

Instruction Book *and* Repair List

*Read Pages 2 and 3
of This Book Before
You Try to Start Engine*

HOW TO START

Battery Equipped Engine, Page 3
Magneto Equipped Engine, Page 12
Kerosene Engine, Page 30

E-W

Be Sure to Give *Engine Number and Horse-
Power* When Ordering Repairs.

Do not return any parts of your engine to us unless we ask you to do so. Write us first for information; by doing this you will obtain quicker service.

IF YOU CANNOT START THE ENGINE, DON'T CALL IN AN EXPERT—READ THE FOLLOWING:

A gasoline engine is not simple unless you understand just how it works. If you should have a little trouble at first, don't blame the engine but remember it is new to you and that it will take you a week or so to learn just how to handle it. Study this book and your engine carefully and it will be only a short time until you will know how to take care of the engine as well as the experts at our factory.

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 reached you.

To be sure that you have done everything necessary to start the engine, please check over the points as follows:

First. Be sure the tank is full of gasoline.

Second. See if the gasoline flows to the mixing valve. Dirt sometimes gets into the gasoline pipe and collects on the fuel valve or under the check valve. To clean the fuel valve, take it out and wipe off the point. To clean the check valve, loosen the nuts just above the valve with a wrench, remove the valve and clean with gasoline.

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

Third. Be sure the battery or magneto wires are properly attached, in good condition and that a bare wire does not touch any part of the engine except the binding post.

Fourth. Test the batteries by snapping the two wires together when the switch is closed to see if they give a good spark. (It will not be necessary to test the magneto, as it must furnish a spark if the wire is connected.)

Fifth. See if the igniter snaps at the right time and that all parts of the igniter or magneto work free as described on page 6.

Sixth. If you have changed any adjustment on the engine or have had any part of the engine off, read the information we give about that part in this book to be sure the part is in proper adjustment.

Seventh. If, after following the above instructions and going over the adjustment of each part according to the instructions in this book, you still cannot get the engine to run, 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.

Keep the engine clean and well oiled, keep the bearings tight and see that all bolts and nuts are tight. If you go over the engine with the care that any piece of machinery should have, you will have no cause to complain and will get satisfactory service.

Don't call in an engine expert under any circumstances unless you know him well and have the utmost confidence in his ability, as the so called gasoline engine expert usually does not know as much about the engine as you do and he may do the engine more harm than good. A neighbor who has a gasoline engine can usually help you out quicker than any expert. If not, write us and we will advise you by return mail.

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 THE RESERVOIR AT NIGHT TO PREVENT FREEZING.**

TO START IN COLD WEATHER.

All gasoline 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, and be sure to close the air damper when starting; also put a teaspoonful of gasoline in the cylinder through the priming cup if the engine has one. 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.

HOW TO ADJUST THE FUEL VALVE.

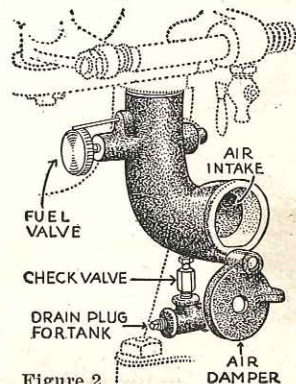
The mixing valve (Figure 2) is of the suction feed type, gasoline being drawn from the tank in the base by the suction of the piston. The air and gasoline are mixed in this valve to form the explosive gas.

When you start the engine, open the fuel valve two full turns to the left, close the air damper and turn the flywheel to the right; this draws a supply of gasoline from the tank and primes the valve. After the engine is running, open the air damper 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.

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, because if this valve is not in place your engine will not get any gasoline. To drain gasoline from tank remove drain plug. (See Figure 2.)

OUT OF GASOLINE.

If the engine is running all right with the fuel valve set at the right point, and it starts to misfire, runs irregularly and explodes through the air inlet or gasps for breath, the supply of gasoline is low and the tank should be refilled.



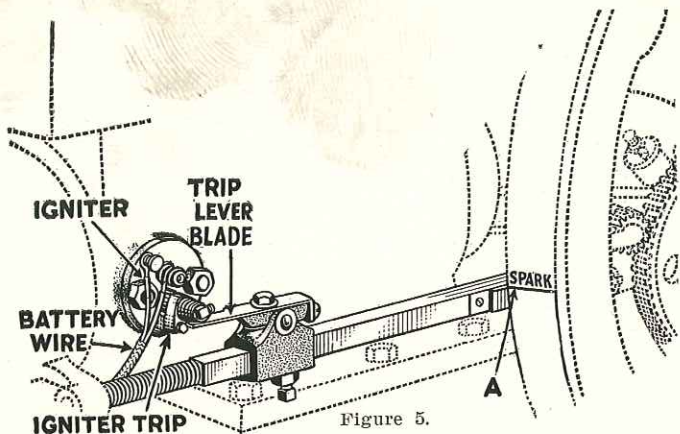


Figure 5.

WHAT MAKES THE ENGINE RUN.

The power of a gasoline engine is furnished by an explosion of gas inside the cylinder. This gas is made by gasoline and air being drawn in through the mixing valve by the suction of the piston. To ignite this gas an electric spark is furnished by a battery or a magneto.

To get the most power from the engine the explosion should take place when the piston reaches the end of the compression stroke or is in the cylinder as far as it will go, so the piston will be pushed out of the cylinder with the full force of the explosion. To get this condition, it is necessary that the electric spark take place at just the right time.

WHEN THE SPARK SHOULD TAKE PLACE.

In order that you may know just where the spark should take place to give the best results we have stamped the word **Spark** on the rim of the flywheel. The spark should take place in the cylinder just as this word **Spark** on the flywheel is opposite the top of the cam rod, as shown in Figure 5. Turn the flywheels around slowly by hand to the right and stop instantly when you hear the igniter snap. If the top of the cam rod is directly opposite the word **Spark** on the flywheel, then the spark takes place at the right time in the cylinder.

If the word **Spark** is below the top of the cam rod, then the spark takes place too soon; if the word **Spark** has passed the top of the cam rod, then the spark takes place too late.

To change the time of the spark, loosen the locknut "A," Figure 3, page 7, and adjust by changing the adjusting screw "B." To advance the spark, turn this screw to the right; to retard the spark turn it to the left. After you have the trip set so the spark occurs at the right time, tighten the locknut "A." Then turn the flywheels around again and see if the igniter snaps at the right time, as in tightening down the locknut it sometimes changes the point at which the spark takes place.

The trouble you have with a gasoline engine is usually caused by the spark not taking place at the right time. If it occurs too late the engine loses power; if it occurs too early there is a back pressure, causing a pounding in the cylinder or preventing the engine from running at all.

THE IGNITER.

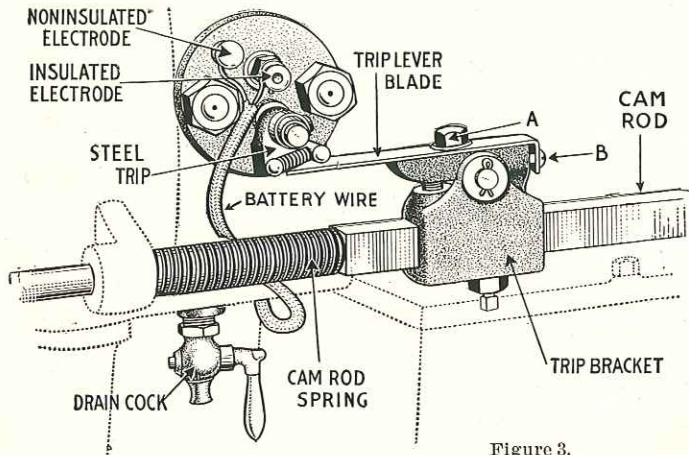


Figure 3.

The igniter is located on the side of the cylinder, as shown above, and is used to make the spark inside of the cylinder. Two wires from the battery (or one from the magneto) are attached to the brass binding posts on the igniter.

The trip on the igniter is caught by the trip lever blade on the cam rod, which brings two points together on the inside of the cylinder, and when these points are released the spark jumps from one point to the other, which is known as the make and break system of ignition. In other words, you make the circuit complete when the igniter points are together, and when they separate it breaks the circuit and makes a spark.

KEEP THE IGNITER CLEAN.

To insure a good spark from these points they must be kept clean. If you feed too much gasoline or oil, or use a poor grade of either, a deposit may form on these points, which will prevent the points from making a good contact and the igniter cannot give a perfect spark, making the engine hard to start or causing it to misfire and sometimes preventing it from running at all. To remove this deposit clean the points with gasoline, fine emery cloth or a very fine file.

In order that the spark shall occur inside of the cylinder the insulated electrode is covered by a mica tube with mica washers on the end, so the electric current must go into the cylinder before it can get across to the other electrode and return to the battery.

As electricity always travels the shortest way, the igniter should be kept clean and free from grease, dust or dirt, as these will in time make a path for the electricity to travel from the insulated electrode to the non-insulated electrode on the outside of the engine, so that you do not get a spark at the igniter points. This is what is known as a short circuit.

To test the igniter take it off the engine, leaving the battery wires attached to the binding posts and snap the igniter by hand. If there is

no spark at the points when they separate, and you know the battery is all right, the igniter is short circuited and will have to be taken apart and cleaned. When taking the igniter apart be sure to notice just how each part is fitted, so you can put it together again properly. In cleaning the parts use kerosene or gasoline, and it may be necessary for you to get a new mica tube and washers. (See No. 47E032 and No. 47E033, page 19.)

Be careful in removing the igniter not to tear the packing, as you will need this when you replace the igniter. If you should tear it, don't put the torn one back on; buy a new one. (See No. 47E026, page 19.) When replacing the igniter screw the nuts down with your fingers as far as possible, then tighten one nut at a time with the small wrench furnished with the engine. Give each nut one-half turn at a time, until they are tight, as this draws the packing down evenly all the way around and prevents a leak. **Be sure after replacing the igniter that the spark takes place at the right time.** (See page 6.)

BATTERIES.

When replacing worn out dry cells be sure the new ones are wired up like the old set and that the spark coil is connected between the engine and the batteries, as the coil is what makes the spark.

We are not responsible for worn out batteries, as their life depends entirely on the care given them. **Buy a magneto for your engine and you will never need batteries.** We can furnish a magneto that you can put on yourself. See information on pages 13, 14 and 23.

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 turn the flywheels around until the key in the crankshaft is straight up, as shown by "B" in Figure 1; 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 quite a little difference in the way your engine will run.

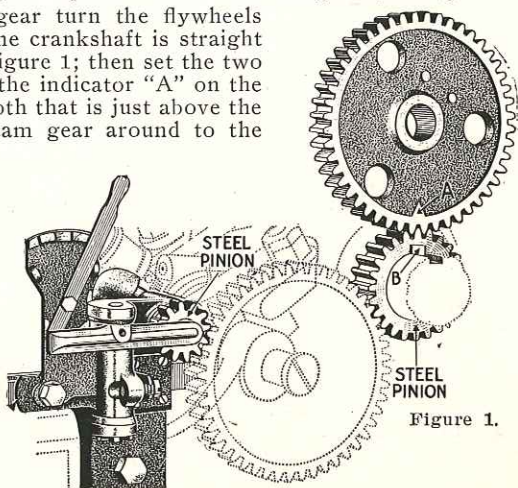


Figure 1.

THE GOVERNOR.

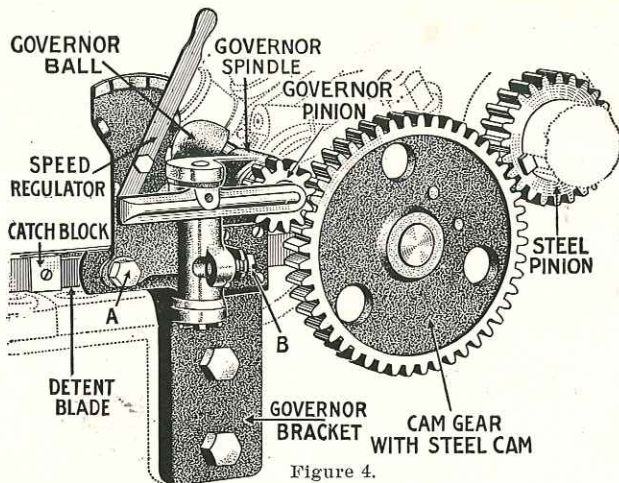


Figure 4.

The governor controls the speed of the engine and is of the hit and miss fly 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 gasoline, 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.

Always keep the speed lever set in the notch to the right, as this runs the engine at its regular speed, where it will give its full power. If you reduce the speed of the engine you also reduce the power it will develop. Never slow the engine down on a heavy load if you want less speed. For heavy work get a smaller pulley for the engine, as the reduction in speed is only to take care of light slow speed machines. (See rules for determining the size of pulleys to use on page 2.) If you set the speed lever in the center notch it gives a reduction in speed of from 50 to 60 R. P. M. and the notch to the left a reduction of from 100 to 125 R. P. M.

HOW TO ADJUST THE DETENT BLADE.

When the exhaust valve is wide open and the detent blade is pushed in behind the catch card block on the cam rod, there should be only the thickness of a postal card between them. When adjusting the detent blade, leave the speed lever in position, as shown at top of this page; the detent blade should stand about $\frac{3}{4}$ inch away from the catch block.

To adjust the detent blade loosen the locknut "A" and screw the adjusting screw "B," either in or out, until you have the blade where it should be, then tighten the locknut.

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 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.

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, buy a new one. (See No. 47E054 in list of repairs, page 20.)

THE CAM ROD SPRING.

The cam rod spring (see Figure 3, page 7) 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. 47E059 in list of repairs, page 20.) 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 27.

HOW TO TAKE OFF A FLYWHEEL OR PULLEY.

To take off the flywheel loosen the bolt and drive an iron or wooden wedge 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 1½-horse power engine loosen the set screw with a screwdriver and drive the pulley off.

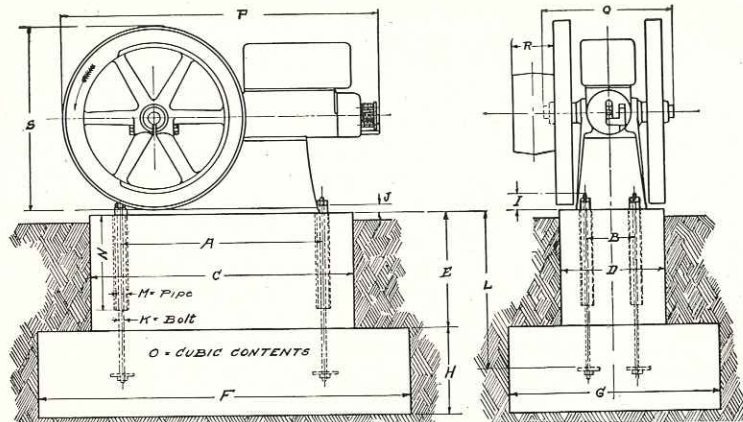
On the larger engines all you have to do is loosen the nuts, take out the bolts or cap screws and the pulley will come off.

If you have to drive the flywheel or pulley off the shaft, use a piece of hardwood 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.

To remove the friction clutch pulleys see page 24.

TO REMOVE GASOLINE TANK.

Take off the fuel pipe which connects the tank to the mixing valve, tip the engine over on one side, remove the rods which hold tank in the base and the tank will come out.



ENG.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1 1/2 HP	20"	5 1/2"	23"	14"	12"	41"	26"	12"	1 1/2"	3/4"	3/8"	18"	1"	10"	10 1/2"	30 1/2"	22 1/2"	4"	18"
2 1/2 HP	25 3/8"	6 1/2"	36"	18"	18"	48"	30"	12"	2 1/4"	1 3/8"	1/2"	24"	1"	15"	16 3/8"	39 3/8"	29 1/2"	4"	22"
5 HP	29 1/2"	8"	42"	20"	18"	56"	34"	12"	2 1/2"	1 1/2"	5/8"	24"	1 1/4"	15"	22"	46 3/8"	24 1/2"	4"	28"
7 HP	36 1/2"	9"	48"	20"	18"	66"	38"	18"	2 1/2"	1 1/2"	3/4"	27"	1 1/4"	15"	36"	56 1/8"	26 1/2"	6"	34"
9 HP	41 1/2"	10"	54"	22"	24"	77"	44"	18"	2 3/4"	1 3/4"	3/4"	33"	1 1/2"	20"	52"	64 1/8"	28 1/2"	8"	38"
12 HP	47 1/2"	12"	62"	25"	24"	86"	50"	18"	2 3/4"	1 1/2"	3/4"	33"	1 1/2"	20"	66 1/4"	70 1/2"	31 1/2"	8"	44"

When an engine is to be located permanently it is best to mount it on a concrete foundation as shown above. In the table each letter shows the distance between the points as indicated in the drawing above.

To make a foundation like this dig a hole as long and wide as indicated by "P" and "G" and as deep as the sum of "E" and "H." If ground is not solid line hole with lumber or sheet metal to prevent caving. Make a box without top or bottom of size as indicated by "C," "D" and "E." Across the top of this box securely attach a couple of strips 2 or 3 inches wide, thickness as indicated by "J" and spaced as indicated by "A," measuring from center to center. These strips should be long enough to reach clear above the hole for foundation and box hung in the center of it. The top edges of box must be perfectly level. In the cross strips bore holes of size as indicated by "K" spaced as indicated by "A" and "B." Foundation bolts of length indicated by "L" fitted with large washers on the bottom should be hung from the cross strips. A piece of pipe or tubing larger than the bolt should be placed on the bolts as indicated by the dotted lines in the diagram. The pipe or tubing should come about 1/4 inch below the top of the cross pieces and is put in so bolts can be shifted on account of a variation in the bolt holes in the engine base.

If engine is to be raised from ground the measurement "E" and length of bolts "L" should be increased to correspond with the height of foundation above ground, but measurements below ground must not be changed.

The concrete should be made up of one part good Portland cement, two parts clean sharp sand and four parts clean gravel or crushed stone. Mix thoroughly while dry and then add water, again mixing well till you have a good mixture. Place this in the foundation hole and fill up to within 1/2 inch of the top of the box. Then fill the remaining space with a mixture of one part cement and two parts sand mixed thoroughly and moistened sufficiently so it can be spread and troweled smooth. Let the foundation set for two or three days, when the wood forms can be removed and space around foundation filled with earth or cinders. Then mix cement and water about like thick cream and fill the spaces between the pipe and bolts. Mount the engine, put nuts on bolts and screw down tight. It will be best to let the foundation harden for at least a week or ten days before using the engine.

THE WEBSTER MAGNETO.

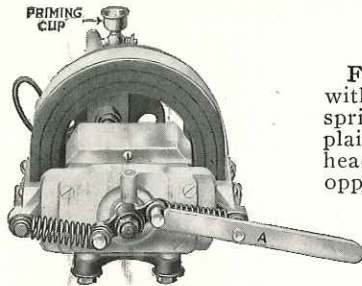


Figure 6.

Figure 7. This is a line drawing of the tripping mechanism showing how it should be set for proper running. It also shows the timing lever "J." Be sure when starting the engine that this is pushed to the right as far as it will go. This retards the spark and prevents the engine from kicking back when starting.

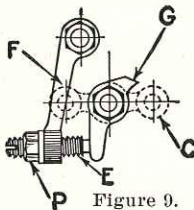


Figure 9.

Figure 11. This is a line drawing showing the position that the connecting rod and crankshaft should be in just before the piston is thrown back against compression when starting, as explained in the fourth paragraph under the heading, "Second Method of Starting," on the opposite page.

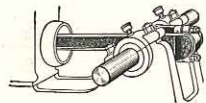


Figure 11.

Figure 6. Shows the Webster Magneto with starting lever "A" in position, the springs cocked ready for starting, as explained in the fifth paragraph under the heading, "Second Method of Starting," on opposite page.

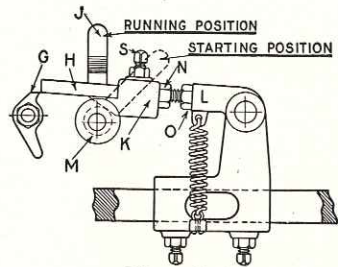


Figure 7.

Figure 9. Shows the tripping finger "G" and movable electrode adjusting screw "E" that controls the position of the igniter points on the inside of the engine. This screw must be kept in proper adjustment, as explained at the bottom of page 15, so as to take up any wear on the tripping finger or the igniter points.

FIRST METHOD OF STARTING ENGINE WITH MAGNETO.

First. Open the needle valve on mixer two full turns to the left, close the air damper, turn on the oil by raising the lever on the lubricator and be sure the oil is dropping properly; also have the piston at the open end of the cylinder, and oil piston pin by putting oil in the oil hole in the top of the piston. **Oil piston pin every time you use the engine.**

Second. Place the timing lever "J" (Figure 7) in the starting position. This retards the spark and prevents the engine from kicking back when you start it.

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. Take hold of a spoke in the flywheel and turn it around to the right rapidly five or six times and then release the detent blade, but continue to turn the flywheel until the engine starts.

We do not furnish a starting crank as this method will enable you to start the engine very easily.

Fifth. As soon as engine starts open the air damper, change the timing lever "J" (Figure 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.

SECOND METHOD OF STARTING ENGINE WITH MAGNETO.

This does not apply to the 1½ horse-power as no priming cup is furnished on that size.

First. Open the priming cup to relieve compression and turn on the oil by raising the small lever on top of the lubricator.

Second. Place the timing lever "J" (Figure 7) in the starting position and turn the flywheels to the right until the igniter trips, then stop.

Third. Prime the cylinder by filling the priming cup four times with gasoline and let it run into the cylinder, then close the cup. In cold weather fill the cup eight times.

Fourth. Open needle valve on the mixer two full turns to the left, close the air damper and then turn the flywheels to the right one-half turn or until the crank is on the outer dead center, as shown in Figure 11.

Fifth. Put tripping lever "A," which you will find with the equipment, on the magneto and cock the springs as shown in Figure 6.

Sixth. Take hold of a spoke in the flywheel at the top with your right hand and put your right foot on a spoke at side nearest the magneto, pull with your hand and push with your foot, giving the flywheel a quick turn back toward the cylinder, at the same time pushing down on the tripping lever "A" with your left hand, and the engine should start.

We do not furnish a starting crank as this method will enable you to start the engine very easily.

Seventh. As soon as engine starts open the air damper on the mixer, shift the timing lever "J" 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, as explained above.

TO STOP THE ENGINE.

As there are no batteries used on the magneto equipped engines, you do not have to open the switch or break the circuit to stop the engine, just shut off the gasoline by closing the needle valve on the mixer. Turn the small lever on top of the lubricator down, which shuts off the oil, and drain the water out of the cylinder if the weather is cold, to prevent freezing.

HOW TO TEST THE MAGNETO TO SEE IF IT IS FURNISHING A SPARK.

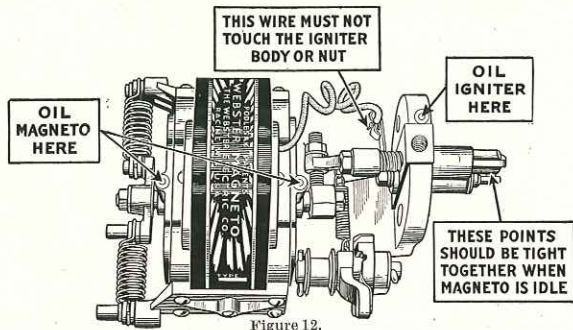


Figure 12.

Remove magneto and the igniter plug as shown above from engine without taking the magneto off the bracket. Trip the magneto with tripping lever the same as when starting the engine. If no spark occurs at igniter points it may be that the insulation on the stationary electrode is broken and should be replaced. (See list of repairs, page 23, No. 47E353 and No. 47E359.) Also see that the igniter points are together. If the points are apart, adjust them by loosening locknut "P" and turning adjusting screw "E" (Figure 9, page 15) until the igniter points are together. It may be that the shaft to which No. 47E502 spring arm is fastened binds. Oil the magneto and take hold of spring arm and rock it back and forth until it works freely.

If you want to run the engine with a battery instead of magneto, loosen locknut "P" and tighten the adjusting screw "E" (Figure 9, page 15) until the igniter points are separated about the thickness of a postal card, then tighten the locknut "P."

When attaching battery use a make and break spark coil connected between the battery and the engine and use a switch so you can shut off the current. Attach the wire that comes from the coil to the terminal on the igniter (Figure 12) and the other wire to the bracket bolt under the magneto. Do not take off the magneto.

CARE OF MAGNETO.

The magneto, being a mechanical device, requires the same attention regarding lubrication as does the engine itself. The two main bearings of the magneto have wick oilers fed from reservoirs that should be filled with sewing machine or cream separator oil once every two weeks. To fill oilers just press down on oiler cap, which is held in place by a spring. Oil trip roller frequently and the four spring roller pins whenever you use the engine.

Use very light oil on the magneto and igniter, and if electrode should stick clean it with kerosene. Igniter points may be cleaned without removing the igniter by sliding the movable electrode back and forth from the outside.

Never remove the magnets from the magneto, as they will immediately lose much of their strength; and do not take the magneto apart.

It contains absolutely no brushes or rubbing contacts of any kind, so there is nothing inside that can get out of order. We do not guarantee the magneto if you take it apart. If you think there is anything wrong, write us.

HOW TO SET THE SPARK WHEN MAGNETO IS USED FOR IGNITION.

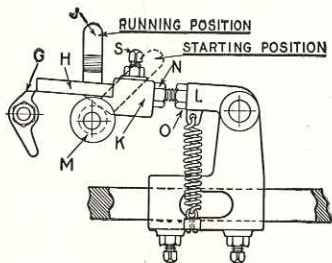


Figure 7.

Third. Place the tripping lever "A" (Figure 6, page 12) on the magneto and cock the springs as shown. Be sure the timing lever "J" (Figure 7) is in the running position.

Fourth. See that the screws which fasten the clamp to the push rod are tight and that the screw nearest the cylinder head is in the hole in the bottom of the cam rod, then adjust the length of push rod "H" (Figure 7) 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."

Sixth. Take off the tripping lever. Be sure the magneto wire is fastened to the terminal (Figure 12, page 14). 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 7) carefully until it does. To make engine fire earlier, move wedge "K" toward magneto. To fire later, move wedge "K" away from magneto.

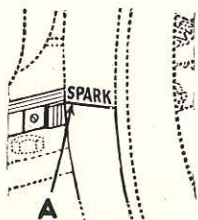


Figure 13.

First. Adjust the screw "E" (Figure 9) until it just touches the push finger "G." Tighten locknut "P."

Second. Turn 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 13). This is the point at which the spark should be made.

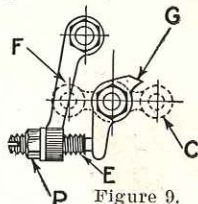
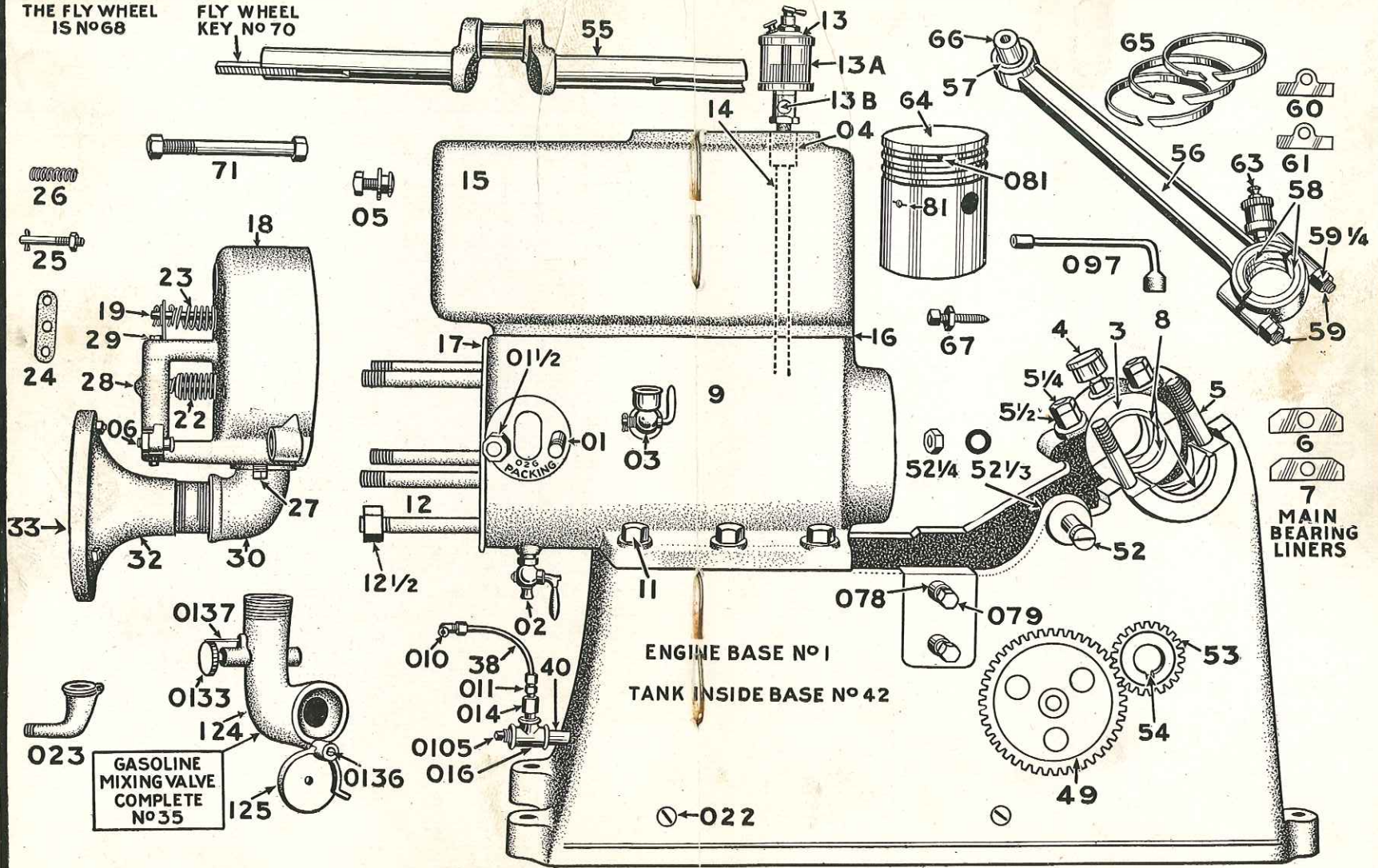


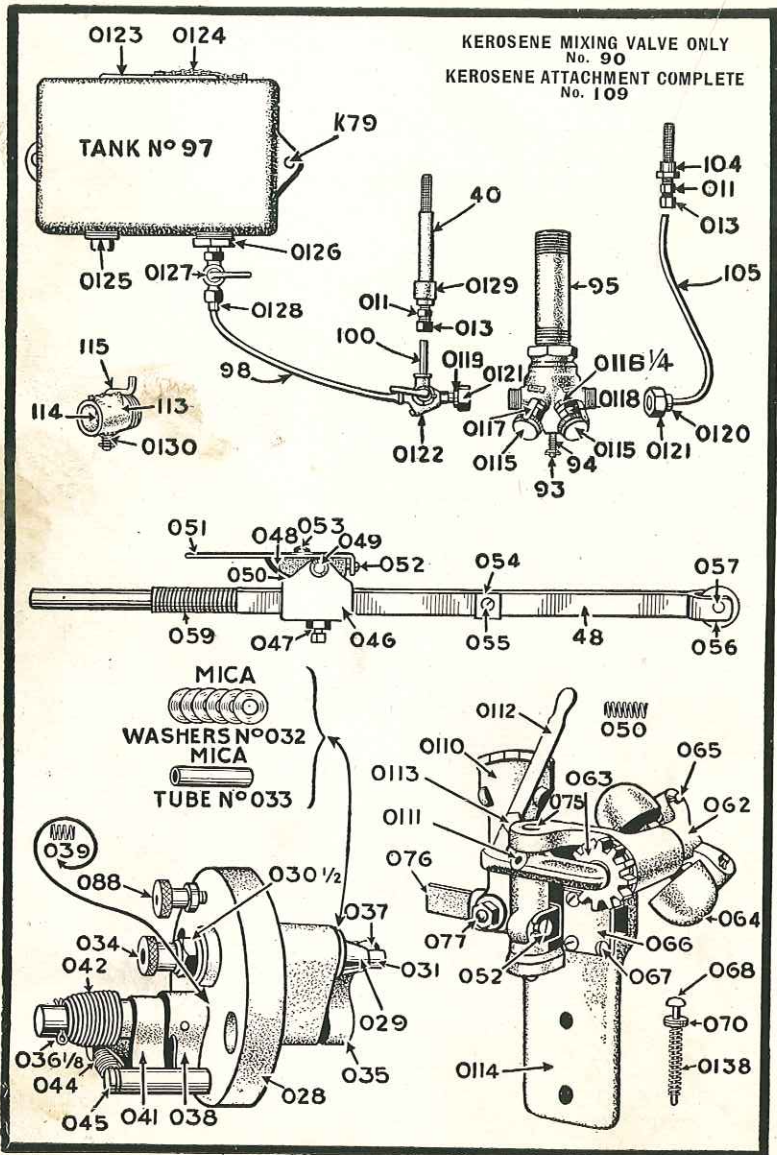
Figure 9.

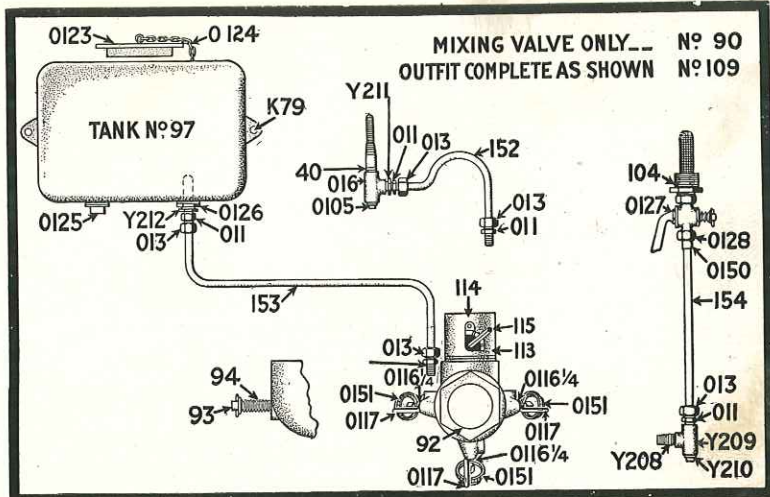
IMPORTANT. The adjusting screw "E" as shown in Figure 9 should always be set so it will just touch the push finger "G" when the spring arm "C" is in a horizontal position.

THE FLY WHEEL IS NO 68

FLY WHEEL KEY NO 70







Be Sure When Ordering to Give the Number of Your Engine.

Part No.	Description	Horse-Power					
		1½	2½	5	7	9	12
47E01	*Igniter Stud.....	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08	\$0.08
47E01½	*Igniter Stud Nut.....	.06	.06	.06	.06	.06	.06
47E02	*Drain Cock.....	.35	.35	.35	.35	.35	.35
47E03	*Priming Cup.....	..	..	.35	.35	.35	.35
47E04	*Oilier Pipe Coupling.....	..	.10	.10	.10	.10	.10
47E05	*Water Reservoir Bolt.....	..	.10	.10	.10	.10	.10
47E06	*Valve Lever Adjusting Screw..	.10	.10	.10	.10	.10	.10
47E010	*Angle Connection.....	.20	.20	.20	.20	.20	.20
47E011	*Straight Connection.....	.25	.25	.25	.25	.25	.25
47E013	*Pipe Union and Coupling.....	..	.25	.25	.25	.25	.25
47E014	*Straight Valve Cage.....	.30	.30	.30	.30	.30	.30
47E015	*Check Valve.....	.10	.10	.10	.10	.10	.10
47E016	*Pipe Tee.....	.15	.15	.15	.15	.15	.15
47E022	*Tank Rod.....	.15	.25	.25	.25	.30	.30
47E023	*Filler Pipe.....	.25	.25	.25	.25	.25	.25
47E026	*Igniter Gasket.....	.10	.10	.10	.10	.10	.10
47E027	*Igniter Complete.....	2.00	2.50	2.50	2.50	2.50	2.50
47E028	*Igniter Body.....	.25	.35	.35	.35	.35	.35
47E029	*Stationary Electrode.....	.15	.15	.15	.15	.15	.15
47E030½	*Stationary Electrode Nut.....	.05	.05	.05	.05	.05	.05
47E031	*Stationary Electrode Point.....	.08	.08	.08	.08	.08	.08
47E032	*Insulating Washers (set).....	.06	.08	.08	.08	.08	.08
47E033	*Insulating Tube.....	..	.10	.10	.10	.10	.10
47E034	*Binding Nut.....	.10	.10	.10	.10	.10	.10
47E035	*Movable Electrode.....	.25	.30	.30	.30	.30	.30
47E036¼	*Cotter Pin.....	.05	.05	.05	.05	.05	.05
47E037	*Movable Electrode Point.....	.08	.08	.08	.08	.08	.08
47E038	*Igniter Anvil.....	.15	.15	.15	.15	.15	.15
47E039	*Igniter Anvil Seating Spring...	..	.08	.08	.08	.08	.08
47E041	*Igniter Trip.....	.30	.30	.30	.30	.30	.30
47E042	*Igniter Tension Spring.....	.08	.08	.08	.08	.08	.08
47E044	*Igniter Trip Spring.....	.08	.08	.08	.08	.08	.08

NOTE—All items marked (*) will be shipped by parcel post, postage paid.

Be Sure When Ordering to Give the Number of Your Engine.

Part No.	Description	Horse-Power					
		1½	2½	5	7	9	12
47E045	*Igniter Stop Pin.....	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05	\$0.05
47E046	*Igniter Trip Bracket.....	.35	.50	.50	.50	.50	.50
47E047	*Set Screw and Locknut.....	.10	.10	.10	.10	.10	.10
47E048	*Igniter Trip Lever.....	.15	.30	.30	.30	.30	.30
47E049	*Igniter Trip Lever Pin with Cotter Pin .....	.08	.08	.08	.08	.08	.08
47E050	*Igniter Trip Lever Spring....	.08	.08	.08	.08	.08	.08
47E051	*Igniter Trip Lever Blade.....	.10	.10	.10	.10	.10	.10
47E052	*Trip Lever or Detent Blade Adjusting Screw .....	.08	.08	.08	.08	.08	.08
47E053	*Igniter Trip Blade Locknut..	.06	.06	.06	.06	.06	.06
47E054	*Detent Catch Block.....	.15	.20	.20	.20	.20	.20
47E055	*Catch Block Screw.....	.05	.05	.05	.05	.05	.05
47E056	*Cam Roller .....	.15	.20	.20	.20	.20	.20
47E057	*Cam Roller Pin.....	.10	.10	.10	.10	.10	.10
47E058	*Cam Roller Pin Dowel.....	.06	.06	.06	.06	.06	.06
47E059	*Cam Rod Spring.....	.08	.08	.08	.08	.08	.08
47E060	*Governor, complete	3.00	3.50	3.50	3.50	3.50	3.50
47E062	*Governor Spindle .....	.40	.50	.50	.50	.50	.50
47E063	*Governor Pinion .....	.35	.35	.35	.35	.35	.35
47E064	*Governor Ball .....	.15	.15	.15	.15	.15	.15
47E065	*Governor Weight Pin with Cotter Pin .....	.06	.08	.08	.08	.08	.08
47E066	*Governor Bracket Plate.....	.10	.10	.10	.10	.10	.10
47E067	*Bracket Plate Screw .....	.06	.06	.06	.06	.06	.06
47E068	*Governor Spindle Rod.....	.20	.25	.25	.25	.25	.25
47E070	*Speed Changing Washer.....	.05	.05	.05	.05	.05	.05
47E075	*Detent Lever Pin.....	.08	.08	.08	.08	.08	.08
47E076	*Detent Blade .....	.10	.10	.10	.10	.10	.10
47E077	*Detent Locknut, complete....	.10	.10	.10	.10	.10	.10
47E078	*Governor Bracket Dowels....	.06	.06	.06	.06	.06	.06
47E079	*Cap Screws .....	.06	.08	.08	.08	.08	.08
47E081	*Piston Ring Pin.....	.06	.06	.06	.06	.06	.06
47E088	*Binding Screw .....	.10	.10	.10	.10	.10	.10
47E090	xDry Cell Battery.....	.35	.35	.35	.35	.35	.35
47E091	*Coil and Switch.....	.65	.65	.65	.65	.65	.65
47E093	*Battery Wire with Terminals..	.15	.15	.15	.15	.15	.15
47E094	*Battery Wire, short.....	.06	.06	.06	.06	.06	.06
47E097	*Igniter Wrench .....	.20	.20	.20	.20	.20	.20
47E098	*Oil Can .....	.35	.35	.35	.35	.35	.35
47E0105	*¼-Inch Drain Plug.....	.10	.10	.10	.10	.10	.10
47E0110	*Speed Change Body .....	.25	.25	.25	.25	.25	.25
47E0111	*Detent Lever .....	.23	.25	.32	.35	.40	.45
47E0112	*Speed Change Lever.....	.05	.05	.05	.05	.05	.05
47E0113	*Speed Lever Screw.....	.05	.05	.05	.05	.05	.05
47E0114	*Governor Bracket .....	.50	.75	.75	.75	.75	.75
47E0115	*Needle Valve and Dial.....	.12	.12	.12	.12	.12	.12
47E0116	*Needle Valve Sleeve.....	.15	.15	.15	.15	.15	.15
47E0116¼	*Dial Pointer Nut.....	.15	.15	.15	.15	.15	.15
47E0117	*Dial Pointer .....	.15	.15	.15	.15	.15	.15
47E0118	*Needle Valve Packing Nut....	.16	.16	.16	.16	.16	.16
47E0119	*Union and Nut, Fuel.....	.50	.50	.50	.50	.50	.50
47E0120	*Water Union .....	.15	.15	.15	.15	.15	.15
47E0121	*Nut, Water .....	.65	.65	.65	.65	.65	.65
47E0122	*Three-Way Cock .....	.95	.95	.95	.95	.95	.95
47E0123	*Gasoline Tank Cover.....	.15	.15	.15	.15	.15	.15
47E0124	*Tank Cover Chain.....	.10	.10	.10	.10	.10	.10
47E0125	*Pipe Plug .....	.10	.10	.10	.10	.10	.10
47E0126	*Bushing .....	.10	.10	.10	.10	.10	.10

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

Be Sure When Ordering to Give the Number of Your Engine.

Part No.	Description	Horse-Power							
		1½	2½	5	7	9	12		
47E0127	*Shut Off Cock.....	..	..	.30	.30	.30	.30	.30	.30
47E0128	*Pipe Coupling.....	..	..	.16	.16	.16	.16	.16	.16
47E0129	*Reducing Bushing.....	..	..	.15	.15	.15	.15	.15	.15
47E0130	*Air Damper Valve Spring.....	..	..	.15	.15	.15	.15	.15	.15
47E0133	*Fuel Valve.....	.25	.25	.25	.25	.25	.25	.25	.25
47E0136	*Damper Screw.....	.05	.05	.05	.05	.05	.05	.05	.05
47E0137	*Fuel Valve Spring.....	.05	.05	.05	.05	.05	.05	.05	.05
47E0138	*Governor Spindle Spring.....	.08	.08	.08	.08	.08	.08	.08	.08
47E0142	*Detent Spring.....	.06	.06	.06	.06	.06	.06	.06	.06
47E0150	*Sleeve for Shut Off Cock.....	.09	.09	.09	.09	.09	.09	.09	.09
47E1	xBase (Stationary).....	7.50	6.50	10.00	18.50	32.50	45.00		
47E2	xBase (Mounting).....	..	..	..	18.50	32.50	45.00		
47E3	*Base Cap.....	.45	.65	.85	1.15	1.35	1.50		
47E4	*Main Bearing Grease Cup.....	.25	.35	.40	.45	.50	.50		
47E5	*Base Cap Stud.....	.15	.18	.18	.25	.25	.25		
47E5¼	*Main Bearing Locknut.....	.06	.08	.08	.08	.08	.08		
47E5½	*Main Bearing Stud Nut.....	.06	.08	.08	.08	.08	.08		
47E6	*Bearing Liners, thick, per set... .	.10	.15	.15	.15	.15	.15		
47E7	*Bearing Liners, thin, per set... .	..	.15	.15	.15	.15	.15		
47E8	*Main Bearings (2 halves).....	.75	.95	1.50	2.50	2.75	3.50		
47E9	xCylinder.....	..	4.75	6.75	9.00	14.00	18.50		
47E11	*Cylinder Cap Screw.....	..	.08	.08	.12	.12	.12		
47E12	*Cylinder Head Stud.....	.20	.25	.25	.30	.35	.35		
47E12½	*Cylinder Head Stud Nut.....	.06	.06	.08	.10	.12	.12		
47E13	*Sight Feed Oiler, complete.....	.75	.85	.85	1.00	1.25	1.25		
47E13A	*Large Glass for Oiler.....	.30	.35	.35	.40	.45	.50		
47E13B	*Small Glass for Oiler.....	.20	.20	.20	.20	.20	.20		
47E14	*Oiler Pipe.....	..	.18	.18	.20	.25	.25		
47E15	xWater Reservoir.....	..	1.95	2.75	3.50	4.50	6.25		
47E16	*Water Reservoir Gasket.....	..	.75	.80	.95	1.25	1.50		
47E17	*Cylinder Head Gasket.....	.35	.35	.50	.75	.95	1.25		
47E18A	xCylinder Head Complete with Valves, Springs, etc.....	3.00	4.25	5.25	6.50	7.80	9.90		
47E18	xCylinder Head only.....	1.50	2.10	3.15	3.95	5.10	6.15		
47E19	*Exhaust or Inlet Valve.....	.25	.30	.35	.40	.45	.50		
47E22	*Exhaust Valve Spring.....	.10	.10	.10	.10	.10	.10		
47E23	*Inlet Valve Spring.....	.10	.10	.10	.10	.10	.10		
47E24	*Valve Lock Lever.....	..	.10	.10	.10	.15	.15		
47E25	*Valve Lock Stud.....	..	.10	.10	.10	.10	.10		
47E26	*Valve Lock Spring.....	..	.08	.08	.08	.08	.08		
47E27	*Pipe Plug.....	..	.06	.06	.06	.06	.06		
47E28	*Valve Lever.....	.30	.35	.40	.45	.50	.60		
47E29	*Valve Lever Pin.....	.08	.10	.10	.10	.16	.16		
47E30	*Street Elbow.....	.20	.22	.27	.35	.65	.95		
47E32	*Muffler Body with Nipple.....	.75	1.10	1.35	1.55	1.90	2.80		
47E33	*Muffler Cap only.....	.50	.75	.90	1.10	1.35	1.45		
47E33A	*Muffler Complete with Nipple and Cap.....	1.25	1.85	2.25	2.65	3.15	4.25		
47E35	*Gasoline Mixing Valve Complete	1.85	2.00	2.50	2.75	3.25	3.50		
47E38	*Supply Pipe and Connectors... .	.45	.45	.45	.45	.45	.45		
47E40	*Strainer Nipple.....	.40	.40	.40	.40	.40	.40		
47E42	*Gasoline Tank.....	1.50	1.85	2.35	2.45	2.95	3.25		
47E48	*Cam Rod.....	.80	.90	1.00	1.10	1.25	1.45		
47E49	*Cam Gear.....	.95	1.10	1.15	1.50	1.65	1.75		
47E52	*Cam Gear Stud.....	.10	.25	.30	.35	.40	.45		
47E52¼	*Cam Gear Stud Nut.....	.06	.08	.08	.10	.10	.10		
47E52½	*Cam Gear Lock Washer.....	.06	.06	.06	.06	.06	.06		
47E53	*Crankshaft Pinion.....	.50	1.80	2.15	2.45	2.50	2.75		
47E54	*Crankshaft Pinion Key.....	.06	.08	.08	.08	.08	.08		
47E55	xCrankshaft.....	3.00	4.35	6.50	8.50	10.75	15.00		
47E56	Connecting Rod.....	*1.50	*2.75	*3.25	*4.25	*5.00	*6.25		
47E57	*Connecting Rod Bushing.....	.20	.25	.30	.35	.40	.45		
47E58	*Connecting Rod Bearing (2 halves).....	.65	.75	1.15	1.50	1.85	2.50		
47E59	*Connecting Rod Bolt with Cotter Pin.....	.30	.30	.30	.40	.45	.50		
47E59¼	*Connecting Rod Nut.....	.06	.06	.06	.08	.08	.08		

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Be Sure When Ordering to Give the Number of Your Engine.

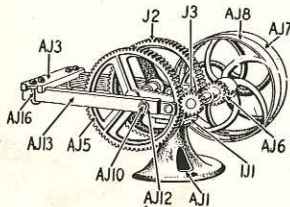
Part No.	Description	Horse-Power							
		1½	2½	5	7	9	12		
47E60	*Connecting Rod Liners, thick, per set....	\$ 0.10	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15	\$ 0.15
47E61	*Connecting Rod Liners, thin, per set....	.15	.15	.15	.15	.15	.15	.15	.15
47E63	*Connecting Rod Grease Cup.....	.25	.30	.35	.40	.45	.45	.45	.45
47E64	Piston	*1.25	*1.70	*2.10	x2.50	x3.25	x4.00		
47E65	*Piston Ring .....	.25	.30	.40	.45	.50	.65		
47E66	*Piston Pin .....	.35	.40	.45	.50	.75	1.15		
47E67	*Piston Pin Set Screw with Locknut.....	.06	.06	.08	.08	.10	.10		
47E68	xFlywheel (each)	2.75	5.50	10.00	15.75	25.00	32.50		
47E70	*Flywheel Key.....	.08	.08	.10	.10	.10	.15		
47E71	*Flywheel Bolt .....	.20	.20	.20	.25	.25	.25		
47EK79	*Gasoline Tank Screws (4).....	. . .	. . .	.15	.15	.15	.15		
47E79	*Machine Bolt for Pulley.....	. . .	.08	.10	.10	.15	.15		
47E80	*Pulley Stud with Nut.....	. . .	.12	.12	.12	.14	.16		
47E80	*Pulley Set Screw on ½ II. P.....	.10	. . .	. . .	. . .	. . .	. . .
47E81	*Piston Oil Tube.....	.35	.35	.35	.35	.35	.35		
47E90	*Kerosene Mixing Valve Complete.....	. . .	. . .	6.68	8.03	8.03	12.75		
47E92	*Mixing Valve Cap.....	. . .	. . .	2.15	3.15	3.50	4.25		
47E93	*Mixing Valve Head and Stem.....	. . .	. . .	1.50	2.10	2.10	3.00		
47E93½	*Mixing Valve Stem Washer.....	. . .	. . .	.10	.10	.10	.10		
47E93¾	*Mixing Valve Stem Cotter Pin.....	. . .	. . .	.10	.10	.10	.10		
47E94	*Mixing Valve Stem Spring.....	. . .	. . .	.20	.25	.25	.30		
47E95	*Mixing Valve Connecting Nipple.....	. . .	. . .	.25	.35	.35	.50		
47E97	*Gasoline Tank .....	. . .	. . .	1.50	1.50	1.50	1.50		
47E98	*Gasoline Tank Copper Tubing (Stationary).....	. . .	. . .	.70	.85	.90	1.10		
47E99	*Gasoline Tank Copper Tubing (Mounting).....	. . .	. . .	.70	.85	.90	1.10		
47E100	*Kerosene Tank Copper Tubing (Stationary).....	. . .	. . .	.45	.50	.55	.60		
47E101	*Kerosene Tank Copper Tubing (Mounting).....	. . .	. . .	.45	.50	.55	.60		
47E104	*Water Strainer and Bushing.....	. . .	. . .	.30	.30	.30	.30		
47E105	*Water Conn. Copper Tubing (Stationary).....	. . .	. . .	.45	.50	.55	.65		
47E106	*Water Conn. Copper Tubing (Mounting).....	. . .	. . .	.45	.50	.55	.65		
47E109	Kerosene Mixer, Complete with Tank and Piping, as shown above.....	. . .	. . .	9.90	11.93	11.93	16.58		
47E113	*Air Damper Body.....	. . .	. . .	.85	.90	.95	1.10		
47E114	*Air Damper Valve.....	. . .	. . .	.30	.35	.35	.45		
47E114½	Cotter Pin for Air Damper.....	. . .	. . .	.10	.10	.10	.10		
47E115	*Air Damper Valve Stem.....	. . .	. . .	.55	.55	.55	.55		
47E115½	*Cotter Pin for Valve Stem.....	. . .	. . .	.10	.10	.10	.10		
47E124	*Mixing Valve Body.....	.60	.60	.60	.75	.75	.75		
47E125	*Mixing Valve Damper.....	.14	.14	.14	.17	.17	.17		
47E132	*Kerosene Fuel Pipe.....	. . .	. . .	.45	.50	.56	.60		
47E133	*Gasoline Fuel Valve.....	. . .	. . .	.71	.86	.90	1.11		
47E134	*Water Feed Pipe.....	. . .	. . .	.45	.50	.56	.66		
47EY208	*Close Nipple .....	. . .	. . .	.08	.08	.08	.08		
47EY209	*Pipe Tee .....	. . .	. . .	.09	.09	.09	.09		
47EY210	*Pipe Plug .....	. . .	. . .	.06	.06	.06	.06		
47EY211	*Reducing Bushing .....	. . .	. . .	.08	.08	.08	.08		
47EY212	*Reducing Bushing .....	. . .	. . .	.30	.30	.30	.30		
47E0151	*Throttle Stem .....	. . .	. . .	.35	.35	.35	.35		
47E0150	*Sleeve for Shut-Off Cock.....	. . .	. . .	.09	.09	.09	.09		

Horizontal Belt Driven Pump Jack Parts.

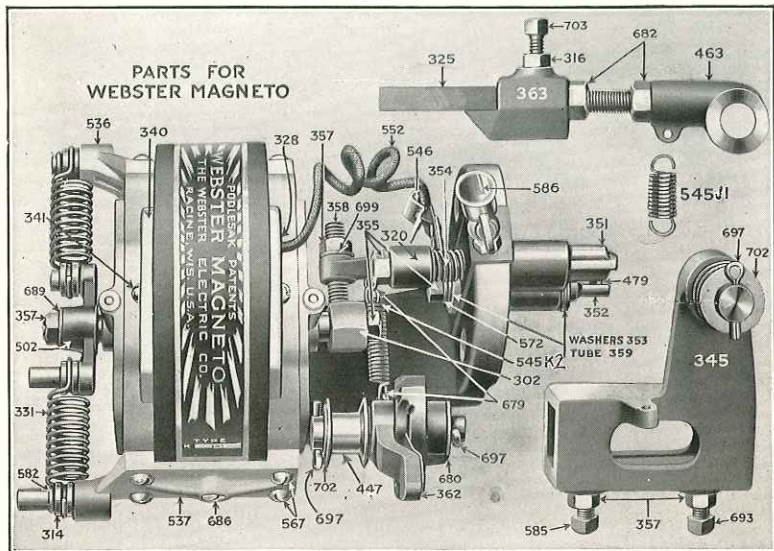
No. 47E310

Part No.	Description	Price
47EAJ1	xSub-Base	\$2.03
47EAJ1	xMain Base.....	2.25
47EJ2	*Crank Gear	2.10
47EJ3	*Pinion .....	.98
47EAJ3	*Crosshead .....	.83
47EAJ5	*Large Gear	2.33
47EAJ6	*Small Gear with Shaft.....	1.28
47EAJ7	*Tight Pulley	2.03
47EAJ8	*Loose Pulley	2.03
47EAJ10	*Crank Pin with Nut and Cotter Pin.....	.45
47EAJ12	*Crank Pin Washer.....	.15
47EAJ13	*Pump Arms (each).....	.60
47EAJ16	*Crosshead Clamp23

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Be sure to give TYPE and NUMBER of magneto when ordering repair parts.



Part No.	Description	Price	Part No.	Description	Price
47E302	Push Finger.....	\$0.50	47E502	Spring Arm.....	\$0.50
47E303	Bracket, Complete.....	5.00	47E536	Magnet Clamp (short pin)....	.25
47E314	Spring Roller.....	.15	47E537	Magnet Clamp (long pin)....	.25
47E316	Nut for Set Screw.....	.05	47E542	Key (Shafts or Electrode)....	.05
47E320	Electrode Arm.....	.25	47E545	Journal Spring.....	.10
47E325	Push Rod.....	.30	47E545K	Electrode Arm Spring.....	.10
47E328	Fiber Bushing.....	.05	47E546	Plug Terminal—Bronze.....	.15
47E331	Inductor Spring.....	.10	47E552	Terminal Wire.....	.10
47E339	Shaft Washer.....	.05	47E552	Clamp Screw.....	.05
47E340	Top Cover.....	.35	47E572	Electrode Washer.....	.05
47E341	Cover Screw.....	.05	47E577	Starting Lever.....	.20
47E345	Valve Rod Clamp.....	.75	47E582	Split King.....	.05
47E351	Movable Electrode and Point.	.75	47E585	Set Screw (sharp point).....	.05
47E352	Stationary Electrode and Point	.60	47E586	Priming Cup.....	.35
47E353	Insulating Washer.....	.05	47E592	Eccentric Washer.....	.05
47E354	Electrode Spring.....	.10	47E680	Eccentric Washer.....	.10
47E355	Nut.....	.05	47E682	Push Rod Nut.....	.05
47E357	Nut.....	.05	47E686	Magnet Bar Set Screw.....	.05
47E358	Adjusting Screw.....	.10	47E689	Washer for Spring Arm Nut....	.05
47E359	Mica Tube.....	.20	47E693	Set Screw (cup point).....	.05
47E362	Control Lever.....	.75	47E697	Eccentric Cotter Ph.....	.05
47E363	Wedge.....	.20	47E699	Adjustable Screw Lock Washer	.05
47E447	Wedge.....	.20	47E702	Roller Washer.....	.05
47E463	Push Rod Roller.....	.20	47E703	Wedge Set Screw.....	.05
47E463	Push Rod Journal.....	.30	47E708	Wedge Set Screw Nut.....	.05
47E479	Spark Point.....	.20			

NOTE—All items shipped by parcel post, postage paid.

BUY A MAGNETO FOR YOUR ENGINE.

It will do away with the batteries entirely as it starts the engine on one turn of the flywheel winter or summer, and we guarantee it to furnish a satisfactory spark as long as the engine lasts. Full instructions sent with each magneto telling just how to put it on. Shipping weight, 15 pounds.

PRICES FOR WEBSTER MAGNETO.

No. 47E338	Webster Magneto complete for 1½ Horse-Power Engine. Price.....	\$ 7.50
No. 47E334	Webster Magneto complete for 2½ or 5 Horse-Power Engine. Price.....	9.50
No. 47E335	Webster Magneto complete for 7 Horse-Power Engine. Price.....	10.50

Be sure to give TYPE and NUMBER of magneto when ordering repair parts.

FRICTION CLUTCH PULLEYS.

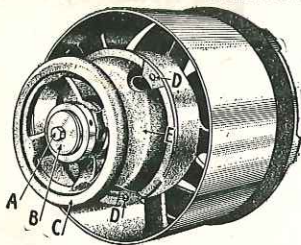


Figure 6.

This releases pulley "H," so it can be taken off.

To put on the new pulley you simply reverse the above operations. Be sure the screws "F" and "D" and the cap screw "A" are tight, to prevent them from working loose while the pulley is running.

The pulley will stand still when hand wheel "C" is pulled out. To start pulley, push hand wheel "C" in toward the engine. When engaging the clutch push the hand wheel "C" in slowly.

IMPORTANT—Be sure to oil clutch pulley every time you run the engine. To oil clutch remove iron plug in pulley hub; use regular gasoline engine oil and be sure to replace plug. If pulley is furnished with grease cup, fill grease cup and turn down top one-half turn every time you run the engine.

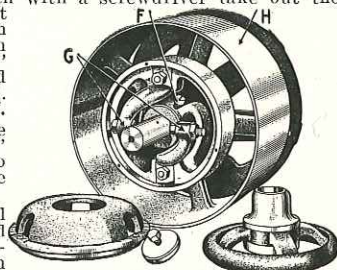
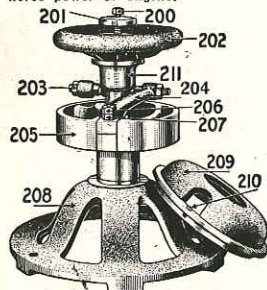


Figure 7.

CLUTCH PULLEY PARTS.

Be sure when ordering parts for clutch to give size of handwheel, diameter and face of pulley and horse power of engine.



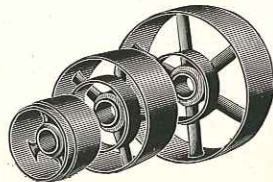
Part No.	Description	Prices on Pulley Parts for 2 1/2, 5 and 7 Horse-Power	Prices on Pulley Parts for 9 and 12 Horse-Power
*47E200	Bolt.....	\$0.03	\$0.03
*47E201	Washer.....	.15	.15
*47E202	Hand Wheel.....	.82	1.05
*47E203	Adjusting Screw.....	.12	.12
*47E204	Clutch Dog, each.....	.30	.45
x47E205	Friction.....	3.83	6.00
*47E206	Locknut.....	.02	.02
*47E207	Nut.....	.02	.02
x47E208	Pulley Frame.....	2.10	4.75
*47E209	Clutch Cover.....	1.05	1.35
*47E210	Set of 3 Screws.....	.08	.08
*47E211	Cam.....	1.05	1.05
x47E212	Pulley Shaft.....	.75	.75
*47E213	Threaded Clutch Collar.....	.22	.22
*47E214	Shaft Set Screw.....	.08	.08
*47E215	Key for Friction.....	.15	.15

NOTE—All parts marked (*) will be shipped by parcel post, postage paid, at prices shown. Parts marked (x) will be shipped by express collect.

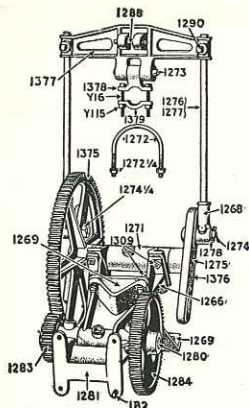
No. 47E329 CLUTCH PULLEY RIMS ONLY.

2 1/2, 5 and 7 Horse-Power.		Price
Size, Inches	Weight	
8x4 Rim	15 pounds	\$1.88
12x6 Rim	23 pounds	3.45
16x6 Rim	45 pounds	4.27
9 and 12 Horse-Power.		Price
Size, Inches	Weight	
16x8 Rim	55 pounds	\$ 5.18
20x8 Rim	65 pounds	10.35
24x8 Rim	90 pounds	11.67
30x8 Rim	150 pounds	16.42

Shipped by freight from factory in Ohio.



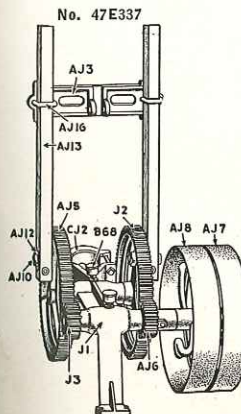
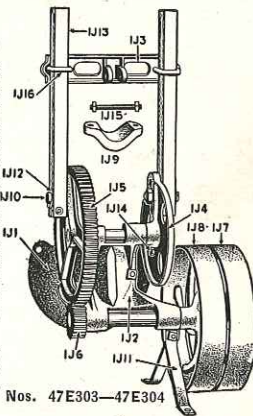
Direct Connected Vertical and Horizontal Pump Jack Parts.



Part No.	Description	Price
47E182	*Cap Screw	\$0.10
47E1266	*Gear Bracket, Weight, 12 pounds	1.15
47E1268	*Pump Rod Head with Pin	.50
47E1269	*Stand	.90
47E1271	*Pump Gear Bearing	.90
47E1272	*Vertical Pump Clamp	.06
47E1272 1/4	*Nut for Clamp	.05
47E1273	*Pump Lever Pin	.06
47E1274	*Pump Rod Stud	.15
47E1274 1/4	*Nut for No. 47E1274	.08
47E1275	*Large Pump Gear Shaft	.75
47E1276	*Horizontal Short Pump Rod	.35
47E1277	*Vertical Long Pump Rod	.75
47E1278	*Washer for Pump Rod Stud	.05
47E1280	*Small Gear Shaft	.60
47E1281	*Engine End Bracket	1.50
47E1283	*Pinion with Pin	.95
47E1284	*Gear with Pin, Weight, 10 pounds	1.45
47E1288	*Vertical Pump Rod Pin	.20
47E1300	*Set Screws	.05
47E1309	*Bolt for Stand	.06
47E1375	*Crank Gear with Pin, Weight, 17 pounds	2.10
47E1376	*Bell Crank with Pin	.95
47E1377	*Crosshead	1.35
47E1378	*Pump Handle Clamp	.50
47E1379	*Clamp Cap	.25
47EY16	*Cap Screw	.10
47EY115	*Nut	.05

Single Gear Belt Driven Pump Jack Parts.

Part No.	Description	Nos. 47E303 and 47E304	Price
47E1J1	*Sub Base		2.03
47E1J2	*Main Base		2.48
47E1J3	*Cross Head		.83
47E1J4	*Crank Disc		1.13
47E1J5	*Large Gear and Shaft		2.33
47E1J6	*Small Gear and Shaft		1.28
47E1J7	*Tight Pulley with Set Screw		2.03
47E1J8	*Loose Pulley		2.03
47E1J9	*Clamp		.45
47E1J10	*Crank Pin and Nut		.45



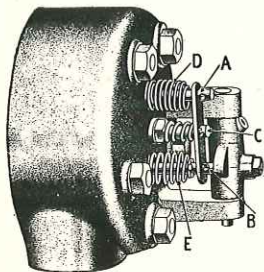
47E1J11	*Brace with Nut	.23
47E1J12	*Crank Pin Washer	.15
47E1J13	*Pump Arms, each	.60
47E1J14	*Set Screw for Crank Disc	.15
47E1J15	*Clamp Bolt	.23
47E1J16	*Cross Head Clamp	.23

Double Geared Belt Driven Pump Jack Parts.

Part No.	Description	No. 47E337	Price
47E1J1	*Main Base		\$3.00
47E1J2	*Crank Gear		2.10
47E1J3	*Cross Head		.83
47E1J5	*Large Gear		2.33
47E1J6	*Small Gear with Shaft		1.28
47E1J7	*Pinion		.98
47E1J7	*Tight Pulley		2.03
47E1J8	*Loose Pulley		2.03
47E1J12	*Clamp		.45
47E1J10	*Crank Pin with Nut and Cotter Pin		.45
47E1J12	*Crank Pin Washer		.15
47E1J13	*Pump Arms, each		.60
47E1J16	*Cross Head Clamp, each		.23
47EB88	*Grease Cup		.30
47E14	*Pulley Set Screw		.10

NOTE—All parts marked (*) will be shipped by parcel post, postage paid. All other items will be shipped by express collect.

INLET AND EXHAUST 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 gasoline at the mouth of the mixer loosen the locknut on valve lock stud "C" and screw stud out one turn and fasten locknut. If engine does not get enough fuel loosen locknut as above and screw stud in one turn and fasten locknut.

When the gas is at the highest point of compression the spark occurs, an explosion takes place and the piston is forced out on the work stroke. It is then necessary to get rid of the burnt gas so that a new mixture can be drawn into the cylinder for the next explosion.

At the end of the work stroke the piston starts back on an inward stroke, and the cam on the cam gear pushes the cam rod toward the cylinder head. This works the lever on the head of the engine and opens the exhaust valve "B" and the inward moving piston forces the burnt gas out through the muffler.

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 pumice stone with oil. (You can get pumice stone at most 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 around.

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.

REPACKING THE CYLINDER HEAD.

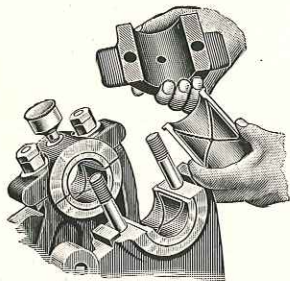
We use a special graphite asbestos packing between the cylinder and cylinder head to prevent the escape of the compressed gas.

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. 47E17 on page 21. If you use the ordinary asbestos packing, soak it in linseed oil; if you buy our special graphite asbestos packing, 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.

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.



The Main Bearings.

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. Be careful when taking up wear in bearings not to get them too tight.

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. A bearing should be neither too tight nor too loose; it must fit snug and the engine never be allowed to run when it is loose, as it will rack the engine and may break something. 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.

BEARINGS.

The main bearings and crankshaft end of connecting rod have die cast bearings which fit perfectly into the machined bearings. The piston end of the connecting rod has a cast bushing.

All the bearings can easily be replaced; the bearing in the piston end of the connecting rod can be driven out and a new one driven in.

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

PISTON AND RINGS.

As explained on page 6 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.

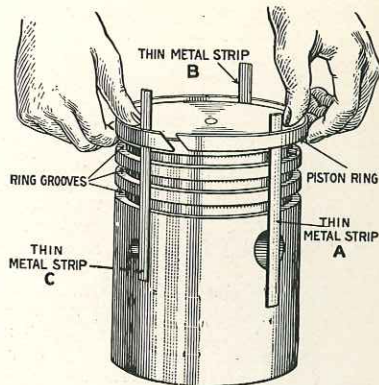


Figure 10.

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.

To remove the piston from the cylinder 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.

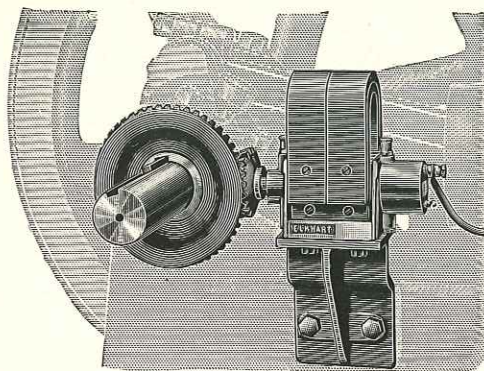
If you find the piston rings are gummed or held tight in the grooves, they must be thoroughly cleaned. To do this you will have to remove the rings and wash them in kerosene or gasoline and you may have to scrape them with a knife.

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 10, 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.

ELKHART BUILT-IN MAGNETO.

Furnished on 1914 Engines.



The magneto we furnish with the engine is part of the engine. It is properly adjusted and timed when it leaves the factory and should not be changed.

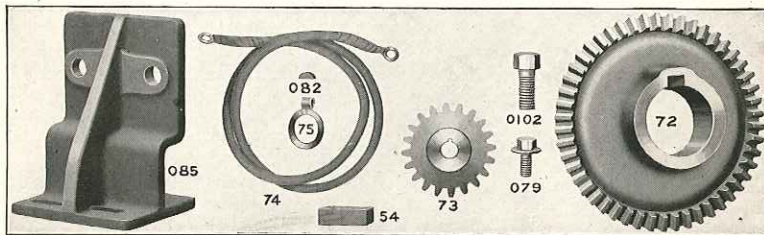
Leave the magneto alone. Do not change anything or take the magneto apart; all the attention the magneto requires is to oil the bearings with a few drops of sewing machine oil every week or ten days.

The magneto is waterproof and is connected to the igniter by water and oil proof cable; it will furnish a sufficient spark to start the engine by simply turning the flywheels as instructed on page 3; no batteries are needed.

When the magneto is put on the engine it is properly timed and the gears are marked with punch marks; two teeth on the side of the big gear and one tooth on the side of the small gear. If for any reason the magneto is removed, be sure to put it back so that the one marked tooth on the small gear goes in between the two marked teeth on the large gear.

Any adjustment of the spark to advance or retard it should be made with the igniter trip and not with the magneto. (See page 6.) If you think the spark does not occur at the right time or you do not get an explosion, do not blame the magneto or change it in any way.

MAGNETO AND BRACKET PARTS.



Part No.	Description	Horse-Power					
		1½	2½	5	7	9	12
47E079	*Hex. Head Cap Screw.....	\$0.06	\$0.06	\$0.06	\$0.06	\$0.06	\$0.06
47E082	*Pinion Key.....	.06	.06	.06	.06	.06	.06
47E085	*Magneto Bracket.....	.75	.90	1.00	1.10	1.20	1.25
47E0102	*Magneto Base Cap Screw.....	.06	.06	.06	.06	.06	.06
47E54	*Magneto Gear Key.....	.06	.06	.06	.06	.06	.06
47E72	*Magneto Gear.....	1.15	1.25	2.00	2.85	3.10	3.75
47E73	*Pinion.....	.50	.60	.65	.70	.75	.80
47E74	*Magneto Lead Wire with Terminals.....	.35	.35	.40	.50	.65	.65
47E75	*Magneto Lead Wire Clip.....		.06	.06	.06	.06	.06

NOTE—All items marked (*) will be shipped by parcel post, postage paid.

HOW TO START THE KEROSENE ENGINE.

First. See that all fuel and water valves are closed; that the fuel tanks are full and that the air damper is wide open.

Second. Put just enough water in the water reservoir to cover the cylinder about 1 inch.

Third. Turn on the oil by raising lever on lubricator; be sure it is feeding properly; screw down all grease cups.

Fourth. Open the gasoline valve on the mixer two full turns to the left, push up on the valve stem until the gasoline drips.

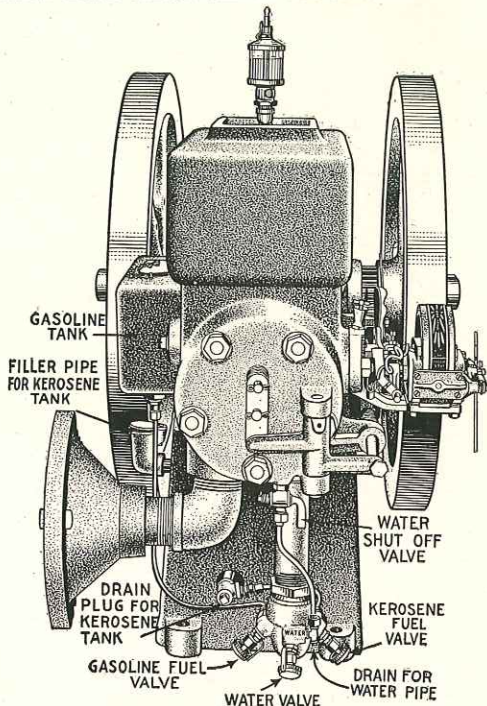
Fifth. Place the timing lever "J" (Figure 7) in the starting position.

Sixth. Turn the flywheels around 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.

Seventh. Take hold of a spoke in the flywheel and turn it around to the right rapidly five or six times and then release the detent blade, but continue to turn the flywheel until the engine starts.

Eighth. Change the timing lever "J" (Figure 7) to the running position and close the fuel valve slowly until the engine runs with the least number of explosions and without black smoke appearing at the exhaust or a popping sound at the mixer. This popping sound is caused by not enough fuel, and smoke at the exhaust indicates too much fuel.

Ninth. Let the engine run a few minutes, then start on whatever work you have to do and continue using gasoline until the supply in the small tank is nearly all used up, or until the water in the reservoir is boiling; then change to kerosene.



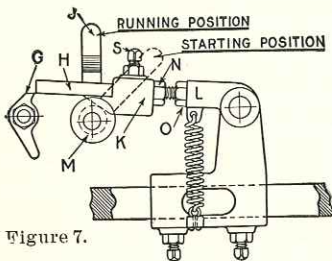


Figure 7.

TO CHANGE FROM GASOLINE TO KEROSENE AS FUEL.

First. Open the kerosene fuel valve about one-quarter of a turn farther than the gasoline valve. Then close the gasoline valve.

Second. Close the air damper (Figure 14) about two notches on the ratchet.

Third. Adjust the kerosene fuel valve until the engine runs regularly.

Fourth. Do not change the load on the engine. Let it continue to work until the water in the reservoir on top of the engine is boiling. Then add a little water from time to time until the reservoir is full, keeping the water boiling all the time.

The engine will give the best results when the water boils, as heat helps to vaporize the kerosene. It will not hurt the engine at all for the water to boil, for as long as you have water in the reservoir covering the cylinder it cannot get too hot.

Fifth. After the engine has been running on kerosene for about three or four minutes, open the water shut-off valve, then the **water valve** one-quarter turn or about eight notches on the dial, which admits warm water from the cylinder head into the mixing valve, where it is thoroughly mixed with the kerosene and air, allowing the engine on the suction stroke to take in a mixture that will burn clean and not leave any carbon deposit.

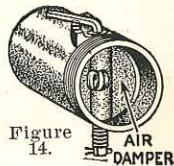


Figure 14.

Be careful never to use too much water, as the engine will lose power; on the other hand, if you do not use enough water there will be a slight pounding in the cylinder. To overcome this open the water valve one notch at a time until the pounding stops.

HOW TO STOP THE ENGINE.

First. Close the water valve by turning to the right as far as it will go.

Second. Fill the gasoline tank; close the kerosene fuel valve and open the gasoline valve, and let the engine run for a minute or two on gasoline. This will remove all the kerosene and water from the mixing valve so the engine will be easy to start the next time you want to use it.

Third. Close the gasoline fuel valve by turning to the right as far as it will go.

Fourth. Shut off the oil. In cold weather be sure to drain all the water out of the reservoir by opening the drain cock at the bottom of the cylinder and open the drain for water pipe on the mixer so the water will drain from this pipe and the cylinder head.

If you are working your engine on a big job running all day, when you shut down at noon your engine will be very hot. If you do not take more than an hour for lunch, when returning to work you can start the engine on kerosene direct and will not have to use the gasoline, as the engine will be hot enough to start on kerosene.

DENATURED ALCOHOL TO REMOVE CARBON.

Our method of mixing a little water with the kerosene and air allows the engine on the suction stroke to take in a mixture that will burn clean and not leave any carbon deposit in the cylinder or on the piston and rings.

If you watch the adjustment of the carburetor and are always sure to turn on the right amount of water when burning kerosene, you should not be troubled with carbon in the cylinder from the fuel you use.

If you feed too much kerosene or lubricating oil the extra quantity of either is liable to result in a carbon deposit in the cylinder or on the igniter, but by using denatured alcohol you can easily and quickly remove this carbon without having to take the engine apart.

Fill the small tank on the side of the engine cylinder with denatured alcohol and run the engine until the tank is empty. Do this once every two or three months and you will have very little trouble from carbon. If you are running your engine constantly day after day, it might be well for you to do this once a month.

Denatured alcohol is not expensive; it can be purchased at any drug store, and for this little expense once every two or three months you will be repaid many times over by the smoother running of your engine, no trouble from carbon and more power from the engine.

CAST IRON ENGINE PULLEYS.

Belt pulleys for transmitting power from the engine to the machines or line shaft should be of a certain size on each size engine to give the best results. The pulleys furnished on our engines are standard and should not be changed unless absolutely necessary.

No. 47E330 Cast Iron Engine Pulleys.

Size, In.	Wt., Lbs.	Price	Size, In.	Wt., Lbs.	Price
4x4	10	\$0.95	20x8	83	\$5.60
8x4	16	1.10	24x8	86	6.80
12x6	32	2.50	30x8	132	8.40
16x6	39	3.40			

It is not advisable to use a pulley any larger than 12x6 inches on the 1½-horse power; 16x6 inches on the 2½ or 5-horse power; 20x8 inches on the 7-horse power; 30x8 inches on the 9 and 12-horse power.