SERVICE MANUAL

MF 120
— MF 3

Fig. 3 — Plugs and Brushes Removed

Fig. 2 — Switch an

Fig. 6 — Remo

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INDEX

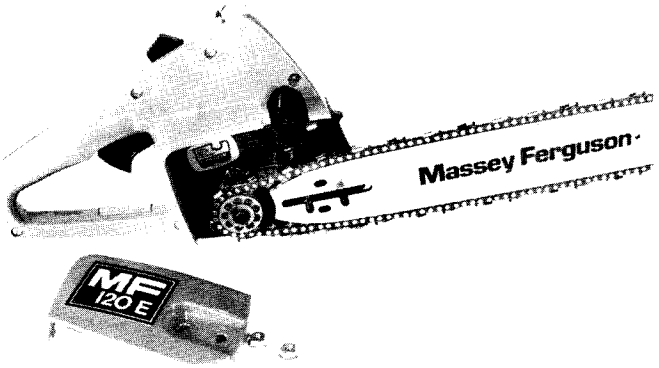

Fig. 1 — Chain Guide Bar Nuts and Guard Removed

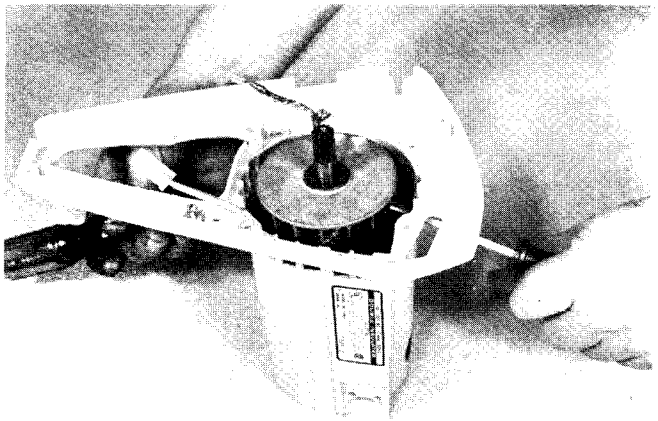

Fig. 4 — Starting Armature Bearing Out of Case

The MF 120E Model is equipped with a manual chain oiling system. The following instructions cover only disassembly and reassembly, not testing of components.

DISASSEMBLY

1. Remove nuts securing cover and guide bar and remove bar and chain, Fig. 1.
2. Remove handle cover, disconnect wire terminals and remove switch and controls, Fig. 2.
3. Remove plugs and brushes, Fig. 3.
4. Remove screws on motor side securing gear case and remove case.
5. Pry lightly against armature, Fig. 4, and lift armature out as shown in Fig. 5.
6. Back out screws and remove air baffle, Fig. 6.

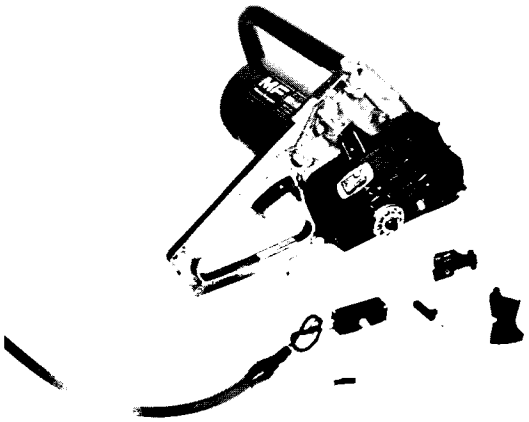

Fig. 2 — Switch and Controls Removed

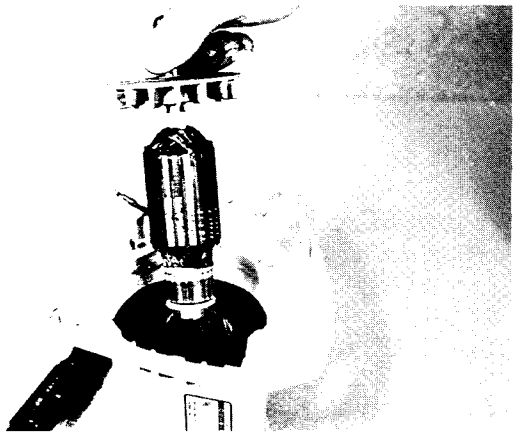

Fig. 5 — Removing/Installing Armature

Fig. 3 — Plugs and Brushes Removed

Fig. 6 — Removing/Installing Air Baffle

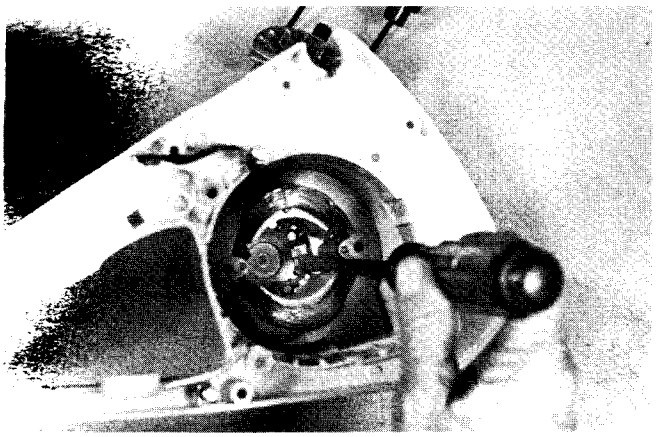

Fig. 7 — Removing Wires from Brush Holder

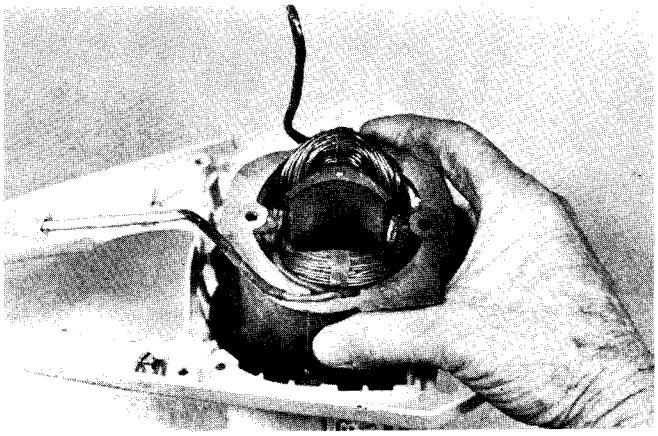

Fig. 8 — Removing/Installing Field Coils

7. Use a screwdriver and unhook wire spade from brush holder, Fig. 7.
8. Remove field coils, Fig. 8.

REASSEMBLY

1. Install field coils as shown in Fig. 8 and connect wires to brush holder.
2. Place gasket over coil assembly and secure assembly in place with air baffle and screws, Fig. 6.
3. Install armature as shown in Fig. 5.
4. Install gear case over splined end of armature shaft and secure with retaining bolts, Fig. 9.
5. Install brushes and secure with plugs, Fig. 3.
6. Connect wire connectors to switch, position switches in handle, hold in place with one hand and install handle cover, Fig. 9.
7. Install guide bar, chain and cover, Fig. 1.
8. Adjust chain as follows:

a. Loosen bar retaining nuts, hold nose of bar up and turn adjusting screw until chain side links just contact bottom of guide bar.

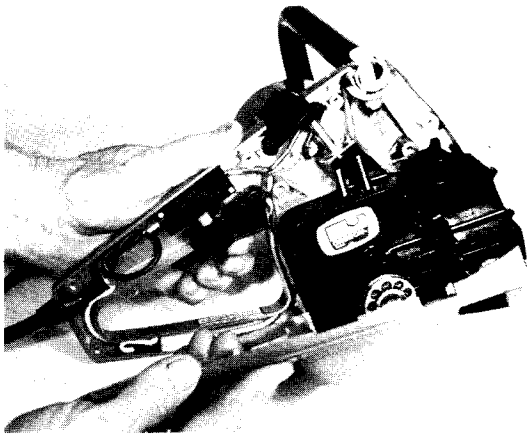

Fig. 9 — Installing Switches and Handle Cover

b. While holding bar up, tighten guide bar nuts.

c. Pull forward on upper side of chain. Chain should rotate around bar freely. If not chain is too tight.

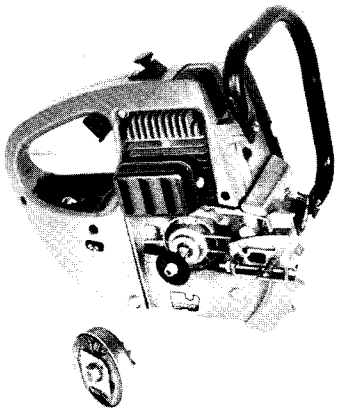

Fig. 10 — Clutch Assembly Removed

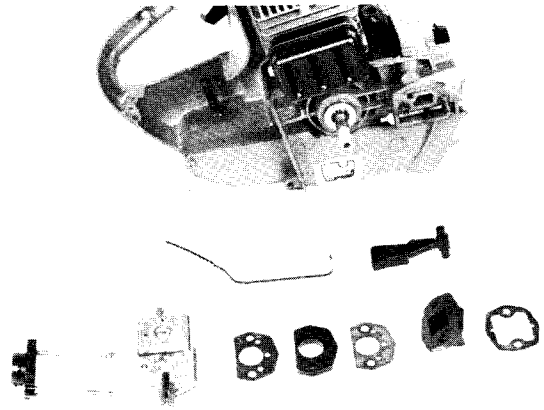

Fig. 12 — Carburetor and Reed Plate Removed

The MF 190 model is equipped with a manual chain oiling system and MF 190A is equipped with an automatic oiling system. The following instructions cover both models.

DISASSEMBLY

1. Remove chain shield, guide bar and chain.
2. With an impact wrench, rotate clutch assembly clockwise on crankshaft and remove clutch, Fig. 10.

NOTE: A screwdriver can be inserted through recoil start housing and into reinforced area of flywheel to hold crankshaft from turning. Then rotate clutch clockwise and remove.

3. Remove screws in front handle and remove handle.
4. Remove four screws and remove cylinder frame and handle, Fig. 11.
5. Remove air filters, carburetor, reed plate, throttle lever and linkage, Fig. 12.
6. Use a screwdriver and pry crankshaft seal cap off case and remove seal, Fig. 13.
7. Remove recoil starter and nut securing flywheel to crankshaft.

NOTE: An impact wrench is helpful in removing flywheel nut (right-hand threads).

8. Screw a 5/16-24 UNF bolt and nut on crankshaft and remove flywheel as shown in Fig. 14.
9. Remove cover over points and disconnect

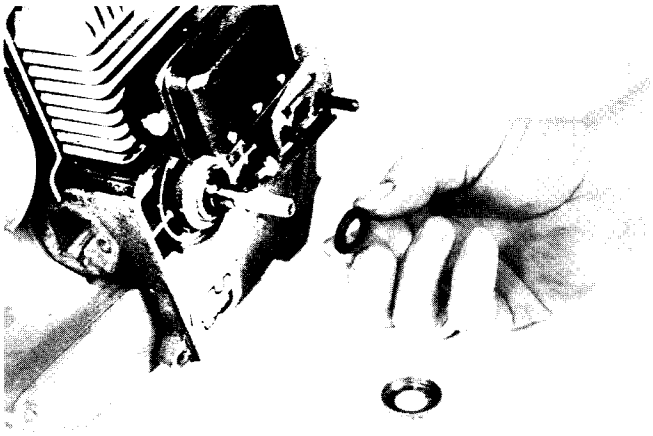

Fig. 13 — Removing/Installing Crankshaft Seal

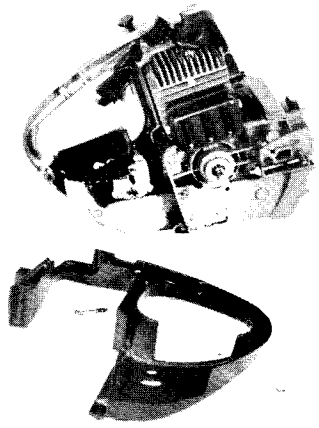

Fig. 11 — Cylinder Frame and Handle Removed

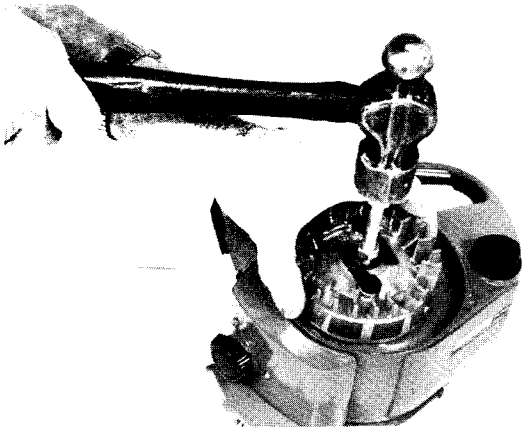

Fig. 14 — Removing Flywheel

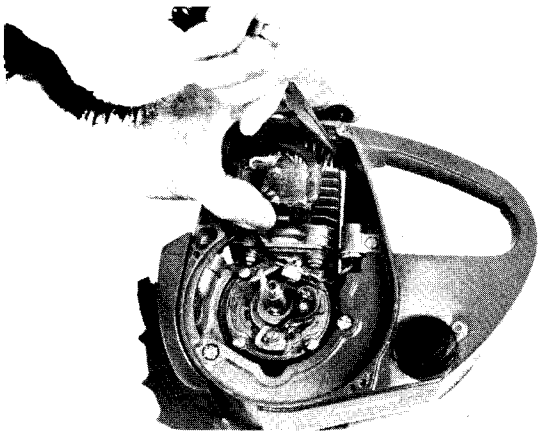

Fig. 15 — Removing Retaining Ring from Manual Oiler Button

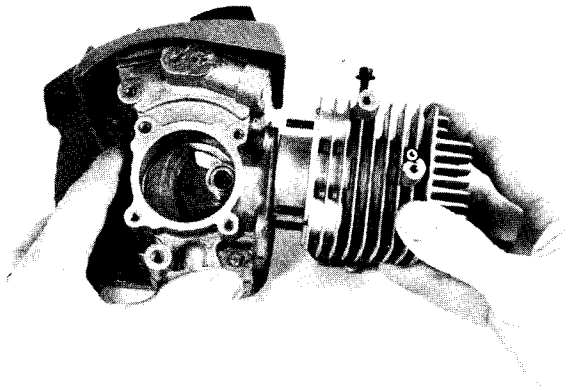

Fig. 18 — Removing/Installing Cylinder, Piston and Rod

wire from points. Points and condenser can be removed if desired.

10. Push down on manual oiler button (if equipped) and remove retaining ring, Fig. 15. Pull button off plunger rod.

11. Remove screws securing fuel tank and cover to crankcase and lift off, Fig. 16.

12. Rotate crankshaft until keyway on shaft is toward top of cylinder.

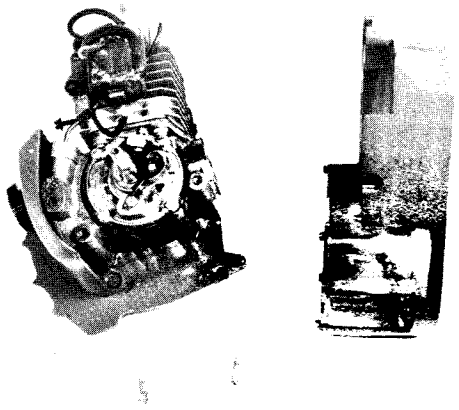

Fig. 16 — Fuel Tank and Cover Removed

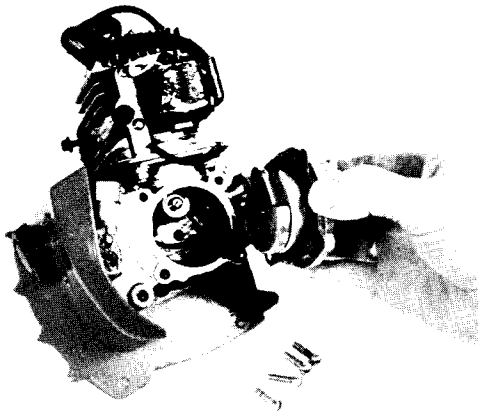

Fig. 17 — Removing/Installing Bearing Carrier and Flywheel Half of Crankshaft

NOTE: This is a two piece crankshaft and piston must be positioned up to clear crankshaft during disassembly or reassembly.

13. Remove four screws and remove bearing carrier and flywheel half of crankshaft, Fig. 17.

14. Remove nuts securing cylinder to crankcase and move cylinder off studs. Carefully lift rod off crankshaft and remove rod, piston and cylinder as an assembly, Fig. 18.

NOTE: Rod bearing is caged loose needles and may fall out. If so they can be retained in cage with grease for reassembly.

15. Remove piston from cylinder.

REASSEMBLY

Inspect all parts for wear or damage and replace all seals and gaskets. Most of the needle bearings are loose caged needles (drawn cap needle bearing grease retained rollers) and may fall out during disassembly. A small amount of grease will hold roller in place during reassembly. Inspect, if cylinder is badly scored replace with new cylinder. Do not attempt to rebore, it is chrome plated approximately .002" thick.

If piston is removed from rod, reinstall piston pin with closed end of pin toward exhaust side.

Use CV Locktite Catalog #242 on screws to hold securely.

1. Inspect bearings, if replacement is necessary press against lettered side of bearing. Install all bearings flush with edge of casting, Figs. 19 and 20.

2. Install rings on piston and align pin in ring groove with end of piston rings.

3. Position piston so EXH marking on top of piston is toward exhaust side of cylinder.

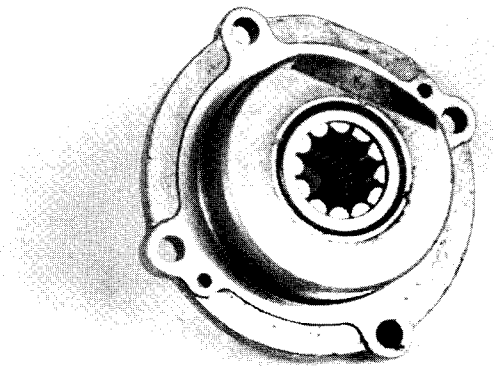

Fig. 19 — Bearings Properly Located in Retainer

4. Compress rings and insert piston into cylinder, Fig. 21.
5. If removed install drive half of crankshaft into crankcase.
6. Position crankshaft at T.D.C. then pivot connecting rod into recess area and install onto crankshaft, Fig. 18.
7. Slide cylinder over studs in crankcase and secure with retaining nuts.
8. With cylinder at T.D.C. install bearing carrier and flywheel half of crankshaft, Fig. 17. Secure with retaining nuts.
9. Reinstall fuel tank and cover to crankcase, Fig. 16, and secure with retaining screws.
10. Install manual oil control plunger and button (if equipped).
11. Install crankshaft oil seal and retainer on flywheel side.
12. Install points and adjust to .015" gap.

NOTE: Point gap setting will change due to two piece crankshaft. When checking gap hold crankshaft against point cam block.

13. Install coil if removed and connect coil and condenser wires to points.
14. Install flywheel and adjust air gap between coil and flywheel to .008".

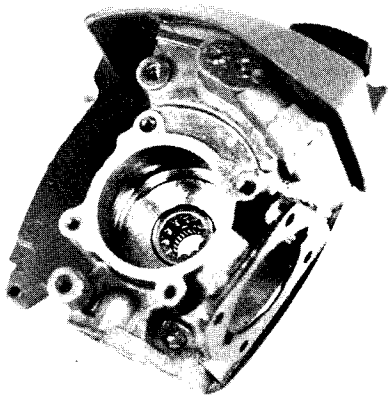

Fig. 20 — Bearings Properly Located in Housing

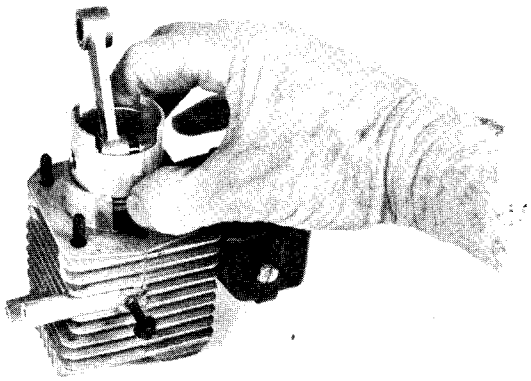

Fig. 21 — Installing Piston into Cylinder

NOTE: Hold flywheel against coil to set air gap.

15. Install crankshaft seal and retainer on clutch side, Fig. 13.
16. Install reed plate, carburetor and throttle linkage, Fig. 22.
17. Position switch and throttle lever and install frame and handle, Fig. 11.
18. Install front handle.
19. Install clutch assembly, Fig. 10.
20. Install chain, guide bar and shield and adjust chain tension as outlined in Operator's Manual.
21. Adjust chain as follows:
    a. Loosen bar retaining nut, hold nose of bar up and turn adjusting screw until chain side links just contact bottom of guide bar.
    b. While holding bar up tighten guide bar nut.
    c. Pull forward on upper side of chain. Chain should rotate freely around bar. If not chain is too tight.

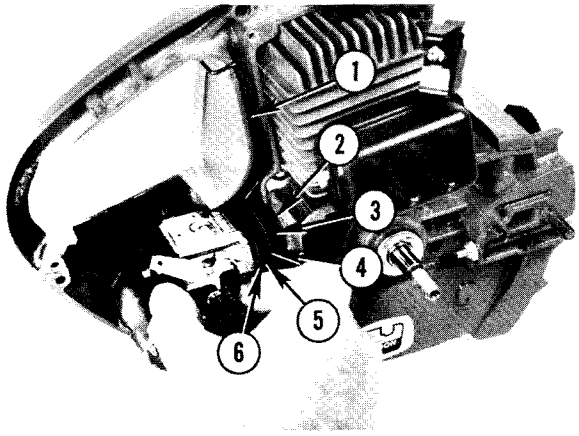

Fig. 22 — Installing Carburetor

1. Throttle Linkage
2. Reed Plate Gasket
3. Reed Plate
4. Spacer Gasket
5. Spacer
6. Carburetor Gasket

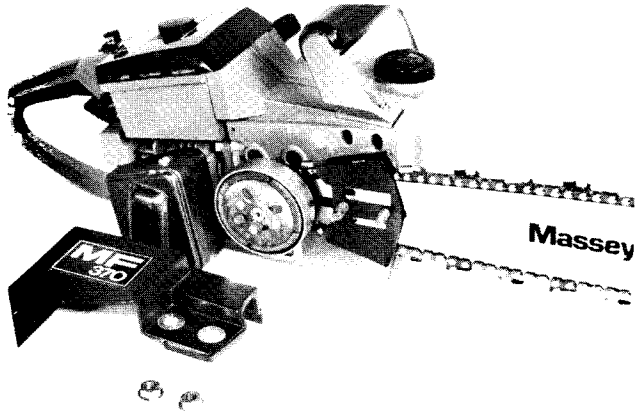

Fig. 23 — Chain Guide Bar Nuts and Guard Removed

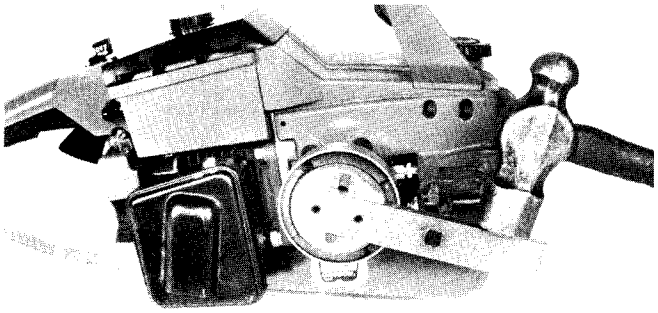

Fig. 25 — Removing Clutch Assembly

The MF 370 model is equipped with a manual oiler. The MF 370A and MF 370AR are equipped with an automatic oiler plus a manual oiler. A metering valve meters amount of oil automatic oiler will deliver to chain and bar.

DEISASSEMBLY

1. Remove chain shield, guide bar and chain, Fig. 23.
2. Remove recoil starter assembly.
3. Place screwdriver in reinforced area of flywheel, Fig. 24, and turn clutch assembly clockwise (left-hand threads) with special tool, Fig. 25. Be sure screwdriver is next to heavy portion of flywheel.

NOTE: A tool can be fabricated so clutch assembly can be removed with an impact wrench, Fig. 26.

4. Remove flywheel as follows:
   a. Remove retaining nut.
   b. Screw a 5/16" 24 UNF bolt and nut on crankshaft.
   c. Hold flywheel with one hand and strike bolt, Fig. 27.
5. Remove cover and air filter over carburetor and disconnect and remove choke control.
6. Remove handle cover and air filter bracket, Fig. 28.

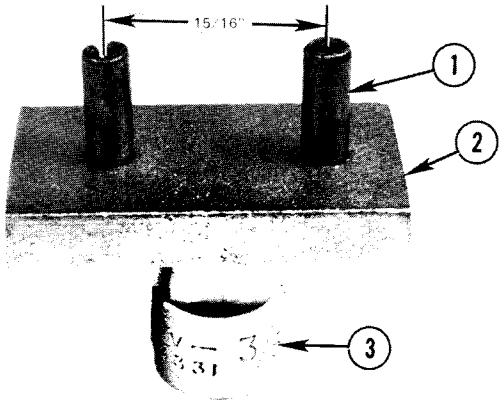

Fig. 26 — Clutch Removal Tool

1. 1/8" x 1/2" Roll Pin (2)
2. Flat Steel 1/4" Thick x 1-1/2" Long
3. 3/8" Drive Socket Welded to Center of Flat Steel

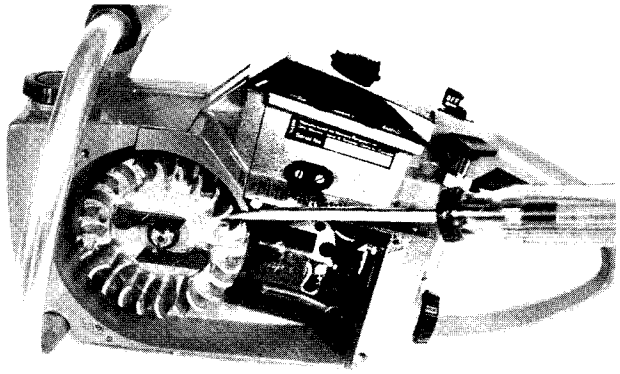

Fig. 24 — Holding Flywheel for Clutch Removal

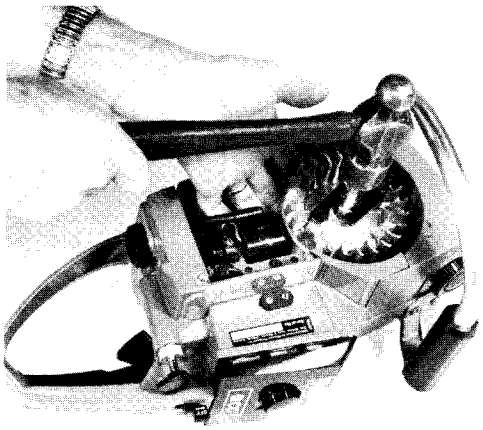

Fig. 27 — Removing Flywheel

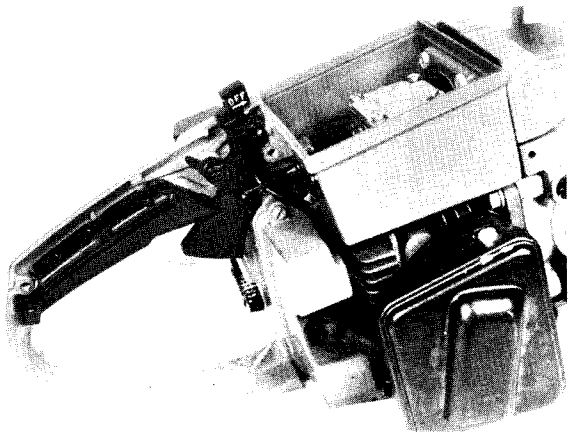

Fig. 28 — Handle Cover Removed

7. Notice that throttle control wire is located in third hole from top in counterclockwise direction on throttle shaft. Then remove wire, throttle lever, detent lever and switch. When releasing detent lever from handle, be careful spring will come out and be lost.

NOTE: Units with automatic oiler system the throttle wire is located under metering pump link.

8. Disconnect fuel line and remove carburetor observing order and positioning of gaskets, Fig. 29.

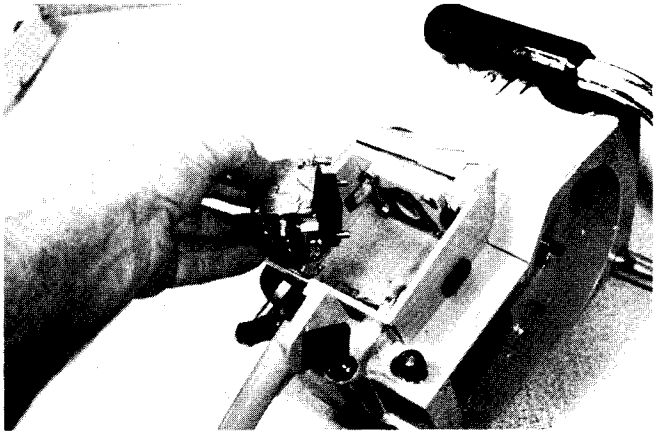

Fig. 29 — Removing Carburetor

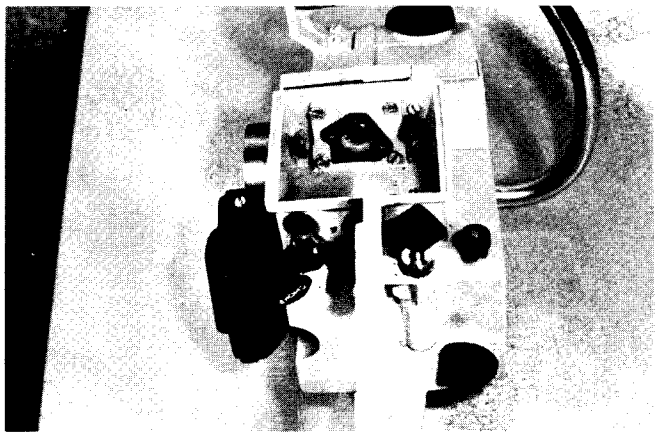

Fig. 30 — Oil Tank Mounting Screws in Carburetor Chamber

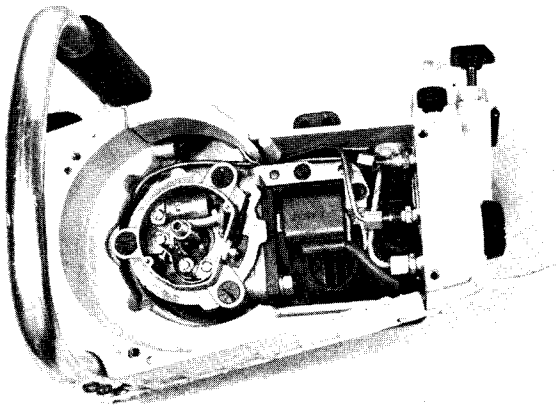

Fig. 31 — View of Oil Lines Used on Automatic Oiler System

9. Remove four screws in carburetor chamber, Fig. 30. One screw on right bottom side of saw, two lines (automatic oiler) on left side of saw, Fig. 31, and remove oil tank assembly.

10. Remove four screws on clutch side of saw and separate engine from fuel tank, Fig. 32.

11. Unhook coil wire and remove coil assembly, Fig. 33.

12. Remove four retaining nuts and remove cylinder from piston, Fig. 34.

13. Remove bearing retainer from side of engine crankcase, Fig. 35.

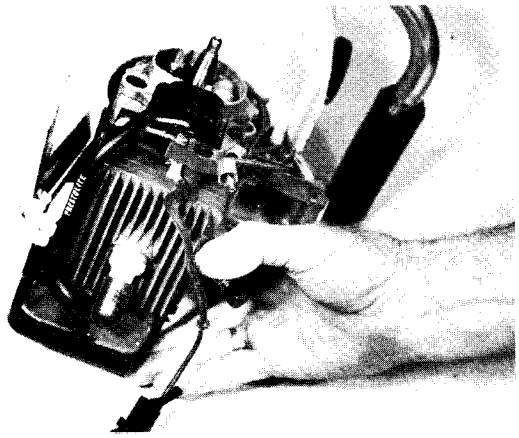

Fig. 32 — Separating Engine from Fuel Tank

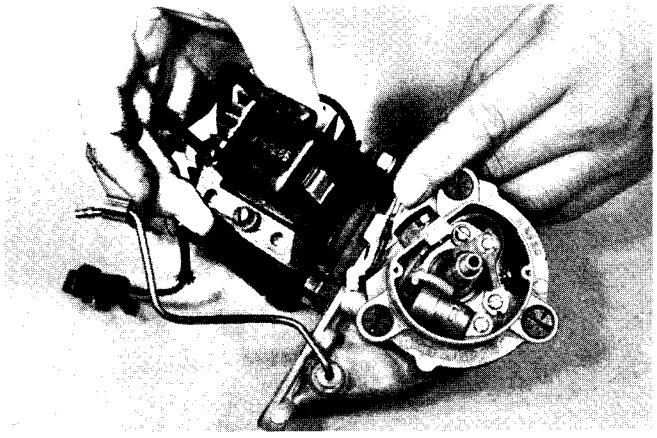

Fig. 33 — Removing Coil Assembly

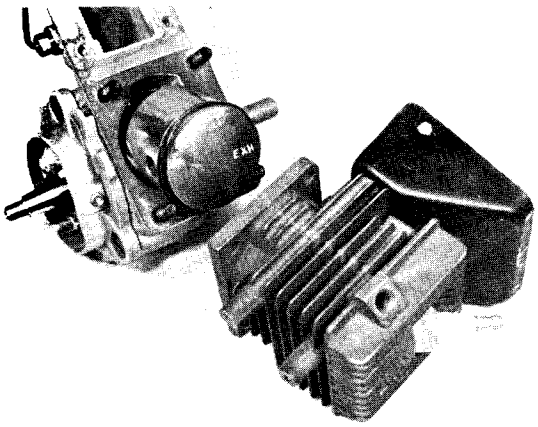

Fig. 34 — Removing Cylinder from Piston

14. Work through side and top openings and remove piston and rod from crankshaft, Fig. 36.

NOTE: Crank end of connecting rod has 31 loose needle bearings. Piston end has a caged bearing.

15. Remove screws and retainers from groove in crankshaft bearing, Fig. 37.

16. Bump end of crankshaft and remove shaft and bearing from crankcase, Fig. 38.

NOTE: A board with 1" hole on open jaws of a vise makes a convenient holder, Fig. 38.

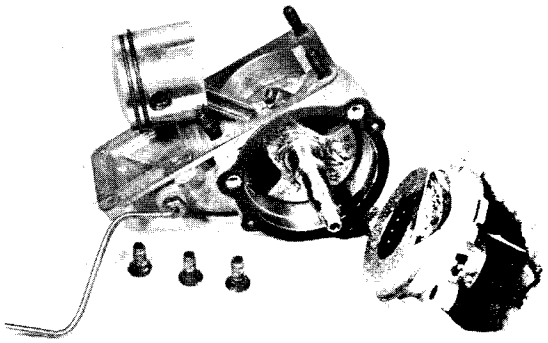

Fig. 35 — Removing/Installing Bearing Retainer

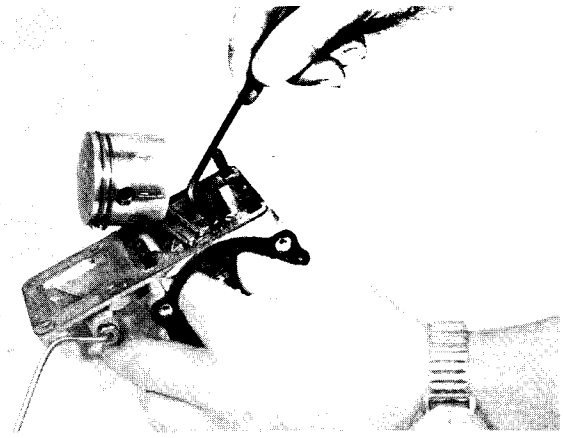

Fig. 36 — Removing Piston and Rod from Crankshaft

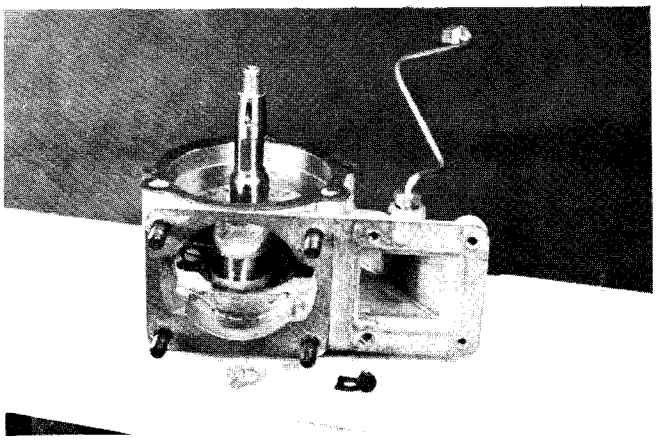

Fig. 37 — Crankshaft Bearing Installed Showing Retainers and Screws

REASSEMBLY

Inspect all parts for wear or damage and replace all seals and gaskets. Most of the needle bearings are loose caged needles (drawn cup needle bearing grease retained rollers) and may fall out during disassembly. A small amount of grease will hold rollers during reassembly. The crankshaft end of connecting rod has 31 loose needle bearings.

If piston is removed from rod, reinstall piston pin with closed end of pin toward exhaust side and connecting rod with match marks opposite exhaust side. Use Locktite CV (Catalog Number 83) or a suitable substitute medium strength product for use on coarse threads and fittings such as nut lock, hydraulic sealant, etc.

1. If removed, install bearing on clutch end of crankshaft with groove in bearing race toward center of crankshaft.

2. If necessary to replace needle bearings, press against lettered side of bearing and position flush with housing, Fig. 39.

3. Install seal in crankcase with lip inward and flush with housing, Fig. 40.

4. Insert crankshaft and bearing into crankcase and secure with retainer clips and screws,

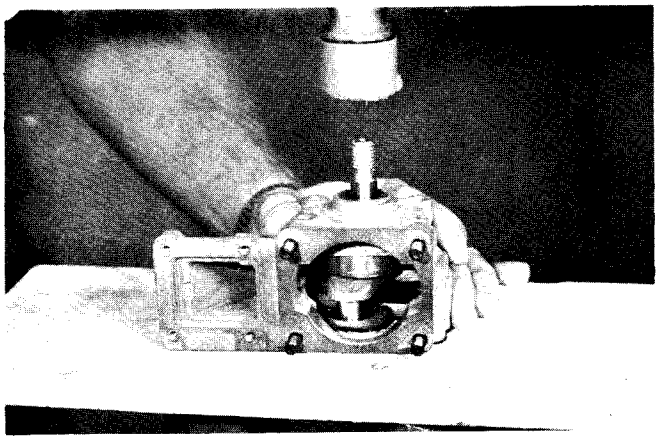

Fig. 38 — Removing Crankshaft and Bearing

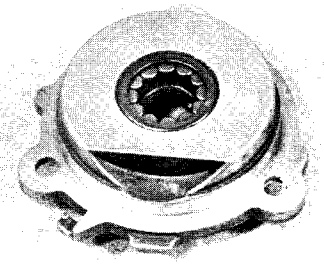

Fig. 39 — Bearing Properly Located in Retainer

Fig. 37. Use CV Locktite on screws. Be sure crankshaft does not contact screws when rotated.

5. Count needle bearings and locate mating marks on connecting rod, Fig. 41.

6. Position needles in rod with grease, Fig. 42.

7. Set rod and piston aside and position needles in rod cap. Work through side and position rod cap on crankshaft with mating mark out, Fig. 43.

8. Hold rod cap with one hand and set rod and piston onto crankshaft with mating mark out,

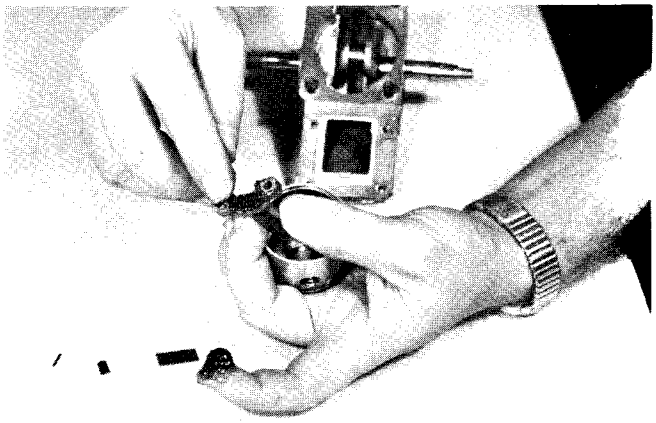

Fig. 42 — Positioning Needle Bearings in Rod with Grease

Fig. 44. Secure rod and cap together with retaining screws.

9. Install rings on piston and align pin in ring groove with end of piston rings.

10. Install seal in bearing retainer and install bearing retainer, Fig. 35.

11. Position cylinder over piston so EXH marking on top of piston is toward exhaust side of cylinder.

12. Compress rings and slide cylinder over pis-

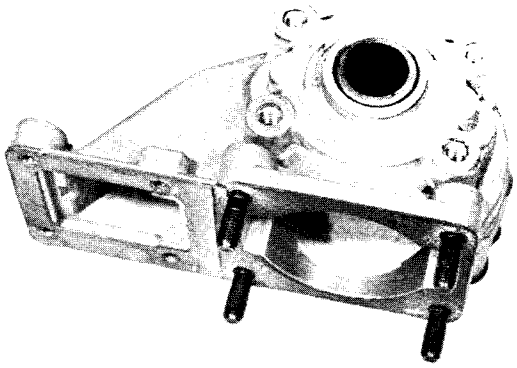

Fig. 40 — Seal Installed in Crankcase

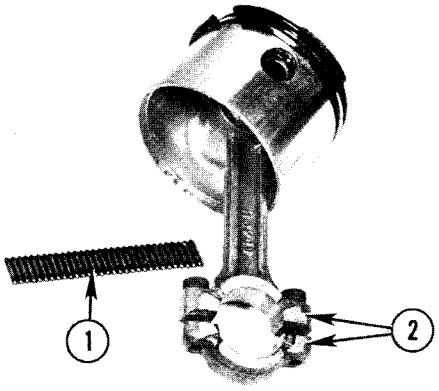

Fig. 41 — Connecting Rod and Piston Assembly

1. Needle Bearings (31) 2. Mating Marks

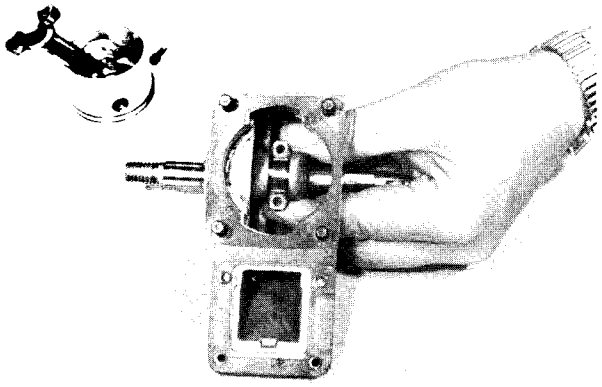

Fig. 43 — Rod Cap Positioned on Crankshaft Prior to Installing Rod and Piston

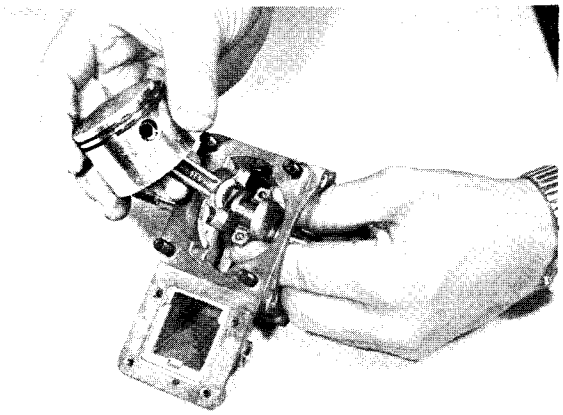

Fig. 44 — Installing Rod and Piston

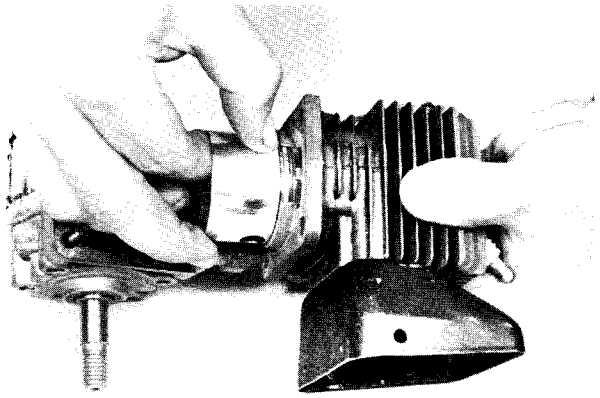

Fig. 45 — Installing Cylinder Over Piston and Rings

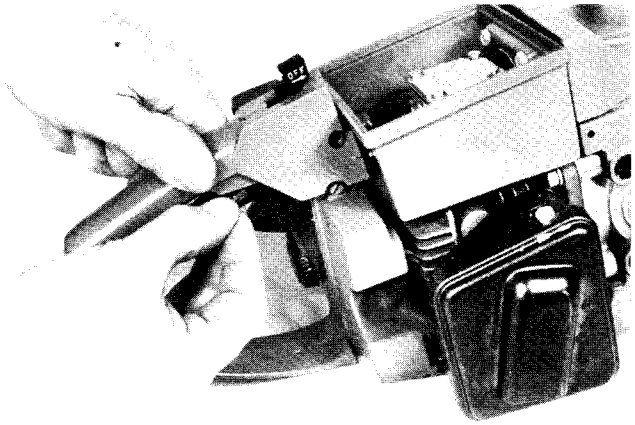

Fig. 48 — Installing Handle Cover

ton, Fig. 45, and studs in crankcase. Secure cylinder to crankcase with retaining nuts.

13. Position coil on cylinder, hold up, away from crankshaft, and lightly tighten screws. Position wire in groove, Fig. 33. Mounting screws on coil will be tightened later when flywheel is installed.

14. Position engine into fuel tank assembly and secure with retaining screws, Fig. 32.

15. Insert reed valve assembly and thick cork gasket into carburetor opening in crankcase.

16. Position oil tank assembly with wires and lines routed as shown in Figs. 46 and 31. Secure with retaining screw — four screws in carburetor chamber and one screw on right lower side of saw. Reconnect oil lines.

17. Install carburetor making sure all gasket holes are aligned, Fig. 29.

18. Install switch with detent spring, Fig. 47.

19. Install throttle control wire, throttle lever and handle cover, Figs. 48 and 49. Throttle control wire is connected to 3rd hole from top, in counter-clockwise direction on throttle shaft.

NOTE: On models with automatic oiler, throttle shaft is placed under metering pump link.

20. Install choke control, air filter bracket, air filter and cover.

21. Reinstall points (if removed), adjust gap to .015" and install flywheel. Adjust air gap between coil and flywheel to .008", Fig. 50.

NOTE: A shipping tag serves as a convenient gauge to set air gap.

22. Install clutch, chain and guide bar. Adjust chain as outlined in Operator's Manual.

23. Install recoil starter.

24. Adjust chain as follows:

a. Loosen bar retaining nuts, hold nose of bar

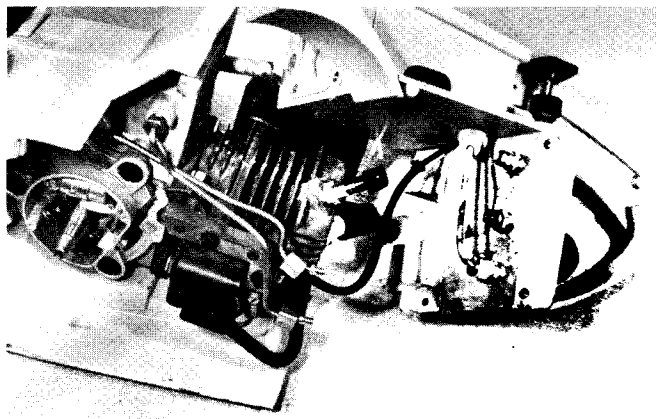

Fig. 46 — Installing Oil Tank

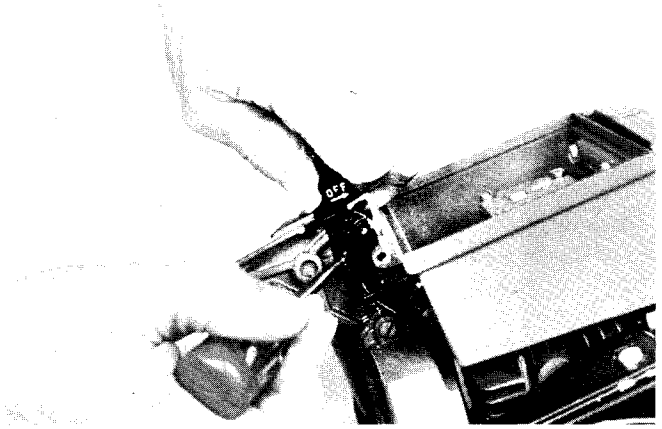

Fig. 47 — Installing Switch and Detent

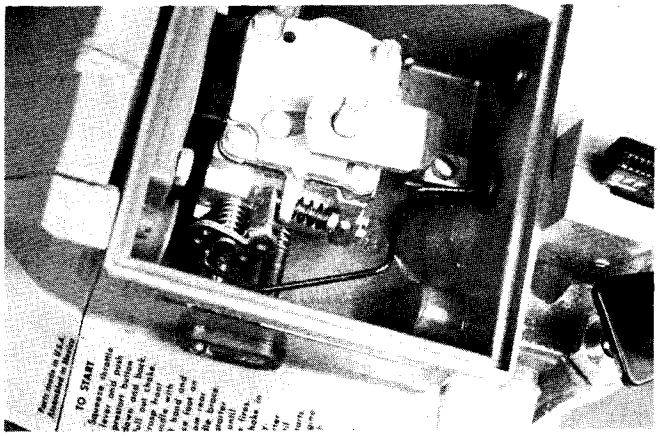

Fig. 49 — Throttle Wire Location

up and turn adjusting screw until chain side links just contact bottom of guide bar.

b. While holding bar up tighten guide bar nuts.

c. Pull forward on upper side of chain. Chain should rotate around bar freely. If not chain is too tight.

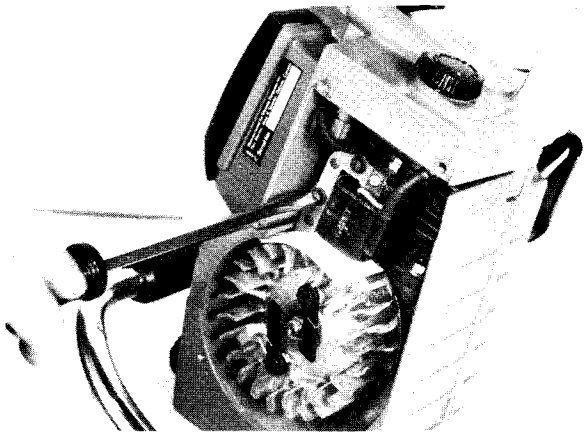

Fig. 50 — Setting Air Gap

FUEL SYSTEM

Maximum power and efficiency are possible only with proper carburetion. Improper carburetor adjustments can cause overheating, spark plug fouling, poor lubrication and lack of power.

Use a good quality of SAE 30 engine oil mixed with regular gasoline 16:1 ratio. Fuel/oil ratio should be increased during break-in period to 3/4 pint oil to 1 gallon gasoline. This mixture should be used for first gallon of gasoline.

CARBURETOR ADJUSTMENTS — MF 190

High speed mixture screw is identified by letter "H" and low speed by letter "L".

1. Stop engine and turn both fuel mixture screws in until they bottom (do not force).
2. Back out both fuel mixture screws 3/4 turn. This is an initial setting.
3. Start engine and warm up, return to idle and if necessary adjust low speed mixture screw until engine runs smooth.
4. Speed engine quickly, if engine doesn't accelerate or hesitates, open high speed mixture screw 1/16 turn at a time and check again. It may be necessary to open low speed mixture screw slightly.

NOTE: Never operate engine on a lean mixture or damage could occur due to lack of lubrication and overheating.

CARBURETOR ADJUSTMENTS — MF 370

High speed mixture screw is identified by letter "H" and low speed by letter "L".

1. Stop engine and turn both fuel mixture screws in until they bottom (do not force).
2. Back out low speed mixture screw 1-1/8 turns and high speed mixture screw 1 turn. This is an initial setting.
3. Start engine and warm up, return to idle and if necessary adjust low speed mixture screw until engine runs smooth.
4. Speed engine quickly, if engine does not accelerate or hesitates, open high speed mixture screw 1/16 turn at a time and check again. It may be necessary to open low speed mixture screw slightly.

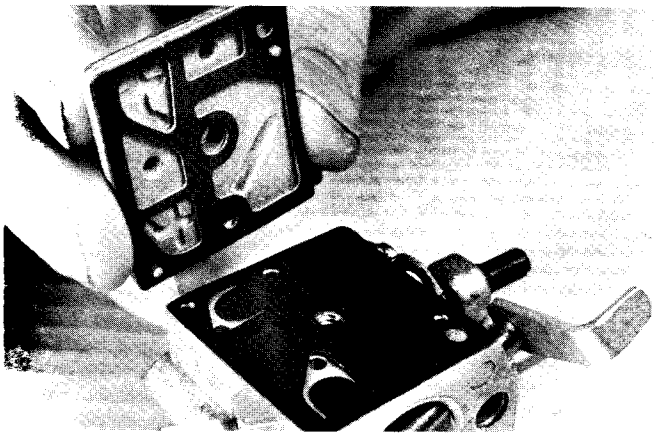

Fig. 51 — Removing/Installing Fuel Pump Cover and Gasket

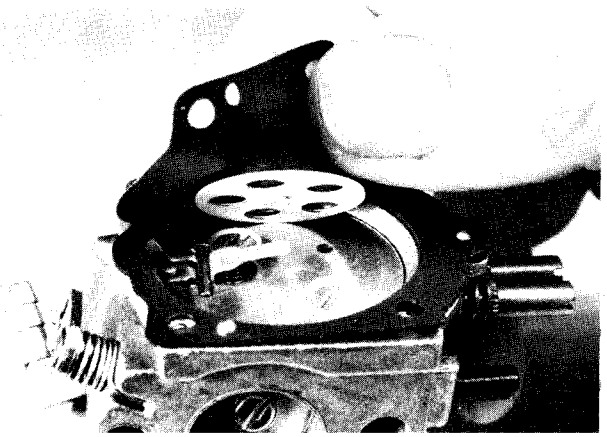

Fig. 54 — Removing/Installing Metering Diaphragm

CARBURETOR DISASSEMBLY — MF 190

1. Remove fuel pump cover, gasket and diaphragm, Fig. 51.
2. Remove screens, Figs. 52 and 53.
3. Remove four screws and lift off metering diaphragm cover.
4. Remove metering diaphragm and gasket, Fig. 54.

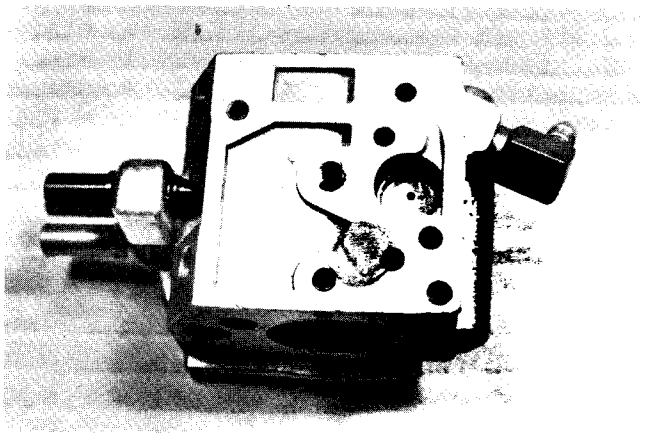

Fig. 52 — Screen Removed

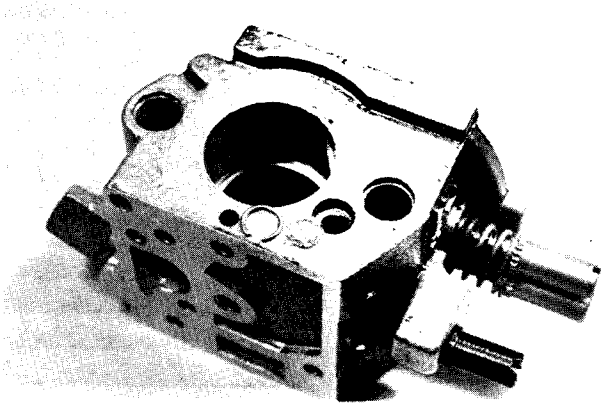

Fig. 53 — Screen and Retaining Ring Removed

5. Remove two flat head screws and lift off plate, lever and inlet needle.
6. Remove spring, black circuit gasket and metering rod.
7. Remove retaining ring and screen, Fig. 55.

CARBURETOR REASSEMBLY — MF 190

1. Install metering rod, screen and retaining ring, Fig. 56.

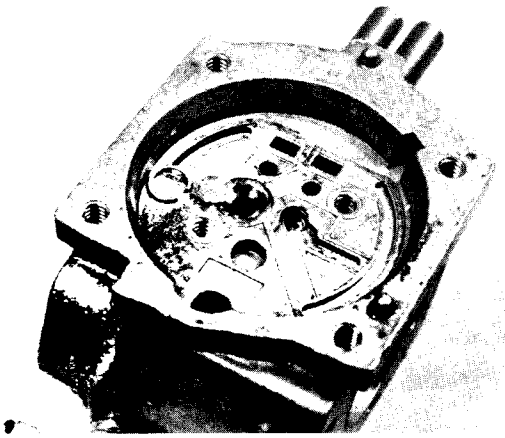

Fig. 55 — Retaining Ring and Screen Removed

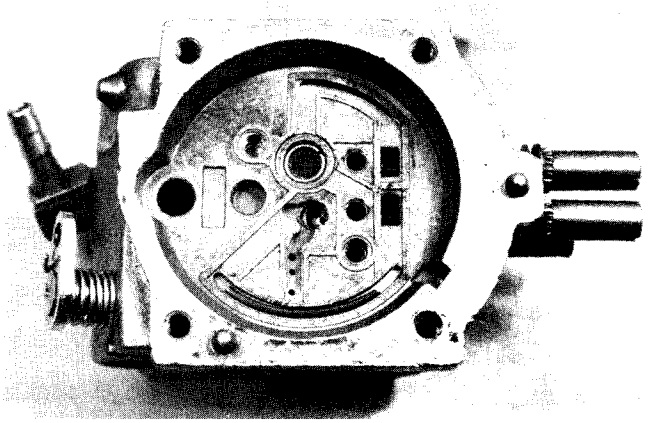

Fig. 56 — Metering Rod and Screen Installed

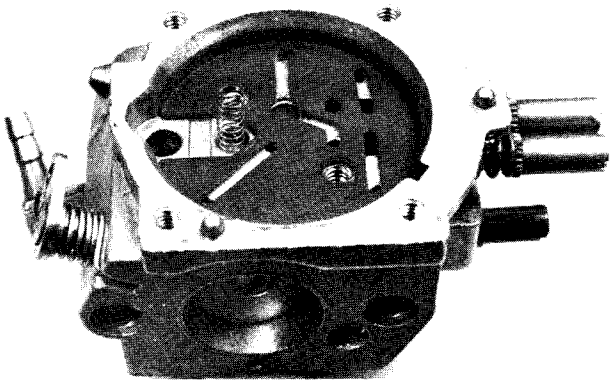

Fig. 57 — Circuit Gasket and Spring Installed

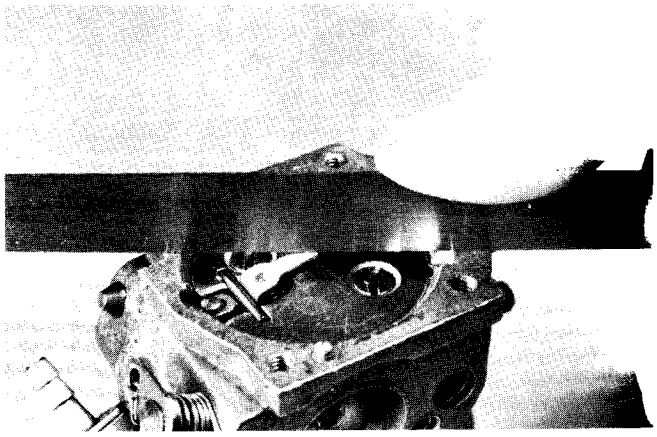

Fig. 59 — Checking Inlet Needle Lever Height

2. Position black circuit gasket and lever spring into place, Fig. 57.
3. Hook inlet needle in lever and install over spring, Fig. 58.
4. Secure plate and lever assembly with flat head screws and check height of lever, Fig. 59. If lever is not level with gasket surface of carburetor housing, carefully bend to correct.
5. Position metering diaphragm and gasket over lever, Fig. 54, and install cover.
6. Reinstall screens, Figs. 52 and 53.
7. Install fuel pump diaphragm, gasket and cover, Fig. 51.

CARBURETOR DISASSEMBLY — MF 370

1. Remove low speed mixture and high speed mixture screws.
2. Remove fuel pump cover, gasket and diaphragm, Fig. 60.
3. Remove main diaphragm cover.
4. Unhook main diaphragm from control lever and remove, Fig. 61.
5. Remove screw and lift out lever, pin, spring and inlet needle, Fig. 62.

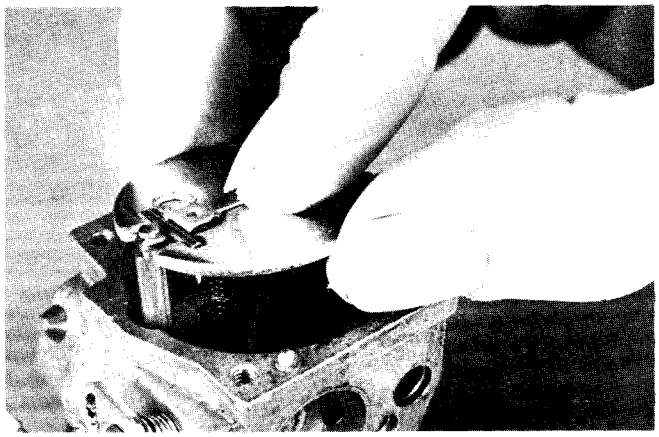

Fig. 58 — Installing Inlet Needle and Plate

6. Carefully drill a small hole in each welch plug, Fig. 63. This hole should just break through plug. Deeper drilling will damage body casting beyond repair. A plastic insert is under large welsh plug to help prevent damage. This plug is included in carburetor repair kit.
7. Use a small punch and pry welch plug from openings, Fig. 64.

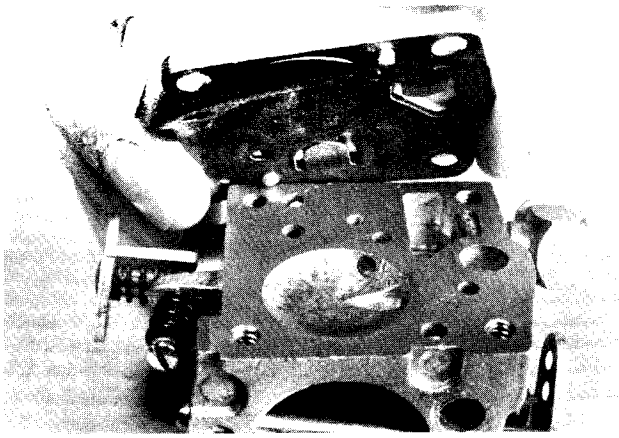

Fig. 60 — Removing/Installing Fuel Pump Diaphragm, Gasket and Cover

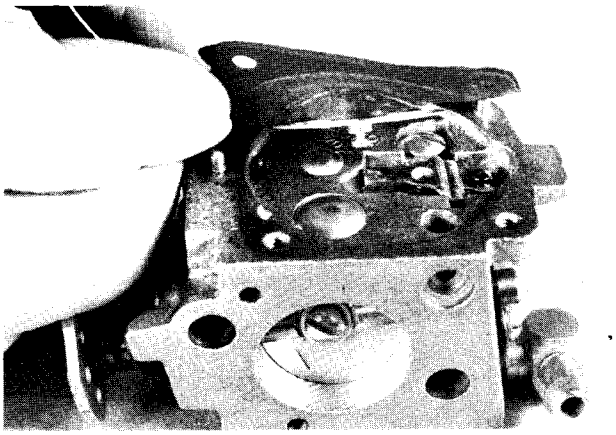

Fig. 61 — Removing/Installing Diaphragm from Control Lever

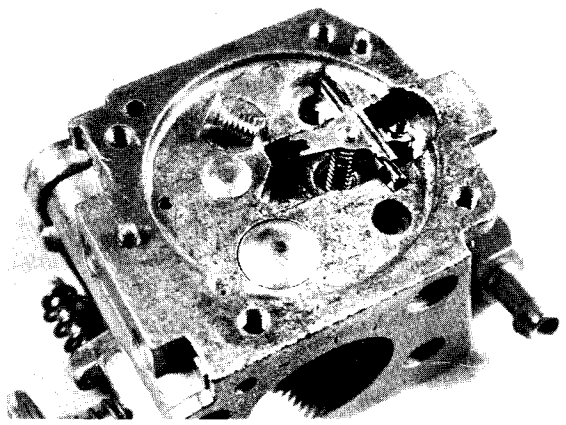

Fig. 62 — Inlet Needle, Lever and Pin in Place with Retaining Screw Removed

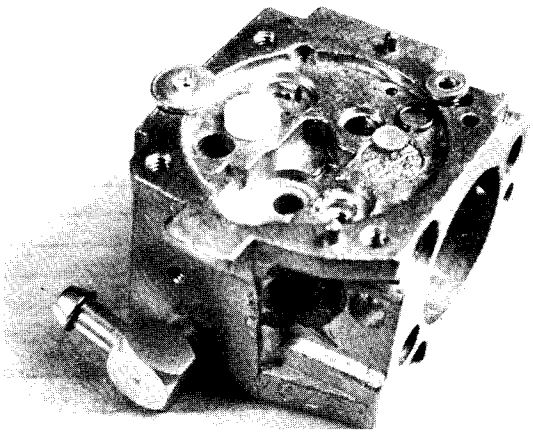

Fig. 65 — Plugs, Plastic Insert and Screen Removed

8. Remove retaining ring, screen and plastic insert, Fig. 65.

9. Remove governor valve assembly, Fig. 66.

10. If choke shaft requires removal, hold hand over hole at end of shaft to prevent detent ball and spring from being lost.

CARBURETOR REASSEMBLY — MF 370

1. If removed, reinstall throttle shaft and spring, Fig. 67.

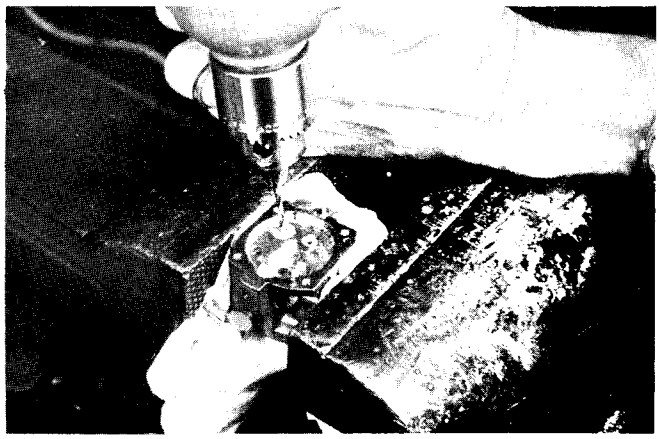

Fig. 63 — Drilling Welch Plugs Prior to Removal

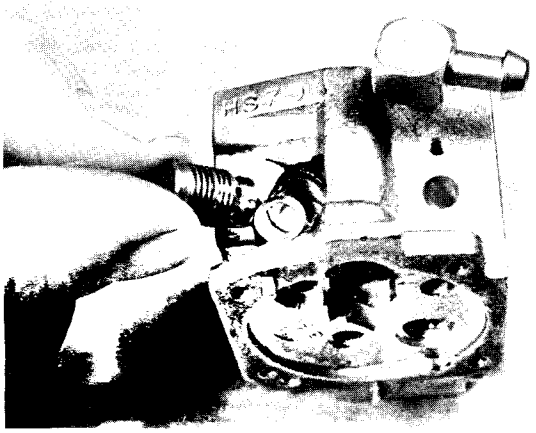

Fig. 66 — Removing/Installing Fuel Governor Valve

Fig. 64 — Removing Welch Plug

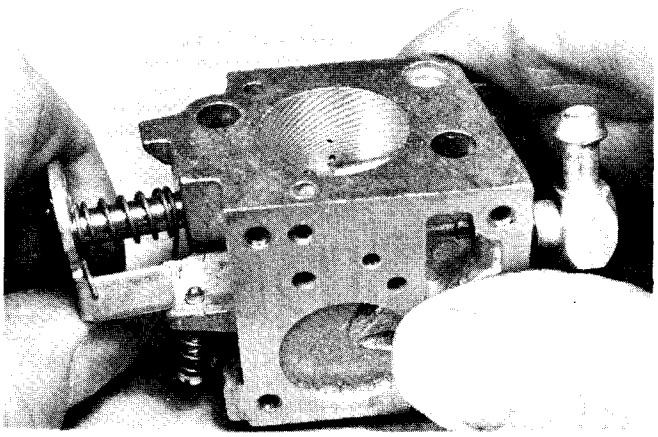

Fig. 67 — Installing Throttle Shaft and Spring

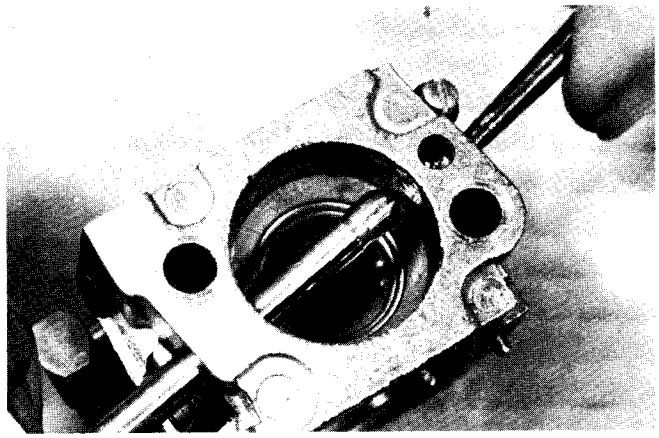

Fig. 68 — Installing Choke Shaft

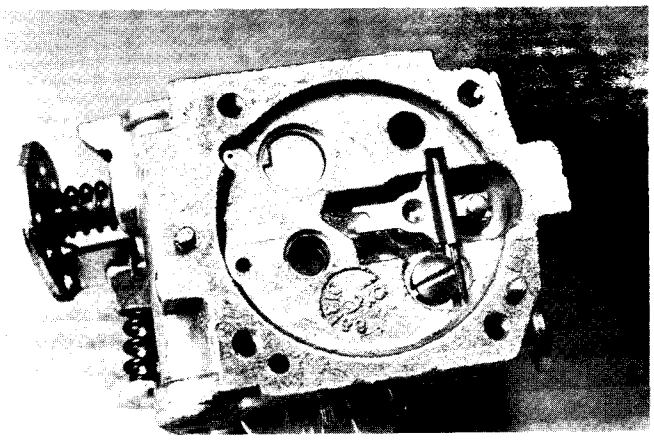

Fig. 69 — Inlet Needle and Lever Installed Also Plastic Insert and Screen

2. Install choke shaft, detent spring and ball, Fig. 68.
3. Install governor valve assembly and gasket, Fig. 66.
4. Install screen, retaining ring and plastic insert, Fig. 69.
5. Install welch plugs with convex side up, and flatten with a flat tool slightly larger than the welsh plug.
6. Install inlet needle, spring and lever and secure with retaining screw, Fig. 69.
7. Check diaphragm end of lever as shown in Fig. 70. Control lever is properly set when flush with housing as shown. If lever is not correct bend lever.
8. Hook main diaphragm to control lever, Fig. 61, and secure in place with cover and screws.
9. Install fuel pump diaphragm, gasket and cover, Fig. 60.

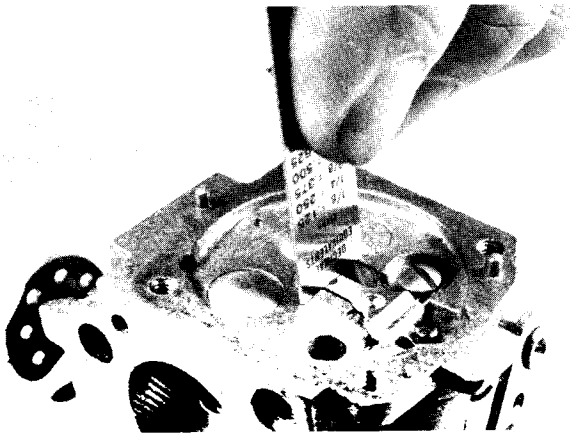

Fig. 70 — Checking Inlet Needle Lever Height

SHARPENING CHAIN

Improper filing can ruin chain faster than anything else. Use a chain filing vise if one is available. If not file chain while it is on guide bar, but be sure chain tension is properly adjusted.

1. File all cutters on one side, then opposite side and file from inside to outside of cutter.
2. Line up filing angle mark on file holder so it is parallel with chain, Fig. 71. Keeping guide line in this position will file chain at recommended 35° angle.
3. Hold file level, use a few firm, long, even strokes.
4. After one side has been filed, move to other side and file in same manner, Fig. 72.

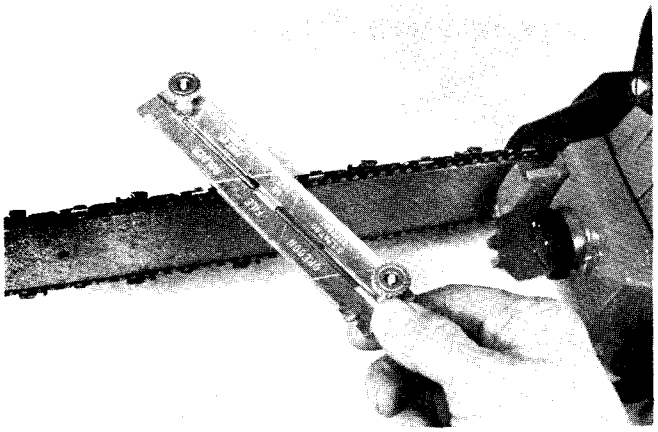

Fig. 71 — File Holder Placed on Chain for Filing all Cutters on Same Side

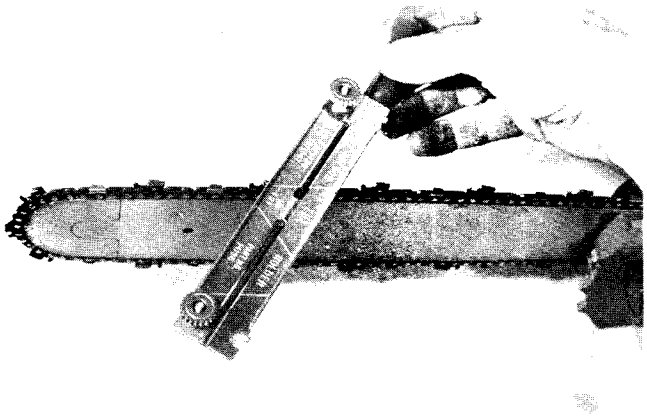

Fig. 72 — File Holder Placed on Chain for Filing Cutters on Opposite Side of Chain

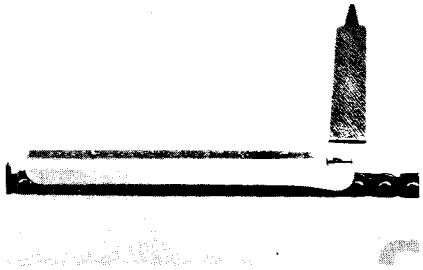

Fig. 73 — Gauge Placed on Chain

5. Use tool and check depth gauge on chain, Fig. 73.
6. If depth gauge on chain projects above tool file down, Fig. 74.
7. Round off front corner to maintain original shape, Fig. 75.

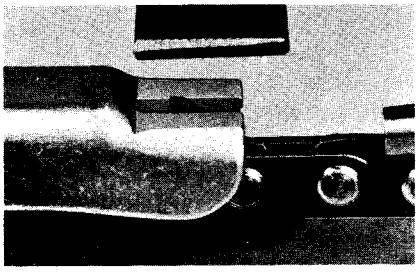

Fig. 74 — Filing Depth Gauge Level with Tool

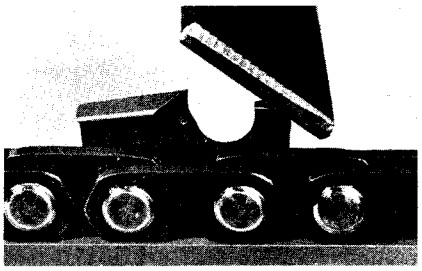

Fig. 75 — Rounding Off Front Corner of Depth Gauge

RECOIL STARTER

ROPE REPLACEMENT — MF 190

1. Remove recoil starter assembly.
2. Untie knot at starter pulley and pull rope out.
3. Remove "E" ring and washer from center post and lift pulley out.
4. Tie knot in one end of rope and thread other end into hole in pulley, Fig. 76.
5. Thread rope through hole in starter housing and attach handle to rope.
6. Reinstall pulley into housing and secure with retaining washer and "E" ring, Fig. 77.

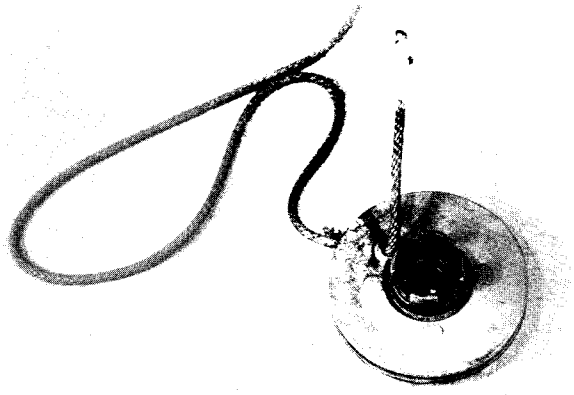

Fig. 76 — Rope Threaded through Hole in Pulley

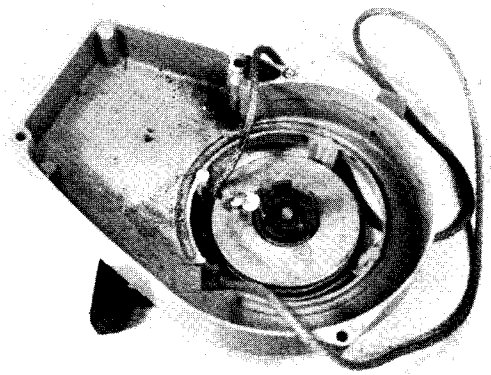

Fig. 77 — Pulley Installed in Housing

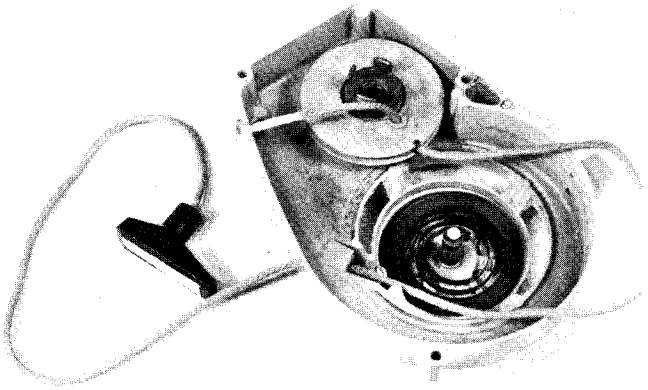

Fig. 78 — Spring Secured into Housing with Screw Prior to Installing Pulley

7. Position rope in notch in pulley and turn pulley clockwise seven turns. Hold pulley and pull rope to take up all slack. Release pulley and allow rope to recoil into housing.

SPRING REPLACEMENT — MF 190

1. Untie knot at end of rope and release spring tension.
2. Remove "E" ring and washer and lift pulley out.
3. Remove screw and washer holding spring in place, and remove old spring.
4. Install new spring and secure in place with screw and washer, Fig. 78.
5. Install spacer plate, pulley and rope and secure with washer and "E"-ring. Rotate pulley seven turns clockwise to wind spring.

ROPE REPLACEMENT — MF 370

1. Remove recoil starter assembly.
2. Untie knot in rope at pulley and pull rope out.
3. Rotate pulley in a clockwise direction eight turns. Align hole in pulley with hole in starter housing and hold in place with a screwdriver, Fig. 79.
4. Insert rope through housing into pulley and tie a knot. Release pulley and allow rope to recoil on pulley, Fig. 80.

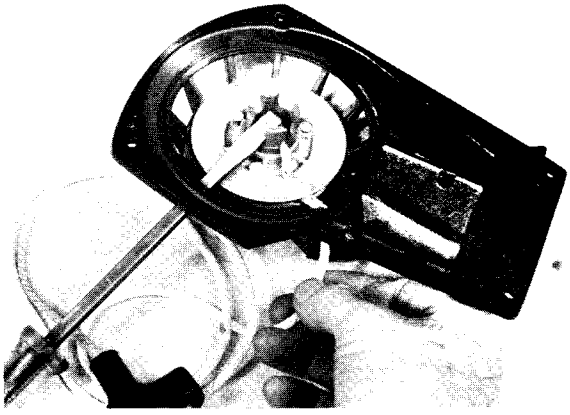

Fig. 79 — Holding Pulley While Installing Rope

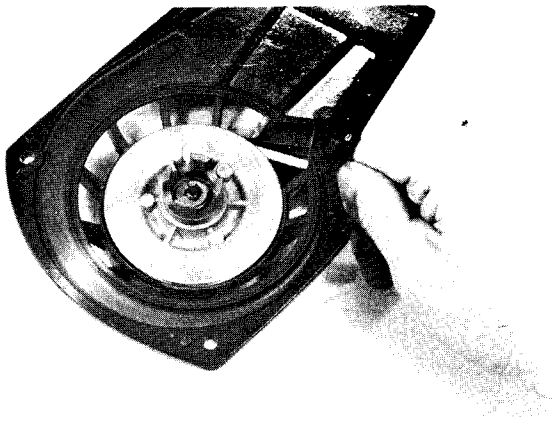

Fig. 80 — Recoiling Rope on Pulley

SPRING REPLACEMENT — MF 370

1. Untie knot at end of rope and release spring tension.
2. Remove "E" ring and washer, Fig. 81, and

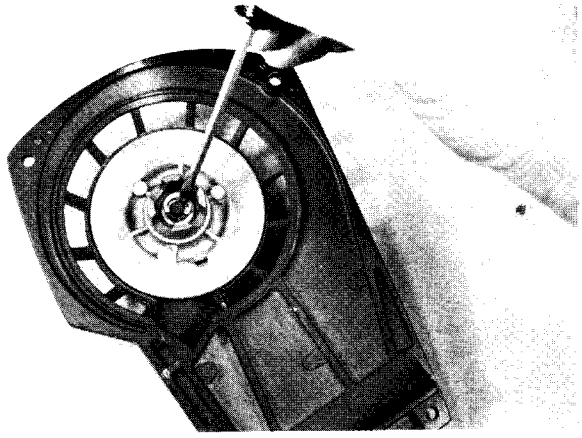

Fig. 81 — Removing Pulley Retaining "E" Ring

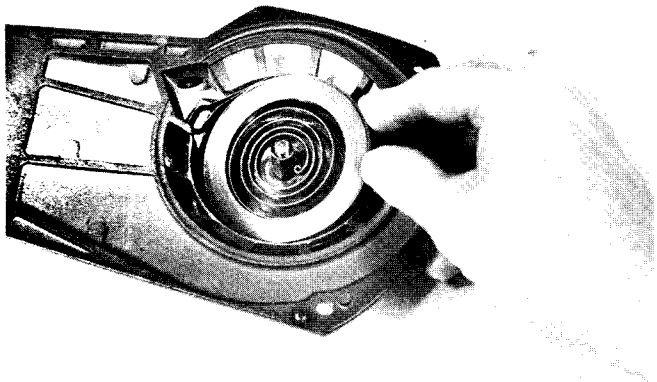

Fig. 82 — Installing Spring

carefully lift pulley out. Remove plastic spacer and spring.

3. Insert new spring, Fig. 82, plastic spacer and pulley, Fig. 83, into housing and secure with "E" ring and washer.

4. Rotate pulley eight turns clockwise, insert rope, tie knot and release pulley.

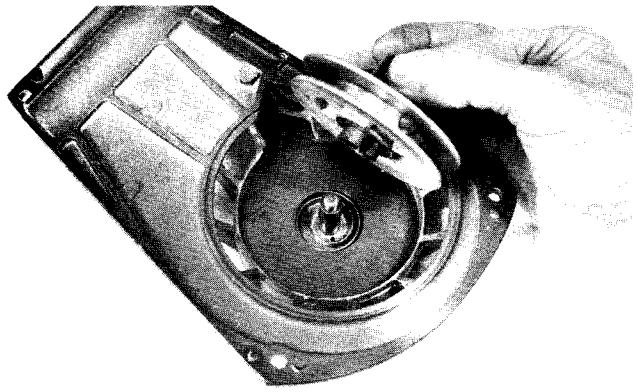

Fig. 83 — Installing Plastic Spacer and Pulley

ENGINE TROUBLE-SHOOTING

ENGINE FAILS TO START

1. Ignition switch — Be sure switch is in on position.
2. No fuel — Fill tank with clean, properly mixed fuel.
3. No spark — Remove spark plug, lay on engine with wire attached. Crank engine, spark should jump across plug points. If not try a new plug. If spark doesn't jump with new plug, check points, coil and condenser.
4. Check ground wire from magneto to ignition switch — Replace as necessary.
5. Carburetor out of adjustment — Adjust as required.

ENGINE LACKS POWER

1. Air filter plugged — Clean or replace filter.
2. Port holes plugged — Remove muffler and clean.
3. Dull chain — Sharpen or replace.
4. Carburetor out of adjustment — Adjust as required.

ENGINE WILL NOT ACCELERATE

1. Air filter plugged — Clean or replace filter.
2. Carburetor out of adjustment — Adjust as required.
3. Port holes plugged — Remove muffler and clean.
4. Weak spark — Check magneto, points and condenser.

ENGINE WILL NOT IDLE

1. Carburetor out of adjustment — Check idle mixture adjusting screw and idle speed screw.
2. Carburetor diaphragm damaged — Replace as required.
3. Crankshaft seal leaking — Replace as required.

ENGINE MISFIRES

1. Intermittent short in electrical system — Check ignition switch, electrical wiring and magneto.
2. Weak condenser — Replace condenser.

NOTE: Two cycle engines when idling may appear to be misfiring. This will not affect operation under load.

ENGINE KNOCKS

1. Connecting rod bearing worn — Move flywheel back and forth quickly. If rod is worn a loud click can be heard. Replace necessary parts.

ENGINE OVERHEATS

1. Cooling fins restricted — Clean fins.
2. Incorrect fuel mixture — Too lean fuel mixture or insufficient oil in mixture. Adjust carburetor and check fuel oil mixture.

ENGINE FLOODS

1. Carburetor inlet needle not seating — Repair or replace.
2. Hole in diaphragm — Replace diaphragm.
3. Carburetor out of adjustment — Adjust carburetor.

CHAIN TURNS WHEN ENGINE IS IDLING

1. Engine is idling too fast — Check carburetor adjustments.
2. Clutch springs weak or broken — Replace as required.

SAW CHAIN TROUBLE-SHOOTING

Incorrect filing, lack of lubrication and loose chain tension are the most common problems with saw chains. Refer to following charts.

SAW CUT IS SLANTED (NOT STRAIGHT)

1. Saw not held properly by operator — See Operator's Manual.
2. Bent guide bar — Replace guide bar.
3. Cutting angles not uniform usually long on one side — Sharpen saw and cut angles to uniform length.
4. Depth gauges not uniform height — File saw and depth gauges.
5. Bar rails worn and spread — Turn bar over or replace and use more oil.

CHAIN DOES NOT CUT OR DULLS QUICKLY

1. Cutters dull — Sharpen saw.
2. Cutters not same length — Sharpen saw.
3. Chain tension not correct — Adjust chain tension.
4. Abrasive wear on some or all cutters due to striking stones or running in dirt — Sharpen or replace chain.
5. Depth gauges too high — Sharpen saw.

CHAIN OPERATES ROUGHLY (CHATTERS OR GRABS)

1. Cutter not sharpened properly — Sharpen saw or replace.
2. Chain not properly tensioned on guide bar — Check chain tension.
3. Sprocket worn — Replace sprocket.
4. Excessive wear on guide bar due to inadequate oil — Replace bar.

CHAIN WILL NOT TURN WHEN ENGINE IS SPEEDED UP

1. Chain tension too tight — Adjust chain tension.
2. Rails on guide bar pinched — Replace bar.
3. Clutch worn or damaged — Replace clutch.
4. Chain drive links damaged — Replace chain and drive sprocket.

CHAIN JUMPS OFF

1. Chain tension too loose — Adjust chain tension.
2. Worn guide bar — Replace guide bar.
3. Broken chain side link — Replace.
4. Worn drive sprocket — Replace.

CHAIN BREAKAGE

1. Chain too loose — Check and adjust chain more often.
2. Tight joints due to burrs on bottom of links — Use more lubricating oil and sharpen chain more often.

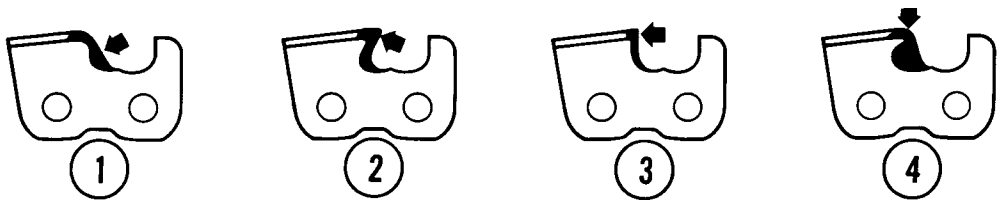

Fig. 84 — Incorrect Filing

NO.	PROBLEM	POSSIBLE CAUSE	CORRECTION
1	Cutter won't feed into wood	File held too high	Refile cutters
2	Cutters grab, cut rough	File held too low or file too small	File to right angle with correct size file
3	Chain won't cut	File handle held too high while filing	File chain to recommended angle
4	Chain dulls too quickly	File handle held too low while filing	File chain to recommended angle

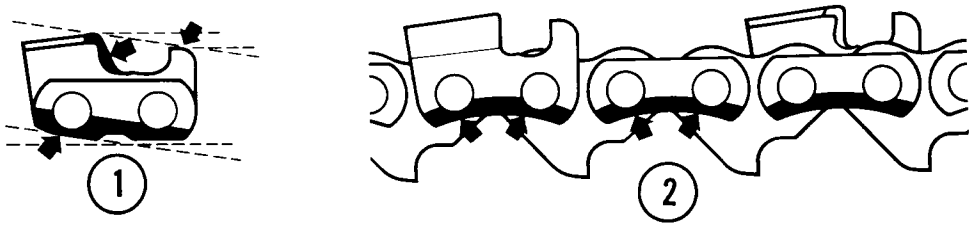

Fig. 85 — Wear on Cutters and Tie Straps

NO.	PROBLEM	POSSIBLE CAUSE	CORRECTION
1	Excessive heel wear on cutters and tie straps	Forcing dull chain to cut, cutting frozen wood, lack of lubrication or blunt top plate filing	File cutters properly. Don't force cutting and lubricate freely
2	Concave wear on bottom of cutters and tie straps	Chain tension too tight or cutting with top of bar	Adjust chain tension and reduce cutting with top of bar

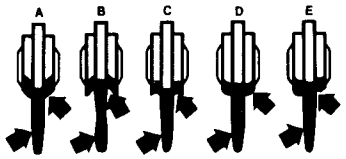

Fig. 86 — End View of Worn Cutters and Straps

A. Open Bar Groove
B. Severe Abrasion and Wobbly Chain
C. Rails Not Flat
D. Wobbly Chain, Rails too Thick
E. One Rail too Thin or Soft

PROBLEM	POSSIBLE CAUSE	CORRECTION
Excessive wear on bottom of all chain parts	Worn bar rails cause chain to wobble. Excessive pressure trying to make chain cut	File or replace chain and repair or replace bar

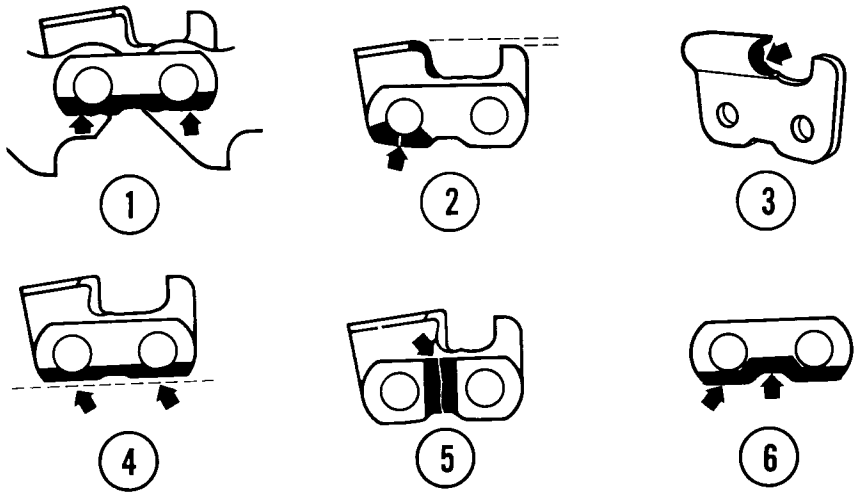

Fig. 87 — Damaged Cutters and Tie Straps

NO.	PROBLEM	POSSIBLE CAUSE	CORRECTION
1	Tight joints in tie straps	Loose chain tension or forcing dull chain to cut	Keep proper chain tension. Replace chain
2	Crack under rear rivet holes	Excessive pressure on dull chain	File chain and use oil freely
3	Light damage on cutting edges of top and/or side plates	Cutters hit dirt or foreign material	File chain
4	Excessive wear on bottom of cutters and tie straps	Depth gauge too high	File depth gauges to proper setting
5	Broken tie straps	Fatigue due to worn sprocket	Replace sprocket and repair or replace chain
6	Edges burred and peened notch on tie straps	Chain running on badly worn sprocket	Replace sprocket and/or chain

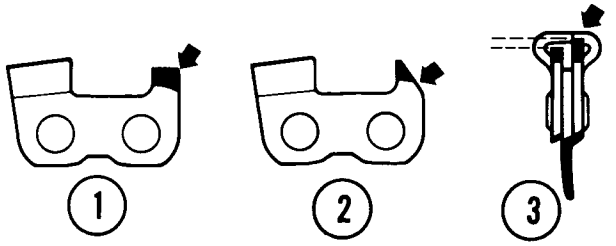

Fig. 88 — Depth Gauges

NO.	PROBLEM	POSSIBLE CAUSE	CORRECTION
1	Rough Cutting	Blunt depth gauge	Round off front corner
2	Depth gauge buries itself into wood	Depth gauge pointed	File cutters and reshape depth gauges
3	Chain won't cut straight	Uneven filing — uneven depth gauges	Use correct depth gauge jointer to lower gauges evenly

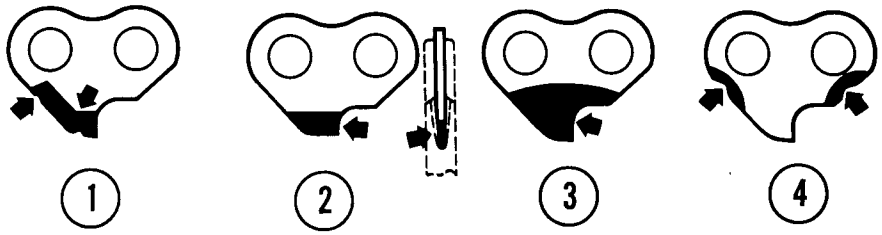

Fig. 89 — Drive Links

NO.	PROBLEM	POSSIBLE CAUSE	CORRECTION
1	Nicks in drive link	Too loose chain tension or wrong sprocket	Install correct sprocket and adjust chain tension
2	Sides worn round at bottom	Chain wobbled in bar groove caused by uneven cutters or worn bar rails	Repair bar or replace and file chain
3	Scars on side	Loose chain jumping off bar	Replace damaged links or chain and adjust tension
4	Front or back peened	Improper sprocket fit	Replace sprocket and repair or replace chain

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