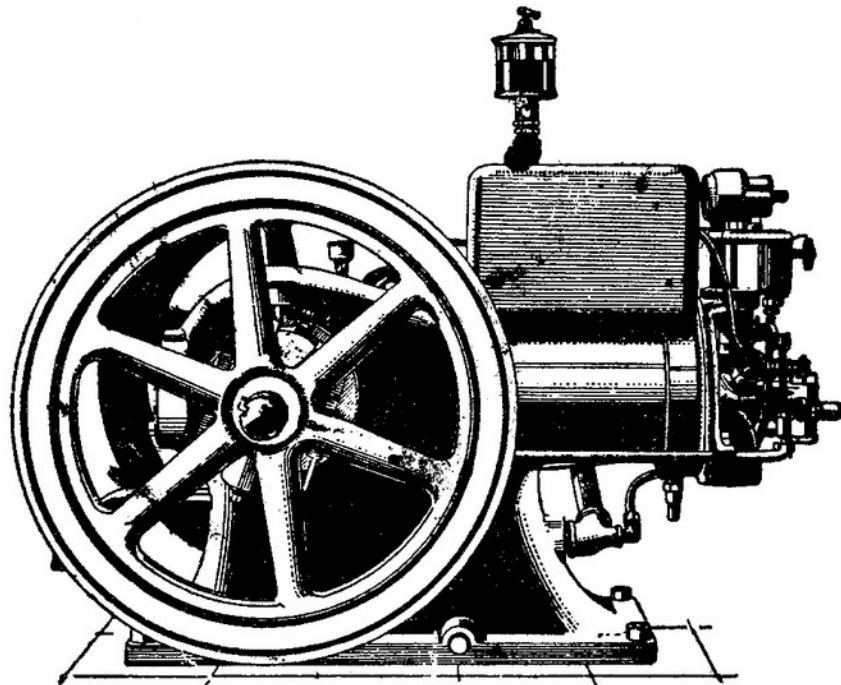


INSTRUCTIONS  
FOR OPERATING THE  
**McCORMICK-DEERING**  
**1½ H. P. ENGINE**

EQUIPPED WITH  
WICO TYPE "EK" MAGNETO



SPARK PLUG IGNITION

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MANUFACTURED BY

**INTERNATIONAL HARVESTER COMPANY**  
(INCORPORATED)

606 So. MICHIGAN AVE.

CHICAGO, U. S. A.

## FOREWORD

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The simplicity of this engine and the ease with which it is operated renders an intimate knowledge of mechanical technicalities unnecessary.

A careful study of the instructions will enable the operator to familiarize himself with the engine, as each move necessary is illustrated and described. Fortified with this knowledge, the operator can maintain the engine economically, operate efficiently and prolong its usefulness. There are several important points in connection with the care and operation, which may be summarized as follows:

### OVER-LOADING:

Never over-load the engine. To do the best work, the engine should have only a normal load, normal speed and proper attention and adjustment. It will add a great deal to the efficiency and life of the engine if the load is kept within the prescribed limits.

### LUBRICATION:

The really important thing connected with an engine's care is keeping all working parts thoroughly cleaned and oiled. Properly defined, this means that all working parts should, when in operation, have a thin film of clean oil around them. This prevents the parts from running in contact and eliminates wear.

### IGNITION:

*(See instructions on page 13.)*

Do not attempt any adjustment of magneto without reading instructions carefully.

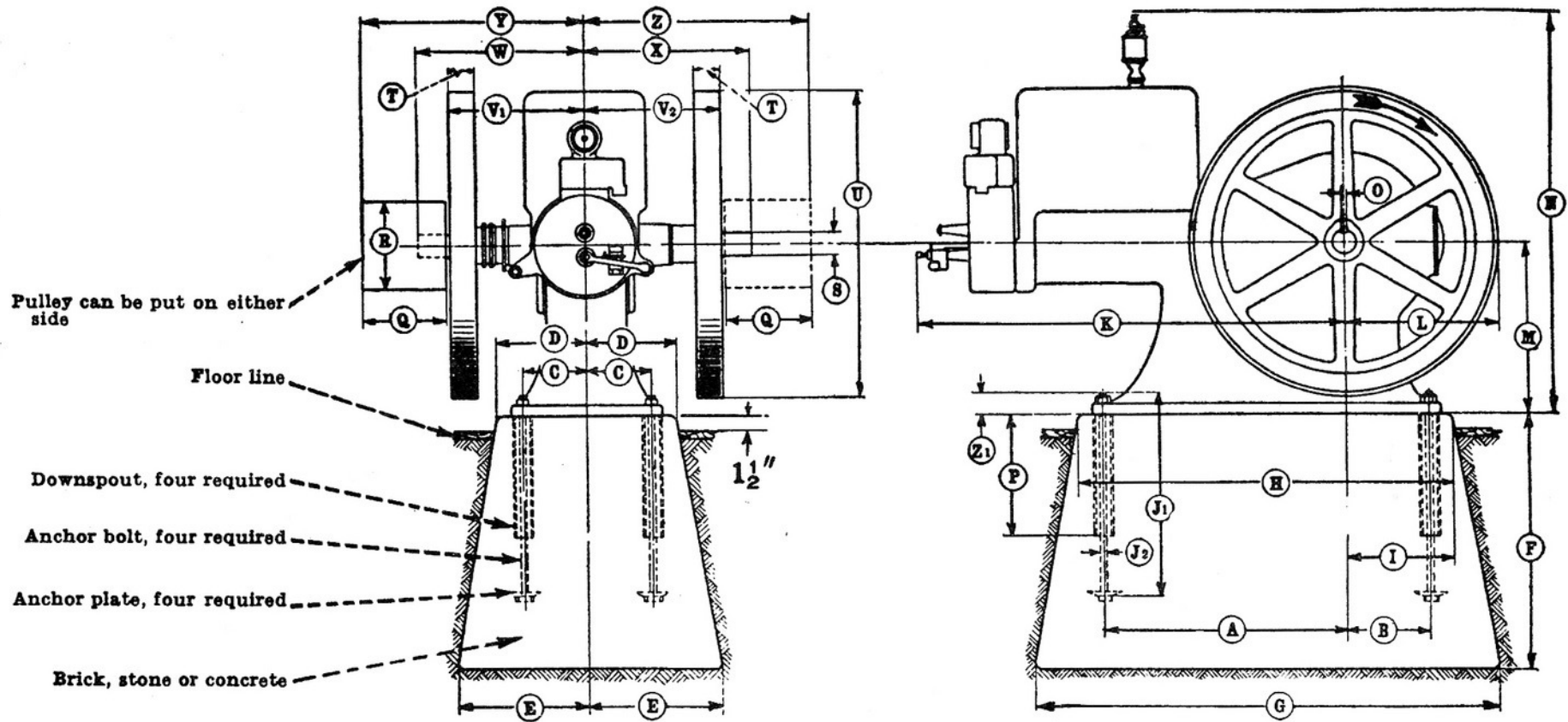
By following the above, time and money will be saved.

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*See List and Illustrations of Repair Parts, Pages 32 to 39.*

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I Illustration No. 1—Foundation Plan.

H.P.	A	B	C	D	E	F	G	H	I	J1	J2	K	L	M	N	O	P	Q	R	S	T	U	V1	V2	W	X	Y	Z	Z1
1 1/2	14 1/4"	5 1/4"	3 3/4"	6"	9 1/2"	18"	31 1/2"	24"	7 1/2"	18"	1/2"	23 1/8"	9"	10"	26"	3/8"	10"	5 1/2"	4"	1 1/2"	1 3/4"	18"	9 1/4"	9 1/4"	11 1/4"	12 1/8"	14 3/4"	15 5/8"	1 3/8"

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## IMPORTANT

This engine is equipped with a strong fuel tank with no gravity openings and great precaution has been taken to produce one of the safest engines for operation in a building. *A permit should be obtained from the insurance authorities when engine is installed in an insured building.*

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## CLEANING

Be sure that all moving parts, especially those of the governor and ignition mechanism, are cleaned of all grease or paint and are free to perform their functions properly. This grease or paint is put on to protect these parts during storage and shipping and, as a rule, a little gasoline or benzine will facilitate its removal.

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## PREPARATIONS FOR STARTING

1. Fill the fuel tank with gasoline.

*(See illustration No. 8.)*

*Carefully strain all fuel and be sure it is free from water.*

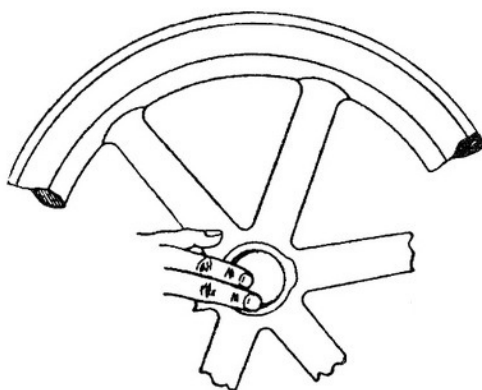
2. Fill the hopper with *clean* water within an inch of the top and keep it well filled. Soft or rain water should be used if same can be readily obtained.

3. Fill all grease cups with a good grade of hard grease and turn down cups.

*(See instructions on page 28.)*

4. Turn down crank pin grease cup about a turn per hour while engine is running.

*(See illustration No. 2.)*



**Illustration No. 2—Turning down  
crank pin grease cup.**

## PREPARATIONS FOR STARTING—Continued

5. Cylinder oiler should be adjusted to feed from five to seven drops of oil per minute.

(See illustration No. 3; also instructions on page 11.)

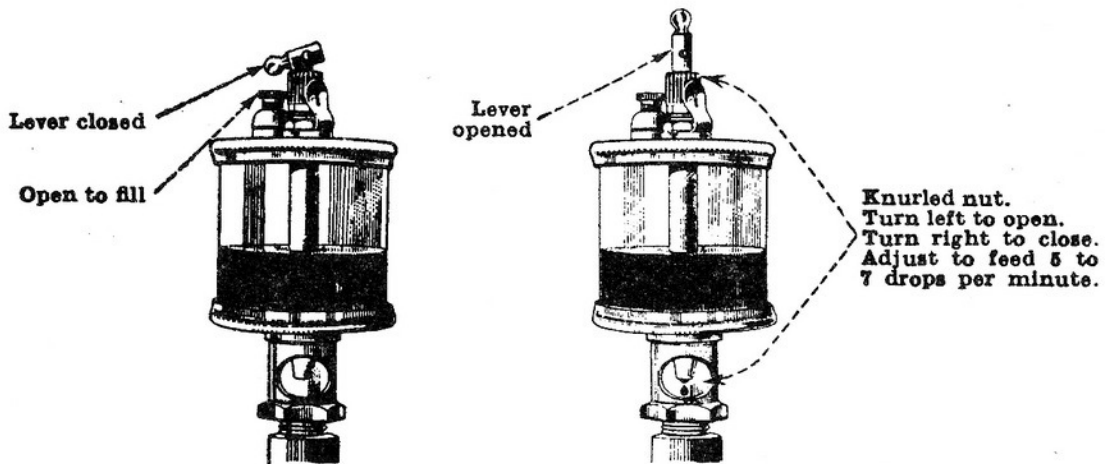


Illustration No. 3—Cylinder oiler.

6. Oil governor sleeve and governor sleeve collar each time before starting engine. Be sure all governor parts work freely.

7. Oil magneto and parts.

(See illustration No. 4.)

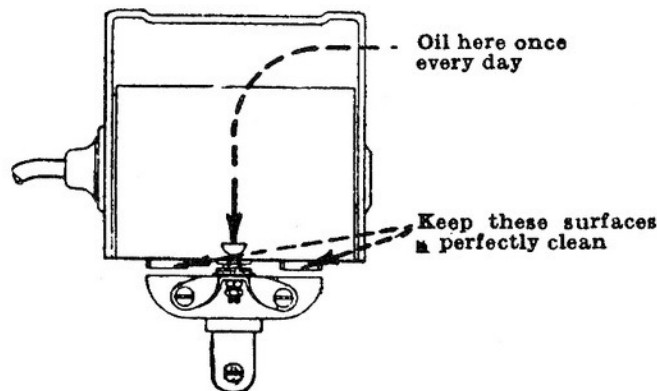


Illustration No. 4  
Side view of magneto, showing oil cup.

8. Before starting for the first time, turn the engine over slowly by hand and oil all moving parts and see that they move freely.

**WARNING:**— Never use axle grease in an engine bearing.

*NOTE: Gasoline container must be kept tightly closed and in a cool place.*

## MIXER

The mixer is provided with just one chamber to which the fuel pump feeds the gasoline from the tank in the base of the engine. When the gasoline reaches the proper level it escapes over the overflow wall in the mixer and goes back to the fuel tank. This wall may be observed by removing the sight hole plug in the mixer top and looking into the chamber as shown in *illustration No. 7*. The drain plug in the bottom of the mixer is provided for draining the gasoline chamber in case water or refuse has been permitted to enter due to carelessness.

*(See illustrations Nos. 7 and 8.)*

## TO START ENGINE

1. Pump gasoline up into the mixer as shown in *illustration No. 9* until chamber is filled to the overflow level. This must be done by working the handle on the pump lever up and down, thus operating the fuel pump. The ignitor eccentric should, however, be on the low side of the cam. If preferred, the mixer may also be filled from a hand can through the sight hole in the top.

*(See illustrations Nos. 7 and 9.)*

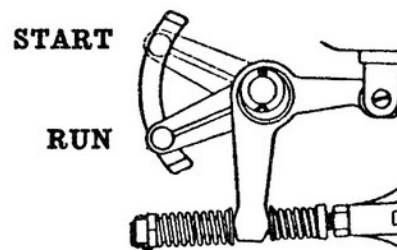
2. Retard spark by raising the timing lever to starting position.

*(See illustrations Nos. 5, 10 and 11.)*

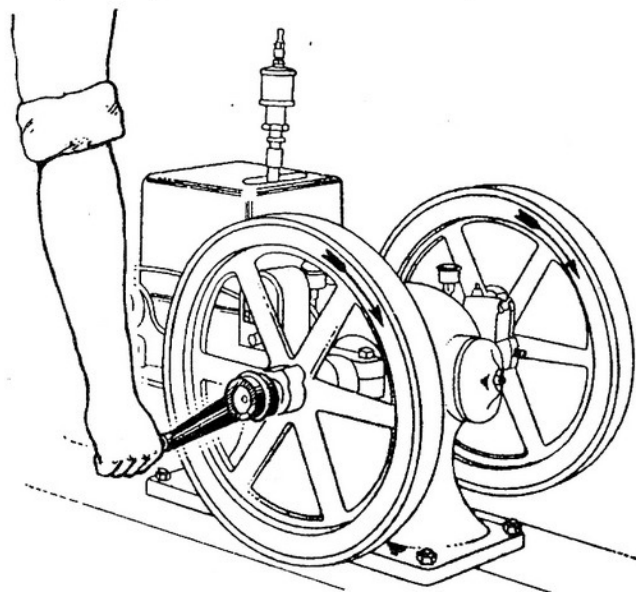
3. Open gasoline needle valve about one-third to one-half turn or to point indicated on the needle valve head. In real cold weather needle valve should be opened wider. Careful trial and observation will show where the best results are obtained. Do not fail to close needle valve to running position after engine starts firing.

*(See illustration No. 8.)*

4. Close air damper. *(See illustration No. 8.)*



**Illustration No. 5**



**Illustration No. 6—Cranking engine.**

5. Turn flywheel of engine rapidly with hand crank to insure a combustible mixture being drawn into the engine cylinder, after which firing should commence. Remove starting crank as soon as engine is started, and open the air damper. *(See illustrations Nos. 6 and 7.)*

6. Advance spark by lowering the timing lever to running position.

*(See illustration No. 10.)*

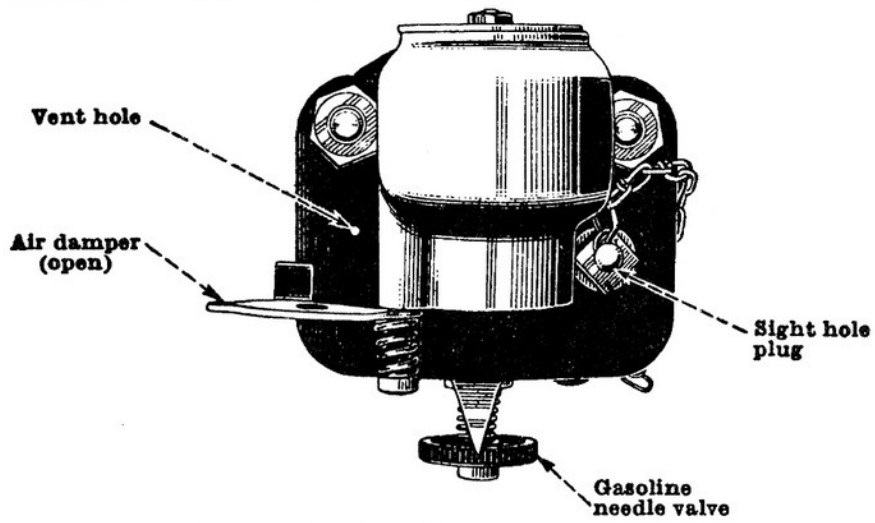


Illustration No. 7—Mixer—Top View.

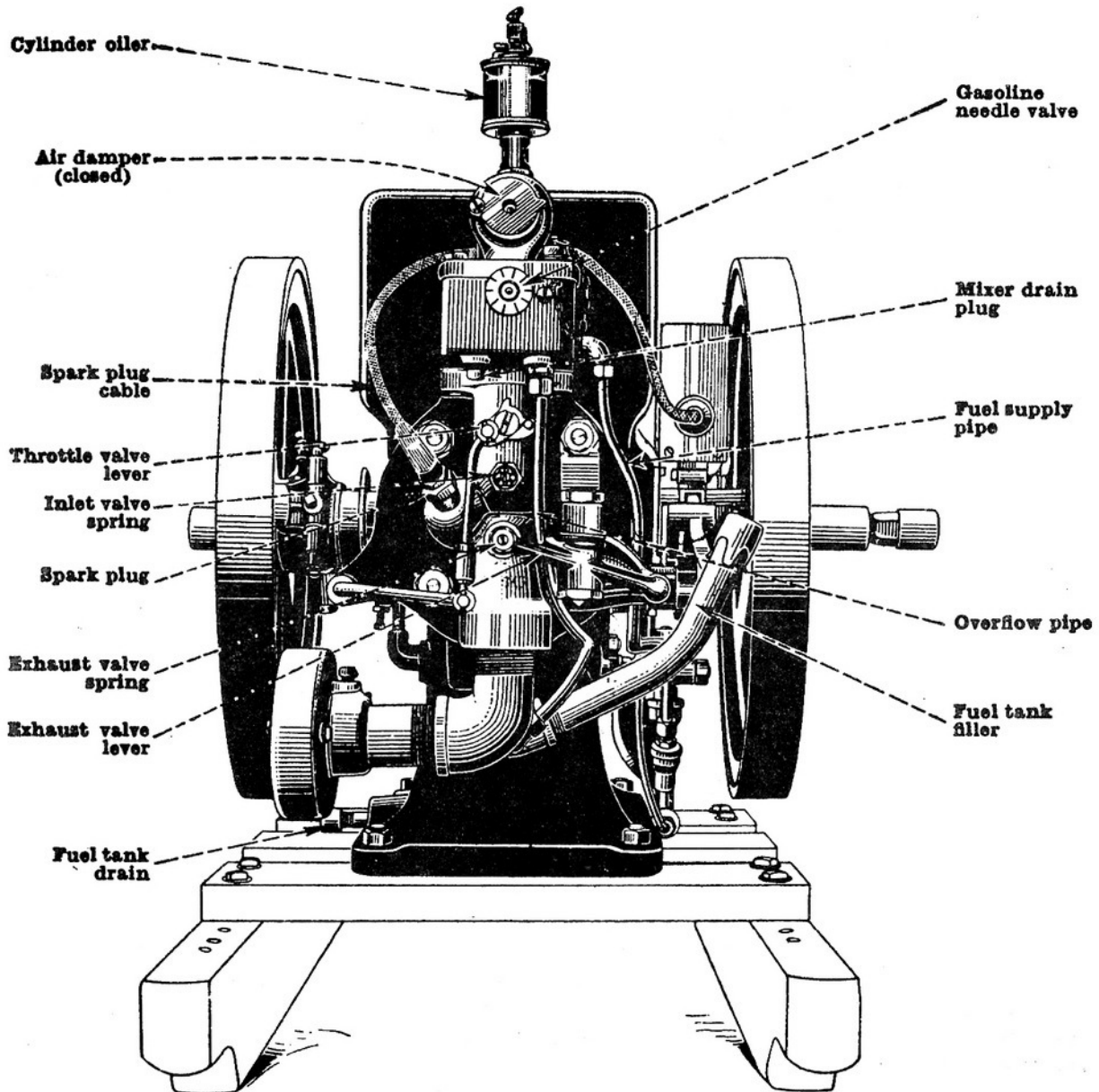


Illustration No. 8

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*NOTE: Adjusting the gasoline needle valve so that only enough fuel is supplied to prevent backfiring, will always give best results.*

---

## **RUNNING**

1. Adjust cylinder oiler to feed from five to seven drops per minute. Turn down grease cups.
2. Do not flood engine with too much fuel, as it will fail to operate if too much enters cylinder, just the same as if not enough enters. Fouling of the spark plug is sure to result if too much fuel is used.
3. Too much fuel will be indicated by a smoky exhaust. Too little fuel will be indicated by a popping back through the air intake of mixer.
4. Should engine be flooded, fuel can be drained out through exhaust valve by turning engine backwards. This causes exhaust valve to open on the compression stroke and excess fuel is blown out past the exhaust valve.
5. In cold weather, low grade gasoline does not vaporize easily and it may be necessary to warm the cylinder or prime with ether to facilitate starting.
6. If there should be any knocking or pounding the engine should be stopped immediately so the cause may be located and remedied.

---

*CAUTION: Spark plugs can only be kept clean by getting along with the minimum amount of fuel necessary to keep the engine running.*

---

## **TO STOP ENGINE**

1. Close the gasoline needle valve.
  2. Shut off the oiler.
  3. Drain the hopper whenever there is danger of freezing.
  4. See that the exhaust valve is closed so seat will not rust if engine stands idle for some time.
-

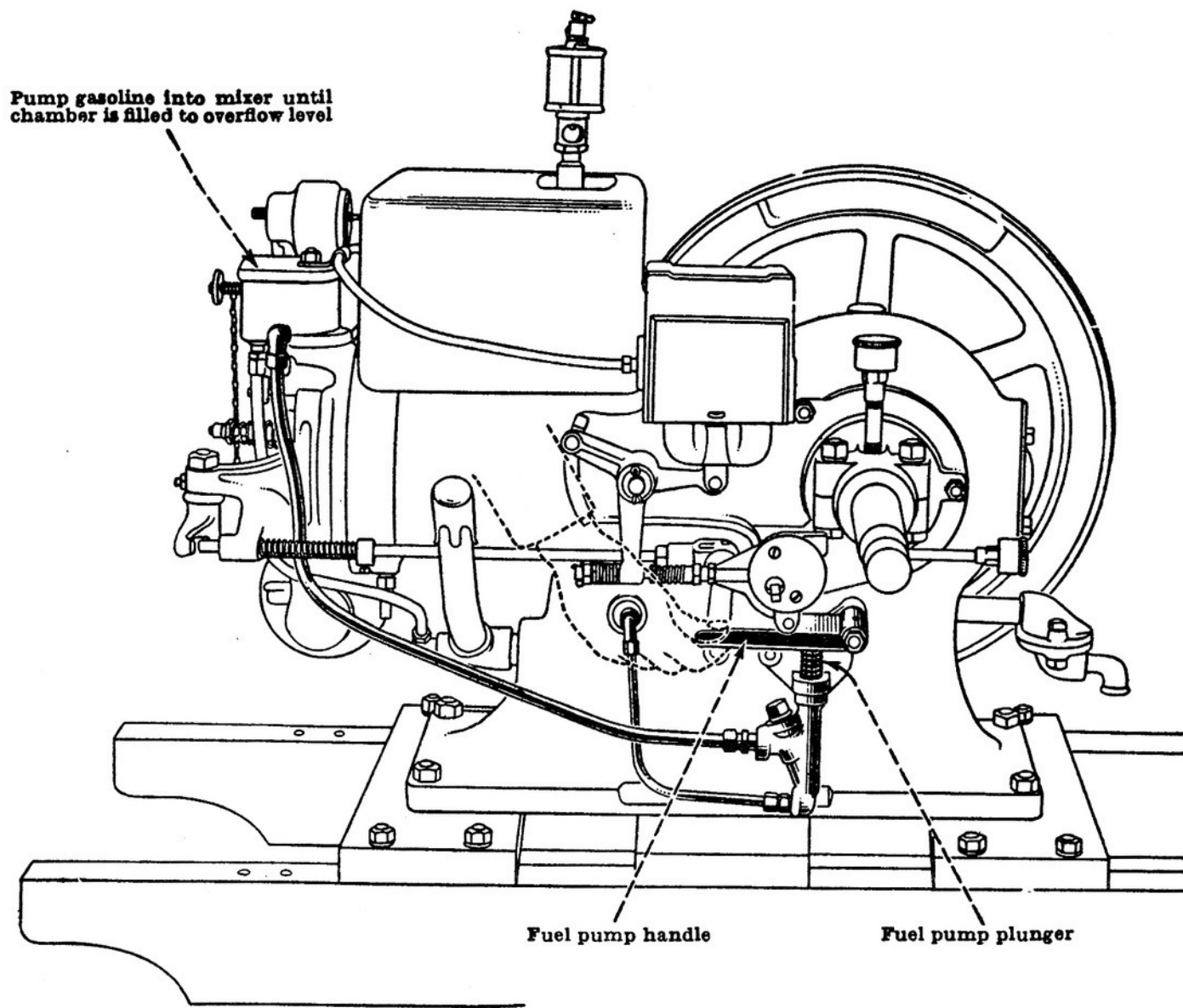


Illustration No. 9—Showing method of pumping up fuel before starting.

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## OPERATION AND CARE OF ENGINE

### LUBRICATION—CYLINDER

Fill oiler with a good grade of heavy gas engine cylinder oil. Cylinder oiler should be adjusted to feed about five to seven drops of oil per minute. Always bear in mind that in cold weather oil is thicker and drops slower and adjustment must be made to meet this condition. After engine is warmed up, adjust lubricator again.

Too much cannot be said about the need of good oil of the proper body. Oil which is suitable for lubrication of internal combustion engines must be *neutral*—that is, free from *acid or alkali* reaction; free from moisture, tarry or suspended matter; must have no thickeners or mineral in suspension.

*SAE No. 20 or No. 30 oil should be used in cold or cool weather and SAE No. 40 or No. 50 oil in warm or hot weather.*

### WATER

The use of water containing salt, gypsum, sulphur or other impurities will cause deposit to form in the water jacket and interfere with the working of the engine. Should a deposit of lime form in the cylinder water jacket it can be removed with a solution of seven parts of rain water to one part of muriatic acid. Allow this to remain in the water jacket about 36 hours and deposit can be easily removed.

### FUEL PUMP

If the pump does not pump sufficient fuel, look after the various joints in the suction line from the pump to the fuel tank, also see that the balls in the pump work properly and are not stuck or gummed up with dirt so that they will not seat properly. There is one ball in the bottom of the pump barrel and another ball in the discharge check. It sometimes happens that these balls become gummed up with dirt and do not seat properly and, under such circumstances, they will not function properly.

Look at the packing around the upper end of the fuel pump plunger. This packing should be pressed down reasonably tight and oiled with heavy cylinder oil occasionally to insure a perfect joint and a perfect suction in the pump barrel. If these instructions are followed, the pump will work satisfactorily and supply all the fuel required to keep engine running properly.

*NOTE: Oil the fuel pump plunger occasionally with heavy cylinder oil.  
(See illustration No. 9.)*

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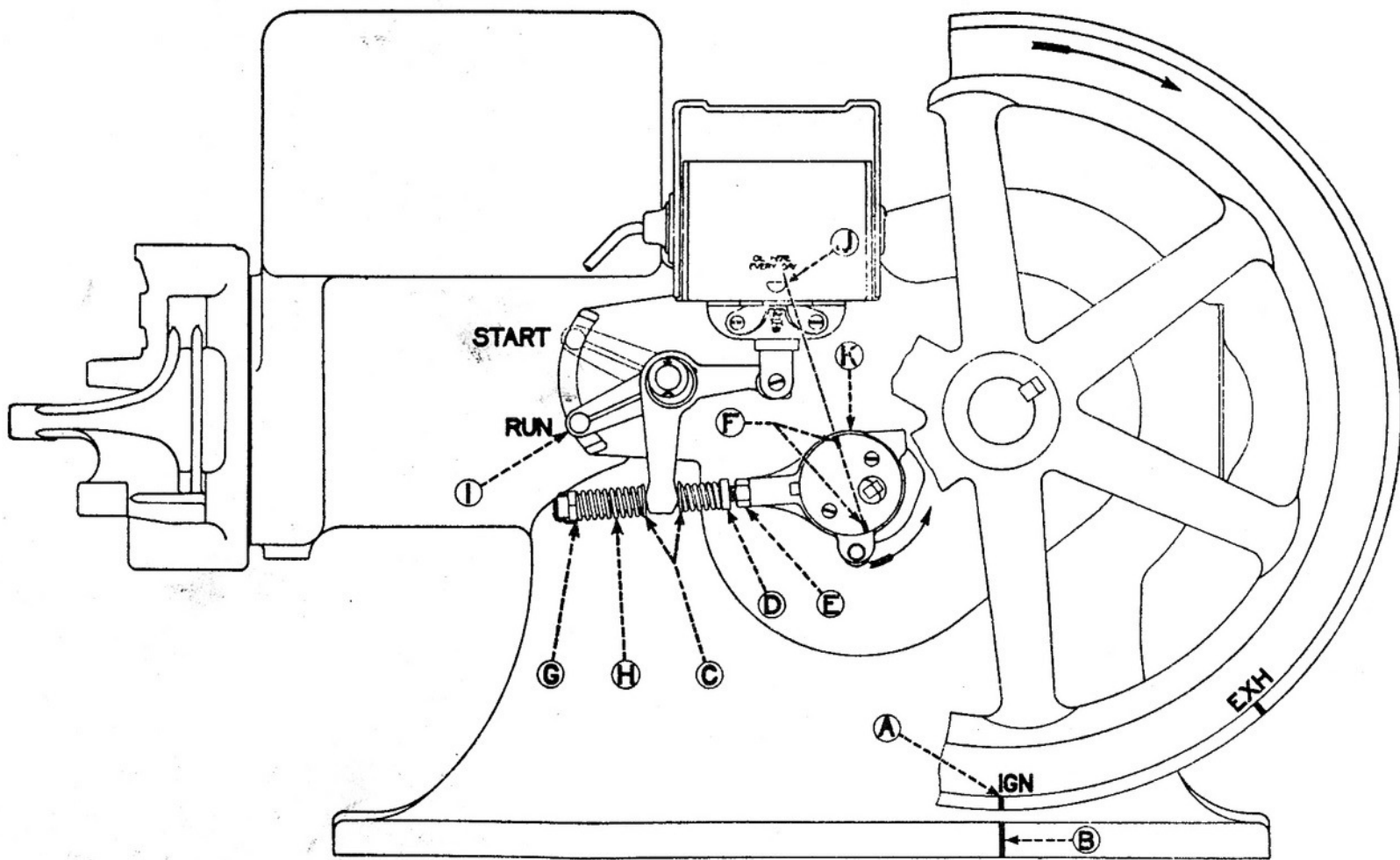


Illustration No. 10—Diagram showing method of timing ignition.

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## IGNITION SYSTEM

The ignition system of this engine is of the highest type with a Wico Type "EK" high tension magneto, and spark plug provided with a waterproof jacket and hood. In case the spark plug is removed for cleaning, the waterproof jacket and hood should be carefully replaced. Otherwise a heavy dew or rain will wet the plug and make it impossible to start the engine.

### ADJUSTING THE IGNITION

*(See illustration No. 10.)*

Set the spark advance lever "I" in running position as shown. Turn flywheel so that line "A" on flywheel (ignition mark) and "B" on crankcase are in line when the engine is on the firing stroke. The magneto should then be at the point of tripping.

If the magneto does not trip when "A" on the flywheel is in line with "B" on the crankcase, adjustment should be made as follows:

If the magneto trips too late, loosen lock nut "E" and with the wrench on adjusting nut "G," screw trip rod "D" out of the eccentric strap "K" until the magneto trips properly.

If the magneto trips too early, perform the same operations as indicated above except screw the trip rod "D" into the eccentric strap "K" until the magneto trips when the mark "A" on the flywheel and "B" on the crankcase are in line; then tighten nut "E." At the same time the marks "F" on the eccentric plate must be in line with the right hand edge of the oiler cup "J."

If marks on the eccentric plate do not line up with the right hand edge of the oiler cup, the cam gear should be remeshed with the crankshaft pinion so that they do come in line. This adjustment need never be made unless cam gear has been removed and improperly replaced, since the engine is always correctly set before it leaves the factory.

Next set the advance lever "I" in starting position (*see illustration No. 11*), and adjust spring "H" by turning the flywheel until the eccentric strap is in its farthest point of forward throw from the bell crank; then screw up the return spring adjusting nut "G" on the end of the trip rod so that the coils of the return spring "H" are not quite closed; then insert cotter pin in end of rod and bend over to prevent it from coming loose. It is very essential that washers "C" be in place as shown since they are very important to the correct operation of the engine.

After these adjustments have been made turn the flywheel slowly in the normal direction of rotation to see that the timing is all correct as described above.

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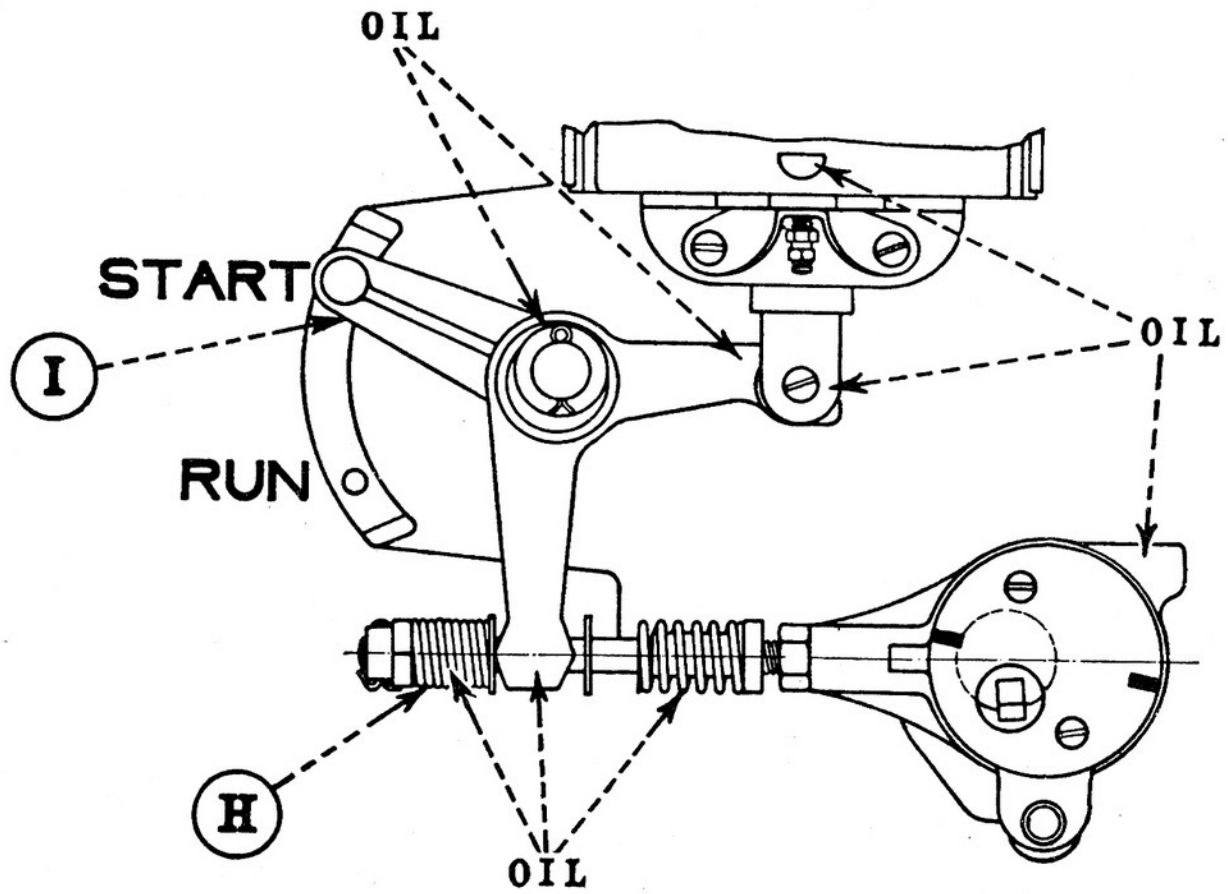


Illustration No. 11—Return spring adjustment.

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## IGNITION SYSTEM—Continued

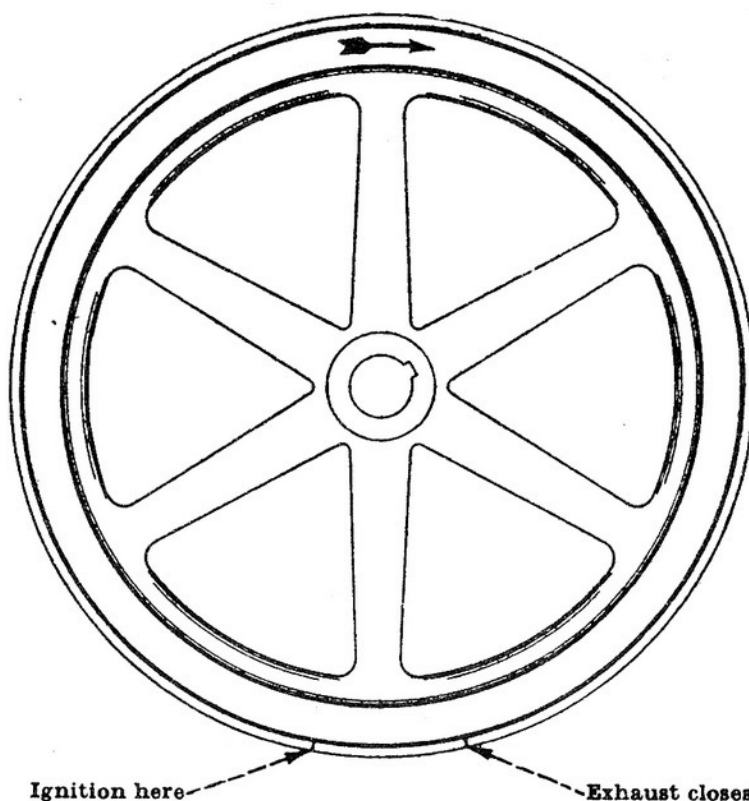


Illustration No. 12—Showing timing marks on flywheel.

### SPARK PLUG

Keep the spark plug clean and free from carbon. The gap should be reset when the electrodes wear farther apart as the engine is run. Fouling of the plug can be reduced to a minimum by properly adjusting the cylinder oiler and fuel needle valve. If the points are too far apart the engine will be hard to start and there will be danger of explosion in the muffler.

The correct spark plug gap is  $1/50$  inch to  $1/32$  inch or the thickness of a well-worn dime.

### TROUBLE

1. The first step to be taken in engine trouble should be a thorough cleaning of the spark plug and an inspection of the high tension cable connection to it.
  2. Examine the high tension cable and see that it is not short-circuited.
  3. Test the spark by holding the end of the spark plug wire within  $\frac{1}{8}$ -inch of a clean space on the engine and rotate the engine by hand. A spark should jump the gap so made. If it fails to do so the magneto should be given attention. For full instructions, see pages 22 to 27 inclusive.
  4. Be sure that the engine has gasoline. The mixer should always be full to the overflow level.
-

## SETTING OF VALVES—VALVE MECHANISM

The engine should be timed so that exhaust valve closes when mark on flywheel on magneto side of engine is in line with mark on crankcase.

(See illustrations Nos. 10 and 12.)

The necessary adjustment may be made by changing the length of the exhaust rod by screwing it in or out at "E," and for small variations by adjusting the exhaust lever set screw.

(See illustration No. 10.)

## TO REGRIND VALVES

Valve seats must always be kept in good shape.

Never operate engine with leaky valves.

When a valve leaks it should be reground.

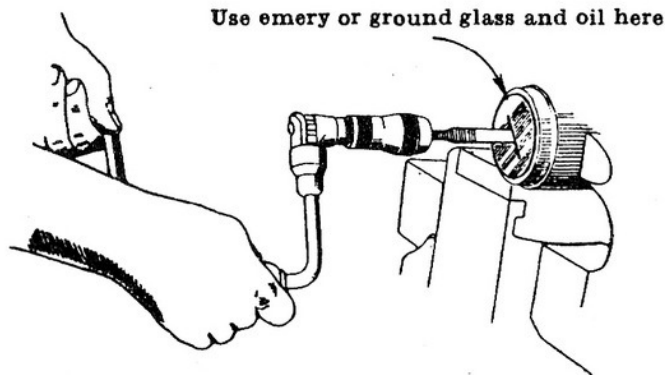
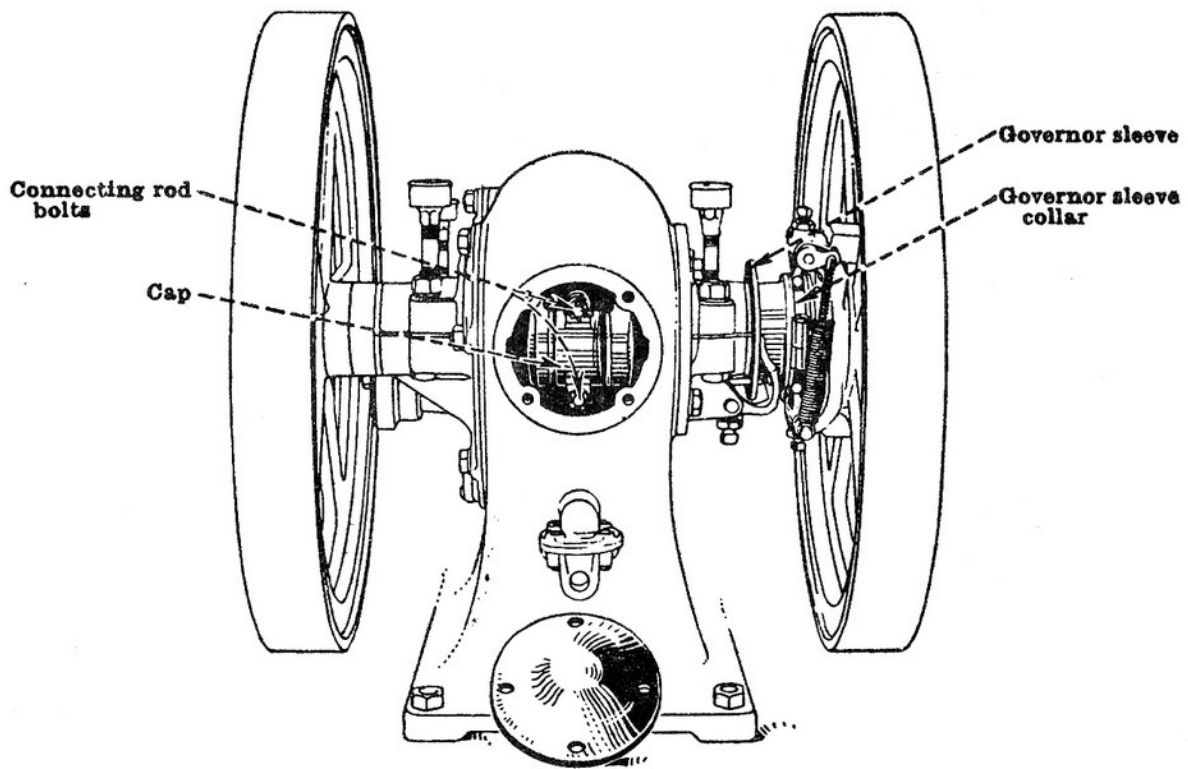


Illustration No. 13

Regrinding valves.

Remove the valve springs, clean valve and valve seat with gasoline. Make a paste of *fine* emery dust and oil. Apply some of this on the valve and seat. Put the valve in place and revolve it with a carpenter's brace and screw driver bit, turning a few turns to the right and then to the left, lifting the valve off the seat occasionally to let the paste get between the valve and seat. Keep on in this manner until the valve and seat show an even surface all the way around. Then wash off with gasoline. Be sure there is no dirt or emery paste left on the valve or seat when assembling, or in valve passages. In case a valve stem becomes sluggish in action or sticks in its guide, it can usually be made to work by oiling with kerosene to loosen deposit. It may be necessary to remove valve and clean stem and guide thoroughly.

Dirty or sluggish moving parts cause the engine to misfire and lose power rapidly.



**Illustration No. 14—Showing handhole cover removed, also governor parts.**

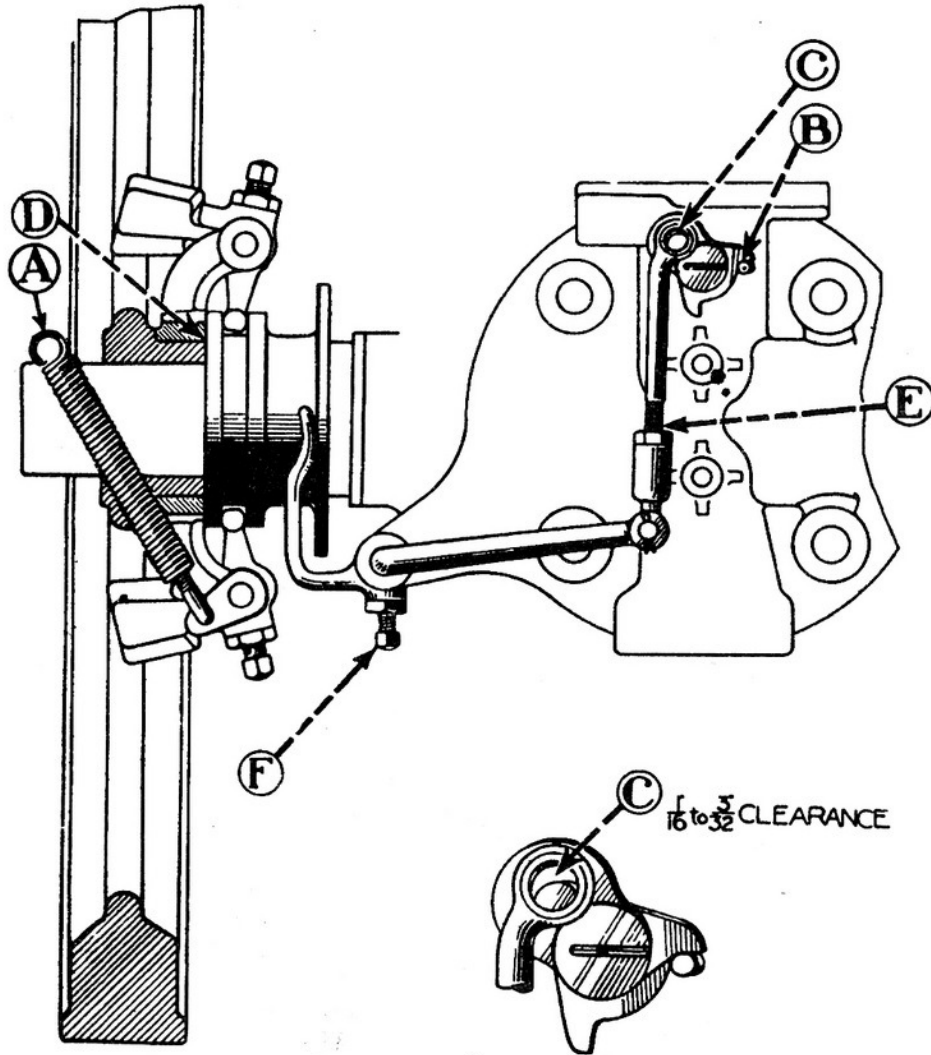


Illustration No. 15—Governor adjustment diagram.

1. Unhook both governor springs as shown at "A". Remove cotter pin at "C" and disconnect upper end of governor valve rod as shown at "C".
2. Push governor collar tightly up against flywheel hub as shown at "D". It is very essential that no space be left between collar and hub.
3. Close throttle completely so that lever is up against stop pin as shown at "B".
4. With all parts in positions indicated above and set screw "F" tight, adjust length of governor valve rod by unscrewing it at "E" to be  $\frac{1}{16}$ " to  $\frac{3}{32}$ " longer than is required to fit over pin at "C". See detail diagram for clearance at "C".

This gives correct length of governor valve rod. Lock nut at "E" should now be tightened. With this completed, parts should be properly replaced after which engine is again ready for use.

## TESTING BEARINGS

To determine if the connecting rod bearings are loose, remove the handhole plate and turn the flywheel until throw of crank is on top, place your hand on the connecting rod and crank and oscillate flywheel to determine lost motion. The connecting rod bearing should not be absolutely tight, but should have about 3/1000 in. to 5/1000 in. play in the bearings and from 1/32 in. to 1/16 in. side play.

## ADJUSTING BEARINGS

To adjust a bearing, remove a liner of the proper thickness from each side of the bearing. Replace the cap and bolt up tight. Now turn the flywheel and see that the engine turns as freely as before the adjustment was made.

## LINERS

The liners in the bearings are of various thicknesses. When a liner is removed from a bearing, save it. Whenever adjusting a bearing you may find it convenient to place one of these extra liners in the bearing joint and to remove one that is slightly thicker; in this manner very close adjustment can be made.

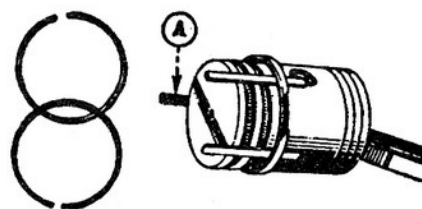
## CONNECTING ROD BEARING

If necessary to take up the connecting rod bearing, care should be taken not to remove too many liners, as this bearing must have a slight amount of play to operate properly. Do not mix the bearing halves. Always replace bearing in its original position.

## PISTON; CLEANING RINGS

Occasionally it is necessary to remove the piston and clean the rings. To do this, disconnect governor rocker shaft, spark plug wire, fuel pump discharge and overflow pipe and remove cylinder head. Take off crankcase handhole plate (*see illustration No. 14*), loosen connecting rod bolts, remove cap and liners from bearing and push out piston with connecting rod.

If the rings are found to be fast in the grooves, clean them by washing in kerosene. Work them up and down in the grooves until free. Now remove the first ring with the aid of three thin metal strips "A" as shown in *illustration No. 16*. Insert these strips under the ring at the joint, leaving two close to the joint. Work the other one to a position opposite the joint. The ring is now out of the groove and can easily be removed. Remove the others in like manner. Clean the rings and ring grooves in the piston thoroughly, using a knife to scrape them if necessary.



**Illustration No. 16**  
Replacing piston rings.

## REPLACING PISTON RINGS

When replacing the rings, put the center ones in first, using the metal strips as before so as to slide the ring over the grooves. After the rings are in position, wash piston in gasoline to remove all dirt and grit. Then oil the piston and rings thoroughly and place the piston in the cylinder, in its original position, being sure that the oil hole is at the top.

## TO REMOVE CYLINDER OIL PIPE

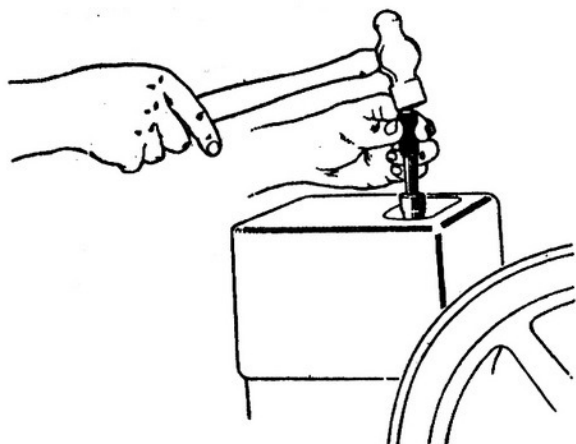


Illustration No. 17

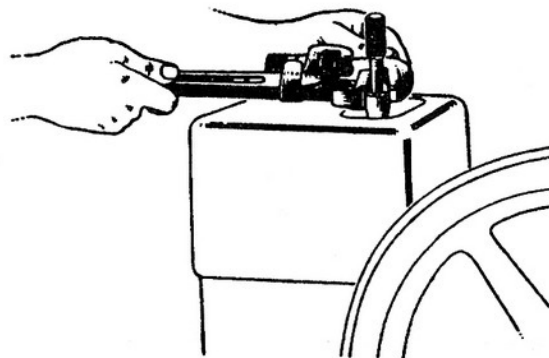


Illustration No. 18

To remove the oil pipe, drive a long taper center punch into top of pipe, leaving the reducing coupling in place. This tightens the pipe in the reducing coupling, and the vibration from hammering tends to loosen the threads down below in the cylinder.

*(See illustration No. 17.)*

Then apply pipe wrench to the projecting end of reducing coupling and unscrew pipe from cylinder; the pipe should remain firmly fastened in the coupling.

*(See illustration No. 18.)*

## TO REMOVE CYLINDER

Unscrew cylinder oil pipe as shown on *page 20*. Put a block of wood through front end of crankcase and place against end of liner, tapping same lightly with a hammer until liner starts to move out. Before replacing liner, examine rubber packing ring in the inner end of cylinder support. If torn or damaged, a new one should be installed.

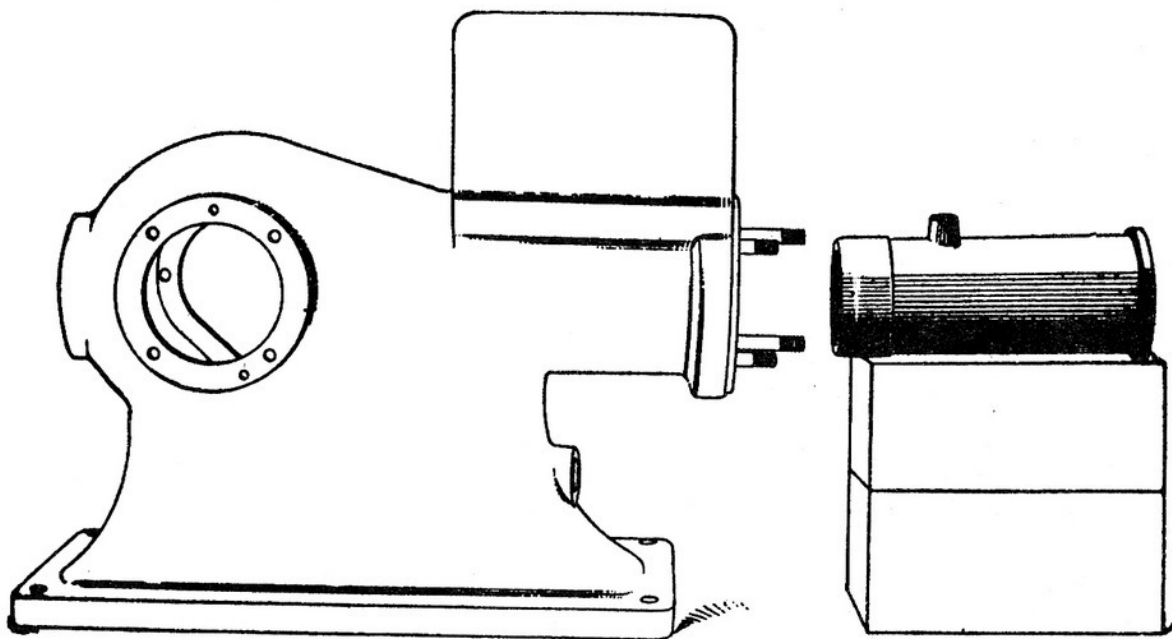


Illustration No. 19—Showing how cylinder is removed from crankcase.

## TO DRAIN FUEL TANK

In case it is necessary to drain fuel tank, remove the pipe cap from drain pipe, which extends from fuel tank through left hand side of main frame.

(See *illustration No. 8.*)

## EXHAUST PIPE

In case the exhaust is carried to the outside of the building a drain should always be provided. Use 45-degree bends or long radius elbows to make the turn. If the pipe is more than 10 feet long, use one size larger pipe than at the engine.

## INSTRUCTIONS FOR WICO MAGNETO

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### CARE OF MAGNETO

The following simple instructions for the care of the Type EK Magneto tell all that you need to know to keep it in perfect condition. Follow these instructions exactly and do not experiment.

The need for making adjustments or replacements will seldom, if ever, arise, but all parts of the magneto are so accessible that adjustments and replacements can easily be made when required.

### SPARK PLUG

The distance between spark plug points should be from .020" to .031" (the thickness of a well-worn dime).

The insulator (Porcelain or Mica) inside base of spark plug must be kept clean (free from carbon), because the electricity from the magneto leaks through the carbon on the insulator instead of jumping across the points, and makes it hard or impossible to start the engine or makes it fire irregularly. Excessive oiling of engine and too rich a fuel mixture may deposit carbon on the insulator. Use a thin knife blade, a rag, and gasoline for cleaning.

A plug will sometimes show a spark when tested outside of the cylinder and yet fail to fire the engine when replaced in the cylinder. This shows that the plug is "leaky," because of carbon or because the porcelain insulator is cracked. A "leaky" plug will spark outside the cylinder and not inside because the spark can jump through the air easier than it can jump through the compressed charge inside the cylinder, especially when the engine is cold.

### MAGNETS

Do not remove the magnets (141) (*see illustration No. 22*). You will instantly destroy their magnetism and gain nothing, because every part of the magneto that may conceivably require renewal can be replaced without removing the magnets and without weakening them.

### MOVING PARTS

All moving parts (*see illustration No. 20*) can be withdrawn from the magneto by lifting the armature (100) from its magnetic contact with the cores (107). This operation does not weaken the magnets. When replacing the armature make sure that the oil pad (266) slips over the guide rod (157).

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## MAGNETO—Continued

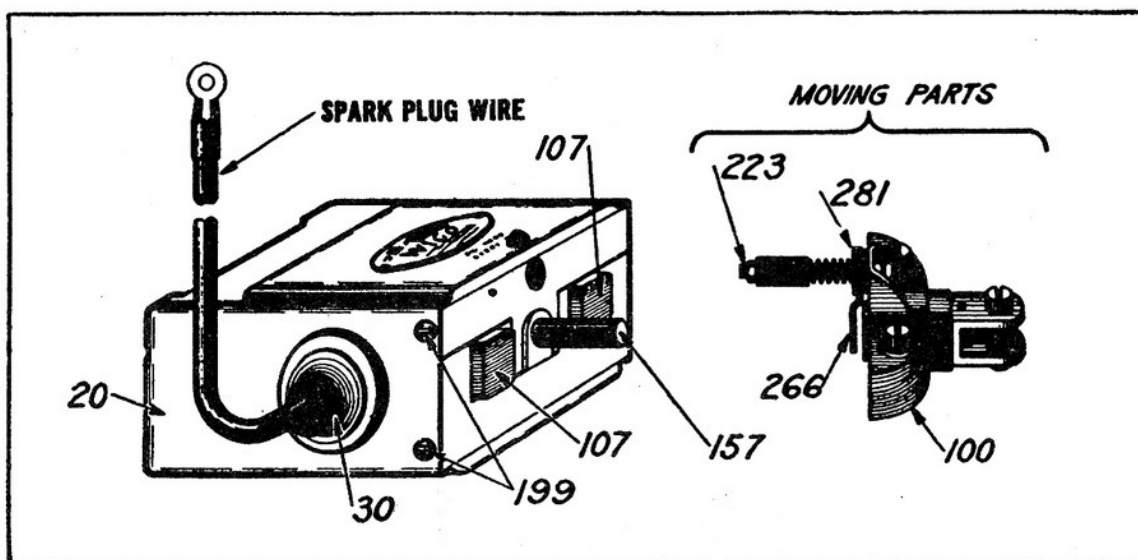


Illustration No. 20—Magneto, moving parts removed.

### IMPORTANT

The continued functioning of this magneto is dependent upon the armature (100) making perfect contact with the cores (107) (see illustrations Nos. 20 and 21) at each stroke of the eccentric. Foreign matter such as straw, chaff, dust, ice, bits of leaves, etc., should not be permitted to lodge between these surfaces for then no spark will occur. The magneto is supplied with an armature cover preventing the entrance of foreign matter but extreme exposure to dust may still result in sufficient deposit to be injurious. In case of a mysterious failure of the spark, examine these surfaces first of all in order to determine without question that they make perfect contact with one another.

### REMOVAL OF COVERS

The covers of the magneto are held in place by the band (20) which is fastened by four screws (199), two at each end of the magneto. The removal of these screws allows the band to be lifted and the covers to be removed. (See illustration No. 20.)

### OILING

The Type EK Magneto is not a delicate instrument that will be injured by oil, but a sturdy machine that requires oil. It will last for years if properly oiled. Its life will be greatly shortened if run dry. Oil it daily with regular engine oil at the points shown in illustration No. 21.

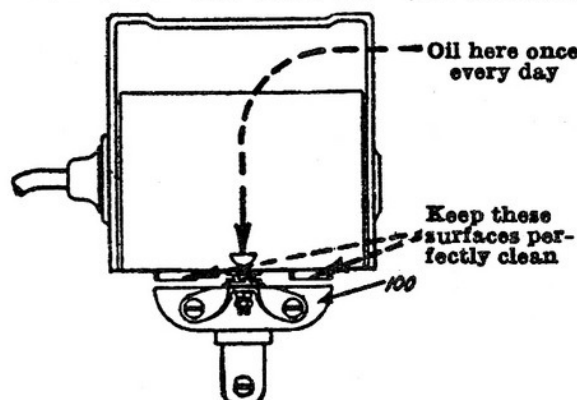


Illustration No. 21  
Side view showing oil cup.

## MAGNETO—Continued

### CLEANING

Where Type EK Magnets are to be used in the open, dirt and grit will collect on all of the exposed portions of the machine. This is to be expected and no decrease of the spark strength will be caused thereby. If, however, the working parts are kept clean their life will be prolonged. After many hours of operation, if the magneto has been oiled frequently and heavily, oily muck may have collected inside the breaker point tube around the upper contact, and this may slightly weaken the spark. Remove the front cover (see "Removal of Covers," page 23), withdraw the moving parts (see illustration No. 20) and with a clean rag and a small hardwood stick wipe off the oily muck wherever it has gathered.

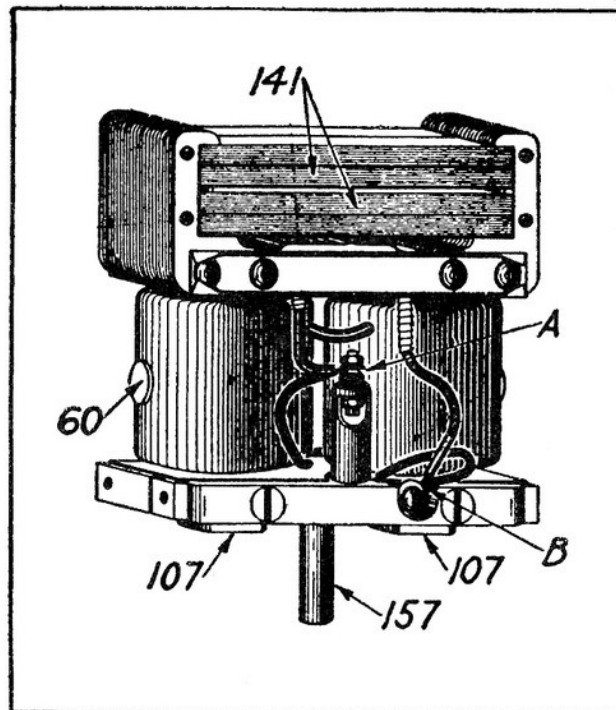


Illustration No. 22

Cover off, moving parts removed.

### ADJUSTMENTS

#### (Breaker Points)

(See illustrations Nos. 20, 22 and 23.)

The breaker point contacts are perfectly adjusted at the works of the Wico Electric Company, and no re-adjustment will be required through thousands of hours of use, except when installing new contacts, at which time proceed as follows:

The breaker point contacts (301 and 223) should just touch when the armature (100) is about  $3/32$ " from the cores (107). To adjust, trip the armature from its contact with the cores, and insert a strip of metal  $3/32$ " thick between the armature and the face of the cores. Loosen the nuts (302) on the breaker point stem and turn the upper nut until the contact (223) just touches the contact (301). Then set up the lower nut tight against the lockwasher and the upper nut. As soon as adjustment has been made, be sure to remove the metal strip that you placed between the armatures and cores.

## MAGNETO—Continued

### REPLACEMENTS (Breaker Points)

(See illustration No. 23.)

The best results will be obtained if both contacts are renewed whenever one of them fails. If either contact fails it may leave the other in such uneven shape as to spoil a new contact.

To replace the moving contact (223): Withdraw the moving parts (see illustration No. 20), and remove the old contact and its spring (176) from the breaker point plate by unscrewing the two nuts (302). Substitute the new moving contact, being careful to replace the felt washers (266 and 281) as shown in illustration No. 23. Replace the nuts and the lockwasher between them. After replacing the moving parts, adjust the breaker point contacts as explained under "**Adjustments.**"

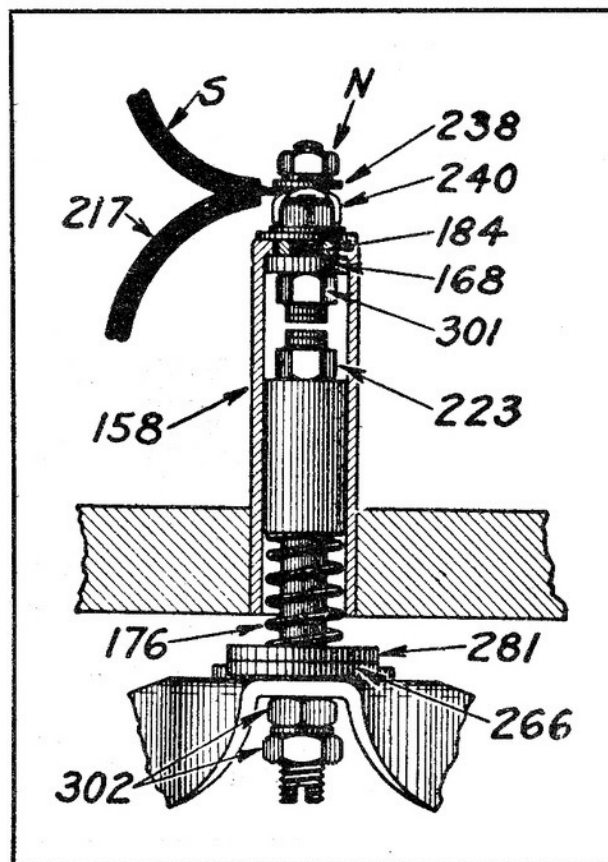


Illustration No. 23—Breaker points.

To replace fixed contact (301): Remove the front cover and withdraw the moving parts. (See illustration No. 20.) Disconnect condenser lead (S) and primary lead (217) from breaker point tube (158). (See illustration No. 23.) Remove all nuts and washers from shank of the contact (301) and push contact down and out of tube. There are two insulating washers (168 and 184) inside of tube and these should be removed also. New insulating washers (168 and 184) and new nuts will be supplied with each new fixed contact and these should always be used in replacements.

Place insulating washers on new contact and insert in tube, replace outside insulating washer, cover it with the lockwasher and screw the nut up tight. Replace the two washers (240 and 238) and the nut (N). Insert the two leads and set the nut up tight. After replacing the moving parts, see that the contacts are properly adjusted. (See "**Adjustments.**")

## MAGNETO—Continued

### SPARK PLUG WIRE

(See illustrations Nos. 20 and 24.)

The spark plug wire is provided with a threaded sleeve (122) on inner end which screws into the shouldered brass washer (26) in the terminal block (30). (See illustration No. 24.) To remove spark plug wire, it is only necessary to unscrew it and insert a new wire and screw it up tightly into place. Spark plug wires are provided by the manufacturer with the threaded sleeve in place on the end of the wire.

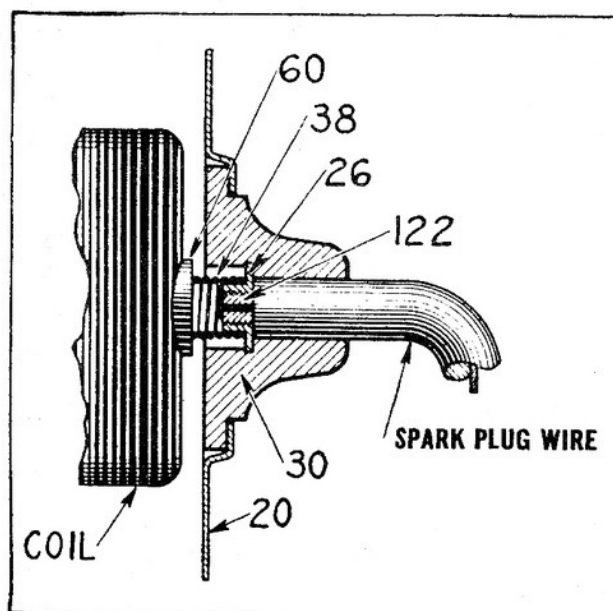


Illustration No. 24—Section showing detail of high tension terminal.

### TROUBLE HUNTING

If ignition trouble is suspected disconnect spark plug wire from plug and observe spark between wire and engine frame, by holding end of wire about  $\frac{1}{8}$ " from frame while cranking engine.

If no spark is produced when magneto is operated, the trouble can be located by proceeding as follows:—

See that the armature (100) returns and makes a firm contact with the cores (107) after being tripped off. (See illustration No. 20.)

Failure to make firm contact indicates a weakened or broken return spring **H** (H5576) or friction of moving parts caused by lack of oil. (See illustration No. 10.)

Remove any dirt from between armature and face of cores. Turn the flywheel over slowly and see that when the armature (100) is tripped it snaps quickly away from the cores (107). Failure to do this indicates binding or friction or a broken drive spring (H5577). (See illustrations Nos. 10 and 11.)

Remove the front cover and use a small wire or piece of wood to remove any dirt from the surfaces of the contacts (301 and 233) and from the insulating washer (168). (See illustration No. 23.)

## MAGNETO—Continued

### RETURN OF MAGNETOS

If, after carrying out the instructions given in this book, the engine does not start and run properly, the magneto should be sent to the service station of the Wico Electric Company at Tulsa, Okla., or to the works of the Wico Electric Company at Springfield, Mass., or to the nearest Branch House of the International Harvester Company.

### EMERGENCY SHIPMENTS

Upon request by telegraph or letter, giving the number on the name plate of your Magneto, the Wico Electric Company will send a new magneto by Express C. O. D. to any point in the United States or Canada, and after examination of the returned magneto will refund the purchase price less the cost of repairing it.

None of the parts of the returned magneto that are found to be defective in material or workmanship will be included in the cost of repairs.

### PACKING OF RETURNED MAGNETO

Pack the magneto carefully for return. Damage in transit will be included in cost of repairs.

### PREPAYMENT OF CHARGES

Transportation charges on returned magnetos must be prepaid or shipment will not be accepted.

### GUARANTEE

Wico Magnetos are guaranteed by the manufacturer for all time against defects in materials or workmanship.

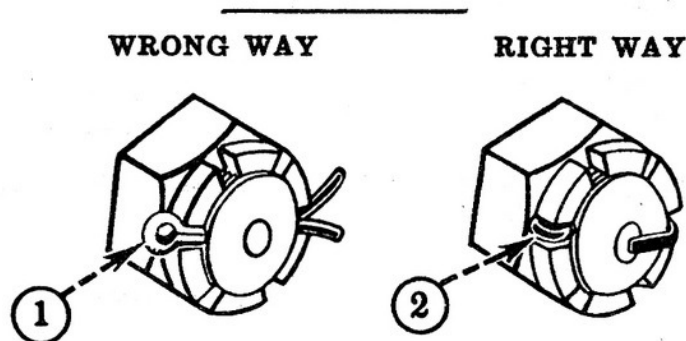


Illustration No. 25

### WRONG AND RIGHT WAY TO SECURE A COTTER PIN

1. Head of cotter not in slot of nut—turned wrong. Ends not split right—turned wrong. This combination will soon work loose and come out.

2. Head of cotter in right—pound down firm—a snug fit in hole. End of cotter pounded back over end of bolt—other end pounded down. Cotter should be tight.

## OILERS—OIL HOLES

See that all oil holes, oil or grease passages, are open and that the oil or grease actually reaches the bearings. Frequent inspection and cleaning of all oil holes, oil and grease passages, may save a bearing from being seriously damaged. It often happens that the oil passage gets clogged right at the bearing, so it is best to completely clean the oil passage all the way to the shaft.

## GREASE CUPS

A very common mistake is made in filling grease cups by not squeezing the grease down in the top of the cup. When the cup is not properly filled, the first few turns down do not force the grease into the bearings but simply compress it in the grease cup (*illustration No. 26*). Because of this fact a man may think he has done his part and greased the bearings when he really hasn't. *Illustration No. 27* shows another thing that happens when the grease cup is carelessly used. This bearing is only partly supplied with grease. *Illustration No. 28* shows the right way to handle the grease cup. Screw the top down until the bearing is well filled or until it can be plainly seen that the grease has reached both ends of the bearing.

## KEEP GREASE FREE FROM DUST

The can containing your supply of grease should not be allowed to stand open so that dust can get into it. Dust is gritty, and if carried into the bearings with the grease, will cut the bearings rapidly, and often cause them to heat excessively.

When filling the grease cups, it is important to wipe the dust from the cup and especially out of the threads on the cup before filling. Dust accumulates on the cup and in the threads, and when the top is unscrewed the dust is carried up to the edge. When grease is put in, the dust gets in with it and bad results follow.

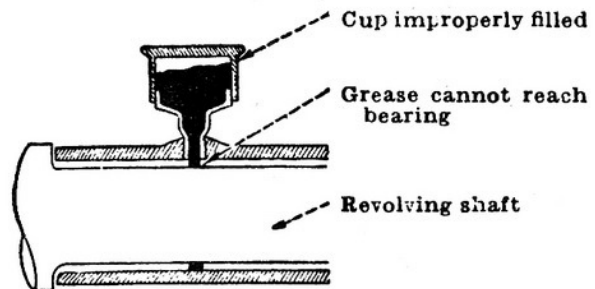


Illustration No. 26

Grease cup not properly filled. The first few turns will not send grease into the bearing—but will compress it into the cup.

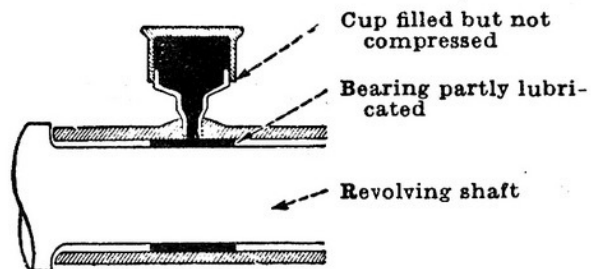


Illustration No. 27

Another careless way of using a grease cup—entire bearing is not lubricated.

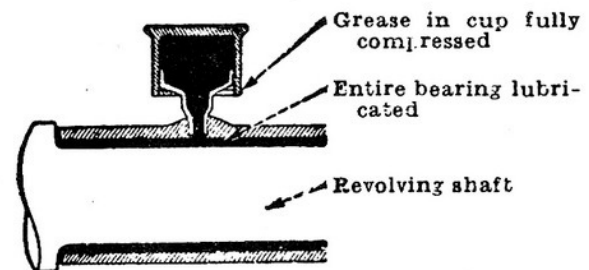


Illustration No. 28

The proper way to lubricate with a grease cup. Note grease full length of bearing and ready to come out at ends.

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## INSTRUCTIONS FOR CARE AND OPERATION IN COLD WEATHER

Cold weather offers certain problems to all engine owners. These are not much of a handicap to the experienced operator, but are likely to be to the man who is wintering his engine for the first time. In order of their importance these problems are:

First—Danger of water in the cylinder jacket and mixer freezing, with consequent cracking of these parts.

Second—Faulty lubrication due to the sluggish action of oils when cold.

Third—Difficulty in starting the engine.

### DANGER FROM FREEZING

The reason an engine cylinder cracks is because the water in it freezes. A man may forget to drain his engine or he may not think it is going to be cold enough to freeze the water in the cylinder jacket. No matter how the water happens to be left there, the result is invariably a cracked cylinder, followed many times by an extensive outlay for repairs. To avoid anything of this sort, there is one simple precaution to take in cold weather, that is, to drain the water out of the cooling system. Although at that time the weather may not be freezing, when the freezing weather does come, he may have forgotten that he left water in the cooling system.

### REPAIRING CRACKED WATER JACKETS

While the ounce of prevention method should be used in draining engines yet some owners may be careless enough to allow the engine cylinders to freeze up and crack the water jacket as the result. Where this takes place, it is seldom that the cylinder itself is injured. It is usually only the outer casing, or water jacket, so-called, that really bursts. There are two general methods of patching cracked water jackets.

### THE "RUST JOINT" METHOD

Where the crack is a very small one, not over a thirty-second of an inch in width, the patching can be done by means of what is termed a "rust joint." After the ice has been melted, drain off all water, then close the main drain cock. Put a coat of putty or tallow over the crack, being careful not to fill the crack with it. Fill the jacket high enough to cover the crack with a salomoniac solution (one pound to a gallon of water), let stand thirty minutes, drain, and run engine five minutes to warm jacket. Stop engine, put solution back into jacket and repeat the process three or four times. If the crack is not too wide, you will thus form a rust joint that will never leak.

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## **THE CEMENT METHOD**

The second method of mending a cracked water jacket can be used to advantage where the crack is too wide for the system outlined previously to be used. This method is by filling up the crack with cast steel cement or "Smooth On" No. 1. These cements can be bought in small quantities at small cost and can be obtained from hardware stores, machine shops, or from International branch houses, and should be mixed according to directions upon the cans in which they come. In preparing a crack for this kind of patch, both edges of the crack should be beveled off with a sharp chisel back about one-eighth of an inch on each side to serve as a funnel for forcing in the cement. In beveling the edges of this crack, care must be taken not to break off a portion of the jacket by using too much force on the hammer and chisel. When the crack has been thus dressed down, the paint should be scraped off to a distance of a quarter of an inch on both sides. Then this mixture of cement should be forced down into this crack by using a putty knife or common steel case knife until it is filled. When the crack is full throughout its length and depth, the surface of the cement should be smoothed over and the patch allowed to harden for several hours or a day if convenient. When once hard, this metal cement takes on the properties of the metal around it. It will contract and expand with changes of temperature and generally prove very satisfactory.

## **FAULTY LUBRICATION IN WINTER WEATHER**

That there is a positive danger through poor lubrication in cold weather has been demonstrated over and over again. It is common knowledge that oil does not flow as fast in cold weather, and for this reason unless special care is taken will not get to the working parts in time to prevent serious wear and tear on bearings and pistons when engines are first started. The same custom which old steam engineers observed, of heating their lubricating oil on frosty mornings, should be followed by engine operators. A little warm oil added to what happens to be already in the oiler will make the entire supply more easily handled.

## **DIFFICULTY IN STARTING**

The greatest difficulty comes from using a poor grade of gasoline for starting purposes.

*If the operator will put a bucket or two of warm water into the hopper of his engine just before he wishes to start, he will find it an advantage.*

This warm water in the water jacket raises the temperature of the cylinder up to a point where it does not have the same condensing and chilling effect upon the vaporized gasoline that it otherwise would have.

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## SPECIFICATIONS

H. P.	Speed R.P.M.	Bore	Stroke	Size of Plain Pulley		Flywheel		Fuel Tank	Water Hopper	Floor Space and Height without Skid			Floor Space and Height with Skid Attached			Floor Space and Height with Skid Attached and Reducing Gear			Reducing Gear	Shipping Weight Pounds
				Diam.	Face	Diam.	Face	Gallons	Gallons	Length	Width	Height	Length	Width	Height	Length	Width	Height	Belt Speed in feet per Min.	
1½	500	3⅝"	4½"	4"	5½"	18"	1¾"	1⅝	2¼	32⅜"	26⅝"	26"	48"	26⅝"	30½"	48"	26⅝"	30½"	107'	325

Regular equipment: One plain pulley, galvanized fuel tank, magneto, spark plug, oil can, muffler, necessary tools and substantial wooden skids.

Special equipment: Consists of plain pulleys, two-wheel hand truck, four-wheel hand truck and reducing gears.

Plain pulleys special—furnished when ordered:

1½-H. P., 3", 4", 5", 6", 7" and 8" diam., all 5½" face.

## INDEX—LIST OF REPAIR PARTS

DESCRIPTION	Page Number		DESCRIPTION	Page Number	
	List	Cuts		List	Cuts
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<b>Cam, Cam Gear, Cam Roller, Lever, Etc.</b> .....	<b>33</b>	<b>37</b>	<b>Governor</b> .....	<b>33</b>	<b>38</b>
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<b>Crankshaft, Connecting Rod and Piston</b> .....	<b>32</b>	<b>36</b>	<b>Mixer</b> .....	<b>33</b>	<b>37</b>
<b>Cylinder Head with Valve, Etc.</b> .....	<b>32</b>	<b>35</b>	<b>Muffler</b> .....	<b>33</b>	<b>37</b>
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			<b>Pulley</b> .....	<b>34</b>	<b>39</b>
			<b>Skids</b> .....	<b>34</b>	.....
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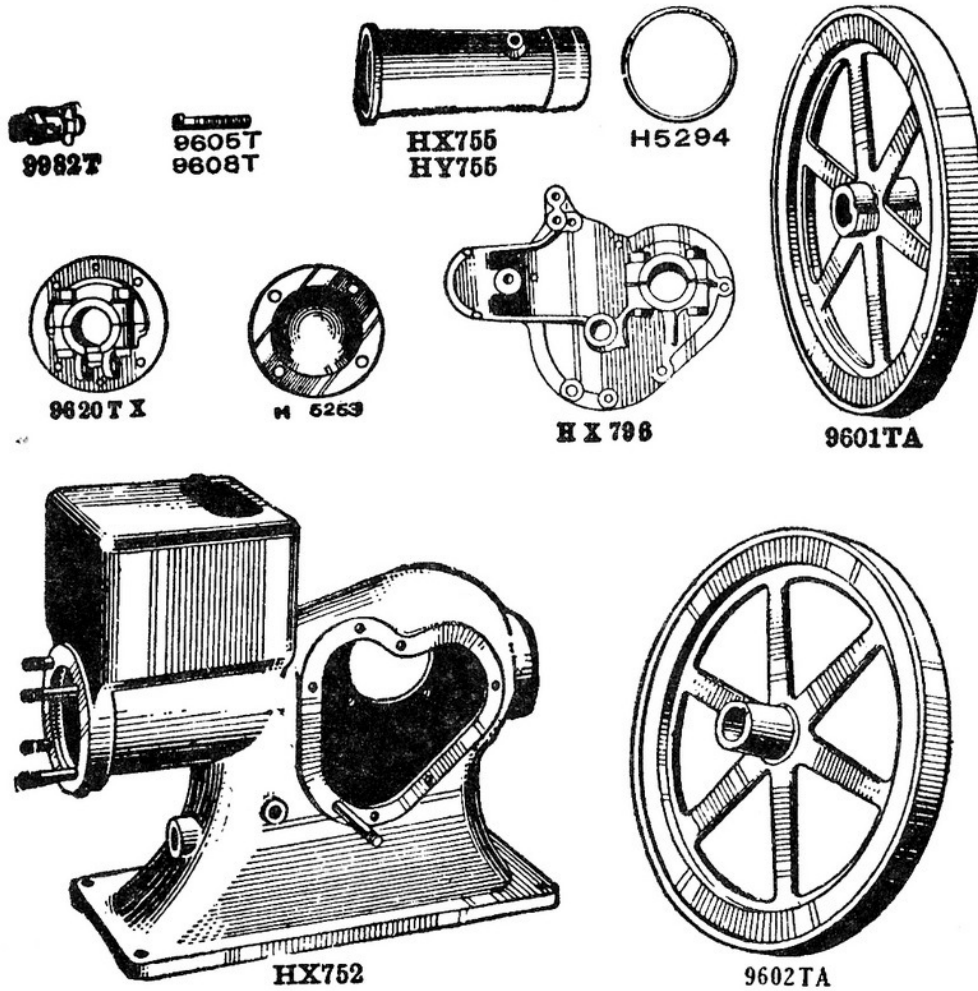
NAME OR DESCRIPTION	Cat. No.	NAME OR DESCRIPTION	Cat. No.
<b>CRANKCASE, CYLINDER AND FLYWHEEL</b>		Intake valve spring .....	9997T
Crankcase, complete .....	HX 752	Water throttle feed pipe street elbow, $\frac{1}{4}$ " O. D. ....	7998TM
Cylinder sleeve with packing ring .....	HX 755	<b>CRANKSHAFT, CONNECTING ROD AND PISTON</b>	
Cylinder sleeve with piston and rings .....	HY 755	Piston .....	H 754
Crankshaft bearing housing, right, with 9614T cap .....	HX 796	Piston (with rings) .....	HX 754
Handhole cover .....	H 5253	Piston ring .....	H 756
Cylinder packing ring .....	H 5294	Connecting rod bushing .....	H 5290
Cylinder oil cup pipe .....	H 5490	Piston pin .....	HA 5296
Main bearing shim, left .....	H 5628	Connecting rod bearing shims ..	H 5625
Main bearing shim, right .....	H 5629	Crankshaft bearing, L. H. ....	HB 5664
Crankshaft bearing housing and fuel pump dowel .....	2127T	Crankshaft bearing, R. H. ....	HB 5665
Flywheel, right .....	9601TA	Crankshaft .....	L 15026
Flywheel, left .....	9602TA	Crankshaft pinion, 30 teeth ...	L 15027
Flywheel key, left .....	9605T	Connecting rod, complete .....	9650TA
Flywheel key, right .....	9608T	Connecting rod, with cap .....	9651TA
Crankshaft bearing housing, left, with 9615T cap .....	9620TX	Connecting rod bolts with nuts ..	9653TX
Hopper drain cock .....	9982T	Connecting rod bolt nut lock ...	9654T
<b>CYLINDER HEAD WITH VALVE, ETC.</b>		Connecting rod bearing (2 halves) .....	9657TBX
Cylinder head stud, short, $\frac{1}{2}$ x $1\frac{3}{4}$ " .....	G 2436	Crankshaft collar .....	9681T
Cylinder head stud, long, $\frac{1}{2}$ x $3\frac{1}{16}$ " .....	G 2729	Crankshaft pinion key .....	9689T
Exhaust valve stem pin .....	G 9026	Crankshaft grease cup, complete	9876T
Cylinder head (H761) with studs, pin and throttle valve ..	HX 761	Piston pin set screw .....	9912TA
Cylinder head (HX761), complete with valves and springs ..	HY 761	<b>FUEL PUMP AND CONNECTIONS</b>	
Exhaust valve bracket .....	H 762	Fuel pump discharge pipe connector .....	13006D
Cylinder head gasket .....	H 5295	Fuel pump discharge valve spring .....	H 5262
Intake valve spring seat .....	H 5466	Fuel pump, complete .....	HA 5263
Intake valve .....	HAX5491	Fuel pump lever .....	L 5000
Exhaust valve lever .....	9606T	Fuel pump gland .....	L 5003
Exhaust valve lever spring .....	9607T	Fuel pump body .....	L 5004
Exhaust valve lever stud .....	9609T	Fuel pump lever stud .....	L 15012
Exhaust valve .....	9694TA	Fuel pump lever bushing .....	L 15015
Exhaust spring seat .....	9696TA	Fuel pump plunger, complete ..	L 15017
Exhaust valve spring .....	9967T	Fuel pump discharge ball stopper .....	L 15018
		Fuel pump discharge valve plug ..	L 15020
		Fuel pump plunger spring .....	L 15021

ORDER REPAIRS EARLY

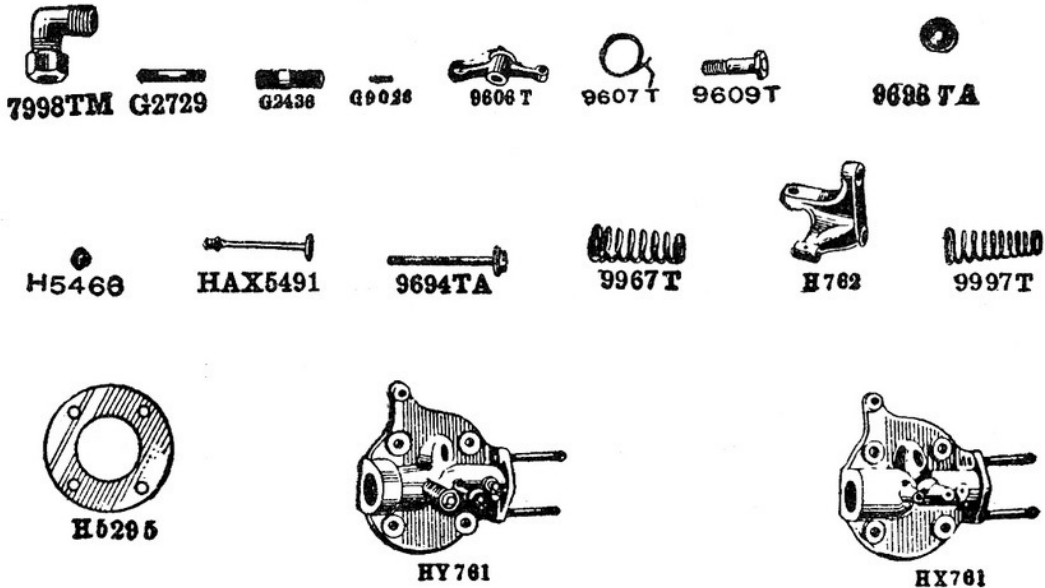
NAME OR DESCRIPTION	Cat. No.	NAME OR DESCRIPTION	Cat. No.
<b>FUEL PUMP AND CONNECTIONS—Continued</b>			
Fuel pump suction pipe.....	L 15022	Cam roller lever stud, $\frac{7}{16} \times 3\frac{3}{4}$ "..	L 15013
Fuel pump discharge pipe.....	L 15023	Exhaust cam key.....	4892T
Fuel pump discharge ball, $\frac{3}{8}$ "...	9113T	Cam and eccentric.....	9256T
Fuel pump suction ball, $\frac{5}{16}$ "...	9921T	Cam roller bearing pin.....	9258T
Suction line and fuel pump connector, $\frac{1}{4}$ " O.D.....	5636TM	Exhaust rod end.....	9263TA
<b>FUEL TANK AND CONNECTIONS</b>		Exhaust rod.....	9264TA
Overflow line and filler pipe street elbow, $\frac{3}{8}$ " O.D.....	13007D	Exhaust rod spring collar.....	9274T
Suction line and fuel tank elbow, $\frac{1}{4}$ " O.D.....	13008D	Cam roller lever stud bushing..	9669T
Fuel tank, complete.....	9610TB	Cam roller.....	9670T
Suction street elbow, complete.	9971TA	Exhaust rod spring.....	9673T
<b>MIXER</b>		Cam gear, fitted with shaft....	9978TX
Overflow line and filler pipe connector, $\frac{3}{8}$ " O.D.....	13006D	<b>GOVERNOR</b>	
Discharge line and mixer street elbow, $\frac{3}{8}$ " O.D.....	13007D	Governor sleeve collar.....	H 774
Damper plate spring.....	G 8306	Governor weight spring.....	H 5434
Gasoline and kerosene needle valve nozzle.....	H 716	Governor sleeve collar screw...	L 15056
Mixer body.....	HX 741	Governor weight hook bolt....	1427 $\frac{1}{2}$ T
Mixer, complete.....	HY 741	Governor valve rod connection.	1524T
Mixer body cover.....	H 763	Governor throttle lever stop pin	1866T
Mixer body cover.....	HX 763	Governor throttle lever, complete.....	9389T
Mixer sight hole plug, complete	H 5269	Governor valve rod connection pin.....	9591T
Needle valve nozzle plug.....	H 5373	Governor weight.....	9627T
Needle valve nozzle gasket....	HA 5376	Governor valve.....	9628T
Venturi sleeve.....	H 5380	Governor weight swivel pin, complete.....	9629T
Needle valve pointer.....	H 5433	Governor shoe.....	9631T
Mixer body gasket.....	H 5484	Governor sleeve.....	9632TA
Mixer body cover gasket.....	H 5485	Governor rocket shaft.....	9633T
Needle valve, complete.....	1711TB	Governor valve rod.....	9643T
Compensating valve, complete.	9683TA	Governor yoke.....	9648T
Compensating valve stud.....	9684T	Governor throttle spring.....	9691T
Compensating valve spring....	9685T	Governor adjusting screw nut..	9932T
Mixer cover washer.....	9688TA	<b>BREATHER</b>	
Mixer overflow pipe.....	9690TA	Breather valve, complete.....	3466T
Mixer body stud, $\frac{3}{8} \times 3\frac{5}{8}$ ".....	9726T	Breather valve spring.....	8788T
Damper plate.....	9951T	Breather body.....	9246T
Needle valve stem spring.....	9971T	Breather cap.....	9247T
<b>MUFFLER</b>		Breather, complete.....	9249T
Muffler, complete.....	L 15000	<b>TOOLS, ETC.</b>	
Muffler cover.....	1509T	"S" wrench.....	G 3171
Muffler body.....	1577 $\frac{1}{2}$ T	"S" wrench.....	G 3172
<b>CAM, CAM GEAR, CAM ROLLER, LEVER, ETC.</b>		"S" wrench.....	G 3173
Exhaust rod end pin.....	H 5377	Starting clutch.....	1418T
Cam roller lever.....	L 5001	Oil can.....	2589 $\frac{1}{2}$ T
		Socket wrench.....	5082T
		Tin funnel.....	5413T
		Starting crank, complete.....	9739T
		Starting crank sleeve.....	9763T
		Starting crank handle stud....	9976T
		Starting crank handle.....	1690TM
		Spark plug wrench.....	13095V



**CRANKCASE, CYLINDER AND FLYWHEEL**

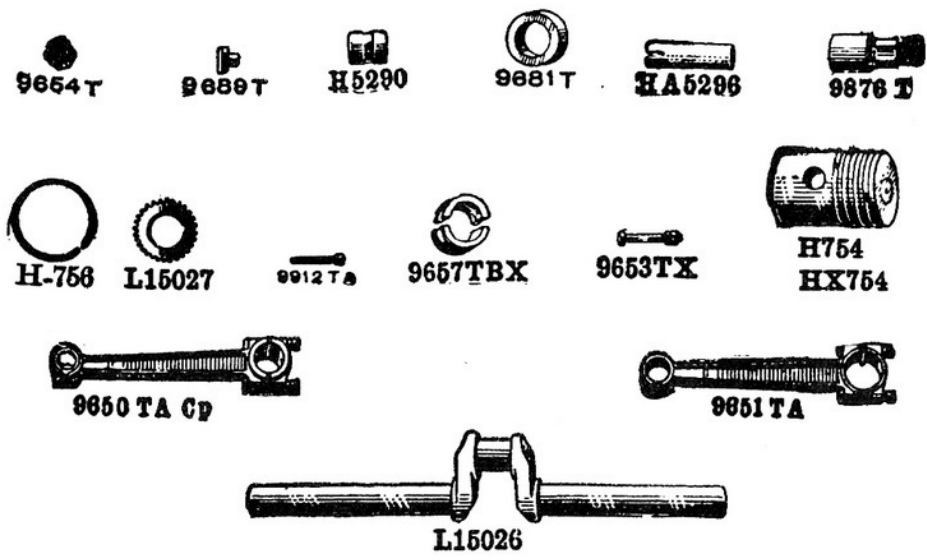


**CYLINDER HEAD WITH VALVE, ETC.**

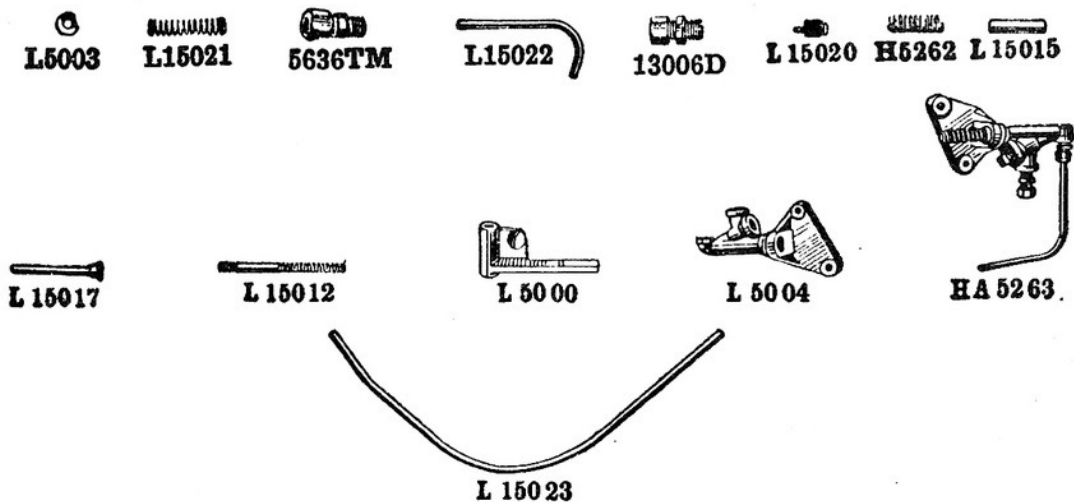


Don't order parts from the illustrations only; refer to the list also.

**CRANKSHAFT, CONNECTING ROD AND PISTON**



**FUEL PUMP AND CONNECTIONS**



**FUEL TANK AND CONNECTIONS**



⚠ Don't order parts from the illustrations only; refer to the list also.

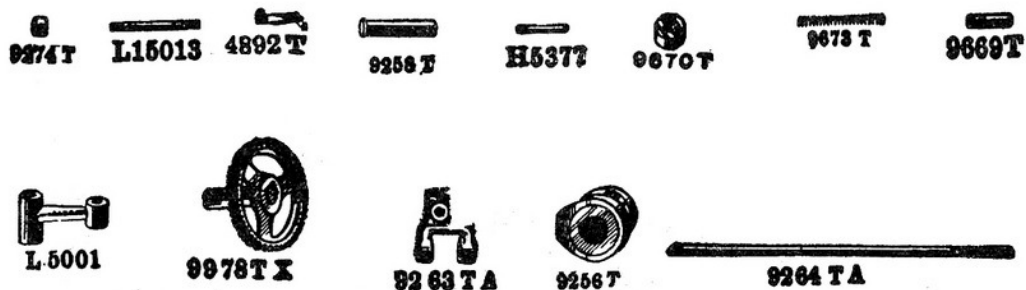
## MIXER



## MUFFLER

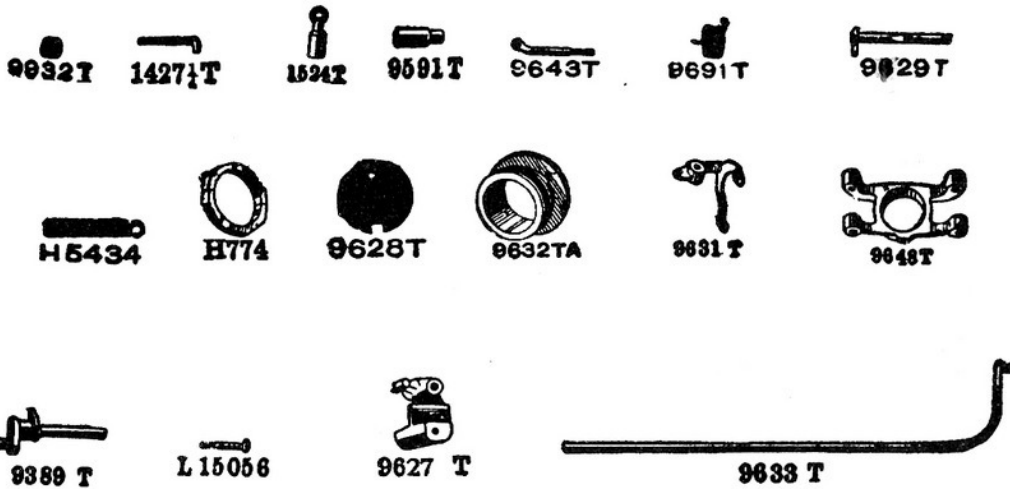


## CAM, CAM GEAR, CAM ROLLER, LEVER, ETC.



⚠ Don't order parts from the illustrations only; refer to the list also.

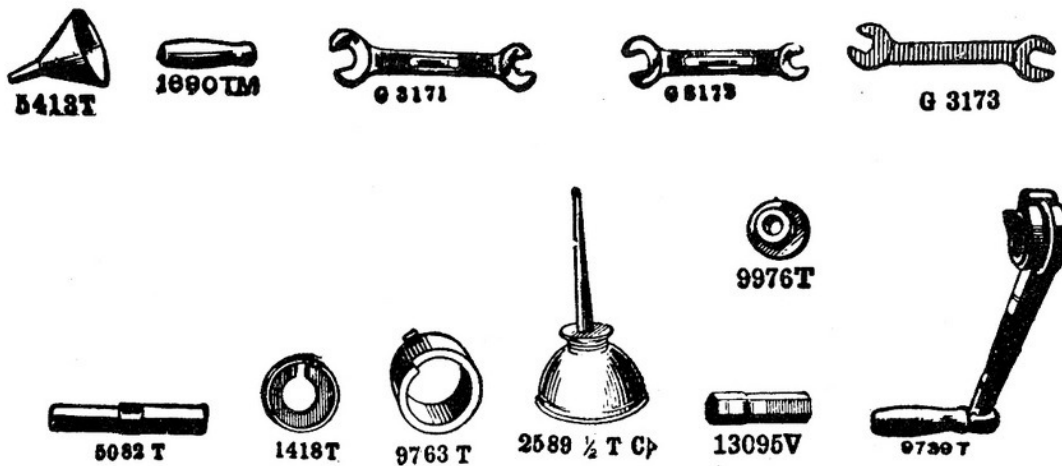
GOVERNOR



BREATHER



TOOLS, ETC.



☞ Don't order parts from the illustrations only; refer to the list also.

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**MAGNETO CONNECTIONS AND SPARK PLUG**



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**OILERS**




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**PULLEY**



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 Don't order parts from the illustrations only; refer to the list also.

# REPAIRS

## ORDER EARLY AND AVOID DELAYS

This "Instruction Book" is packed with each machine, and contains a list and illustrations of the parts used.

Order parts by number. If the part is lost, and you have no "list," describe it, telling where it goes, the name and number of machine; also, the year purchased.

Inferior repair parts are sold for IHC machines, but you take an unnecessary risk when you buy them. Insist on the genuine. IHC repair parts fit. They are made from the same patterns as the original parts.

Look for the  Trade Mark