governor lever.....	92-C	1
85		Governor lever fulcrum pin, with (two) cotters.....	92-C	1
88		Suction valve spring collar pin.....	9-C	1
92-C		<b>92-C Governor</b> .....		1
92	92	Governor bracket.....	92-C	1
	80	Governor plunger pin.....		1
	81	Governor hub.....		1
	82	Governor weights.....		2
	79	Governor weight fulcrum pins, with (two) cotters each.....		2
	33	Governor weight friction spring.....		1
	321	Governor weight friction spring adjusting screw, with lock nut.....		1
	308	Governor weight spring.....		1
	156	Governor weight spring adjusting screw.....		1
	48	Governor gear.....		1
	83	Governor lever.....		1
	85	Governor lever fulcrum pin, with (two) cotters.....		1
	209-C	Governor speed regulator.....		1
	212	Governor speed regulator fulcrum pin.....		1
104		Governor bracket to base cap screw.....		2
		Governor bracket to base cap screw lock washer.....		2
		Fuel tank strap.....		1
105		Fuel tank strap to base carriage bolt.....		2
106		Fuel reservoir overflow valve.....	4A-C	1
110		Pulley clips for 3 H. P.....		3
117		Connecting rod crank pin bearing shims (set of four).....	18-C	1 set
		Pulley.....		1
		Pulley to flywheel machine bolt.....		3
120		Suction valve friction spring.....	9-C	1
121		Suction valve friction spring collar.....	9-C	1
126		Main bearing shims (set of eight).....	1-C	1 set
139		Igniter clamp.....		1
150		Connecting rod bolt, with cotter only.....	18-C	2
151		Connecting rod bolt castle nut.....	18-C	2
156		Governor spring adjusting nut.....	92-C	1
157		Flywheel keys.....		2
160		Opposite governor flywheel to bearing thrust washer.....		1
176		Connecting rod crank pin bearing (halves).....	18-C	2
190		Cylinder head gasket.....		1
192		Reservoir to cylinder head gasket.....		1
195		Name plate.....	1-C	1
		Name plate rubber washer.....	1-C	2
		Name plate brass machine screw.....	1-C	2
201		Butterfly valve shaft washer.....		1
203A		Butterfly valve.....	3-C	1
204A		Butterfly valve shaft.....	3-C	1
205		Governor lever link with (two) cotters.....		1
206A		Butterfly valve shaft lever.....		1
		Butterfly valve shaft lever clamp screw.....		1
		Butterfly valve shaft screws.....		2
		Butterfly valve shaft screw lock washers.....		2
209-C		<b>209-C Governor Speed Regulator</b> .....	92-C	1
209	209	Governor speed regulator lever, always fitted with.....	209 C	1
	222	Governor speed regulator lever leaf spring (not furnished separately).....		1
	224	Governor speed regulator lever screw.....		1
	212	Governor speed regulator lever pin.....	92-C	1

# Repair Parts List—Fairbanks-Morse Type "Z" Oil Engines

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Repair Nos. Arranged Numerically	The Group Number in heavy type, when shown at the head of a group of parts, includes all items mentioned in that group.		Included in Group Number	No. of Pieces used for 3 or 6 H. P.
217-C		<b>217-C Water Throttle Fitting, 6 H. P. only</b> .....	3-C	1
217	217	Water throttle fitting.....	217-C	1
218	218	Water throttle tube packing ring always fitted with.....	217-C	1
	220	Water throttle tube (not furnished separately).....	217-C	1
	311	Water throttle valve spring.....	217-C	1
219A	219A	Water throttle valve.....	217-C	1
220		Water throttle tube (not furnished separately).....	217-C	.....
222		Governor speed regulator leaf spring (not furnished separately).....	209-C	.....
223		Fuel reservoir nozzle and bushing.....	4A-C	1
224		Governor speed regulator lever screw.....	209-C	1
225A		Gear guard.....	.....	1
226		Exhaust rocker return spring collar and set screw.....	.....	1
265		Starter crank pawl.....	14-C	1
266		Starter Crank Pawl Fulcrum pin with (2) cotters.....	14-C	1
267		Starter crank pawl spring.....	14-C	1
271		Cylinder oiler pipe.....	.....	1
300		Fuel pump plunger spring.....	4A-C	1
301		Igniter clamp stud.....	1-C	1
		Igniter clamp stud nut.....	.....	1
302		Fuel pump ball valve.....	{ 4A-C and 65-C }	2
308		Governor weight spring.....	92-C	1
309		Exhaust valve pin.....	10-C	1
310		Suction valve spring.....	9-C	1
311		Needle valve spring for either fuel or water valve.....	{ 4A-C and 217-C }	2
312		Cylinder to head long stud.....	1-C	1
313		Cylinder to head short stud.....	1-C	3
		Cylinder to head stud nut.....	.....	4
314		Fuel reservoir cover spring.....	4-C	1
316		Flywheel crankshaft pinion drive pin.....	13A	1
317		Exhaust valve spring.....	10-C	1
		Fuel pump plunger lever drive screw lock washer.....	36	1
319		Exhaust rod return spring.....	.....	1
321		Governor weight friction spring adjusting screw.....	92-C	1
324A		Oscillating Magneto trip spring.....	52-C	1
326A		Butterfly valve shaft torsion spring.....	.....	1
327		Cylinder drain plug.....	1-C	1
328		Base drain plug.....	1-C	1
333-A		Oscillating Magneto trip fulcrum pin (not furnished separately).....	52-C	1
334-A		Oscillating Magneto trip fulcrum pin ring.....	52-C	1
505		Main bearing grease cup.....	.....	1
506		Cam gear grease cup.....	.....	1
509		Connecting rod grease cup.....	.....	1
527		Cylinder oiler.....	.....	1
695		Oscillating Magneto unit—less Magneto—Complete (for separate repairs on this see Instruction Book No. 2479).....	.....	1
696		Magneto only—Complete (for separate repairs on this see Instruction Book No. 2479).....	.....	1
		Adjustable wrench.....	.....	1
		Tin funnel.....	.....	1
		Hand oiler.....	.....	1

## Repair Parts List—Fairbanks-Morse Type "Z" Oil Engines

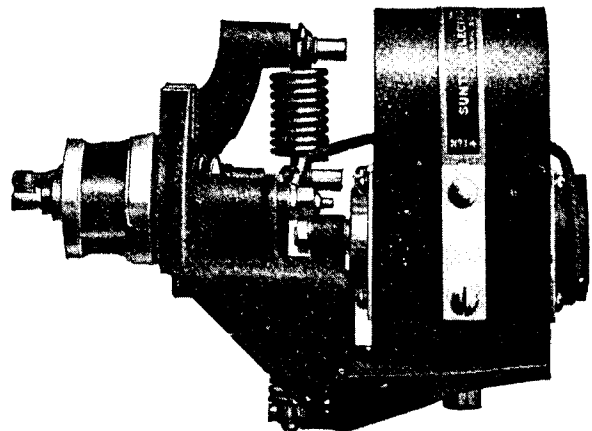


## Repair Parts List Model "C" Oscillating Magneto

For 3 H. P. and Larger Type "Z" Engines

Always mention the direction of rotation and the serial number when ordering repairs.

Part No.	Name of Part	Part No.	Name of Part
20602	Spring Roller	20634	Cable Assembly
20603	Magneto Crank	20635	Trip Finger Assembly Complete
20604	Trip and Break Lever	20800C	Magneto IMP No. 14 Complete
20605	Stationary Electrode Insulating Bushing	20820	Stationary Electrode Holding Nut, Hex
20606	Igniter Point	23288	Spring Post Ring
20607	Moveable Electrode Arm	23322	Moveable Electrode Key
20608	Stationary Electrode Terminal Nut		
20612	Trip Break Lever Spring		
20613	Moveable Electrode Nut		
20615	Moveable Electrode Arm Spring		
20616	Stationary Electrode Assembly (Electrode with Point)		
20617	Stationary Electrode Gasket		
20619	Moveable Electrode Seating Spring		
20622	Magneto Fastening Screw		
20623	Moveable Electrode Nut Lock Washer		
20624	Magneto Fastening Screw Lock Washer		
20626	Moveable Electrode Assembly (Electrode with Point)		
20629	Igniter Bracket with Pins, Assembled		
20630	Starting Lever		
20631	Stationary Electrode Washer		



Model "C" Oscillating Magneto  
Used on 3 and 6 H. P. Type "Z" Oil Engines

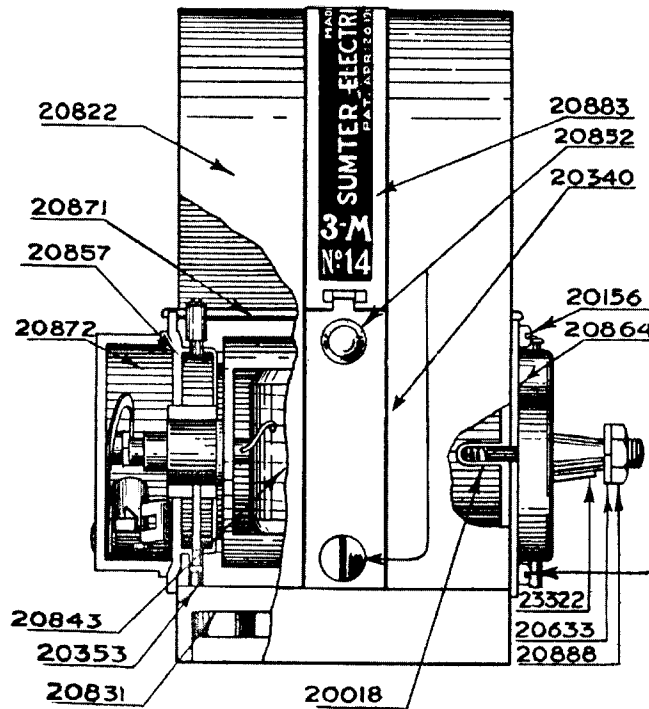


Fig. 674

Parts of Imp. Model 14 Magneto

## Repair Parts List for Imp. Model 14 Magneto

Part No.	Name of Part	Part No.	Name of Part
20018	Brush Assembly	20852	Magnet Screw, 5/8-12
20043	Red Thrust Washer	20857	End Plate Assembly (Terminal)
20043 B	Black Thrust Washer	20858	Oval Fil. Hd. Screw 9/16-6-32, for Bakelite Terminal Cap
20156	End Plate Screw, 3/8-8-32	20864	End Plate Assembly (Drive)
20340	Magnet Clamp	20871	Top Plate Assembly
20633	Lock Washer	20872	Terminal Cap Assembly
20816	Lock Washer, No. 8, 1/16x3/64	20883	Magnet Band
20819	Lock Washer, No. 12, 5/64x3/64	20888	Hex. Nut, 5/16-24, 5/32 thick
20822	Magnet	23322	Woodruff Key, 3/32x5/16
20831	Frame Assembly		
20843	Armature Assembly		

Always give serial number and state whether magneto has oil well bearing end plates.

## TROUBLE CHART

Trouble	Possible Cause		Remedy	See Para-graph
Engine will not start.	Instructions not followed.		Read and follow instructions.	1 to 13
	No fuel in tank.		Fill tank.	6
	Water in gasoline used in starting.		Strain gasoline.	
	Water in engine cylinder.		Water will work out if engine is turned over slowly.	13
			Close water throttle valve on 6 H. P. before engine stops.	
			See that gasket is unbroken	29
	Engine flooded.		Close fuel needle valve. Open suction valve and Crank Engine.	13
	Poor compression.	Valve leaks.	Grind valves.	28
		Head gasket leaks.	Put on new gasket.	29
		Piston blows.	Remove rings and clean.	34
	Engine very cold.		Put but little water (preferably hot water) in hopper	7
	No Spark or Poor Spark	Igniter dirty.	Take out igniter, clean points.	Inst. 2479
		Short circuit.	See that wire from magneto is not grounded.	Inst. 2479
		Movable electrode sticking.	Remove and clean spring should hold points together.	Inst. 2479
		Oscillator.	Remove oscillator, trip with hand lever and note if spark occurs.	Inst. 2479
		Mechanism sluggish.	Oil all parts well.	Inst. 2479
Engine misses fire after being started.	Ignition.	Mechanism sluggish.	Oil all parts.	Inst. 2479
		Short circuit.	Clean. See that insulation on wire is good.	Inst. 2479
		Igniter dirty.	Clean.	Inst. 2479



# Trouble Chart—Fairbanks-Morse Type "Z" Oil Engines

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Trouble	Possible Cause	Remedy	See Paragraph
Engine knocks.	Igniter dirty.	Clean.	Inst. 2479
	Water in fuel collects in bottom of reservoir and fuel tank.	Drain water from reservoir through plug in bottom.	
		Pump water out of tank.	
	Fuel. { Dirty.	Clean out tank piping, reservoir and nozzle tube.	
		Throttle adjustment.	14
	Hard Explosion.	Remove head and clean carbon.	29
		Open water throttle on 6 H. P.	16
	Loose crank pin bearing.	Take up bearing.	
	Loose flywheel.	Tighten bolts.	
	Roller jumps on pawl.	Adjust spring when rollers are on low cam spring should be 6¼" long.	
Engine runs irregularly.	Governor struck.	Clean out scale.	
		Scale formation in jacket casues engine to overheat.	
	Weak exhaust valve spring.	See that governor parts are free. Use kerosene to loosen.	30
		Adjust (33) spring.	30
Engine tends to run away.	Butterfly may not close.	Put washer under spring till new spring can be obtained.	
	Excessive fuel causes engine to hit and miss.	Adjust butterfly crank and governor travel.	31
Engine will not carry load.	Exhaust valve setting off.	Carefully set throttle.	14
	Poor compression.	Reset.	19-20
	Late ignition.	See "Engine will not start"	28-29-34
	Too rich mixture.	Correct.	Inst. 2479
	Carbon in combustion space.	Adjust fuel throttle.	14
	Silencer clogged.	Remove head and clean.	
	Butterfly moved.	Clean out.	
		Reset.	31

# Trouble Chart—Fairbanks-Morse Type "Z" Oil Engines

Trouble	Possible Cause	Remedy	See Para-graph	
Engine uses too much fuel.	Throttle open too far.	Close.	14	
	Poor compression.	See "Engine will not start"	28-29-34	
	Late Ignition.	Time correctly.	Inst. 2479	
	Nozzle displaced.	Straighten.	33	
	Exhaust valve setting off.	Reset.	19-20	
	Exhaust pipe or silencer choked.	Clean.		
	Fuel drips from suction pipe.	Weak suction valve spring. Friction spring too weak or too strong.	Lengthen spring by stretching small coils. Bend spring or put on new one.	
Carbon forms.	Too much fuel.	Close throttle.	14	
	Too much lubricating oil.	Adjust lubricator.	8	
	Engine too cold.	See that engine is hot before turning on oil fuel.	15	
Engine smokes.	Exhaust.	Too much lubricating oil.	Adjust lubricator.	8
		Too much fuel.	Adjust fuel throttle.	14
	Piston.	Oil thrown into piston by crank.	Open crank case drain, clean out crank case.	
		Piston blows.	Remove piston, clean rings, may need new rings.	34
Cylinder oiler will not feed properly.	Filler opening left open.	Screw in plug after filling.	8	
	Piston blows.	Clean piston and rings, may need new rings.	34	
Water boils away too rapidly.	Mixture too rich.	Close throttle.	14	
	Late ignition.	Correct.	Inst. 2479	
		Never let the water get below top of cylinder.	17	