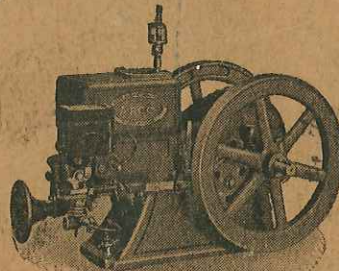


Instruction Book and Repair List

SERIES No. 925

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Read Page No. 23



Keep This Booklet for Future Use

**Every Arco Engine is Carefully Tested
and Inspected to Insure Our
Customers 100% Service**

The life of your engine depends on the
attention you give it. Please take advantage
of the instructions we give you in this book.

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Special Notice

Watch your fuel and lubricating oil adjustment, it will save both fuel and oil and ignition trouble.

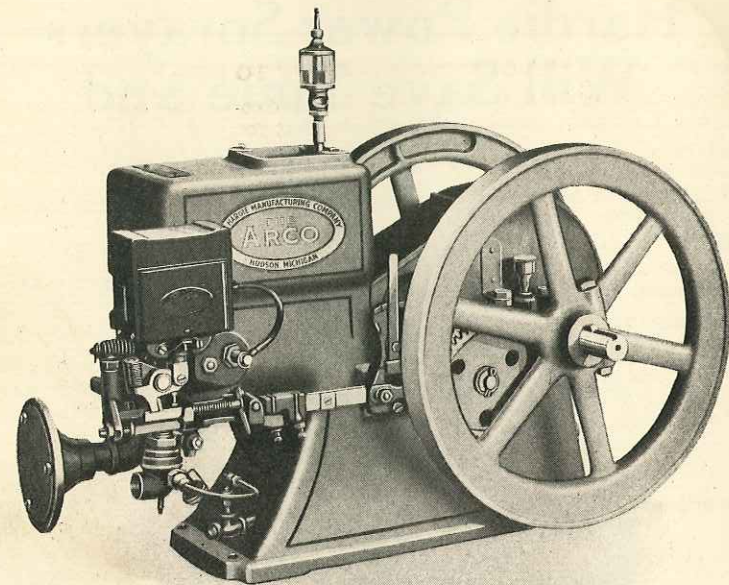
Too much fuel and oil may foul the spark plug. Black smoke or muffled sound at the exhaust indicates a rich mixture. (See pages 3 and 4 on amount of oil to use and how to adjust the fuel.)

Hardie Power Sprayers Will Save Time and Money

*Study
Your Instruction
Book and
Be Able To Make
All Necessary
Adjustments On
Your Arco Engine*

The
Hardie Manufacturing Co.
HUDSON, MICHIGAN

The Arco Gasoline Engine Especially Designed and Equipped for Sprayers



CRANK SHAFT. Drop forged high carbon steel. 10% oversize. Turned and ground.

GEARS. Governor gear and crank shaft gear are cut from solid blocks of steel.

BEARINGS. High Grade Babbitt, die cast removable and interchangeable. Best automobile motor bearings are exactly the same. Compare this with babbitt melted and poured into the rough castings around the shaft, the method used in the manufacture of practically all other low-priced engines and a great many of the high-priced ones.

GOVERNOR WITH SPEED CHANGING DEVICE. High-speed fly-ball type as used on highest-priced engines. Equipped with speed changing device that enables the operator to change the speed 125 R.P.M. while engine is in operation by merely shifting a vertical lever.

FINISH. All castings are ground smooth, given several coats of filler, thoroughly sanded, painted and varnished, producing a wonderfully smooth and attractive finish.

Every man takes pride in realizing the fact that he has made a good purchase. Our customers do our advertising.

Gasoline Engine Instructions



TO GET ENGINE READY TO RUN

Remove the plugs from the holes in the main and connecting rod bearings, clean them out thoroughly, also any other oil holes that you find.

Fill the grease cups with the sample grease we furnish and screw the tops of the cups down until the grease starts to come out of the bottom. Then put the cups in place on the engine and turn the top down two full turns, which forces the grease into the bearings.

Oil all movable parts thoroughly and turn the flywheels around two or three times to work the grease into the bearings. Oil the valve stems, **feed oil to oil hole in cam.**

Fill water hopper with clean water and the tank in the base with gasoline.

Screw the lubricator into the pipe on top of the water reservoir, fill it with oil. Raise the lever on the top of the lubricator straight up and adjust it so the oil will drop freely. To increase the flow of oil turn the adjusting collar, just under the lever to the right; to decrease the flow turn it to the left.

Before starting engine make sure all parts are properly oiled. Never use steam engine oil; use a good grade (high fire test) gas engine oil. For quantity see page 4.

To adjust the No. 63 Automatic Grease Cup see page 4.

FIRST METHOD OF STARTING GASOLINE ENGINE

First. Open the needle valve on mixer one full turn to the left, turn on the oil by raising the lever on the lubricator and be sure the oil is dropping properly.

Second. Lift magneto spark lever No. 403 as shown on page 24, Fig. 7, up to starting position. This retards the spark and prevents the engine from kicking.

Third. Turn the flywheels to the right until the detent blade on the governor can be pushed in behind the catch block on the cam rod and hold it there.

Fourth. Apply starting crank and turn it around to the right rapidly five or six times and then release the detent blade, but continue to turn the flywheel, at the same time partly close opening in mixer with left hand, until the engine starts.

Fifth. As soon as engine starts, change the spark lever No. 403, Fig. 7, to the running position and close the fuel valve slowly until the point is reached where the engine runs with the least number of explosions and without black smoke appearing at the exhaust or a popping sound at the mixer, the latter being caused by an insufficient supply of fuel, and smoke at the exhaust by too much fuel.

THE AUTOMATIC CONNECTING ROD GREASE CUP

To fill and adjust this cup, screw the lever "A" down as far as it will go. Then unscrew the cup at "B". With a screwdriver turn the screw in the shank "C" to the right until the hole through the bottom of the cup is closed.

Fill the cup with grease. Screw the two parts of the cup together securely and turn the lever "A" to the left until it reaches the position "D". Then take the screwdriver and turn the screw "C" slowly to the left until the grease starts to come out **slowly**. Then screw the cup in position on the connecting rod. This cup should be readjusted for hot or cold weather. One filling should be enough for about eight hours' continuous running.



Figure 1

LUBRICATION

Before starting engine make sure all parts are properly oiled. Never use steam engine oil, use any good grade (high fire test) gas engine or tractor oil.

Under ordinary conditions we recommend that lubricator be set to feed as follows on gasoline engines:

H. P.	On Full Load	On Light Load
2 to 2½	10 drops per minute	5 drops per minute
3	15 drops per minute	10 drops per minute

In cold weather warm the oil so that it will flow freely.

HOW TO ADJUST THE GASOLINE FUEL VALVE

The mixing valve (Figure 2) is of the suction feed type, gasoline being drawn from the tank in the base by the suction of the piston. The air and gasoline are mixed in this valve to form the explosive gas. When in the cylinder it is compressed, and at the highest point of compression is ignited by the electric spark. This explodes the mixture, forces the piston out and makes the engine run. The proper running of the engine depends almost entirely on the proper mixture of the gasoline and air, so that it is very necessary that you understand the mixing valve thoroughly.

It is a common mistake to flood the cylinder in starting the engine. In case engine is flooded close needle valve and turn flywheels around ten or fifteen times, then follow method of starting gasoline engine on page 3. Open fuel valve 1 turn on 2 and 2½ H.P. engines and from one to two turns on the larger sizes. In cold weather use more fuel. After the engine is running, close the fuel valve slowly until the point is reached where the engine runs with the least number of explosions and without black smoke appearing at the exhaust, or a popping sound at the mixer, the latter being caused by an insufficient supply of fuel and smoke at the exhaust by too much fuel.

If it is ever necessary to take the mixing valve and feed pipe off the engine, be very careful not to lose the valve out of the check valve cage, because if this valve is not in place your engine will not get any gasoline. To drain gasoline from tank remove drain plug. (See part 0105, page 20.)

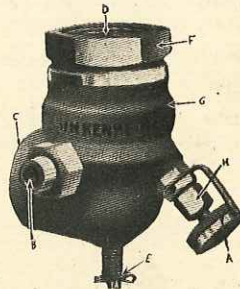


Fig. 2

Gasoline Engine Instructions

THE GOVERNOR

The governor controls the speed of the engine and is of the ball type. When the engine runs above its regular speed, the balls on the governor widen their circuit, which presses in on the pin going through the governor spindle. This forces the detent blade in so that it catches behind the block on the cam rod and holds the exhaust valve open, at the same time stopping the spark and cutting off the supply of fuel, until the speed of the engine is reduced to where it should be, then the detent blade flies out again, releasing the cam rod and the engine takes up its regular operations. **When running, empty the engine exhausts every eight to ten revolutions of the flywheel.**

HOW TO ADJUST THE DETENT BLADE

When the exhaust valve is wide open and the detent blade is pushed in behind the catch block on the cam rod, there should be only the thickness of a postal card between them. When adjusting the detent blade, the speed lever should be set at lowest speed and the detent blade should stand about 1/8 inch away from the catch block.

To adjust the detent blade loosen the locknut "077" and screw the adjusting screw "052" (see page 19), either in or out, until you have the blade where it should be, then tighten the locknut.

THE DETENT CATCH BLOCK

The catch block on the cam rod is made of tool steel and should last a long time. If the block should wear on one side so it does not hold the detent blade properly file off the point of screw where it is riveted on side of rod next to the engine, remove the screw with a screwdriver and turn the catch block around, using the other side. After both sides of the block are worn, it will be necessary to replace same with a new one. (See No. 054 in list of repairs, page 16.)

TO STOP THE ENGINE

First. Shut off the gasoline by closing the fuel valve.

Second. In cold weather drain the water from the reservoir by opening the drain cock underneath the cylinder, also remove plug from bottom of cylinder head. Be sure to do this, as even a light frost may crack the cylinder or cylinder head by freezing the water.

Third. Turn flywheel until exhaust valve closes. This prevents corroding of valve seats and injury to cylinder.

Gasoline Engine Instructions



TO START IN COLD WEATHER

All engines are harder to start during cold weather than in warm weather, because gasoline does not vaporize as readily in cold weather. You can overcome any difficulty from this cause in starting by pouring a couple of gallons of warm water in the water reservoir; this warms up the cylinder, causing the gasoline to vaporize more readily. (Be careful if engine is real cold not to use water too hot, as the sudden change may crack the cylinder.) It is also advisable to open the fuel valve farther than you generally do. Work the intake valve in and out before starting in cold weather, as this will remove any frost that may have collected on the valve stem and allow valve to work easily.

IF THE WATER IN THE HOPPER SHOULD BOIL

The hotter the water gets, the better the engine runs, because the gasoline vaporizes more readily and the engine will use less gasoline. The cylinder is cooled by the water circulating around it and the heat passes off in the form of steam, so if the water boils, you need not be alarmed. Keep the cylinder properly lubricated and the reservoir full of water and there will be no danger of your engine overheating. **IN COLD WEATHER DRAIN BOTH THE CYLINDER AND CYLINDER HEAD AT NIGHT TO PREVENT FREEZING.**

Stop—Look—Listen

If your engine does not give perfect satisfaction, do not call in an expert—read the following:

Every engine is carefully tested and inspected to insure our customers 100 per cent service.

Just before we shipped your engine it was gone over carefully and run to be sure that all parts were in proper adjustment and in perfect condition, so that when the engine reached you there would be no trouble in your running it, provided you did not change any of the parts from the way they were set when the engine left our factory.

If Engine Will Not Start or is Hard to Start

An engine to give satisfactory results must get a good mixture of fuel and a good spark, at the proper time, inside the cylinder.

To do this, it is absolutely necessary that you use the proper amount of fuel that is free from water, and there is no obstruction to prevent its flow. Read very carefully the following paragraphs: Fuel, Clean Connections; Water in Fuel; Too Much Fuel and Too Little Fuel (page 7).

Gasoline Engine Instructions



See that the valves are properly timed: Read very carefully paragraph on Valve Timing (page 11).

See that the magneto furnishes a spark and that it takes place just as the word "spark" passes the top edge of the valve rod as shown in Fig. 7, page 36.

FUEL, CLEAN CONNECTIONS

Make certain there is plenty of fuel in tank.

See if the fuel flows to the mixing valve. Dirt sometimes gets into fuel pipe and collects on the fuel valve or under the check valve. Clean all connections carefully.

If you find the mixing valve or connections are dirty, drain the tank by removing the plug and strain the fuel through a chamois skin, which will keep out the dirt and water.

WATER IN FUEL

Water in fuel will cause loss of power. The presence of water is rather hard to detect, but if doubtful you can make certain by straining the fuel through a chamois skin. This is rather dangerous, however, as the gasoline, being a volatile substance, in passing through the chamois forms static-electricity, which will cause spark unless the funnel fits securely on a conducting material which is properly grounded; in other words, if the funnel fits securely on the mouth of the tank which is properly grounded on engine, you will need fear no danger from this source.

TOO MUCH FUEL

It is a common mistake to flood the cylinder in starting engine, which makes it very hard to start. Unless engine is subjected to a low temperature, do not flood the cylinder, as engine can be choked down by feeding too much fuel just as easily as by not feeding enough. If fuel is subjected to low temperature, the rate of vaporization is much lower and an extra amount of fuel is necessary.

TOO LITTLE FUEL

If engine is not given the proper amount of fuel there will be a popping and back-firing out of air inlet; however, this popping noise is also caused by poor ignition, valves not seating properly, or poor mixture. It is possible that the head gasket has given out, allowing water to leak out and mix with the fuel; if so, it will be necessary to replace with a new gasket. Generally, the leak is so slight that after engine has once been started the leak is not noticeable.

IGNITION

Be sure the magneto wire is attached to spark plug, in good condition, and that a bare wire does not touch any part of the engine except the spark plug.

Gasoline Engine Instructions



If Engine Dies Down After Starting

LACK OF FUEL

See that there is proper amount of fuel in tank.

FAULTY IGNITION

Examine spark plug to be sure you are getting a good spark. Remove it, but leave connected to wire, place against the side of cylinder, trip magneto by turning flywheels to right. If you do not get a good spark, remove wire from plug and hold end of wire about 1/8-inch from side of magneto and trip magneto again. If the spark is good here, the trouble is in the plug. (Clean or put in new plug.) See that points on plug are not farther than the thickness of a thin dime apart. Next examine the magnet posts in the bottom of the magneto body removing all dirt or rust from these posts if you fail to get a spark. (See pages 23 to 33.)

If Engine Has No Power

SPARK REGULATION

Have you advanced spark; that is, have you placed spark lever No. 403 (see page 24) back in running position after you have started engine?

FAULTY IGNITION

Make certain that the magneto trips when the word "spark", which you will find stamped on the rim of the flywheel, is opposite top of cam rod. See page 35, Fig. 17.

If magneto does not trip at the proper time loosen cap screws **No. Y15, Fig. 8, page 23** and move part No. K198B forward or backward until the magneto will trip with the word "spark" opposite top edge of cam rod. Then tighten cap screws Y15 and set screw No. Y460.

POOR MIXTURE

The greater percentage of causes of lack of power can be traced down to a poor mixture. If the charge is not mixed properly, it makes a slow burning mixture which will, in most cases, cause back-firing, owing to the charge burning so slowly that it fires the incoming charge, which, of course, would naturally escape back through the mixer on account of the inlet valve being open.

Owing to the variance in atmospheric conditions, there is no certain point at which the needle valve may be adjusted; however, if you will carefully watch action of engine and adjust it at a point at which the engine runs most regularly, and without excessive exhaust, you will have no trouble along this line.

Pre-ignition is indicated by a deep, heavy sound and is generally either caused by a poor mixture, hot cylinder or a red hot deposit in cylinder.

Gasoline Engine Instructions

If pre-ignition does not seem to be due to poor mixture or a hot cylinder, it is evidently due to an excessive deposit of carbon in the combustion chamber. However, this trouble can generally be eliminated by running engine a short time on denatured alcohol; if this does not eliminate the trouble, remove the head and clean combustion chamber thoroughly.

Test fuel for water. Water in fuel will cause loss of power. See page 7.

Make certain that the exhaust valve is closing on inner center. See page 11.

If valves do not seat properly, remove same and grind them down so that they fit the valve seats properly. This adjustment is fully explained on page 11.

MISCELLANEOUS

Make certain that the working parts, such as gears, governor, etc., are properly oiled. It is well to examine the oil tube in piston from time to time and make sure that this is not clogged up.

In cold weather, much attention must be paid to lubrication. If the oil is subjected to low temperature it will have a tendency to thicken to such an extent that it will not flow freely down oil pipe. In such cases, it is well to warm the oil before starting.

Oil the governor so that it works freely; also feed the proper amount of oil to oil hole in cam and to the pocket in governor bracket through which cam rod works.

If after going over the adjustment of each part according to the instructions in this book, you cannot get the engine to run satisfactorily, write us a letter. Tell us just what you have done, just how the engine acts, and we will tell you by return mail just what to do.

If in writing you refer to any certain part, give the regular repair list number of same so we will know exactly what you are referring to.

HOW TO PUT ON THE CAM GEAR

If it is ever necessary to take off the cam gear or to put on a new one it must be put on in a certain position, as the cam on the gear controls the time of the spark and the opening and closing of the valves, in fact every operation of the engine depends on this cam being set just right.

To put on the cam gear, hook detent blade back of catch block, turn flywheels around until the key in the crank shaft is straight up, as shown by "B" in Figure 3; then set the two teeth that are just under the indicator "A" on the cam gear over the one tooth that is just above the Key "B", then roll the cam gear around to the right until it reaches the position as shown by dotted gear, being sure to keep the gear teeth together. Then slip the cam gear pin in place and fasten it with the lock washer and nut.

Be very careful in putting on this gear to see that it is just right. One tooth out of the way makes a decided difference in the way your engine will run.

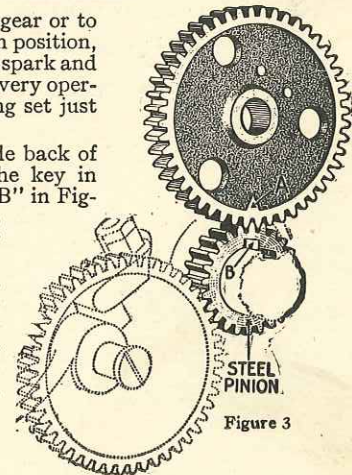


Figure 3

Gasoline Engine Instructions

HOW TO PUT ON THE CAM ROD SPRING

The cam rod spring holds the cam rod and roller against the cam on the cam gear. As this spring does a lot of work it may wear out; if it does, buy a new one. (See No. 059 in list of repairs, page 16.) To put on a new spring, remove the cylinder head, slip the spring over the end of the cam rod and replace the cylinder head. If necessary to repack cylinder head, see page 12.

HOW TO TAKE OFF A FLYWHEEL OR PULLEY

To take off the flywheel, loosen the bolt and drive iron or wooden wedges into the slot, one on each side of the hub. This will loosen the flywheel so it can be removed. To take off the pulley on the 2 and 2½ horse power engines loosen the set screw with a screwdriver and drive the pulley off. Remove all paint from crankshaft before taking flywheel off.

If you have to drive the flywheel or pulley off the shaft, use a piece of hard wood against the hub of the wheel and do not drive too hard. A number of light blows will loosen the flywheel without danger of breaking.

HOW TO REPLACE A FLYWHEEL

When replacing flywheel, place wheel in proper position on shaft, tighten the bolts down securely and drive in key.

TO TAKE OFF THE GOVERNOR BALLS, SPINDLE OR PINION

If you find it necessary to take the governor apart, first take off the governor pinion. To do this loosen small set screw in pinion No. 063, hold the flywheels stationary, which locks the gears, then take a wrench, stand on the governor side of the engine and turn the governor balls to the right, as the pinion is put on with a right hand thread. The governor spindle screws into the governor pinion.

VALVES

The inlet valve "A", as shown in the illustration is opened by the suction of the piston. For the entire length of the suction stroke gas is being drawn into the cylinder; then when the piston starts to compress the gas this valve closes and is held shut by the valve lock "C", so that no gasoline is wasted.

If there is a loss of fuel at the opening of the mixer loosen the locknut on the valve lock stud "C" and screw stud out one turn and tighten locknut. If engine does not get enough fuel loosen locknut as above and screw stud in one turn and tighten locknut.

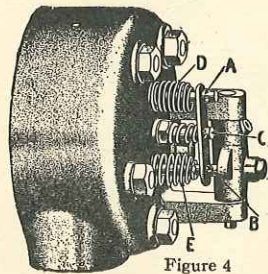


Figure 4

Gasoline Engine Instructions

VALVE TIMING

In many cases where engine is hard to start, trouble can be traced to the valves not being timed properly.

As this is a four cycle engine, we will show you the four distinct parts in the movement of the piston and crankshaft and the timing of the valves.

The first is known as the suction stroke, during which time the piston is traveling from extreme inner to extreme outer position, causing a vacuum which automatically opens the inlet valve and admits a charge of gasoline mixed with air from the carburetor.

In the next or compression stroke, the piston returns from extreme outer to extreme inner position, compressing the charge which has been drawn into the cylinder. During this stroke both valves remain closed. The spark taking place just before the end of this stroke.

The third, or power stroke, is caused by the force of the explosion in the cylinder driving the piston out again to its outer position. Before the piston reaches the extreme outer position the exhaust valve is opened by means of a cam which pushes out the cam rod and works the valve lever and lifts the valve. The proper time for this valve to start to lift is when the crankshaft is half way between the vertical and horizontal position on the downward part of this stroke.

We now come to the last or exhaust stroke. The exhaust is already open so as piston returns from its outer position it drives the burnt gases out into the exhaust pipe. The exhaust valve remains open until the crankshaft has passed the inner center 3° or 5°.

This adjustment is controlled by means of No. 06 adjustment screw (page 20), and is easily regulated.

Notice the setting of this valve from time to time, as this may work out of adjustment as the engine is used.

If exhaust valve spring has weakened to such an extent that suction is pulling in exhaust valve, replace with new spring.

When cam rod is not in contact with No. 06 adjusting screw, the No. 24 valve lock lever should not bind on either valve stem. This can be easily regulated by readjusting the "C" valve lock stud. See illustration on opposite page. (Figure 4.)

HOW TO GRIND THE VALVES

When an inlet or exhaust valve leaks, remove the cylinder head, take off the valve springs, remove the valve you want to grind and wash it and the valve seat in gasoline, then make a paste of fine emery dust and oil. If you cannot get emery dust, use powdered pumice stone with oil. (You can get powdered pumice stone at almost any drug store.) Smear this on the valve and valve seat, put the valve in place and put a nail through the hole in valve stem on the outside of the head, grasp the nail with your fingers and turn from left to right for a minute or so, then lift the valve and turn it about half way around and repeat this until the valve and valve seat show an even surface all the way round.

After the valve is ground in, wash off the emery dust with gasoline and do not get any dirt on the valve seat. In replacing the valves be sure to get the heavy spring on the exhaust valve and the light spring on the inlet valve.

Gasoline Engine Instructions

PACKING THE CYLINDER HEAD

We use a special graphite asbestos packing between the cylinder and cylinder head to prevent the escape of the compressed gas.

To repack the cylinder head in case the packing should blow out or if you should break the packing when removing the cylinder head, you can use ordinary asbestos packing such as you buy at your hardware store or the kind we furnish under No. 17 on page 20. If you use the ordinary asbestos packing, soak it in linseed oil; if you buy our special graphite asbestos packing or gasket, it is all ready to be put on.

Before putting on new packing be sure all particles from the old packing which may have stuck to the cylinder or cylinder head are scraped off and that these parts show a smooth, clean surface. If all the old particles are not cleaned off the new packing will blow out in a short time.

After you have the packing in place push the cylinder head in close to the cylinder and screw on the nuts by hand as far as they will go, then use a wrench and turn each nut, one after the other, about one-half turn at a time. **Do not screw one nut down perfectly tight and then go to the next, as this causes an uneven joint and the packing will not hold.** After the engine has been running for about ten minutes tighten the nuts again and you will have a perfectly tight joint.

CYLINDER HEAD PACKING

If you make a new packing from sheet asbestos you must be sure to cut openings in the packing so the water can circulate from the cylinder, through the cylinder head and around the valves; if you fail to cut these water openings the cylinder head will get too hot and be ruined.

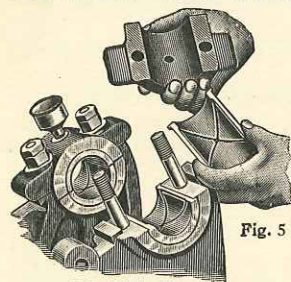


Fig. 5

The Main Bearings.

The crankshaft bearings and the bearing in the crankshaft end of the connecting rod are made of a special die cast babbitt. They are fitted with steel liners so you can take up any wear in the bearings. Remove the bearing cap and take out enough of the steel strips from both sides of the bearing so it fits snug.

After you have removed the steel strips and put the cap back on again, screw down the bolts, but before starting the engine open the exhaust valve by pushing the detent blade in behind the catch block on the cam rod and turn the flywheels around by hand to see that they turn freely. If they bind you have taken out too many steel strips and you will have to put enough back until the flywheels turn easily. Watch the grease cups closely and give them a quarter of a turn each time you start the engine. See that all bolts are tight and you will have no trouble with the bearings.

Gasoline Engine Instructions

PISTON AND RINGS

As explained on page 4, what makes the engine run is the combination of air and gas drawn into the cylinder by the suction of the piston, this gas being compressed before it is exploded. To compress this gas it is necessary that the space in the cylinder be gas-tight. The piston is fitted to the cylinder and makes a fairly tight joint, but on account of the expansion of iron when it gets hot, it is necessary to have some other means of keeping the gas from escaping. Each piston is fitted with three rings that spring out and press against the walls of the cylinder, preventing the gas from escaping.

These piston rings hold the compression and must fit free in the grooves of the piston. Feeding a poor grade of gasoline or lubricating oil, or too much of either, will cause a carbon deposit to form around the rings, which will in time bind them in the grooves, so they cannot spring out against the walls of the cylinder to hold the compression. It is very necessary that you use the proper grade of oil and watch the supply of gasoline, for on this depends the proper running of the engine.

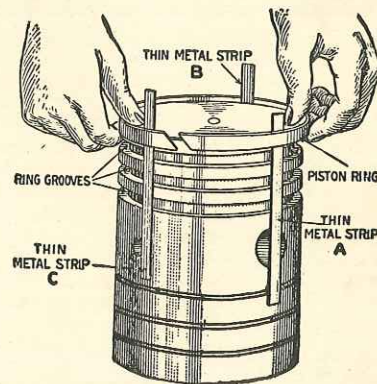


Figure 6

Before removing the piston from the cylinder, be sure the wire is disconnected from the magneto, take out the connecting rod bolts at the crankshaft end of the connecting rod. Remove the bearing which loosens the connecting rod from the crankshaft. Next, you will have to take off the governor spindle, as instructed on page 10, which gets the spindle and balls out of the way. This is all of the governor that you will have to take off, as the piston will now slip out of the cylinder.

If you find the piston rings are gummed or held tight in the grooves, they must be thoroughly cleaned. To do this you will have to remove the rings and wash them in kerosene or gasoline and you may have to scrape them with a knife.

To remove the rings take three thin metal strips (pieces of an old hack saw blade are fine for this) and slip under the center ring. Start the first strip under the ring at the joint and force it all the way around until you have it at the position shown by "A", Figure 6, then slip the second strip to "B" and the third to "C", which will raise the ring out of the groove so it can be slipped off. Take the top ring next and repeat the operation; then the bottom ring.

In replacing the rings, put the center ring on first, using the three metal strips as before, then without the three metal strips you can slip the top ring on and then put the bottom ring on, bringing it up from the bottom of the piston. Before putting the piston back in the cylinder, oil the rings and surface of the piston thoroughly. In replacing rings be sure and put rings with small slots in them on the center and bottom groove.

Price List of Engine Parts

SUBJECT TO CHANGE WITHOUT NOTICE

When Ordering Parts, Be Sure to Give the Letters, Number and Horse Power of Your Engine as Stamped on Name Plate

Part No.	Description	Horse Power		
		2	2½	3½
1	xBase.....	\$25.60	\$29.35	\$22.20
3	*Base Cap.....	.85	1.05	1.55
4	*Main Bearing Grease Cup.....	.15	.15	.19
5	*Base Cap Stud and Nut.....	.37	.43	.43
6	*Bearing Liners, thick, per set.....	.18	.25	.29
7	*Bearing Liners, thin, per set.....			.29
8	*Main Bearings (two halves).....	1.50	1.63	1.94
9	xCylinder.....			15.95
11	*Cylinder Cap Screw.....			.24
12	*Cylinder Head Stud and Nut.....	.44	.56	.56
13	*Sight Feed Oiler, complete.....	2.44	2.44	2.62
13A	*Large Glass for Oiler } Give name of	.56	.56	.65
13B	*Small Glass for Oiler } manufacturer	.37	.37	.37
13C	*Small Glass Cage } of	.37	.37	.37
13D	*Cap for Oiler } Oiler	.75	.75	.75
14	*Oiler Pipe.....	.34	.34	.34
15	xWater Reservoir.....			8.56
16	*Water Reservoir Gasket.....			.31
17	*Cylinder Head Gasket.....	.66	.69	.69
18	*Cylinder Head with Valves and Springs only.....	5.56	7.94	10.00
18A	xCylinder Head complete with Valves, Springs, Levers, etc.....	6.25	8.75	10.87
19	*Exhaust or Inlet Valve.....	.50	.50	.62
22	*Exhaust Valve Spring.....	.19	.19	.19
23	*Inlet Valve Spring.....	.19	.19	.19
24	*Valve Lock Lever.....	.19	.19	.19
25	*Valve Lock Stud.....			.19
26	*Valve Lock Spring.....			.15
27	*Pipe Plug.....	.06	.06	.06
28	*Valve Lever.....	.56	.63	.67
29	*Valve Lever Pin.....	.15	.15	.19
30	*Street Elbow.....	.31		.50
31	*Muffler Body with Nipple.....	1.25	1.25	2.06
32	*Muffler complete with Nipple.....	2.35	2.35	3.47
33	*Muffler Cap.....	.75	.75	1.41
38	*Supply Pipe and Connectors.....	.65	.65	.75
40	*Strainer Nipple.....	.75	.75	.75
42	*Fuel Tank.....	2.81	3.06	3.50
47	*Stationary Tank Binders with Nuts.....	.31	.31	.31
48	*Cam Rod.....	1.69	1.69	1.87
48A	*Cam Rod with Roller and Catch Block.....	2.00	2.00	2.50
49	*Cam Gear.....	1.81	1.81	4.12
52	*Cam Gear Stud, complete.....	.19	.94	1.87
Y487	*Cam Gear Oil Pipe with Coupling.....			.31
53	*Crankshaft Pinion.....	1.25	1.31	2.31
54	*Crankshaft Pinion Key.....	.10	.10	.10
55	xCrankshaft.....	7.50	9.06	10.62
56	*Connecting Rod and Cap (with Bolts and Nuts).....	3.75	4.81	7.37
56A	*Connecting Rod complete (with Bearings).....	4.87	6.06	8.69
56C	*Connecting Rod Cap only.....	.87		

Note—All items marked (*) can be shipped by parcel post. All items marked (x) will be shipped by express or freight, collect.

Price List of Engine Parts

SUBJECT TO CHANGE WITHOUT NOTICE

When Ordering Parts, Be Sure to Give the Letters, Number and Horse Power of Your Engine as stamped on Name Plate

Part No.	Description	Horse Power		
		2	2½	3½
57	*Connecting Rod Bushing.....	.56	1.20	1.25
58	*Connecting Rod Bearings (Two Halves).....	1.22	1.37	1.44
59	*Connecting Rod Bolt with Cotter Pin and Nut.....	.37	.44	.69
59½	*Connecting Rod Nut.....	.07	.07	.07
60	*Connecting Rod Liners, thick, per set.....	.19	.19	.29
61	*Connecting Rod Liners, thin, per set.....	.19	.19	.29
63	*Connecting Rod Grease Cup.....	.47	.47	.94
64	*Piston.....	2.19	3.31	4.69
65	*Piston Ring, (each).....	.47	.50	.56
66	*Piston Pin.....	.66	.75	.75
67	*Piston Pin Set Screw, complete.....	.11	.11	.11
68	xPlywheel (each with Key).....	7.81	10.31	15.00
70	*Plywheel Key.....	.15	.15	.15
71	*Plywheel Bolt.....	.31	.31	.31
77	*Starting Crank (Old Style).....	1.25	1.25	1.87
77S	*Starting Crank (Socket Type).....	1.25	1.25	1.87
79	*Machine Bolt for Pulley.....			.12
80	*Pulley Stud with Nut.....	.12	.12	
81	*Piston Oil Tube.....			.37
01	*Igniter Stud and Nut.....	.25	.25	.25
02	*Drain Cock.....	.63	.63	.63
04	*Oiler Pipe Coupling.....	.19	.19	.19
05	*Water Reservoir Bolt.....		.12	.12
06	*Valve Lever Adjusting Screw and Nut.....	.20	.20	.20
010	*Angle Connection.....	.38	.38	.38
011	*Straight Connection.....	.38	.38	.38
014	*Straight Valve Cage and Check Valve.....	.94	.94	.94
016	*Pipe Tee.....	.30	.30	.30
022	*Tank Rod.....	.24	.24	.36
023	*Filler Pipe.....	.59	.59	.89
026	*Igniter Gasket.....	.24	.24	.24
052	*Detent Blade Adjusting Screw.....	.15	.15	.15
054	*Detent Catch Block.....	.37	.37	.37
055	*Catch Block Screw.....	.10	.10	.10
056	*Cam Roller.....	.29	.29	.40
057	*Cam Roller Pin with Dowel.....	.19	.19	.19
059	*Cam Roller Spring.....	.15	.15	.15
060	*Governor, complete.....	6.62	7.50	10.00
062	*Governor Spindle.....	1.19	1.19	1.75
062A	*Governor Spindle (Model H and S).....	1.19	1.19	1.75
063	*Governor Pinion with Set Screw.....	.69	.69	.69
063½	*Governor Pinion Set Screw.....	.06	.06	.06
064	*Governor Ball.....	.31	.31	.31
064B	*Governor Ball.....	.31	.31	.31
065	*Governor Weight Pin with Cotter Pin.....	.11	.11	.15
065A	*Governor Weight Pin with Cotter Pin.....	.11	.11	.15
066	*Governor Bracket Plate.....			.15
067	*Bracket Plate Screw.....			.25

Note—All items marked (*) can be shipped by parcel post. All items marked (x) will be shipped by express or freight, collect.

Price List of Engine Parts

SUBJECT TO CHANGE WITHOUT NOTICE

When Ordering Parts, Be Sure to Give the Letters, Number and Horse Power of Your Engine as stamped on Name Plate

Part No.	Description	Horse Power		
		2	2½	3½
068	*Governor Spindle Rod	.31	.50	.50
068B	*Governor Spindle Rod	.31	.50	.31
068C	*Governor Spindle Rod End	.12	.12	.12
070	*Speed Changing Washer	.10	.10	.10
075	*Detent Lever Pin	.15	.15	.15
076	*Detent Blade	.19	.19	.25
077	*Detent Lock Nut, complete	.19	.19	.19
078	*Governor Bracket Dowels	.11	.11	.11
079	*Cap Screws	.11	.11	.15
151D	*Igniter Wrench	.37	.37	
151A	*Igniter Wrench			.37
0195	*Governor Thrust Washer	.19	.19	.19
0164	*Governor Bracket Grease Cup	.19	.19	.19
0105	*¼-inch Drain Plug	.06	.06	.06
0110	*Speed Change Body	.47	.47	.56
0111	*Detent Lever	.44	.44	.47
0112	*Speed Change Lever	.12	.12	.12
0113	*Speed Lever Screw	.06	.06	.06
0114	*Governor Bracket	1.31	1.37	2.37
0136	*Damper Screw	.06	.06	.06
0138	*Governor Spindle Spring	.15	.15	.15
0142	*Detent Spring	.09	.09	.09
Y111	*Cam Rollers Stud Nut	.06	.06	.06
Y167	*Cam Gear Pin Set Screw	.12		
Y306	*Steel Ball (for Governor Spindle Rod)	.06	.06	.06
Y467	*Set Screw with Lock Nut	.06	.06	.06
154-H	*Lunkenheimer Carburetor, complete	Price on request		
25-H	*Lunkenheimer Carburetor Body only	3.94	3.94	4.69
26-H	*Cap for Lunkenheimer	1.25	1.25	1.43
F	*Disc Assembly	1.13	1.13	1.25
U	*Gasoline Valve Hub	.29	.29	.28
S	*Gasoline Valve Springs	.10	.10	.10
T	*Gasoline Valve Lock Nut	.13	.13	.12
R	*Gasoline Valve Stuffing Box	.15	.15	.15
P-O	*Needle Valve Assembly	.75	.75	.75
G	*Spring with Washer and Cotter Key	.31	.31	.31
218	*Splasher Ring complete with Corner Irons and Bolts	.90	.90	.95
224	xCrank Case Cover	Price on request		
0120	*Nut for Fuel Line Connection	.37	.37	.37
0121	*Fuel Line Connection to Carburetor	1.10	1.10	1.10

Note—All items marked (*) can be shipped by parcel post. All items marked (x) will be shipped by express or freight, collect.

Repair Parts Price List

For Model H Governor Used On 3 H. P. Engine

(See Cut Top Page 18)

Following Instructions for Model H Governor Only



IF ENGINE RUNS TOO FAST

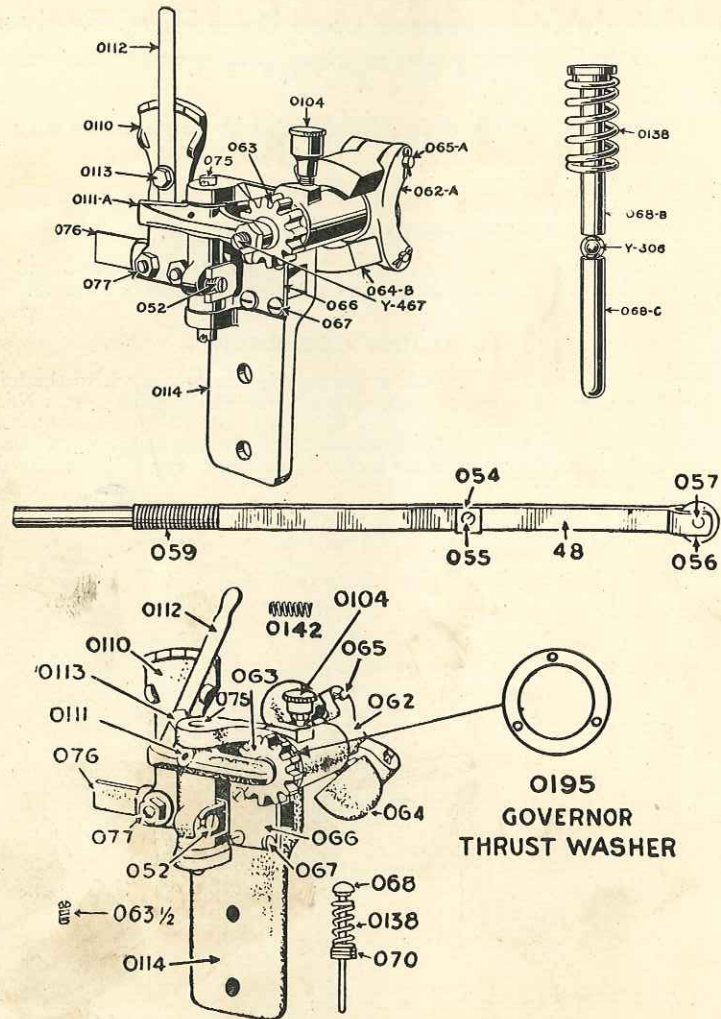
Examine the following parts for wear: Y467, 068-B, Y306, 068C and 0195 Thrust Washer. If any parts show wear order new ones from page 18.

TO ADJUST GOVERNOR

Put speed change lever No. 0112 in low speed, (the last notch to the left on part No. 0110 as you face engine) then adjust screw Y467 so that detent No. 076 will stand out about ¼-inch from catch block No. 054. Be sure that all screws and locknuts are tight and that 062 governor spindle is screwed securely into 063 governor pinion, then tighten small screw in pinion. (For old style governor instructions see page 5.)

New Style Model H Governor

Parts Numbers Not Found On Page 18 Will Be Found On Pages 15 to 17



Gasoline Engine Governor Complete.

Help Us to Help You!

+++

Read this page carefully before
ordering any repair parts

+++

The following information which you will find stamped on the name plate must be given in your orders for repair parts before we can fill them:

The number and quantity of parts wanted.

The engine number.

The horse power.

The letter appearing after horse power of engines.

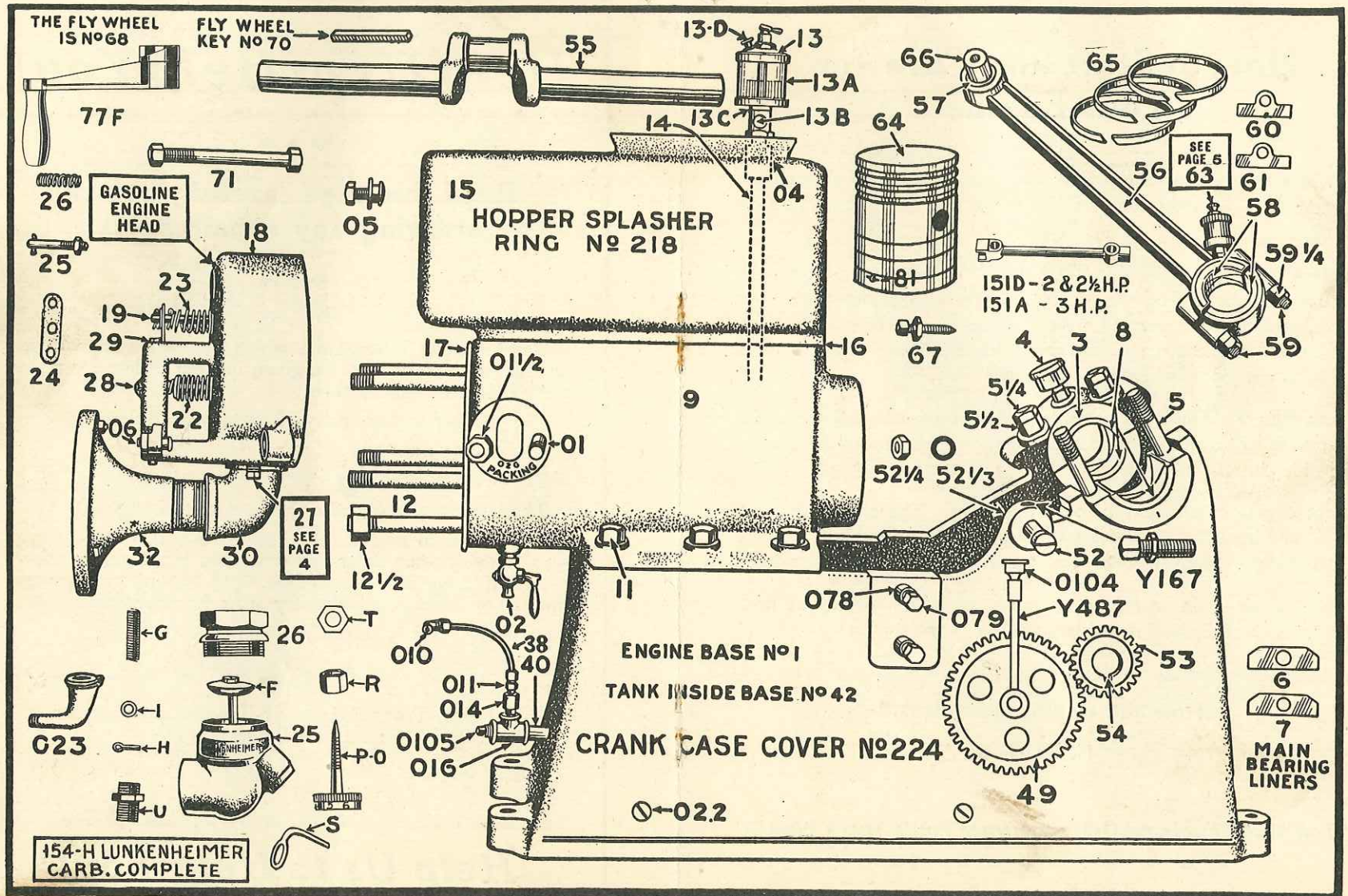
If you fail to give us this information it will be necessary to delay your order and write you for same, therefore, to avoid annoying delays, see that the information requested above is given on every order for repair parts.

For Example

Ship Parcel Post, Express or Freight 1—Number 059
Cam Rod Spring for 2 Horse Power Engine.

Engine Number 294136.

Help Us to Help You!



How to Start and Care for Your Engine

"A large part of the success and service you get out of your engine depends upon the attention you give it the first few hours and days you use it."

Before starting your engine **"OIL IT."** Do not depend upon the oil cups and sight feed oilers for the first oiling, but take your oil can and oil each moving part. Move the working parts with your hands. See that each part is moving freely and that the oil is getting to the places where it is needed.

Turn your flywheels over until the piston comes out of the cylinder as far as it will come, then oil the end of the piston and the piston pin inside the piston.

Your engine is new and all parts are tight. The oil put on it at the factory immediately before shipping has dried and will have to be softened up before the oiling system will perform its regular duty.

Watch your engine carefully. Do not let it get too hot at first. Care for it carefully and it will last you for years.

A little time spent now will save both

"Time and trouble afterwards."

HARDIE MANUFACTURING CO.

"Too Much Fuel and Oil Sometimes Fouls Spark Plug"

Wico Magneto With Complete Equipment

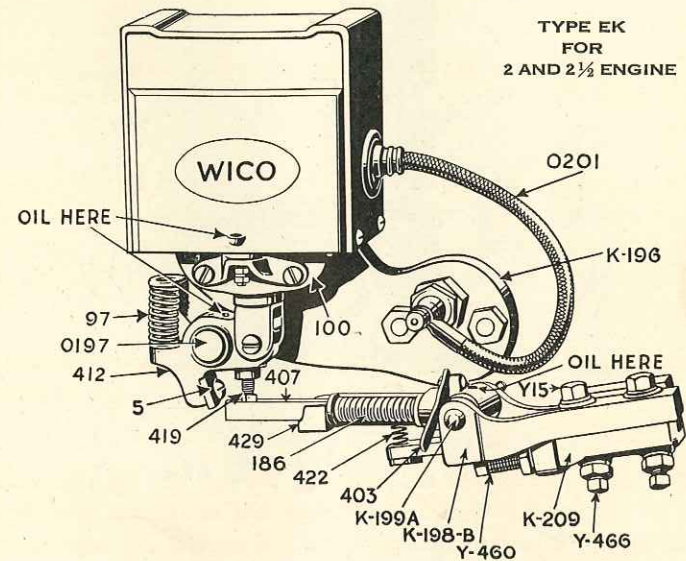


Figure 7

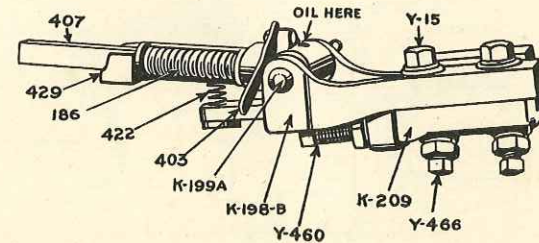


Figure 8

New Style Wico Trip Bracket
Instructions for adjustment on page 8

Wico Magneto With Complete Equipment

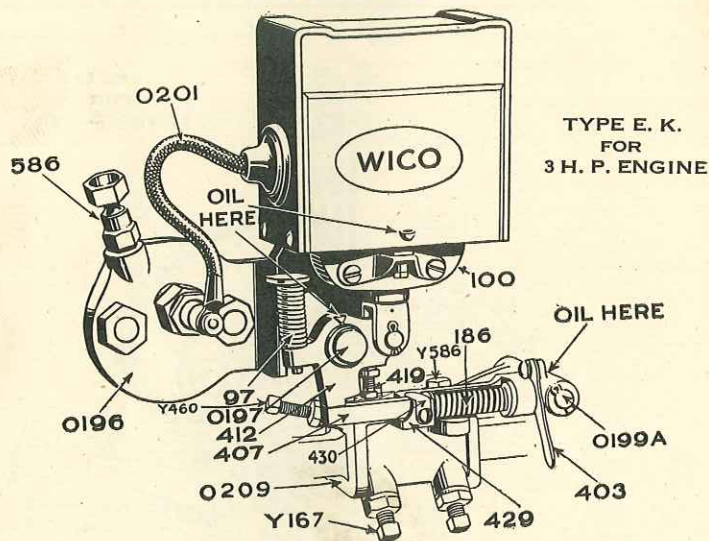


Figure 9

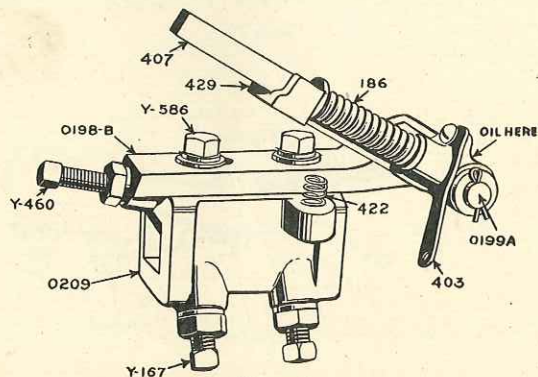


Figure 10

New Style Wico Trip Bracket
Instructions for adjustment on page 8

Repair Parts Price List For New Style Wico Trip Bracket

Part No.	Description	Horse Power 2, 2½, 3½
0197	Rocker Arm Stud.....	.50
K198B	Trip Bracket Casting (2 and 2½ H.P. Adjustable Type).....	.31
O198B	Trip Bracket Casting (3½ H.P.).....	.31
K198C	Trip Bracket Assembly, complete (2 and 2½ H.P.).....	3.75
O198C	Trip Bracket Assembly, complete (3½ H.P.).....	3.88
K199	Trip Finger Pin (2 and 2½ H.P.) Old Style.....	.19
K199A	Trip Finger Pin (2 and 2½ H.P.) Adjustable Type.....	.19
O199	Trip Finger Pin (3 H.P.) Old Style.....	.19
O199A	Trip Finger Pin (3 H.P.) Adjustable Type.....	.19
K209	Trip Bracket Clamp (2 and 2½ H.P.) Adjustable Type.....	.37
O209	Trip Bracket Clamp, Adjustable Type.....	.37
Y15	Cap Screw with Washer for Adjustable Trip Bracket Casting (2 and 2½ H.P.).....	.12
Y460	Set Screw with Lock Nut (2 and 2½ H.P.).....	.12
Y466	Set Screw with Lock Nut (2 and 2½ H.P.).....	.12
Y167	Set Screw with Lock Nut (3½ H.P.).....	.12
Y460	Set Screw with Lock Nut (3½ H.P.).....	.12
Y586	Cap Screw with Washer (3½ H.P.).....	.12

All parts numbers not listed on this page are listed on page 26

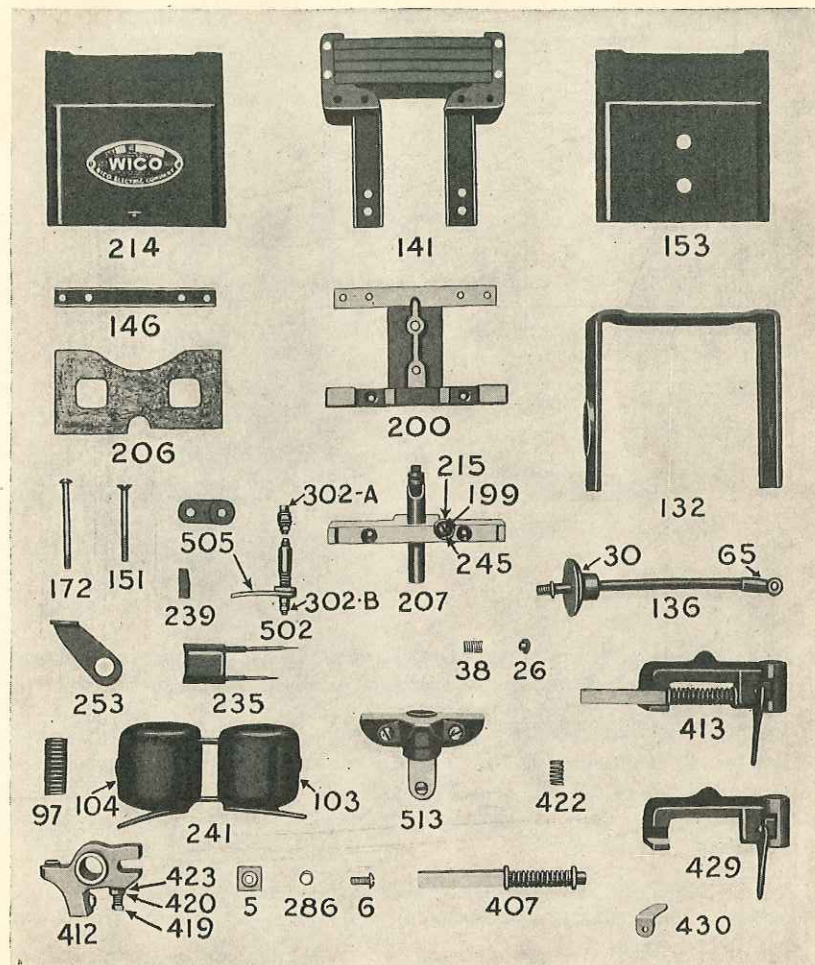
All parts above can be shipped by parcel post

Parts Price List of Wico Type E. K. Magneto as used on 2 to 3 H.P. Engines

Part No.	Description	Horse Power 2, 2½, 3½	
W5	Latch Block.....		\$.44
W6	Latch Block Screw.....		.06
W26	Spring Clamp Washer.....		.12
W30	Terminal Insulation Block.....		.37
W38	Terminal Contact Spring.....		.25
W65	Lead Wire Terminal.....		.06
97	Armature Return Spring.....		.50
103	Coil Group, Right Hand.....		4.69
104	Coil Group, Left Hand.....		4.69
107	Core Group.....		1.56
132	Side Band Group.....		1.25
136	Terminal Group.....		.96
141	Magnet Group.....		8.12
146	Cross Arm.....		.12
151	Deck Screw.....		.12
153	Back Cover.....		.44
W172	Pole Yoke Screw.....		.12
186	Latch Springs.....		.31
199	Ground Connection Screw, Side Band Screw.....		.06
200	Assembly Plate.....		1.25
206	Coil Gasket.....		.12
207	Deck Half Group.....		2.19
214	Front Cover.....		.62
215	Ground Connection Screw Lock Washer.....		.06
235	Condenser.....		3.75
239	Coil Wedge.....		.06
241	Coil Group.....		10.50
245	Ground Lead Clamp Washer.....		.06
253	Return Spring Support.....		.12
286	Latch Block Screw Lock Washer.....		.06
302A	Breaker Point Nut.....		.06
302B	Breaker Point Nut.....		.06
403	Spark Lever.....		.31
407	Latch Group.....		1.25
412	Rocker Arm Group.....		1.55
413	Trip Finger Group.....		1.55
419	Latch-off Screw.....		.12
420	Latch-off Screw Nut.....		.06
422	Trip Finger Support Spring.....		.19
423	Latch-off Screw Washer.....		.06
429	Trip Finger Frame Group.....		.94
430	Latch Group Clip.....		.09
W502	Breaker Point Set.....		2.50
505	Breaker Point Lubricating Felts.....		.12
511	Set Coil Connecting Wires.....		.25
513	Armature Group.....		2.20
O201	Lead Wire with Terminal and Intensifier.....		1.00
K196	Magneto Bracket (2-2½ H. P.).....		2.37
O196	Magneto Bracket (3½ H. P.).....		2.75

All parts on list above can be shipped by parcel post

Parts and Numbers for the Wico Type E. K. Magneto as used on 2 to 3 H. P. Engines



To avoid delays and mistakes always show number, name of part and type of magneto. For prices see page 26.

Wico Magneto

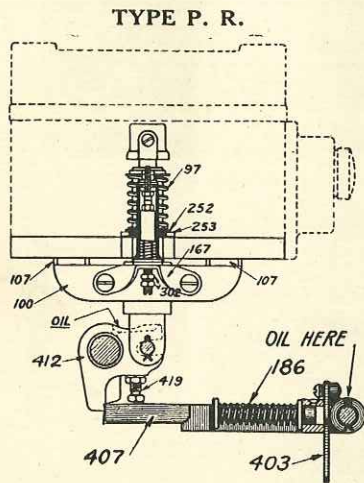


Figure 11

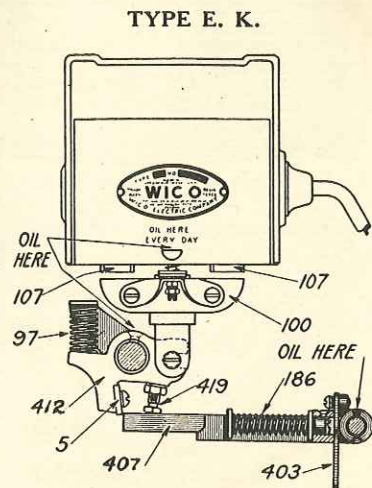


Figure 12

The numbers on Figures 11 and 12 will be used in the instructions on adjusting Wico Magnetos. Figure 11 shows the position of the trip finger No. 407 and armature No. 100, just before the contact between armature No. 100 and the face of the cores No. 107 has been broken. Figure 12 shows position of the trip finger No. 407 and armature No. 100 after the contact between armature No. 100 and the face of the cores No. 107 has been broken, also at the point where trip finger No. 407 trips off of rocker arm No. 412 causing armature No. 100 to return to its original position.

Note—Type P.R. and type E.K. Magnetos are alike except in size and the location of spring No. 97. Therefore the instructions on Wico Magnetos will apply to both types.

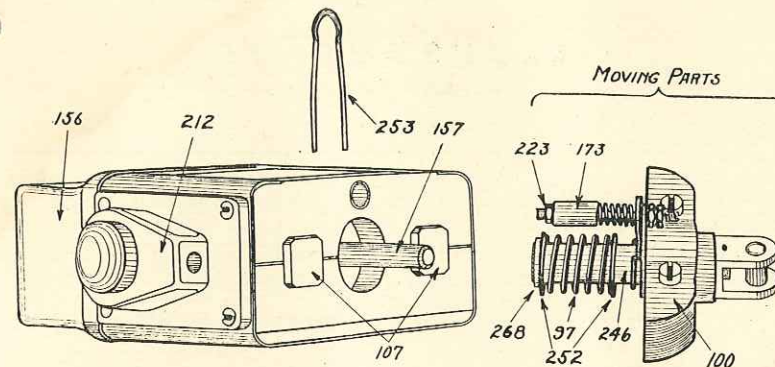


Figure 13

Breaker Point Group

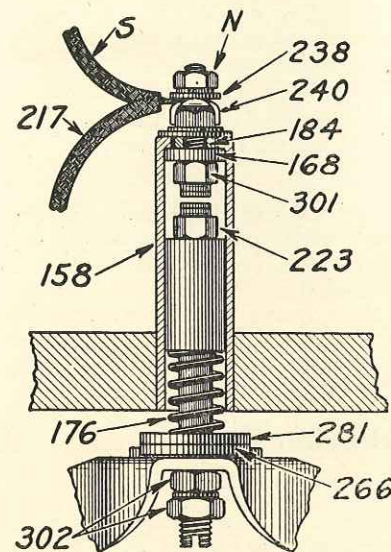


Figure 14

Figure 13 shows the stationary and moving parts of the Wico Magneto. Figure 14 shows the parts with numbers of the breaker point group.

ADJUSTMENTS

Latch-off of Trip Finger

(See Figure 12)

The rocker arm (412) is provided with a screw (419) and locknut for adjusting the "latch-off" of the trip finger. This screw must be set back so that the latch (407) will slip off the lip of the rocker arm just after the breaker points have been opened by the downward movement of the armature.

If the screw is screwed OUT too far the breaker points will not open and the magneto will not spark.

If the screw is screwed IN too far the trip finger will drive the armature down too far and possibly break the return spring or the parts that hold it.

This adjustment will be made originally by the engine builder and should not require attention thereafter. It has nothing whatever to do with the time of the spark.

If necessary, the adjustment can be made as follows:

Trip the armature (100) from its contact with the cores (107) and insert a strip of metal 7-64" thick between the armature and the face of the cores. Move the push rod slowly until the latch of the trip finger reaches the rocker arm. The edge of the latch should then just engage the edge of the lip of the rocker arm, and the adjusting screw (419) should be bearing on the top side of the latch, (see Figure 12) so that the least further movement of the push rod will cause the latch to slip off the edge of the rocker arm.

If the latch does not engage the lip of the rocker arm when armature is set as above the adjusting screw should be screwed in until the latch just engages. If the latch engages the lip of the rocker arm too much (more than 1-32") unscrew the adjusting screw to give the proper engagement.

Loosen the locknut on the adjusting screw (419) before attempting to change adjustment and be sure to set it up tight after the adjustment has been made. Remove the metal strip before attempting to start the engine.

Adjustment of Breaker Points

(See Figure 14)

The breaker point contacts are perfectly adjusted at the factory, and no re-adjustment will be required 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 7-64" from the cores (107). To adjust, trip the armature from its contact with the cores, and insert a strip of metal 7-64" thick between the armature (100) and the face of the cores. Loosen the nuts (302) on the breaker point stem, (see Figure 14), and turn the upper nut until the contact (223) just touches the contact (301). Then set up the lower nut tight against the upper nut. As soon as adjustment has been made, be sure to remove the strip that you placed between armature and cores.

REPLACEMENTS

Breaker Points

(See Figure 14)

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 Figure 14) 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 Figure 14.

Replace the nuts and the lock washers between them. After replacing the moving parts, adjust the breaker point contacts as explained under "Adjustments."

To replace fixed contact (301):—Remove the front cover and the spring support (253) and withdraw the moving parts (see Figure 13). Disconnect condenser lead (S) and primary lead (217) from breaker point tube (158). 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 large brass washer and lock washer 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 in proper adjustment (see "Adjustments," page 30).

Latch and Latch Block Edges

(See Figures 11 and 12)

If the edge of the latch (407) becomes worn where it engages latch block (5), a fresh edge can be obtained by clamping the latch in a vise and pulling it out of the trip finger and giving it a quarter turn before replacing it. A fresh edge on the latch block (5) may be obtained by loosening the latch block screw and giving the latch block a quarter turn before replacing it. The screw is headed over at its outer end and the heading should be filed off before attempting to loosen the screw. Be sure to replace the lock washer and set screw up tight. The latch-off screw (419) should be removed to get at the latch block screw. After the latch block is replaced, the latch-off adjustment should be made as described under "Adjustments", see page 30.



SPECIAL NOTICE

Before making any adjustments on the Wico Magneto be sure it is at fault.

Start at the spark plug to look for trouble. If you do not get any spark or the spark is weak see that the plug is cleaned of all carbon, also examine the porcelain of the spark plug to be sure it is not cracked. If the spark plug is in good condition and you fail to get a spark, then examine the lead wire, look for breaks and loose connections. Do not try to make adjustments on working parts of magneto until you are sure that the spark plug is clean—and then proceed with adjustments as shown on pages 30, 31 and 32. To clean a spark plug always take it apart, then adjust fuel and lubricating oil to stop fouling of plug. (See pages 3, 4, 7 and 8.)

TROUBLE HUNTING

If ignition trouble is suspected, disconnect spark 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:—

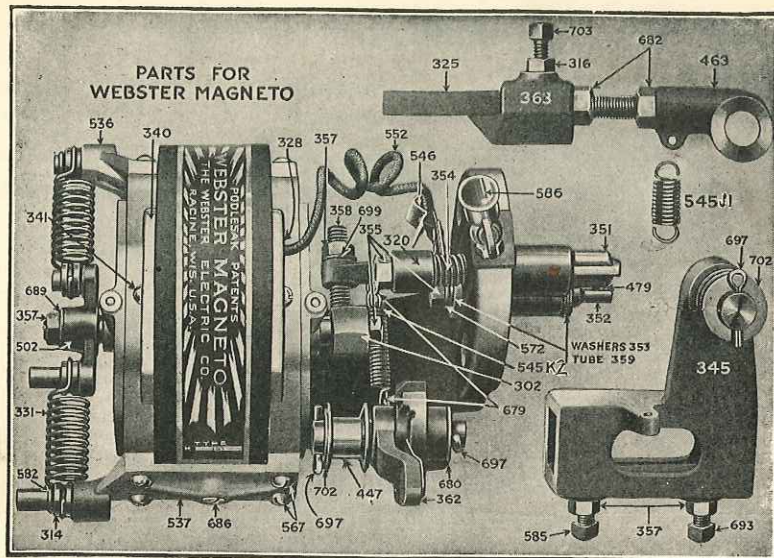
See that the armature (100) returns and makes a firm contact, with the cores (107) after being tripped off.

Failure to make a firm contact indicates a weak-end or broken return spring (97) or friction of moving parts caused by lack of oil.

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 (186). (See Figures 11 and 12.)

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 223) and from the insulating washer (168). (See Figure 14.) See that electrical connections are tight.



Parts for Webster Magneto (Old Style)

M 1, K 26 and L 26

Part No.	Description	Price	Part No.	Description	Price
302	Push Finger.....	\$1.06	479	Spark Points, each.....	.19
303	Bracket, complete, 2 H.P.....	7.81	502	Spring Arm.....	.71
303	Bracket, complete, 3 H.P.....	9.37	536	Magnet Clamp (short pin).....	.56
314	Spring Roller.....	.25	537	Magnet Clamp (long pin).....	.62
316	Nut for Set Screw.....	.06	542	Key (shafts or electrode, not shown).....	.06
320	Electrode Arm.....	.75	542J1	Journal Spring.....	.19
325	Push Rod.....	.50	542K2	Journal Spring.....	.19
328	Fiber Bushing.....	.06	546	Plug Terminal, Bronze.....	.25
331	Inductor Spring.....	.19	552	Terminal Wire.....	.19
339	Shaft Washer (not shown).....	.06	567	Clamp Screw.....	.06
340	Top Cover.....	.56	569	Journal Screw (per set of 8).....	.50
341	Cover Screw.....	.06	572	Electrode Washer.....	.06
345	Valve Rod Clamp.....	1.37	577	Starting Lever (not shown).....	.31
351	Movable Electrode and Point.....	1.37	582	Split Ring.....	.06
352	Stationary Electrode and Point.....	.94	585	Set Screw (sharp point).....	.06
353	Insulating Washer.....	.06	586	Priming Cup.....	.56
354	Electrode Spring.....	.19	679	Spring Cotter Pin.....	.06
355	Nut.....	.06	680	Eccentric Washer.....	.06
357	Nut.....	.06	682	Push Rod Nut.....	.06
358	Adjusting Screw.....	.19	686	Magnet Bar Set Screw.....	.06
359	Mica Tube.....	.31	689	Washer for Spring Arm Nut.....	.06
362	Control Lever.....	1.19	693	Set Screw (cup point).....	.06
363	Wedge.....	.44	697	Eccentric Cotter Pin.....	.06
371	End Plate.....	1.37	699	Adjusting Screw Lock Washer.....	.06
447	Push Rod Cotter.....	.31	702	Roller Washer.....	.06
463	Push Rod Journal.....	.56	703	Wedge Set Screw.....	.06

NOTE—All items above can be shipped by parcel post.

NOTE—See magneto parts list for new style type 1-A and 2-C magnetos on pages 36 to 39

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

The Webster Magneto

HOW TO SET THE SPARK WHEN MAGNETO IS USED FOR IGNITION

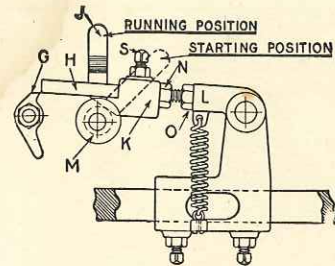


Figure 15

First and IMPORTANT The adjusting screw "E" as shown in Figure 16 should always be set so it will just touch the push finger "G" when the spring arm "C" is in a horizontal position. If screw "E" does not touch push finger "G" or if it is set in too far you will get only a weak spark.

Second. Be sure timing lever "J" shown in Figure 15 is in running position, then turn the flywheels to the right until the piston starts back into the cylinder on the compression stroke, then continue to turn them slowly until the word **Spark** on the rim of the flywheel is opposite the top of the cam rod (Figure 17). This is the point at which the spark should be made.

Third. Place the tripping lever in position on the magneto and cock the spring.

Fourth. See that the screws (Figure 15) which fasten the clamp to the push rod are tight and that the one nearest the cylinder head is in the hole in the bottom of the cam rod, then adjust the length of push rod "H" (Figure 15) until the end of the rod touches the push finger "G". Tighten locknut "O".

Fifth. Loosen set screw "S", move wedge "K" on the push rod toward the magneto until the lower edge of the end of the rod "H" is just even with the upper edge of the magneto push finger "G" as shown, tighten set screw "S", then the locknut "N".

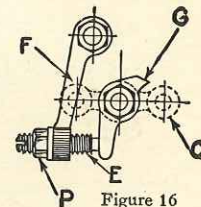


Figure 16

Sixth. Take off the tripping lever, be sure the magneto wire is fastened to the terminal. Turn the flywheels to the right to see if the magneto trips off when the word **Spark** is opposite the top of the cam rod. If not, adjust the wedge "K" (Figure 15) carefully until it does. To make engine fire earlier, move wedge "K" toward magneto. To fire later, move wedge "K" away from magneto.

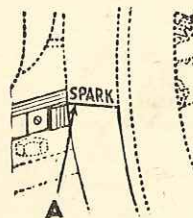


Figure 17

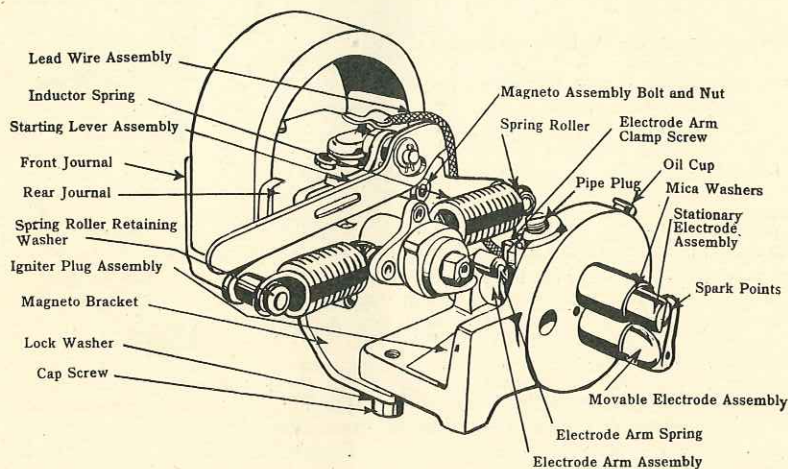
Webster Magneto

(New Style)

HOW TO ORDER SPARE PARTS

1. Give type of magneto and igniter plug.
2. Give part No. and part name.
3. Give H.P. name and type of engine.

NOTE: New Style Webster Magneto cannot be used if engine is equipped for old style.



IF REPAIR WORK IS REQUIRED SEND IN BOTH MAGNETO AND IGNITER PLUG

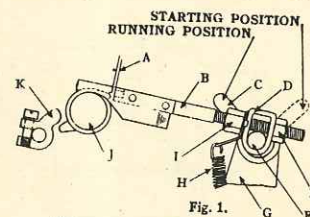
NOTE: See Magneto Parts List for old style M1, K26 and L26 Magnetos on page 34

Instructions for Using Webster Magneto

Type No. 1 and Type No. 2

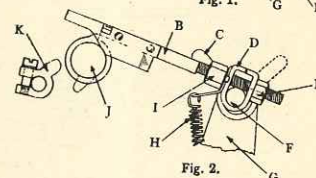
When starting the engine retard the time of ignition by moving the lever (C) (Fig. 1) away from the magneto and toward the engine crank shaft. Then follow the regular engine instructions for starting and as soon as the engine has gained a little speed advance the time of ignition by moving the lever (C) toward the magneto.

There are no special instructions to be followed in operating an engine equipped with this magneto except that **all moving parts of magneto must be thoroughly oiled daily and magneto must not be taken apart.**



Adjustment of Webster Magneto:

There is only one point of adjustment on the Webster Magneto type No. 1 or type No. 2, and this is the length of the push rod (B) as governed by the adjustment of the locknuts (I and E) (Fig. 2). The purpose of this adjustment is to trip the magneto at the right time in the stroke of the engine. To make this adjustment loosen the nuts (I and E) turning them until the push rod (B) is moved well away from the magneto; then turn the engine to the firing point. This should be about seven to eight degrees before dead center for each 100 R.P.M. of the engine. Thus, if the engine runs 400 R.P.M. the magneto should trip about thirty degrees before dead center. Now, turn the adjusting nut (I) so as to move the push rod toward the magneto until the magneto trips, then lock the rod in position by tightening up locknut (E). This nut should be turned very tight in order to make the adjustment secure and permanent. When the engine is now turned very slowly the magneto should trip at the proper place, but if there is any slight variation it can be corrected by adjusting the push rod either toward or from the magneto to secure the proper timing.



Note:—The push rod clamp (D) can be moved in or out on the stud (F) in order to line the push rod (B) up with the push finger (J).

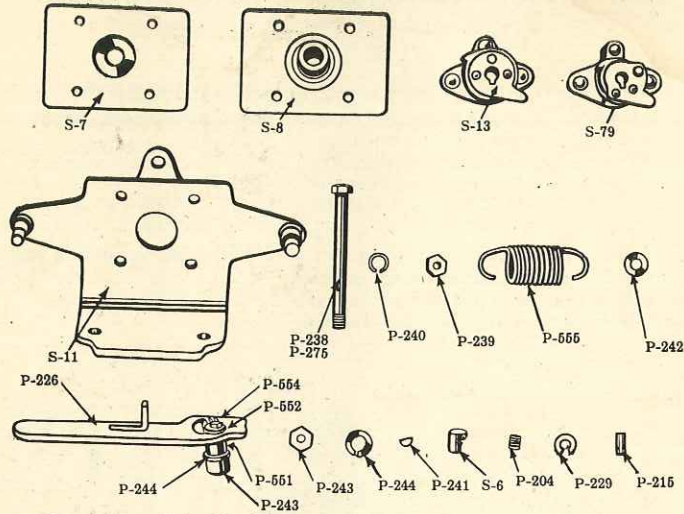
When magneto is properly adjusted on the engine there should be a slight clearance (A) (Fig. 1) between the end of the push rod (B) and tip of the push finger (I) when the push rod is farthest toward the engine crank shaft.

Sluggish action of the movable electrode is probably due to a deposit of carbon which should be washed out with a little kerosene applied to the oil hole.

The igniter points can be cleaned from the outside by pushing the movable electrode in and out, thus rubbing the igniter points together.

CAUTION:—Keep all bolts and nuts tight and take good care of the magneto if you wish to secure long and efficient service from it.

Webster Magnetos Types 1-A and 2-C



Spare Part List for Magnetos, Types No. 1-A and No. 2-C

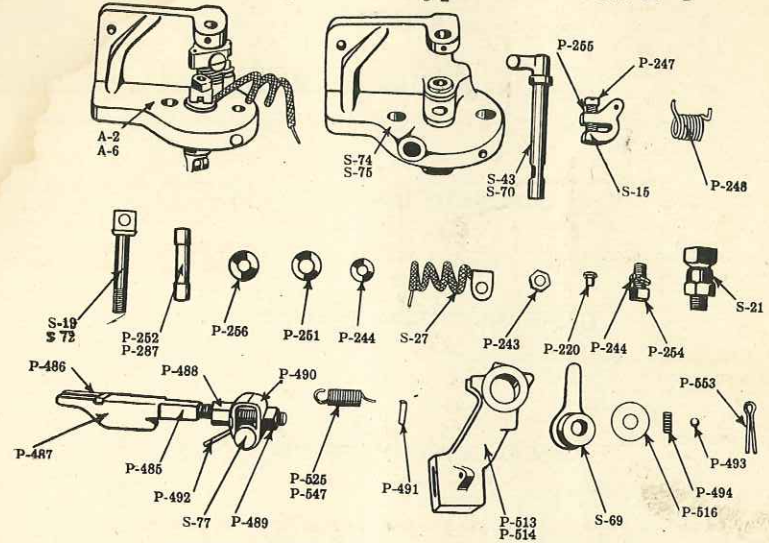
Part No.	Description	Price
S- 6	Oil Cup.....	\$.19
S- 7	Journal Assembly (Front).....	1.62
S- 8	Journal Assembly (Rear).....	2.06
S- 11	Magneto Bracket Assembly.....	1.62
S- 13	Push Finger Assembly for 1-A Magneto, 2 H.P.....	2.62
S- 79	Push Finger Assembly for 2-C Magneto 3 H.P.....	2.62
P-204	Magnet Bar Set Screw.....	.06
P-215	Oil Wick for S-7 or S-8.....	.06
P-226	Starting Lever.....	.19
P-229	Retaining Washer for P-242.....	.06
P-238	Assembly Bolt for No. 1-A Magneto 2 H.P.....	.19
P-239	Lock Nut for P-238 or P-275.....	.06
P-240	Lock Washer for P-238 or P-275.....	.06
P-241	Woodruff Key.....	.06
P-242	Spring Roller.....	.06
P-243	Shaft Lock Nut.....	.06
P-244	Shaft Lock Washer.....	.06
P-275	Assembly Bolt for No. 2-C Magneto 3 H.P.....	.19
P-555	Inductor Spring.....	.19
P-551	Starting Lever Stud.....	.19
P-552	Retaining Washer for P-551.....	.06
P-554	Cotter Pin for P-551.....	.06

SPARE PART LIST FOR EQUIPMENT

A- 2	Igniter Plug Assembly, 3 H.P.....	\$7.81
A- 6	Igniter Plug Assembly, 2 H.P.....	7.37
S- 6	Oil Cup.....	.19
S-15	Electrode Arm Assembly.....	1.19
S-19	Stationary Electrode Assembly for A-6, 2 H.P.....	.50
S-21	Priming Cup.....	.56
S-27	Lead Wire Assembly.....	.19
S-43	Movable Electrode Assembly for A-6, 2 H.P.....	1.19
S-69	Control Lever Assembly.....	1.12
S-70	Movable Electrode Assembly for A-2, 3 H.P.....	1.19

NOTE—All items above can be shipped by parcel post.

Webster Magnetos Types 1-A and 2-C



SPARE PART LIST FOR EQUIPMENT

Part No.	Description	Price
S- 71	Push Rod Assembly (complete).....	\$1.94
S- 72	Stationary Electrode Assembly for A-2, 3 H.P.....	.54
S- 74	Igniter Plug Sub-Assembly, 3 H.P.....	4.19
S- 75	Igniter Plug Sub-Assembly, 2 H.P.....	2.62
S- 77	Push Rod Journal Stud Assembly.....	.31
P-220	Spark Point.....	.19
P-243	Nut for S-19 or S-72.....	.06
P-244	Lock Washer for S-19 or S-72.....	.06
P-247	Electrode Arm Clamp Screw.....	.12
P-248	Electrode Arm Spring.....	.12
P-251	Mica Washer (each).....	.06
P-252	Mica Tube for S-19.....	.19
P-253	Washer for S-19 or S-72.....	.06
P-254	Cap Screw.....	.06
P-255	Lock Washer for P-247.....	.06
P-256	Asbestos Washer.....	.06
P-280	Pipe Plug.....	.06
P-287	Mica Tube for S-72.....	.19
P-485	Push Rod.....	.06
P-488	Push Rod Nut, Special.....	1.06
P-489	Push Rod Nut, Standard.....	.06
P-490	Push Rod Journal Stud Clamp.....	.06
P-492	Push Rod Spring Holder.....	.37
P-493	Ball.....	.06
P-494	Spring.....	.06
P-513	Valve Rod Clamp with A-6 for 1 1/2 H.P.....	.06
P-514	Valve Rod Clamp with A-2 for 3 H.P.....	1.37
P-516	Retaining Washer for S-77.....	1.87
P-525	Push Rod Journal Spring for P-513.....	.06
P-547	Push Rod Journal Spring for P-514.....	.12
P-553	Cotter Pin for S-77.....	.12
		.06

NOTE—All items above can be shipped by parcel post.

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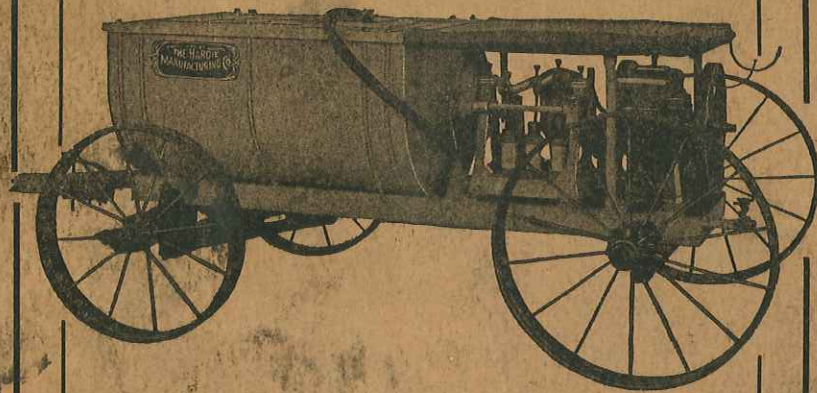
MISCELLANEOUS INFORMATION

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CAPACITY OF FUEL TANKS

The fuel tank is located in the base. The 2 H. P. tank holds 1.1 gallon; 2½ H. P., 1.4 gallon; and the 3 H. P., 1.6 gallon.

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