

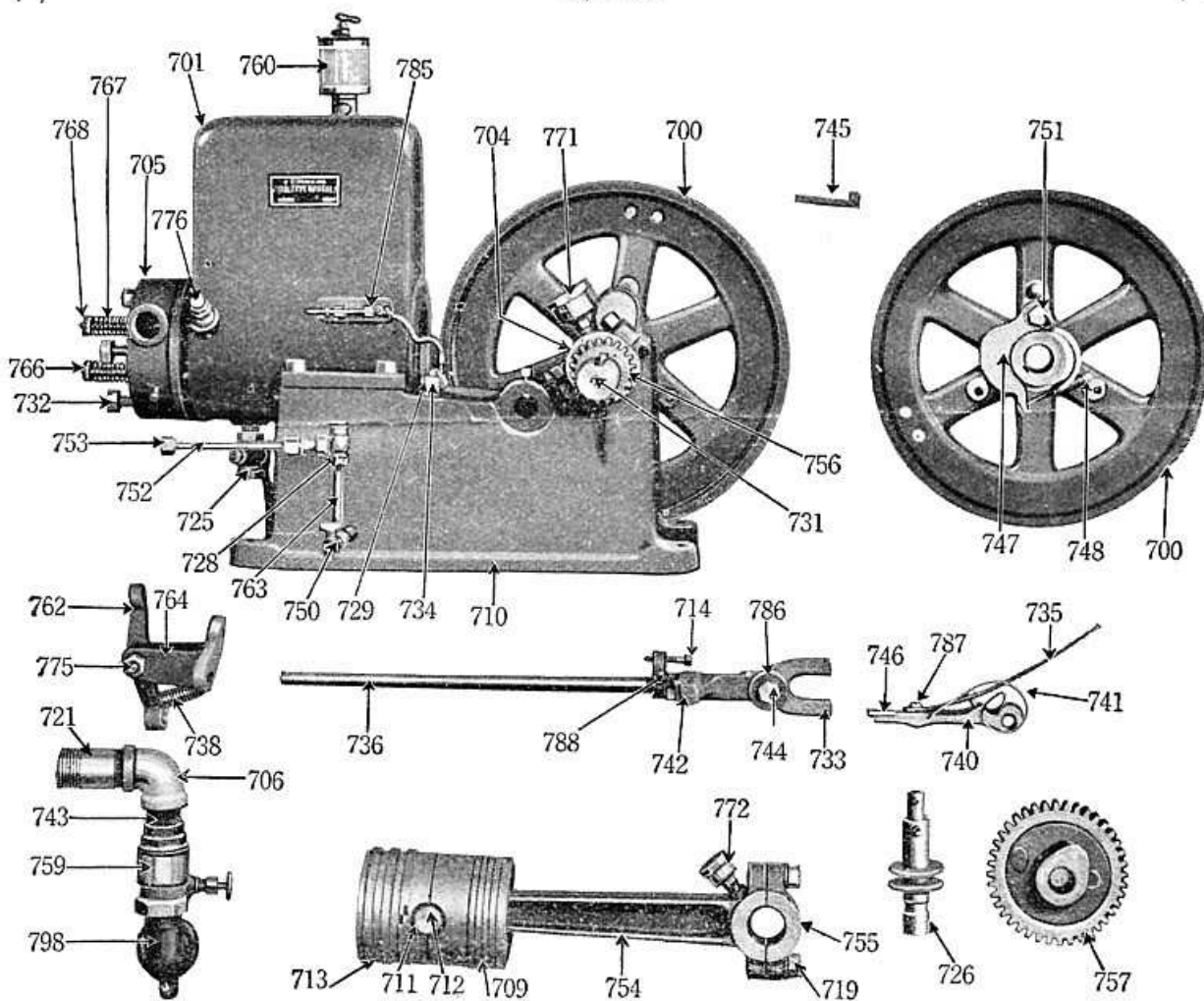
Instructions and Repair List FOR GASOLINE ENGINES

Canceling All Previous Price Sheets

Fig.



160



Repair Parts Price List on the Leader, 2 1-2 H.P. and 4 H.P. Engine, Fig. 160
WHEN ORDERING, GIVE NAME AS WELL AS NUMBER OF PARTS WANTED

FIELD FORCE PUMP CO.
MANUFACTURERS
ELMIRA, NEW YORK

COMMON SENSE

Gas engines are a good deal like human beings—properly cared for they are capable of good service; without proper care the life of the best of them is short and full of trouble. Constant attention to small disorders is worth more than frequent over-hauling. Guard against bad fuel as you would against unwholesome food. Don't forget that knocking and thumping is the way your engine coughs and a neglected cough may be fatal.

BEFORE STARTING

1st—Fill the lubricator oil cup with good grade of gas engine cylinder oil.

2nd—See that all electrical connections are tight.

3rd—Fill gasoline tank with gasoline and the hopper with water.

4th—Open needle valve by turning dial.

5th—Close damper on the air regulator if engine will not start while open.

6th—Apply the starting crank on the right hand side of the engine. This is the governor side. Give a few quick turns until you get an explosion. Then open air damper immediately and the engine will speed up. It may be necessary to turn the dial on the needle valve regulating the gasoline control a little either way until the engine is running the best when pulling load.

It is important to open the air damper immediately after the first explosion or the engine will become flooded with gasoline.

Do not stop the engine by turning off the gasoline.

After the engine is adjusted to the load to be pulled, do not turn the dial on the needle valve as the engine will not flood when standing still.

See that the sight feed lubricator is feeding from 4 to 5 drops per minute.

To stop engine, open switch.

POSSIBLE TROUBLES

If, after following these directions carefully the engine refuses to start, the trouble is usually due to some of the following:

Run down batteries.

Battery connectors loose or broken in transit.

No gasoline in tank.

Needle valve in connection with the carburetor No. 759 not opened.

Cylinder flooded with gasoline.

Contact on timing spring needs cleaning.

Vibrator on coil has been tampered with and screwed too tight or loose so that it does not vibrate.

Care should be taken in filling the tank with gasoline that no dirt or ingredients are admitted into the tank as this may cause the check valve to leak, and let the gasoline back to the tank, leaving the brass connecting tubing full of air.

Strain gasoline through chamois skin.

SPARK PLUGS

The spark points should always be kept clean and free from carbon. The points on the jump spark plug should be about the thickness of a dime apart. Watch the porcelain insulators and be sure **THAT THEY ARE NOT CRACKED** as this is very frequently the cause of missing.

CAUSES OF KNOCKING

The most common reasons for knocking are:

Carbon deposits on piston heads.

A loose connecting rod bearing.

Loose crank shaft bearing.

Spark advanced too far or engine over heated.

A loose fly wheel is sometimes confused with the cylinder knock.

DIFFERENT KINDS OF KNOCKS

This may be caused by carbon in the combustion chamber which gives forth a clear, hollow sound especially noticeable when the engine is hot. There will also be a sharp rap when the engine is speeded up. The knock from advancing the spark too far is dull; the knock from a loose connection bearing is a metallic sound like the rap of a small hammer on steel but not so distinct; the knock from a crank shaft bearing is a dull thud.

ADJUSTING THE BEARINGS

To tighten the main bearings on the crank shaft, remove enough of the shims between the bearings so that when the screws are tightened there is no play but yet not be tight enough to bind. The connecting rod or crank bearing should be tightened in the same way. If these adjustments are made too tight they will heat and burn out the bearing metal.

OVER HEATING

Over heating is almost always due to an insufficient supply of circulating water, lack of oil or it may be caused by the spark being too far retarded—the mixture too rich or carbon deposits in the combustion chamber. Poor circulation of water may be caused by sediment in the water jackets. This would prevent the water from running entirely around the cylinder.

PUSH ROD ADJUSTMENT

An important adjustment is the push rod. It may be very easily adjusted by loosening the clamping screw No. 788 and adjusting the push rod No. 736 so as to have 1-32 of an inch clearance between the end of the exhaust valve stem and the tappet arm when valve is closed and cam roller is not on flat of cam or on sparking position. If there is too much play the exhaust valve will not open in time.

LACK OF POWER

This may be due to:

Poor compression.

Dirty spark plugs or other ignition trouble or weak valve springs.

Leaking valves.

Improper mixture.

BACK FIRING

This is caused by delay in combustion of a previous charge of gas. This is usually due to an insufficient charge of gasoline which makes a slow mixture with the result that it explodes not only on the power stroke but on the exhaust stroke firing the incoming charge which is forced back into the carburetor. If feeding more gasoline does not correct the trouble, look for carbon.

LOST COMPRESSION

Lost compression can always be traced to lack of oil, too much oil or the use of oil of poor quality.

If the piston ring becomes badly worn or broken it should be replaced at once for there is danger of scoring the cylinder.

Very often the trouble is due to the anxiety of the operator to "give her lots of oil" with the result that too much is fed and the valve becomes fouled, thereby preventing it from seating properly.

Lack of compression will be noted when turning the engine over by hand slowly. If the leak is at the piston the compression can be heard blowing by the rings. If it does not blow by the rings it must escape by the valves, providing, of course, that the spark plugs and the valve plugs are tight. If the leak is at the piston and the engine has not had sufficient use to wear the rings, and the cylinder is not scored the trouble is probably due to the fact that the rings have stuck in the grooves and cannot expand fully. In this case remove your piston and soak same in kerosene oil. After the rings have become loosened remove and clean both the piston and the rings with very fine emery cloth. Pour a good grade of lubricating oil on the piston and rings and replace.

If the trouble is with the valves, remove the head, take out the valves, clean the seat area on the valves and the head and then with some flour of emery and oil grind the valves in place so that they seat around the entire surface. In grinding the valve be sure and turn it back and forth, changing its position frequently. When you have the valves properly ground be sure to REMOVE ALL TRACES OF OIL AND EMERY. If the valve stem has been sticking, use a very fine piece of emery cloth and clean thoroughly.

ENGINE STOPS SUDDENLY

The common causes of sudden stopping are:

Empty gasoline tank.

Water in gasoline.

Too much gasoline.

Dirt in carburetor or feed pipe.

Wire loose.

Contact point obstructed.

Short circuit.

Over heating or gas mixture too lean.

Without exception almost every cause of trouble is lack of gasoline or faulty ignition.

JUMP SPARK IGNITION

Jump spark or high tension ignition is a form of electrical ignition in which the explosion is caused by means of a spark or arc forming across the gap between two metallic points. The electric current is of high tension produced either by the batteries in connection with an induction coil or the magneto.

SHORT CIRCUIT

Be careful to see that the insulation on all wiring is in good condition. Where the wiring is exposed to dampness or wear the insulation may become worn or damp and result in short circuit.

We sometimes have complaints in regard to lack of power. In following this up we find that in most cases there is plenty of power but the pressure gauge is indicating wrongly

due to the fact that the hand or pointer is loose on the pin and not registering properly. In most cases we have found that the engine is developing its full rated power but that the pressure gauge does not indicate correctly.

This can be overcome by taking the glass front off and with a pair of pliers remove the pointer and (when there is no pressure) place same back to its proper position against the starting point and then press firmly on to the stem or pin. If the pin is lightly tapped with a very small hammer or small article it will fasten it more securely.

We have also found cases where the engine would not develop the required pressure and have found that this was due to the fact that the pump was sucking in air caused by a loose connection or lack of water in the tank. These are minor points that any one familiar with our machines should readily correct.

We have also found cases where customers have complained in regard to lack of power that this has been caused by the screwing down of the packing cap of the pump. In some cases it has been screwed down so tightly that the packing has adhered to the plunger making it impossible for any engine, no matter what the h. p. may be, to lift the plunger. The packing cap should at all times be in a position so that it can be turned in every direction very easily with the packing wrench furnished with each machine and be sure **TO UNSCREW THE PACKING CAPS A GOOD 1-3 OF AN INCH WHEN YOU HAVE FINISHED WITH YOUR SPRAYING FOR THE DAY.** This will allow your packing to expand and resume its normal condition.

More trouble is caused by clogged strainers than by any other reason. To avoid this trouble be sure to put all spraying solutions through a fine mesh strainer before pouring in tank of machine. Be sure that the **AGITATOR BRUSHES** (furnished only with our make of machines) are cleaning this suction strainer at each revolution of the agitator. If the suction strainer becomes clogged, remove the screen, clean and replace.

DONT'S

- Don't let the bearings or any working parts suffer for want of lubrication.
- Don't keep the engine in a damp place. It is hard on your batteries.
- Don't let the engine get covered with dust, dirt or grease.
- Don't leave water in the hopper in cold weather, it will freeze and may crack your cylinder.
- Don't forget to open sight feed lubricator when you start.
- Don't let your engine get loose in the bearings. In time the play will wreck it.

REGARDING CARE OF PUMP

- 1st—Pull the plug out at end of tank allowing all water to drain out.
- 2nd—Start the engine, open the pet cocks in the pump, open all valves (this includes the throttle valve as well as discharge and suction valves), run the engine and pump until the water or liquid is all discharged from the pet cocks.
- 3rd—Shut down your engine, drain water from cylinder water-jacket. Oil and grease thoroughly the gears, piston and all bearing parts.
- 4th—Unscrew packing caps (No. 1088), remove plunger guide and packing. Do not put packing back in place until you are ready to start spraying in the spring. This will give your packing a chance to resume its normal condition and, in most cases, you will find that the old packing will be almost as good as new.

DURING THE SEASON WHEN THE PUMP IS IN ACTIVE USE

- 5th—When the pump is in use the packing caps should only be tightened sufficiently to prevent the plungers from leaking. Each night these packing caps No. 1088 should be "backed off" to permit the packing to expand and resume its normal condition, otherwise it will become so hard as to not give satisfactory results. This packing and plunger are to be kept thoroughly lubricated with a heavy oil, as the strong spray mixtures neutralize the lubricants and the application of oil, as above suggested, will prolong the life of the packing and the pump will operate much easier.

WHEN THE PUMP IS PUT AWAY FOR ANY LONG PERIOD

- 6th—Take the caps off the connecting rods and pull plungers and connecting rods entirely out of the pump and open drain cocks. Invert these so that all water will run thoroughly out of the plungers. These can be left out until next spring or you can oil them thoroughly and put back in the pump.
- 7th—Grease all parts of the pump well and cover both pump and engine with burlap or some other cloth.
- 8th—The entire outfit should be covered and stored in a dry barn or shed until you are ready to use it next spring.

FIELD FORCE PUMP CO. ELMIRA, N. Y.

REPAIR PARTS PRICE LIST

No.	Name of Part	Price	
		2½ H.P.	4 H.P.
700	Fly wheel (2), each.....	\$ 7.20	\$ 9.60
701	Cylinder.....	16.80	21.60
704	Main bearing caps (2), each.....	.90	1.20
705	Cylinder head.....	7.50	8.50
705	Cylinder head with 2- No. 770 valve guides.....	10.30	11.30
706-A	Replacing Nos. 706, 721 and 743 on 4 H. P.....		.70
906-A	Replacing Nos. 706, 721 and 743 on 2 H. P.....	.60	.....
707	Cylinder head packing.....	1.00	1.00
709	Piston.....	6.00	7.00
710	Base.....	16.50	22.60
711	Piston bronze bushing(2 for 2 H. P.)..... each.....	.50	.
712	Piston pin.....	.40	.50
713	Piston rings (3), each.....	.35	.60
714	*Contact screw.....	.05	.05
717	Cam stud set-screw.....	.05	.05
718	Cam Stud Cotter.....	.05	.05
719	Connecting rod cap-screw (2), each.....	.05	.05
721	1x3 inch nipple.....	.15	.15
722	Cam rivet.....	.05	.05
723	*Contact spring bolt (2)..... each.....	.05	.05
724	*Special Screw (used with No. 727).....	.05	.05
725	Cylinder drain shut-off.....	.50	.50
726	Cam stud.....	2.00	2.00
727	*Spark Advance Lever.....	.05	.05
728	1-4 inch check valve for gasoline feed (for Tayoga only).....	1.60	.....
729	*Contact spring.....	.15	.15
730	Lower rest for housing support.....	.20	.20
731	Crank shaft.....	13.00	20.00
732	Cylinder studs (give length) (6), each.....	.10	.10
733	*Cam roller bearer.....	2.25	2.25
733	*Cam roller bearer assembled with Nos. 742, 744, 761, 786.....	3.00	3.00
734	*Fibre insulator.....	.25	.25
735	Flat spring for governor.....	.40	.40
736	Exhaust lifter rod.....	.30	.30
737	Threaded cast plate for housing support.....	.20	.20
738	Exhaust lifter rod spring.....	.10	.10
740	Governor latch and 746.....	1.25	1.25
741	Governor latch spring.....	.10	.10
742	Governor hook.....	.15	.15
743	1 inch close nipple.....	.10	.10
744	Cam roller stud.....	.10	.10
745	Fly-wheel key (2), each.....	.15	.15
746	Governor latch tip.....	.20	.20
747	Governor weight.....	.85	.85
748	Governor weight spring.....	.10	.10
749	Governor spring rod.....	.05	.05
750	Gasoline drain cock.....	.25	.25
751	Governor weight stud.....	.20	.20
752	Curved brass gas suction tube (give length).....	.30	.30
753	Slip joint connection to mixing valve.....	.50	.50
758	Lower joint connection with strainer and check valve.....	.75	.75
754	Connecting rod and cap.....	4.00	5.00
754B	Bushing for Connecting rod.....		.90
755	Connecting rod cap (only).....	.55	.55
756	Small time gear.....	2.00	2.00
757	Cam gear.....	3.20	3.20
757	*Cam gear assembled with Nos. 722 and 796.....	6.00	6.00
759	Generator valve.....	4.50	4.50
	Air valve springs.....	.12	.12
	Air check valve.....	.90	.90
	Needle valve.....	.85	.85
760	Lubricator (sight feed).....	3.50	3.50
761	Governor hook cap screw.....	.05	.05
762A	Rocker Arm.....	.40	.40
763	Nipple to base (1-4 x 2 1-2 inch).....	.10	.10
764A	Rocker arm bracket.....	.50	.50
765	Exhaust or intake valve..... each.....	.75	.75
766	Exhaust valve spring.....	.10	.10
767	Intake valve spring.....	.10	.10
768	Valve stem washer (2), each.....	.10	.10

*Used with coil and battery ignition only

REPAIR PARTS PRICE LIST (Continued)

No.	Name of Part	Price	
		2½ H.P.	4 H.P.
769	Key for No. 756 .....	.10	.10
770	Valve guide (2) each.....	1.40	1.40
771	1-4 inch grease cup (2), each.....	.15	.15
772	1-8 inch grease cup.....	.15	.15
773	1-4 inch Tee for gasoline pipe .....	.15	.15
774	Main bearing cap screw 4), each .....	.10	.10
775	Rocker arm stud.....	.15	.15
776	Spark plug.....	.50	.50
777	*Spark coil	4.00	4.00
778	Valve stem cotter pin .....	.05	.05
780	*Contact wire, primary, per foot.....	.03	.03
781	*Ground wire, primary, per foot .....	.03	.03
782	*Spark plug wire, secondary, per foot .....	.15	.15
785	*Switch .....	.30	.30
786	Cam roller.....	.40	.40
787	1-4 x 3-4 inch cap screw.....	.05	.05
788	1-4 x 1 inch cap screw.....	.05	.05
790	Muffler	1.00	1.00
791	Gasoline nipple and strainer (not used now) see No. 758.....	.40	.40
792	Filler Cap .....	.15	.15
794	3-8 x 2 inch machine bolt for pulley (3) each.....	.05	.05
796	*Cam for cam gear	2.75	2.75
797	Starting crank	1.40	1.40
798	Air regulator.....	.75	.75
799	*Four cell battery, each	3.25	3.25
	1-4 x 4 inch nipple for sight feed lubricator.....	.12	.12
	1-4 x 5 inch nipple for sight feed lubricator.....	.15	.15
	1-4 x 8 inch nipple for sight feed lubricator.....	.20	.20
	PULLEYS		
	5½ inch diameter, 4 inch face.....		1.20
7	" " " 4 " "		1.40
8	" " " 4 " "		1.90
9	" " " 4 " "		2.60
12	" " " 4 " "		3.20
15	" " " 4 " "		4.80

*Used with coil and battery ignition only.

PARTS USED WITH WICO MAGNETO

591	Magneto Bracket (4 H.P.).....	\$1.30
592	Magneto Bracket (2 H.P.).....	1.20
593	Cam Roller Bearer.....	3.00
594	Trip Lever.....	.80
511	Trip Rod with Collar.....	.40
512	Trip Lever Stud.....	.20
513	Dished Washer.....	.15
514	Special Washer $\frac{25}{64} \times \frac{7}{8}$.....	.05
515	Special Washer $\frac{25}{64} \times \frac{9}{16}$.....	.05
516	Advance Lever.....	.25
518	Drive Spring.....	.15
519	Return Spring.....	.15
520	Cam.....	3.00
521	Trip Sleeve.....	.60
523	Oil cup for 594 .....	.25
757	Cam Gear assembled with Nos. 722 and 520.....	6.00

Fig. 171 Magneto Ask for Prices.

When Ordering Repair Parts Always Give Number of Engine and H. P. Also state if for Leader or Tayoga. Prices Subject to Change Without Notice.