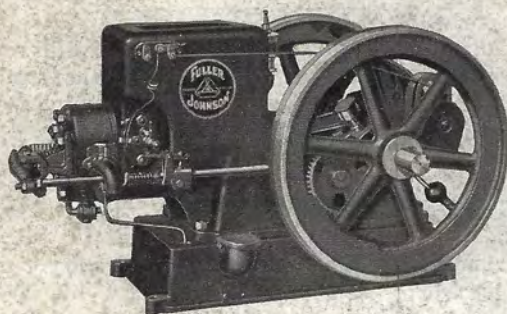


OPERATING INSTRUCTIONS  
AND  
REPAIR PRICE LIST

# FULLER & JOHNSON

2½ H. P. MODEL "N"  
GASOLINE ENGINE



All Prices Subject to Change Without Notice

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EFFECTIVE OCTOBER 10, 1923  
TERMS: CASH WITH ORDER

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To enable us to fill your orders for repairs promptly and correctly, it is absolutely necessary for us to have the following information:

- Give engine number and horsepower found on name plate.
- Give symbol number and name of part.
- Give name of railroad or express station, if different from your postoffice address.
- State how to ship, whether by mail, express or freight.
- Write your name and address plainly.

## FULLER & JOHNSON MFG. CO.

ENGINE SPECIALISTS

Established 1840

Madison, Wisconsin, U. S. A.

Cable Address "Fullerjohn"—ABC, 5th Edition; Lieber's; Western Union  
Universal; Western Union Five Letter; Bentleys

# OPERATING INSTRUCTIONS

## Section A

### READ AND REMEMBER

A1. Each Fuller & Johnson engine is carefully built, thoroughly tested and is rigidly inspected before leaving our factory. Therefore, leave the adjustments as they are set at the factory. Read the instructions and be sure that you understand the operation of each part. FOLLOW THE DIRECTIONS.

## Section B

### FOUNDATION AND LOCATION

B1. For the best results the engine should always stand level. Keep the engine clean.

## Section C

### BEFORE STARTING

C1. Study the information given in the illustrations, and in reading the instructions, where a reference is given, be sure to refer in every case to the illustration. If at the same time you will examine the part on the engine, it will help you to become familiar with your engine.

C2. **Clean Valves.**—When you are familiar with the parts proceed as follows: Clean the admission and exhaust valve stems by squirting some gasoline or kerosene on the stems. This will clean the valve stem of any grease or dirt. Then push the valves in and out to be sure they work freely. Then oil them with gas engine lubricating oil.

C3. **Ignitor.**—Examine the ignitor. Clean off the dirt and grease by squirting kerosene on the ignitor. Then operate the loose catch by pulling back the lever "A" (Fig. 4), with a wiping stroke to be sure it snaps freely; also take hold of the movable electrode "M" (Fig. 4), and rotate it slightly. Be sure electrode "M" works freely.

C4. **Ignition Setting.**—The engine gives the best results when the ignition is set correctly. On  $2\frac{1}{2}$  H. P. Model "N" engines, when equipped with battery or geared magneto, the ignitor should snap when the crank pin is about 18 degrees below the inner horizontal center, the piston moving forward on the compression stroke (before center). When the crank pin is in this position the word "snap" stamped on the face of the flywheel will be at the center of the exhaust valve rod (See Fig. 3), the piston moving in on the compression stroke.

C5. **Lubrication.**—Examine the grease cups on the main bearings and if there is plenty of grease in cups give the cup an extra turn to force the grease on the bearing.

C6. Attach the lubricator to the oil feed pipe. Fill the lubricator with special **Gas engine oil**. Put the small lever on oil cup to vertical position and by means of the knurled nut adjust the oiler for 12 to 20 drops of oil per minute. To increase the flow, turn the knurled nut to the left. To decrease the flow turn the nut to the right. To flush the oiler turn the lever to an angle of 45 degrees. In cold weather the cylinder oil should be diluted with enough kerosene to make the oil flow freely. To stop flow put the lever in horizontal position. Use oil freely, especially when engine is new. If too much is used there will be grey-white smoke in the exhaust.

C7. **Water Cooling Hopper.**—Next fill the hopper half full of clean water. Warm water aids in starting in cold weather. Keep the hopper tank and water passages clean of any sediment or dirt. Never allow the water to freeze in the hopper. It is easier to drain the hopper than to repair the damage that may be caused by freezing.

C8. **Fuel Tank.**—Fill the fuel tank with gasoline. Be sure that the fuel used is not some low grade gasoline that has been exposed to the air for some time. Best results are obtained if **fresh** gasoline is used.

### TO START AND OPERATE ENGINE

**First.**—Tighten grease cups, including that on connecting rod, and set feed on cylinder sight feed oil cup.

**Second.**—Open throttle to starting mark "S."

**Third.**—Close damper by putting handle in horizontal position.

**Fourth.**—Close switch.

**Fifth.**—Attach starting crank on governor side of engine, and give engine a few quick turns. As soon as the engine starts, open damper and adjust throttle to running position. "R" or where it gives best results. As load increases close throttle more.

### TO STOP ENGINE

Close throttle. Open switch. Shut off oiler. Always be sure switch is open when engine is standing still.

Drain hopper in cold weather. A sufficient amount of calcium chloride will prevent water in hopper from freezing. Write us for instructions.

To increase speed loosen the lock nut on governor rod and turn governor weight so as to increase tension on governor spring. To reduce speed turn governor weight so as to loosen tension on governor spring. Always be sure lock nut is tight after adjustment.

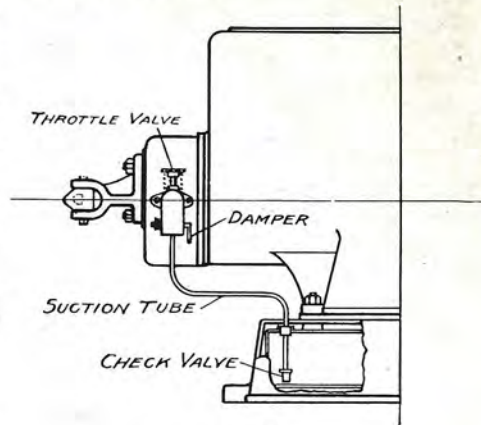


Fig. 1

## Section D

### SUGGESTIONS FOR GOOD OPERATION

D1. Examine the ignitor setting frequently. Keeping the ignitor set properly will save fuel.

D2. Keep the engine as free from dirt as possible.

D3. If the engine is equipped with a magneto, be careful not to get too much oil on the magneto. One drop of sewing machine oil on each bearing every ten hours running will be sufficient.

D4. Use the least amount of fuel possible. Adjust the throttle so that the least amount of fuel will be used, and at the same time the engine will maintain its normal speed.

D5. Drain the hopper in cold weather.

## Section E

### VALVE SETTINGS

**E1. Exhaust Valve.**—The burnt gases and refuse from the lubricating oil are forced out through the exhaust valve. Therefore, it is necessary to use good gas engine lubricating oil and keep the fuel throttle set properly. The least accumulation of anything that interferes with the perfect seating of the valve will cause a leak. To determine if the exhaust valve seats properly, turn the flywheel around in the direction the engine runs until the piston moves forward on the compression stroke. If valve seats properly there will be no leaking or hissing noise at the exhaust. Should the valve leak, first be sure the valve stem is clean. Squirt some gasoline on the stem and push the valve in and out, in order that it will work freely in the valve guide. If the

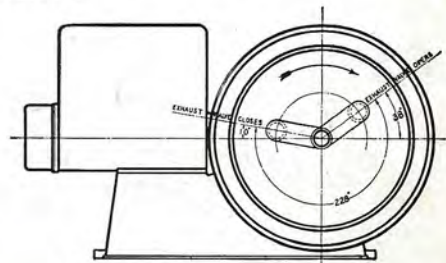


Fig. 2. Showing Valve Setting

valve still leaks, start the engine and while the engine is running take a pair of pliers and rotate the valve on its seat. Then take a block of wood and tap on the end of the exhaust valve lever right next to the exhaust valve stem. By doing this you will find that the tapping will lift the valve from the seat at the time of the explosion and the force of the explosion will blow any accumulation off the valve seat, thus allowing the valve to seat properly. Should this fail it will be necessary to remove the cylinder head, clean and regrind the valve. When replacing the cylinder head be sure to check both the valve and ignition settings.

**E2. Exhaust Valve Setting.**—For the best results the exhaust valve should begin to open when the crank pin is  $38^{\circ}$  above the outer horizontal center, the piston moving out on the power stroke, and should close when the crank pin is  $10^{\circ}$  above the inner horizontal center, the piston starting to move outward on the suction stroke, that is, the exhaust valve remains open while the crank pin passes through an arc of approximately 228 degrees (See Fig. 2).

## Section F

### REMOVING THE IGNITOR

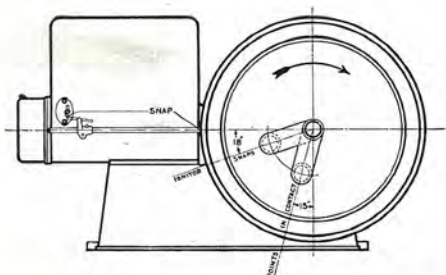


Fig. 3. Showing Ignition Setting

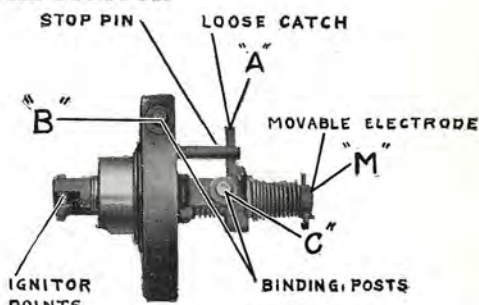


Fig. 4 Ignitor

**F2. To Remove Ignitor.**—To take out the ignitor turn engine flywheel until ignitor pawl carrier moves back toward the flywheel. Then by using the special socket wrench, the ignitor can be easily removed. In cleaning the ignitor be sure to clean the inside face of the ignitor and the ignitor points, also clean the mica washers. Be sure the movable electrode works freely. If it does not, then remove the electrode and clean the stem with fine emery cloth or fine sand paper, and oil the stem with a little gas engine oil. Be sure to examine the ignitor carefully before dismantling it. In this way you will be sure to assemble it correctly. In replacing the ignitor, first replace the ignitor gasket, then the ignitor, and tighten the nuts evenly, not too tight.

### CHECK VALVE

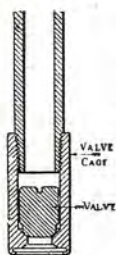


Fig. 5  
Check Valve

To maintain a constant gasoline level in the vaporizer, a check valve is placed at the lower end of the stand pipe in the fuel tank. With the throttle properly set, if the engine sucks several times before the explosion occurs, and if when the damper is closed the first suction or charge explodes, and there is no black smoke in the exhaust, this condition indicates that the check valve is leaking, caused possibly by dirt on the valve seat.

To clean the check valve, unscrew the union in the fuel line just below the vaporizer, turn the feed pipe one-quarter turn out in front of the engine and remove the pipe. Unscrew the valve cage at the bottom of the pipe and the valve can be easily removed. After cleaning, replace the check valve in the cage with the slotted end UP and then fill the valve cage with gasoline to test for leakage. If the valve still leaks it will be necessary to regrind the valve or replace with a new one. In reassembling, be sure the valve cage is screwed tightly to the stand pipe.

## GOVERNOR

The governor on the 2½ H. P. Model N Engine is the hit and miss type, that is, the number of explosions is in proportion to the load on the engine. The accompanying drawings (Figures 6 and 7) show the action of the governor.

When the engine is running, centrifugal force causes the governor weight (G) to move outward.

When the proper set speed is reached, the extreme outward movement of the governor weight (G) brings the face of the governor eccentric collar (E) in contact with end of the detent finger (A) and forces it **upward**. As (A) is pivoted at (B) then point (P) is forced into the detent catch (C).

With the governor weight (G) in **this** position (see Figure 6), the exhaust push rod is held forward keeping the exhaust valve open. With the exhaust valve open, no suction is produced by the movement of the piston, therefore, no charge is drawn into the cylinder. With a load on the engine, the speed will quickly lower slightly and the governor spring (S) will push the governor weight (G) nearer the shaft (see Figure 7). With governor weight in this position, the coil detent spring will raise point (P) out of the catch and then allow the roller to follow the cam (see Figure 7) allowing the exhaust valve to close and a charge to be drawn into the cylinder. The power from this explosion tends to increase the speed causing the governor weight (G) to move outward and again force the detent point (P) into the catch (C), (Figure 6). When the engine is heavily loaded it may require several successive explosions to bring the engine up to the set speed.

If at any time it is necessary to check the adjustments of the governor, proceed as follows:

Turn the fly-wheel until the detent catch (C) moves toward the head of the engine in position as shown in Figure 6. At this position the point (P) of detent finger can be pushed into catch (C). There should be a clearance of one thirty-second of an inch between the point of the detent (P) and the edge of the catch (C). If the clearance is less, grind point (P) to give proper clearance. Be sure to grind detent point at proper angle. Next take hold of governor weight (G) and pull it outward toward rim of fly wheel, this will force detent finger point (P) into catch (C). With governor weight pulled out, there should be a clearance of

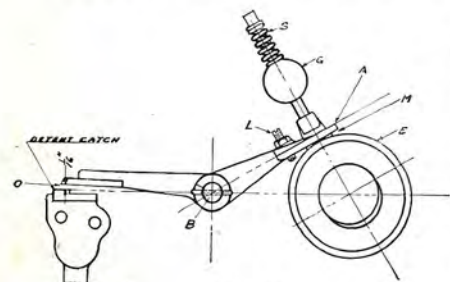


Fig. 7

one thirty-second of an inch between the **lower face** of the detent blade or point and the **face** of the detent catch.

If the clearance is greater, it will be necessary to bend the end (A) down slightly, or if less, bend (A) up slightly.

On the 2½ H. P. engine, turn fly wheel until detent (C) is in position as shown in Figure 7. Then place a piece of cardboard or thin sheet metal in opening "O." Then adjust detent screw "L" so that the point touches firmly on the main bearing cap. Be sure to tighten lock nut securely. With detent in this position, there should be a slight clearance at "M."

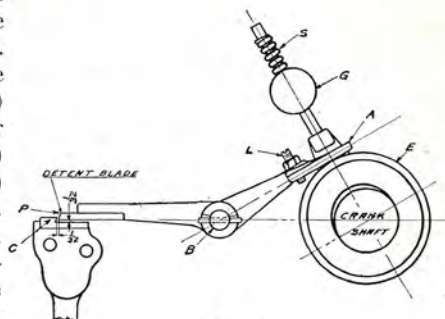


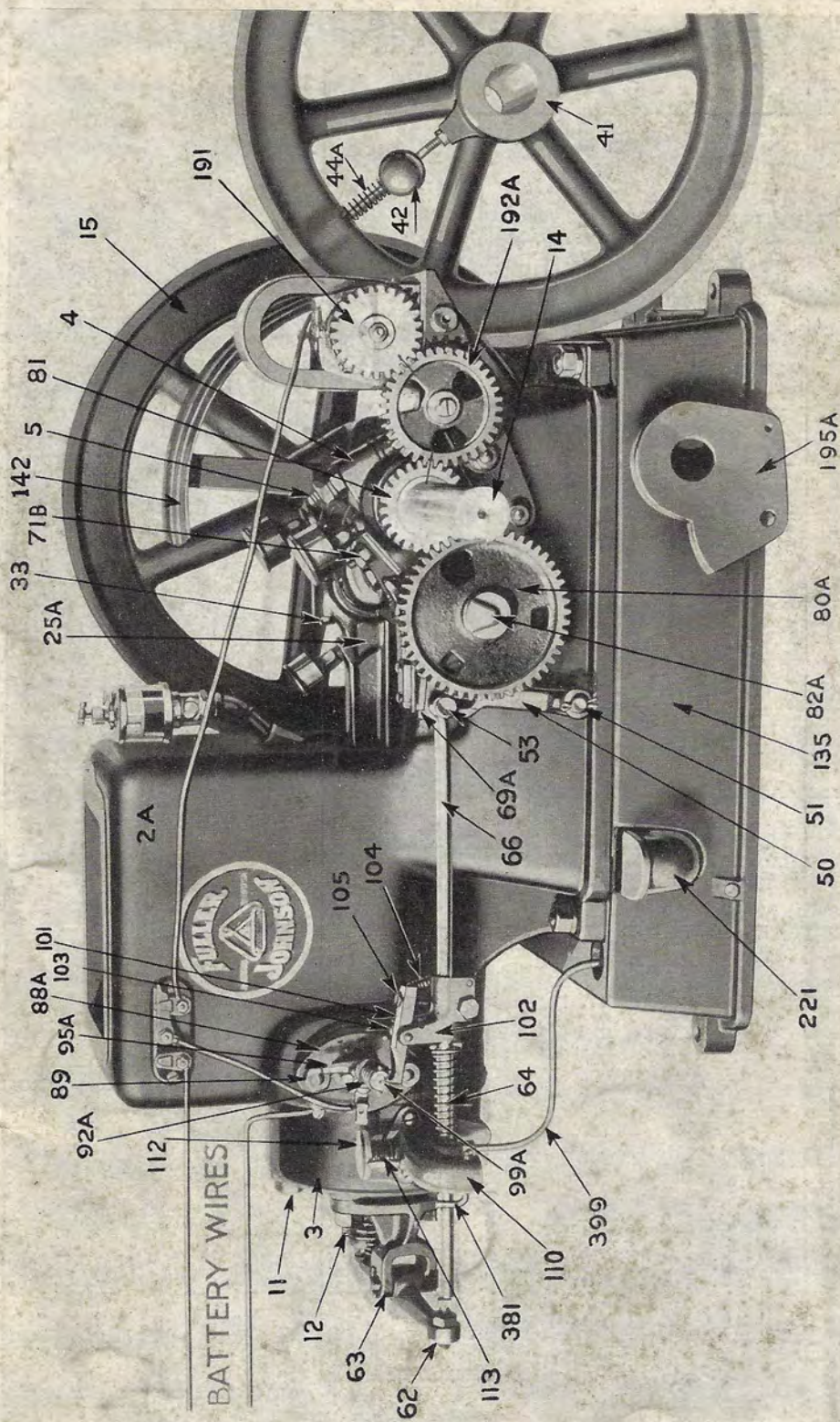
Fig. 6

# Repair Price List for Fuller & Johnson 2½ H. P. Model "N" Gasoline Engine

| Description                                                  | Symbol No. | Price Each | Description                                                   | Symbol No. | Price Each |
|--------------------------------------------------------------|------------|------------|---------------------------------------------------------------|------------|------------|
| Cylinder and base complete with main bearings and studs..... | X13N2A     | \$30.00    | Cam roller pin.....                                           | 11N53      | .20        |
| Cylinder and base complete with piston and rings             | XG13N2A    | 38.50      | Cam roller.....                                               | J54        | .50        |
| Cylinder head only, valve seats ground in.....               | X13N3      | 7.00       | Exhaust lever.....                                            | 13N62      | .85        |
| Cylinder head complete with valves.....                      | G13N3      | 10.50      | Exhaust lever bracket.....                                    | 13N63      | 1.20       |
| Main bearing cap right hand fitted.....                      | X13N4      | 1.50       | Push rod spring.....                                          | 13N64      | .15        |
| Main bearing cap left hand fitted.....                       | X13N4A     | 1.50       | Exhaust lever pin.....                                        | 2N65       | .15        |
| Main bearing studs.....                                      | 2N5        | .20        | Push rod.....                                                 | X13N66     | .75        |
| Ignitor wrench.....                                          | 2N7        | .30        | Detent stop.....                                              | 11N69A     | .75        |
| Engine skid.....                                             | 13N10B     | 1.00       | Detent blade hardened and fitted.....                         | X11N70     | .30        |
| Cylinder head studs (short).....                             | 2N11       | .15        | Detent with blade.....                                        | G11N71B    | 1.50       |
| Cylinder head studs (long).....                              | 13N12      | .15        | Detent pin.....                                               | 11N72A     | .25        |
| Crank Shaft.....                                             | 13N14      | 9.50       | Detent spring.....                                            | 11N74      | .15        |
| Fly wheel.....                                               | 13N15      | 11.00      | Timing gear.....                                              | 11N80      | 2.50       |
| Fly wheel key.....                                           | 2N17A      | .30        | Timing pinion.....                                            | 13N81      | 2.00       |
| Cylinder head gasket.....                                    | 3N20       | .50        | Timing gear shaft with collar.....                            | G11N82B    | .85        |
| Connecting rod shims (per set of 2).....                     | 2N24A      | .50        | Timing gear shaft collar.....                                 | 11N83A     | .10        |
| Connecting rod complete with bearings.....                   | G13N25A    | 7.00       | Timing gear shaft dowel.....                                  | 11N86      | .05        |
| Crank pin bushing (rod half) fitted each.....                | X13N26     | .40        | Timing pinion key.....                                        | 11N87      | .10        |
| Crank pin bushing (cap half) fitted each.....                | X13N26A    | .40        | Ignitor body with stop pin.....                               | XG2N88A    | 1.75       |
| Piston pin bushing, drilled and reamed.....                  | X13N28A    | .90        | Ignitor complete.....                                         | G2N88A     | 6.00       |
| Connecting rod bolts, each.....                              | 13N33      | .30        | Ignitor body studs.....                                       | 2N89       | .12        |
| Connecting rod dowel pin.....                                | 11N34      | .10        | Fixed electrode assembled with ignitor point.....             | XG2N91A    | .75        |
| Piston only with ring pins.....                              | XG13N35A   | 5.50       | Movable electrode spring.....                                 | 2N92A      | .15        |
| Piston complete with rings.....                              | G13N35A    | 7.50       | Movable electrode stop pin.....                               | 2N93A      | .10        |
| Piston pin.....                                              | 3N36       | 1.35       | Movable electrode with loose catch and collar.....            | XG2N94A    | 2.00       |
| Piston rings.....                                            | 13N37A     | .50        | Ignitor loose catch.....                                      | 2N95A      | 1.00       |
| Piston pin screw.....                                        | 3N32       | .15        | Ignitor loose catch spring.....                               | 2N96A      | .10        |
| Piston ring pins.....                                        | 11N39      | .10        | Fixed electrode terminal.....                                 | 2N98       | .10        |
| Piston oil tube.....                                         | H40        | .10        | Ignitor loose catch collar drilled and fitted.....            | X2N99A     | .60        |
| Governor eccentric.....                                      | 11N41      | .45        | Mica washers, per set.....                                    |            | .15        |
| Governor weight.....                                         | 13N42      | .40        | Throttle knob pin.....                                        | 3N100      | .90        |
| Governor weight spring.....                                  | 11N44A     | .10        | Ignitor pawl with spring pin.....                             | XG2N101    | .90        |
| Cam rocker only.....                                         | 11N50A     | 1.25       | Ignitor pawl carrier with spring stud.....                    | XG3N102    | .90        |
| Cam rocker complete with roller and detent stop.....         | G11N50A    | 3.00       | Ignitor pawl carrier complete with pawl carrier and pawl..... |            |            |
| Cam rocker pin.....                                          | 11N51      | .20        | Ignitor pawl pin.....                                         | G3N102     | 2.25       |
|                                                              |            |            |                                                               | 2N103      | .10        |

| Description                                  | Symbol No. | Price Each | Description                                       | Symbol No. | Price Each |
|----------------------------------------------|------------|------------|---------------------------------------------------|------------|------------|
| Ignitor pawl spring.....                     | 2N104      | .10        | Magneto idler gear shaft only.....                | 13N194A    | .25        |
| Ignitor pawl spring stud.....                | 3N105      | .10        | Magneto gear shield.....                          | 13N195A    | .35        |
| Ignitor pawl spring stud.....                | 3N106A     | .10        | Exhaust valve.....                                | 2N302      | 1.00       |
| Vaporizer only with index pin.....           | XG13N110   | 1.60       | Exhaust valve nut.....                            | 2N304      | .25        |
| Vaporizer complete with throttle.....        | G13N110    | 3.00       | Exhaust valve spring.....                         | 2N305      | .20        |
| Throttle valve stem complete.....            | GJ112      | .60        | Admission valve washer.....                       | 3K307      | .05        |
| Throttle valve spring.....                   | J113       | .10        | Admission valve only.....                         | 3K308      | 1.00       |
| Index pin.....                               | J114       | .05        | Admission valve complete with washer and nut..... | G3K308     | 1.25       |
| Ignitor points.....                          | P114A      | .25        | Admission valve spring.....                       | 3K309      | .20        |
| Muffler complete.....                        | G2N118     | 1.50       | Battery box only.....                             | J324       | .85        |
| Vaporizer gasket.....                        | 1V119      | .10        | Battery box complete with 5-3" battery connectors |            |            |
| Check valve.....                             | XGJ129     | 60         | 5-No. 6 dry cells, 1-No. 16-6 ft. duplex cable,   |            |            |
| Sub base.....                                | 13N135     | 5.50       | 1-No. 22 coil.....                                | GJ324      | 6.00       |
| Sub base fuel tank.....                      | 13N136     | 3.75       | Damper.....                                       | 2N380      | .05        |
| Straps for sub base tank.....                | 13N137     | .15        | Damper handle, drilled for damper.....            | 13N381     | .20        |
| Magneto cable (long).....                    | 11N138     | .15        | Damper spring.....                                | 11382      | .10        |
| Magneto switch cable (short).....            | 3N139      | .15        | Suction tube complete with check valve and bush-  |            |            |
| Crank shield complete.....                   | G13N142    | .80        | ing.....                                          | G13N399    | 1.25       |
| Check valve bushing.....                     | 11N150     | .15        | Ignitor gasket.....                               | 2N440      | .10        |
| Starting crank.....                          | 2N153A     | 1.25       | Sight feed lubricator.....                        |            | 1.50       |
| Magneto bracket.....                         | 13N190A    | 1.25       | Large glass for lubricator.....                   |            | .00        |
| Magneto complete with bracket and gears..... | G13N190A   | 16.50      | Small glass for lubricator.....                   |            | .20        |
| Magneto pinion.....                          | 11N191     | 1.75       | No. 0 plain grease cup.....                       |            | .15        |
| Magneto idler gear with shaft.....           | XG13N192A  | 2.00       | Spark coil No. 22.....                            |            | 3.20       |

Note: Mention name of lubricator when ordering repairs for engine.



Detail of Parts 2½ H. P. Model "N" Gasoline Engine  
(Fly Wheel Removed)