

I · E · L

The Featherweight

**MODEL H. A.
POWER CHAIN SAW**

*for pulpwood and small timber cutting
and general power-tool sawing*

INSTRUCTION MANUAL AND PARTS CATALOGUE



INDUSTRIAL ENGINEERING LIMITED

VANCOUVER 4 • BRITISH COLUMBIA

I.E.L.'s produced by the first makers of chain saws in America, represent many years of experience and research and are the most widely distributed chain saws on the market today. The Company has developed the best possible "close-by" Service and Parts system to eliminate delays and inconvenience for any user of an I.E.L. saw. And, I.E.L. parts are top quality parts. Your I.E.L. saw is easy to service, has an excellent record of low maintenance cost and high production. It can be quickly disassembled and reassembled. Standard Wico Magneto and Tillotson's famous carburetor, for example, are among the easily available parts. I.E.L. service is nationwide — fast servicing keeps your saw working.

Industrial Engineering Limited
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I.E.L. power chain saws are sold and serviced by dealers throughout the U.S.A. For name of your nearest dealer, write:

I.E.L. Power Saws Inc.,
1112 Westlake Ave., North,
Seattle 9, Washington

Spare parts are stocked by the I.E.L. dealer in your vicinity.

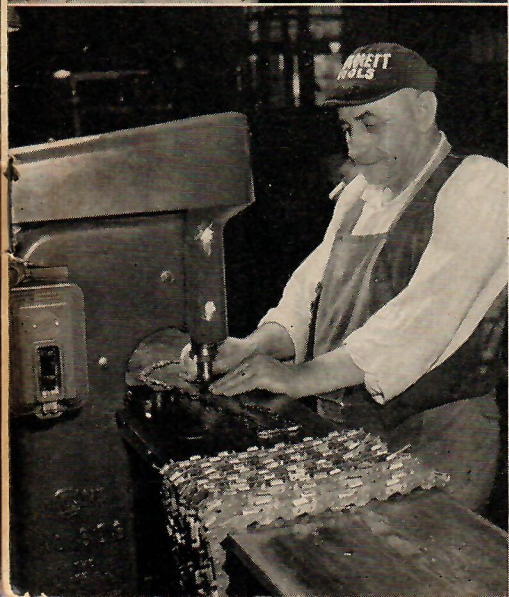
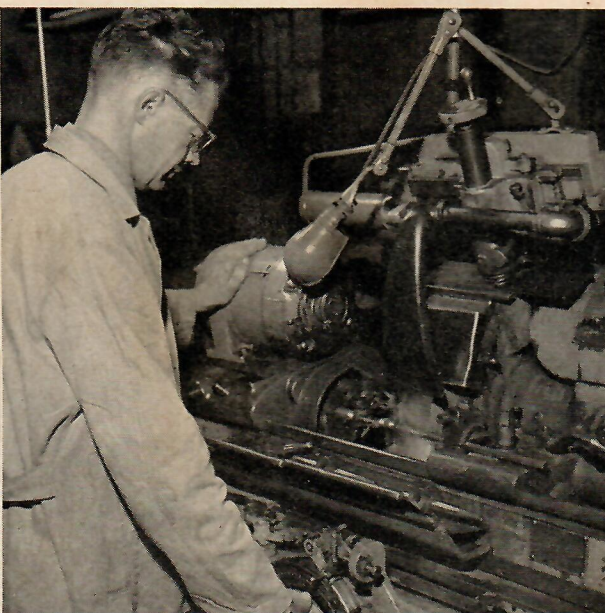
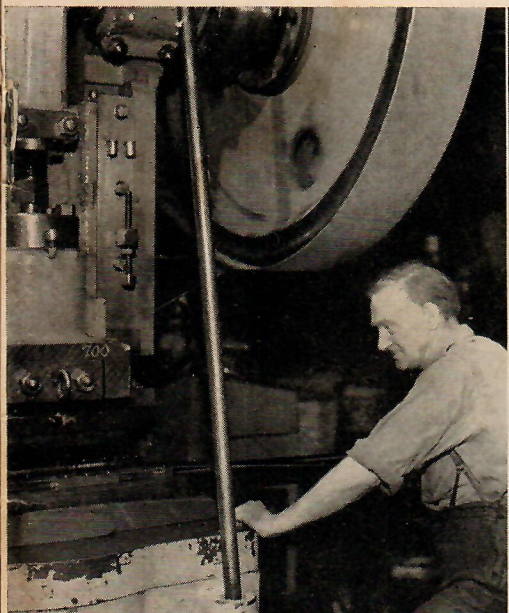
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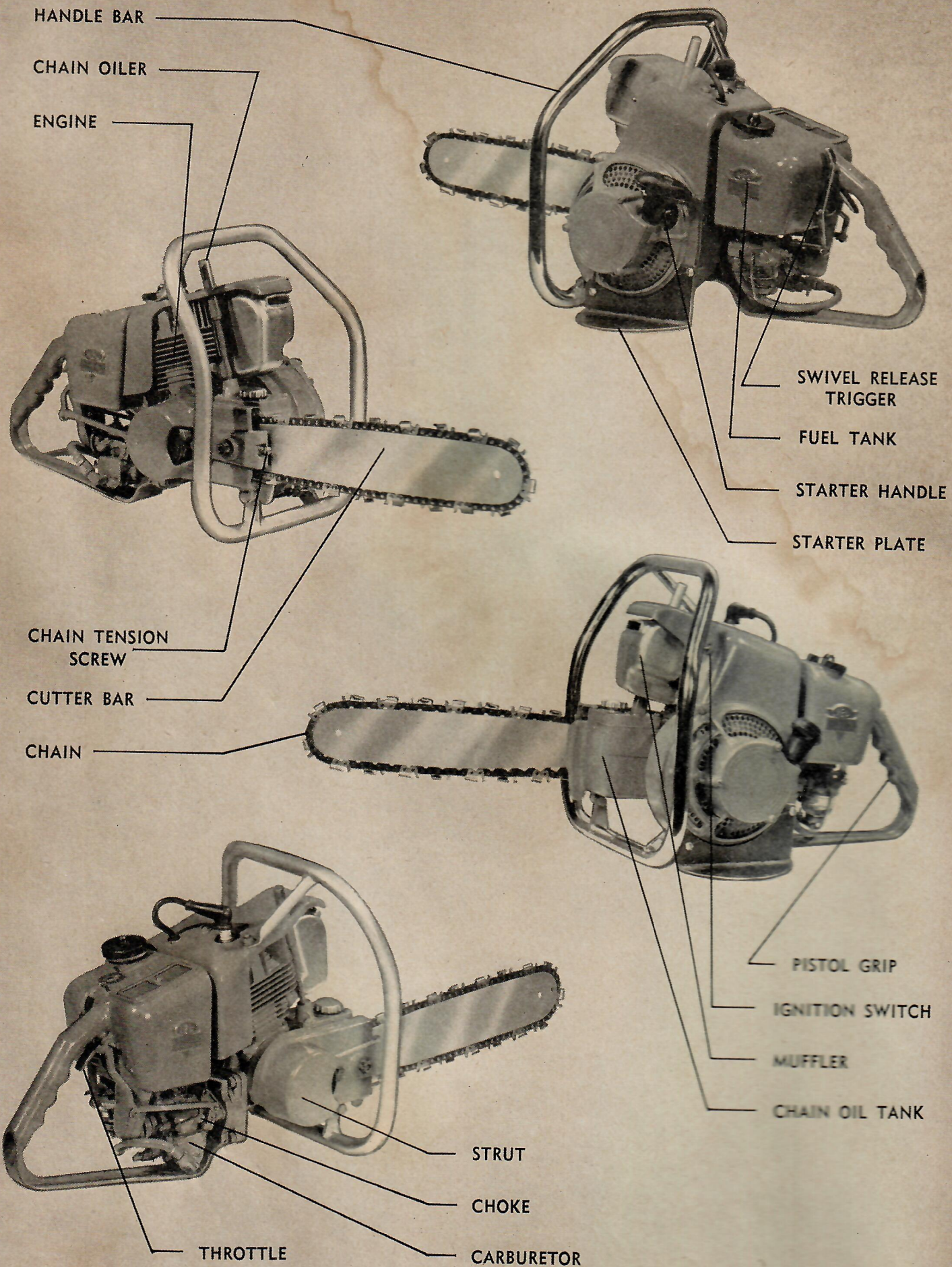
- (1) Model and serial number of saw.
- (2) Part number and description of part in full.
- (3) Complete shipping instructions.

**COMPLETE AND SPECIFIC INFORMATION ON SPARE PART
ORDERS ASSURES THE CUSTOMER OF PROMPT
AND EFFICIENT SERVICE**

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HANDLE BAR

CHAIN OILER

ENGINE

SWIVEL RELEASE TRIGGER

FUEL TANK

STARTER HANDLE

STARTER PLATE

CHAIN TENSION SCREW

CUTTER BAR

CHAIN

PISTOL GRIP

IGNITION SWITCH

MUFFLER

CHAIN OIL TANK

STRUT

CHOKE

CARBURETOR

THROTTLE

YOUR INDUSTRIAL ENGINEERING LIMITED POWER CHAIN SAW MODEL H.A.

You now own the newest member of the famous I.E.L. family of Power Chain Saws—the revolutionary new “Featherweight” Model H.A. This manual is your guide to the jobs you can do with it—the detail of its component parts, and the best way to keep it in perfect running condition for service anytime—anywhere.

The more you use Model H.A., the more invaluable a power cutting tool you'll find it for a variety of jobs. It's designed for the fastest, most efficient cutting of pulpwood and cordwood, in the woods and on the farm, for felling small timber, limbing and pruning, cutting fenceposts and pit props and for every type of construction work.

Among the many advantages for you in this compact, lightweight Chain Saw are included faster cutting, engineered balance for minimum operator fatigue even on all-day operations. The power you need is always at your finger tips because Model H.A. has the same big, ball and roller bearing engine of the famous I.E.L. Super Pioneer.

You'll like the convenient thumb release for instant swivelling and the 8 positive blade locations, the way that motive power is transferred from the engine through the self-energizing clutch to the chain driving sprocket—a brand new I.E.L. achievement in simplified Chain Saw design by the best engineers in the Chain Saw field. Other features are the I.E.L. “Redipull” starter, conveniently located and with a trouble-free automatic rewind, and the new Starter Plate which acts as a foot rest for easier starting, a shield against snow entering the intake screen, and a knee support when felling with the H.A. in side position. Close-to-ground felling is easy with the H.A. because of the new side location of the bar and chain.

Whatever you need for a Chain Saw, your new Model H.A. will give you more teeth per foot per minute for faster cutting. It's a lightweight portable cutting whirlwind you can take anywhere.

SPECIFICATIONS

ENGINE: Single cylinder—air cooled—new bigger bore cylinder with improved porting and increased torque.

CRANKSHAFT: A single throw—alloy steel SAE 4615—case hardened, precision balanced crankshaft.

MAIN BEARING: Crankshaft supported by two SKF precision double-shielded ball bearings.

SEALS: Synthetic rubber, garter type, wear resistant, pressure sealing oil resistant seals.

PISTON: Permanent mould, low expansion aluminum alloy piston with full floating wrist pin.

PISTON RINGS: The new, latest design narrow type piston rings lessening friction wear. Improved sealing.

CON ROD: Drop forged alloy steel. Heat-treated and precision ground. Patented bolting feature.

CYLINDER: Aluminum alloy cylinder block with centrifugal cast special alloy sleeve, accurately machined porting and precision honed walls give higher torque and greater, smoother power.

CYLINDER HEAD: Heavily finned aluminum alloy with high turbulence combustion chamber.

VALVES: New, stronger, wear-resistant reinforced nylon valve.

IGNITION: The famous Wico single FWS series magneto with special rotary seal to exclude sawdust and moisture.

CARBURETOR: Well known Tillotson, concentric-float type, with adjustable high speed and idling jets. Air intake located high with wire mesh screen. Tillotson fuel filter.

STARTING SYSTEM: I.E.L.'s famous Redipull starter conveniently located, trouble-free automatic rewind.

CONTROLS: Swivel control and ignition switch are finger-tip located for ease of access when required.

CLUTCH: Automatically balanced cushioned, three-shoe centrifugal type. Self-energizing with bonded linings and ground steel drum.

CHAIN SPROCKET: Case hardened, heat treated, nickel alloy steel. New design allows inclusion with clutch unit permitting direct drive.

CHAIN OILER: Positive chain lubrication with a manually operated double-acting plunger pump.

BAR MOUNTING: A two-point mounting with heat-treated alloy steel studs and nuts and an easy, accessible and adjustable screw tightener for proper chain tension. Well guarded.

BAR: A new I.E.L. engineered feature. Narrower bar to reduce pinching. Wears longer, yet lighter. Heat treated and hard chrome plated.

CHAIN: New higher speed, short pitch chain with more chrome-plated teeth per foot. Sizes 15" x 18" also available in 100 ft. reels.

FUEL TANK: Strategically located to ensure a trouble-free, positive gravity feed of the fuel at any cutting angle through a sight fuel filter.

COOLING SYSTEM: Air cooled by a Sirocco-type fan with self-cleaning rotary screen supplying a carefully directed flow of clean air.

EXHAUST: Aluminum casting with integral baffling system for spark arresting.

WARRANTY

All machines are guaranteed against defective parts for one month from date of sale by our authorized Distributors and Dealers providing our recommendations regarding lubrication and general operation are observed. This machine has passed our most rigid inspection. Its satisfaction in your service is of prime importance to us.

All labour, service charges or other expenses, part or parts altered or repaired outside of I.E.L. factories or authorized distributors or dealers, must have factory authorization. Misuse, negligence or accident automatically causes this warranty to become null and void.

WARRANTY PROCEDURE

A part or parts covered under this warranty should be returned to your authorized dealer or distributor. Do not return parts to the Factory unless authorized.

Part or parts sent in for replacement under this warranty must be prepaid by Purchaser.

PREPARING YOUR MODEL H-A

When your model H.A. saw arrives inspect it carefully to make sure it has not been damaged in transit. The shipping carton should contain a complete motor unit, a cutter bar and chain, a sparkplug wrench, an extra sparkplug, a warranty card, and this instruction manual.

Preparing the model H.A. saw for operation is easy with these instructions and photos. There are three basic steps:

1. The strut must be dismantled temporarily from the motor unit.
2. The blade must be mounted and the chain fitted and properly tensioned.
3. The strut must be remounted and securely fastened.

The strut and sprocket housing are cast in one piece with the tensioning device mounted inside. This controls the chain tension by means of an adjusting screw which operates a block in the strut.

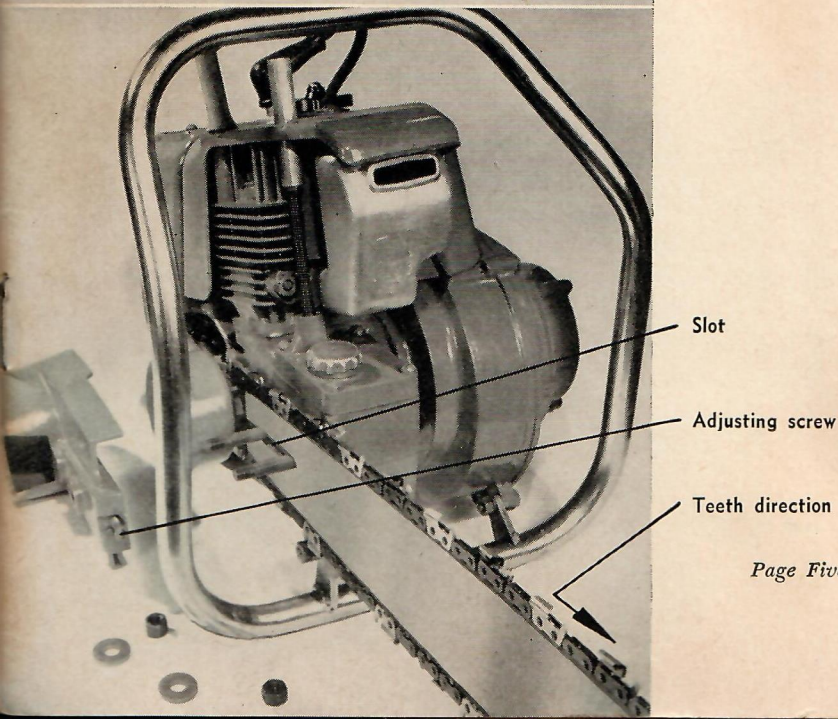
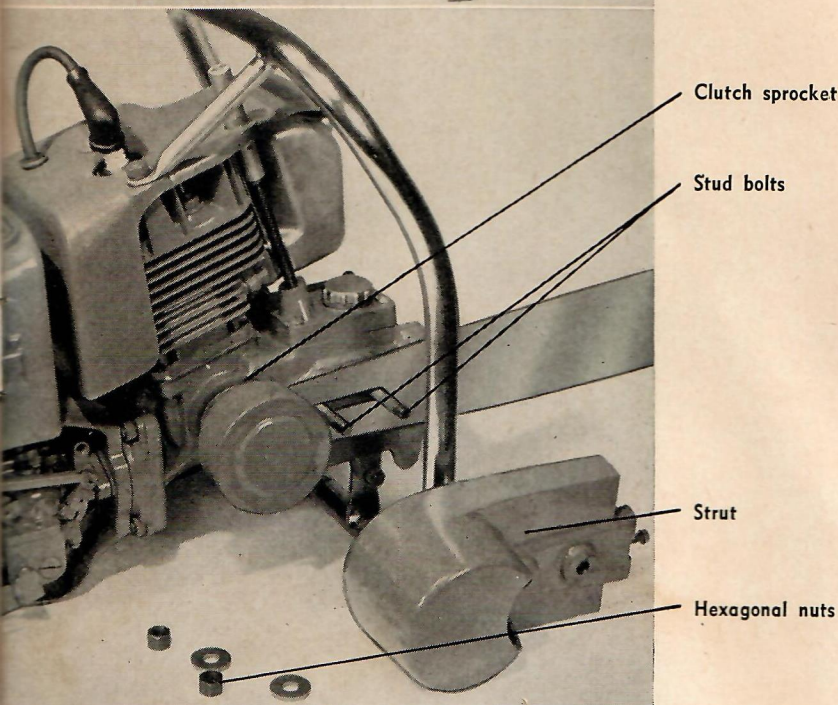
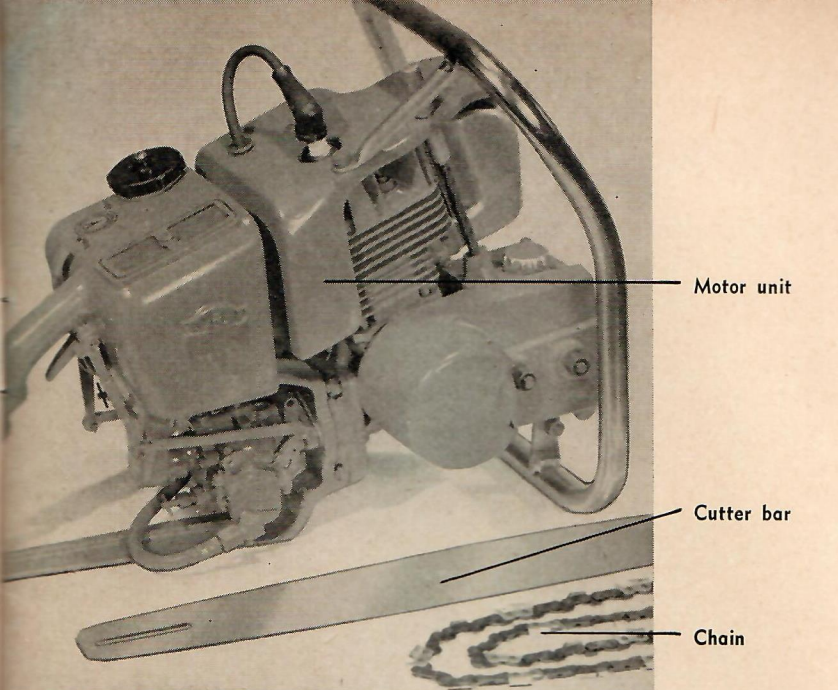
On this block, there is a lug which fits into the slot in the cutter bar. By turning the adjusting screw to the right the cutter bar is moved away from the sprocket and the chain is tightened.

To dismantle the strut, remove the two hexagonal nuts from the stud bolts and lift off. This will reveal the end of the main casting and the clutch-sprocket assembly.

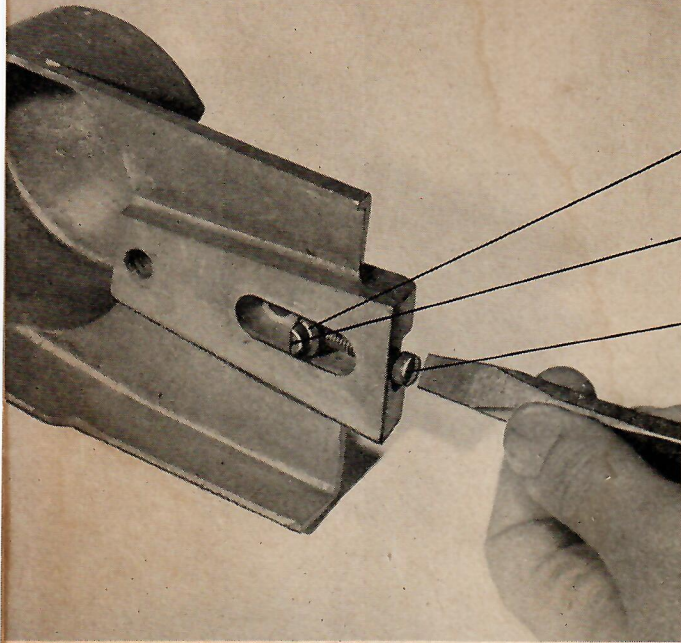
Always use a one-half inch box wrench or spanner on the hexagonal nuts.

To mount the cutter bar, place the slot in the square end of the bar over the stud bolts in the main casting. Then slide the bar as close to the sprocket as the slot will allow.

To fit the chain, place it around the sprocket and fit the driving lugs of the centre links into the sprocket teeth and the groove of the cutter bar so that the cutting edges of the teeth on TOP of the bar point AWAY from the motor unit.



CHAIN TENSION



Block

Lug

Adjusting screw

The next step is to adjust the tension of the chain and to do this properly, the strut with the tensioning device must be remounted. First turn the adjusting screw as far out as it will go, then slip the strut onto the stud bolts and slide the bar by hand away from the sprocket to take up the slack in the chain.

Make sure at this point that the adjusting screw lug is fitted properly into the slot in the cutter bar and the strut is seated tight against the bar. Then screw down the hexagonal nuts until they are just finger tight.

The chain is correctly tensioned when it can be raised just enough for the bottom edge of the driving lug at the TOP CENTRE of the cutter bar to clear the top of the bar by a quarter of an inch.

To obtain this tension, turn the adjusting screw to the right with a screw driver until the chain tightens sufficiently.



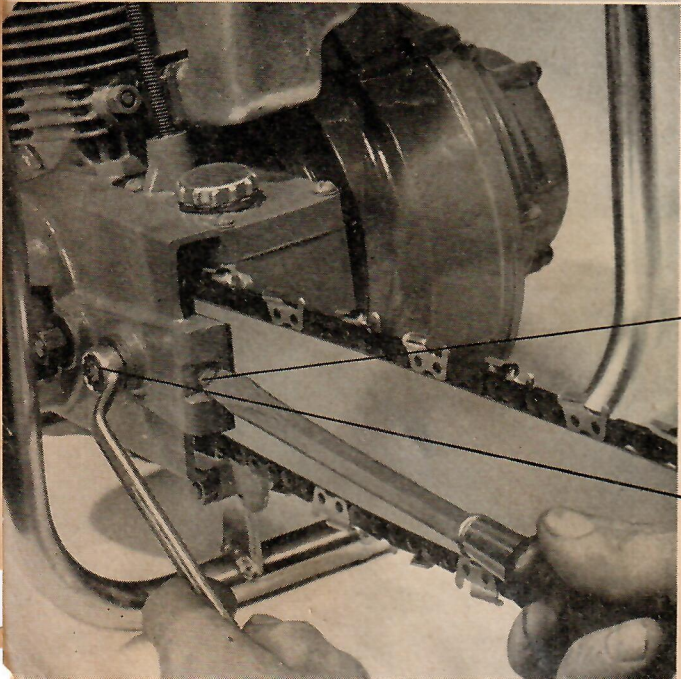
$\frac{1}{4}$ -in.
clearance
nuts finger-tight

When the chain is correctly adjusted, tighten down the hexagonal nuts to clamp the strut and the cutter bar securely to the main casting and the assembly operation is completed.

Note: A new chain may be stiff and therefore will require re-tensioning after the first few cuts. Check it frequently and re-adjust when necessary until the chain is fully flexible and broken in.

CAUTION

1. Check chain tension frequently when chain is new.
2. Don't try to adjust the chain while the motor is running.
3. Never try to turn the adjusting screw while the hexagonal nuts are screwed down tight or you may strip the threads on the adjusting screw.
4. Don't tighten the hexagonal nuts until you are sure the lug on the adjusting screw is fitted properly into the slot in the cutter bar or you will break the strut.



Final
adjustment

Tighten nuts

FUEL AND LUBRICATION

The Model H.A. saw is powered with a two-cycle motor which means that lubrication for the internal moving parts must come from the fuel tank.

Therefore, the Model H.A. is "fed" a mixture of oil and gasoline. For a new machine, the ratio of this mixture is 1 part of oil to 10 parts of gas. **Never run the machine on straight gasoline; it will ruin the engine.**

Regular gasoline and motor oil may be used if none other is available. But for best performance I.E.L. strongly recommends non-leaded gasoline mixed with SAE 40 motor oil of a non-carbon forming type.

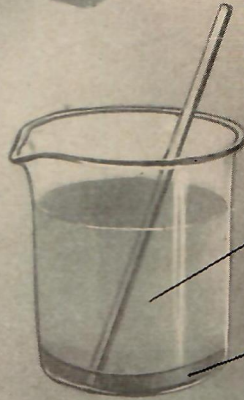
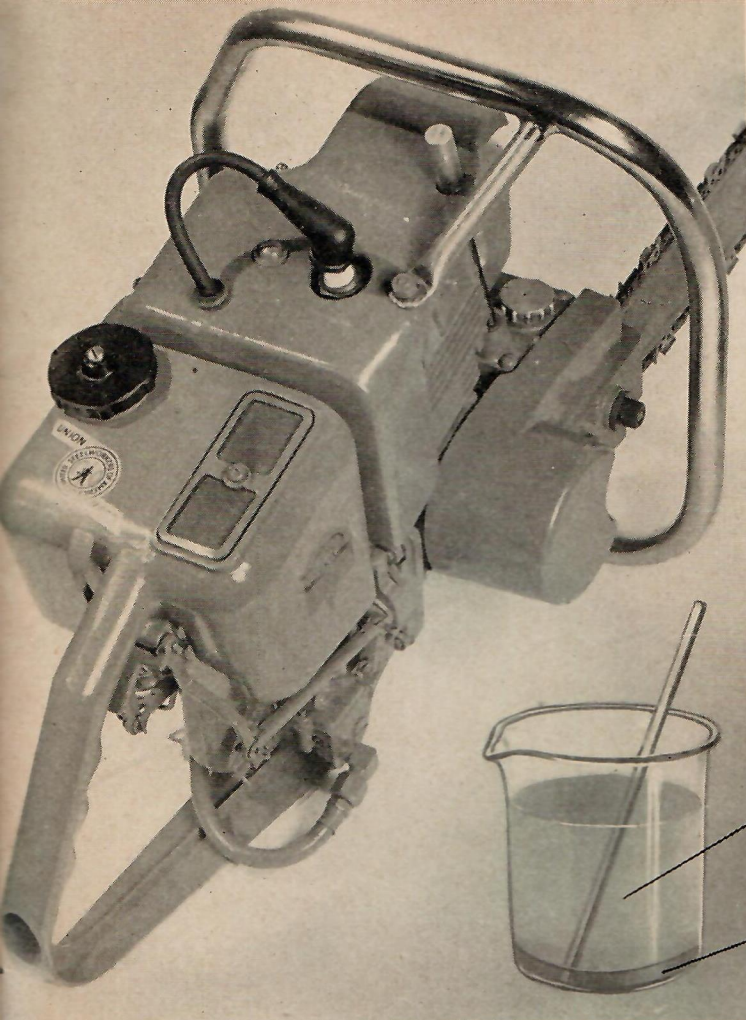
When the machine is broken in, the fuel ratio can be 1 to 12, and the simplest recipe is a pint of oil to 1½ gallons of gasoline thoroughly mixed. When mixing the fuel, use a clean container and a wooden paddle for stirring. Take extra care in winter as chilled oil is harder to mix.

It is most important to mix the fuel thoroughly, as improperly mixed fuel will result in heavy carboning, fouled plugs and possible engine failure.

If the fuel mixture is left standing for any length of time, shake it well before using to make sure the gas and oil are thoroughly mixed again.

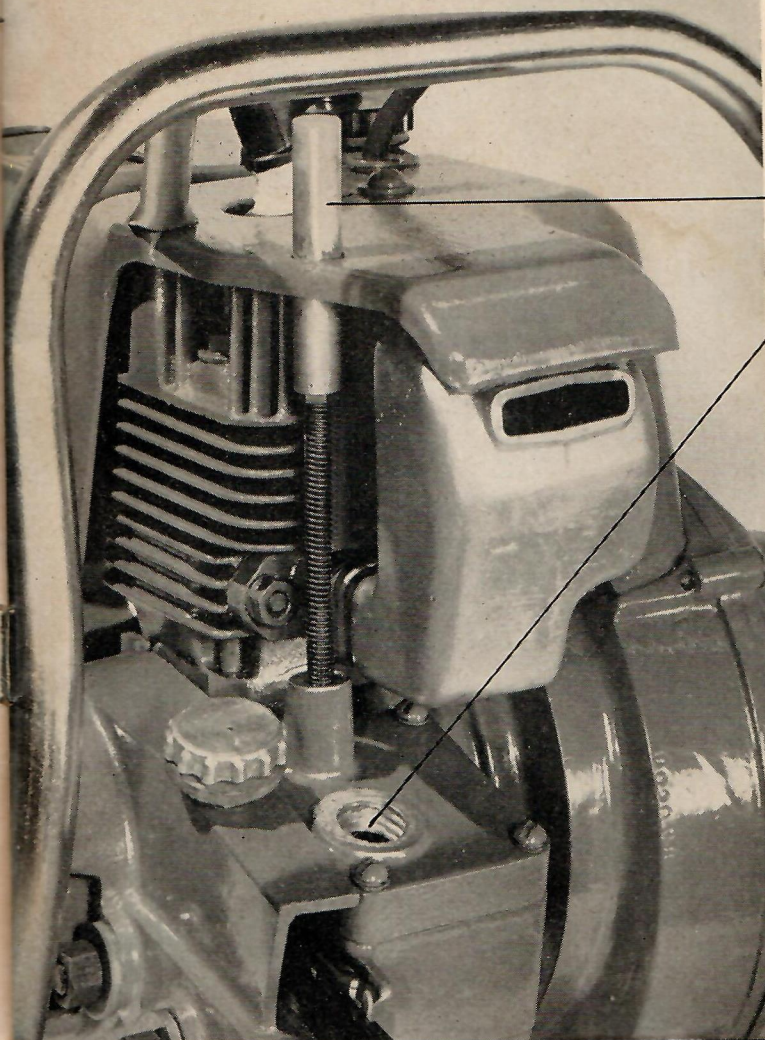
Several oil companies sell chain saw fuels. If you use one, make sure it conforms to the specifications in this manual.

The chain is lubricated by a pump which forces oil into the upper groove of the cutter bar. The pump is operated by a plunger conveniently located on the top of the cooling shroud for finger-tip control. Any good grade of No. 10 or 20 oil can be used to lubricate the chain. Never use second-hand crankcase oil.



10 parts
gasoline

1 part oil



Chain oiler
plunger

Oil filler hole

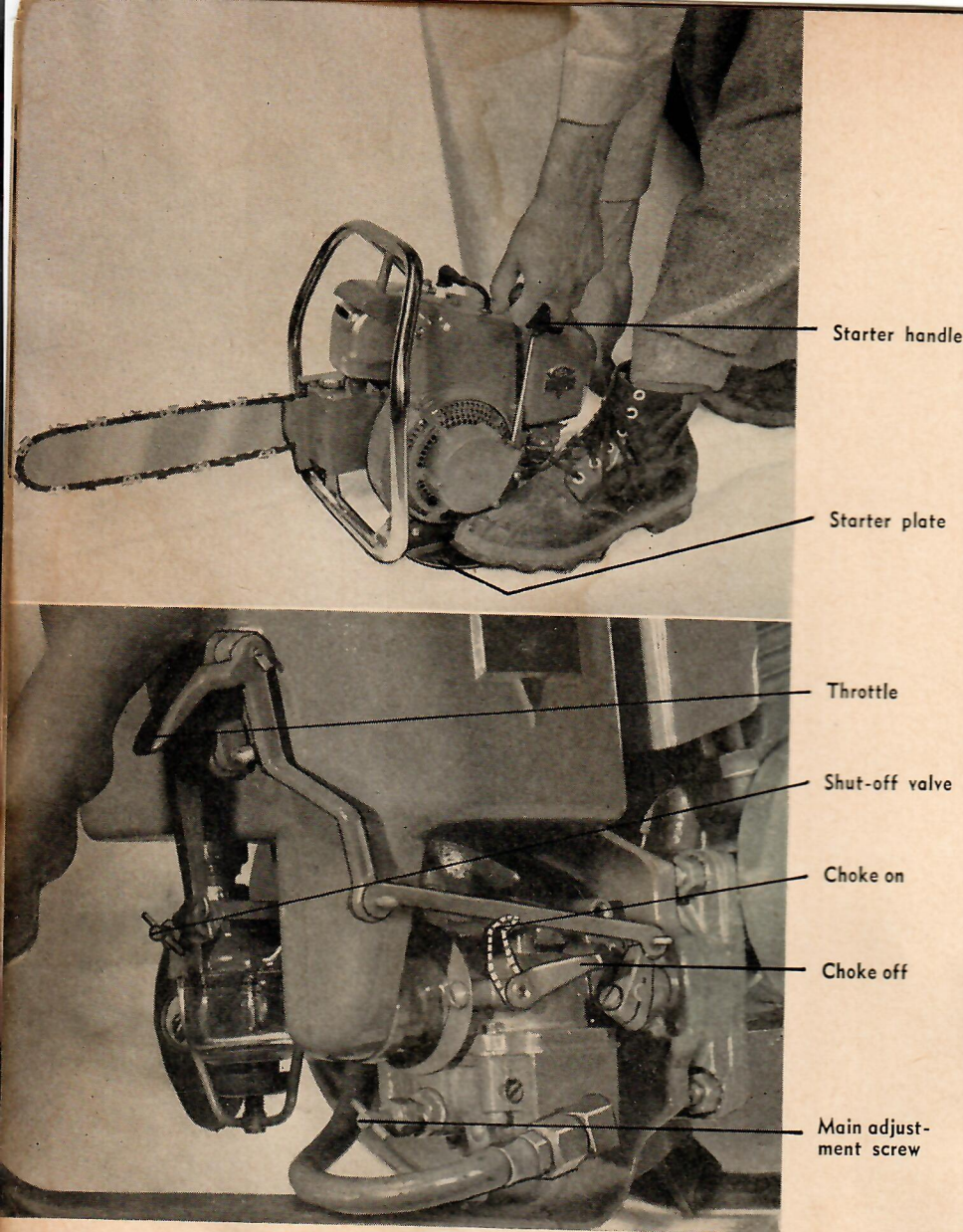
STARTING INSTRUCTIONS

To start the motor, place the Model H.A. saw in a convenient position where it will sit squarely and firmly when you pull the starter.

Open the shutoff valve; and then choke by moving the choke lever towards you; turn the ignition switch to "On". Take a firm hold on the pistol grip with the right hand, and open the throttle with your index finger. Take the starter handle in your left hand and place the left foot on the starter plate. Turn the motor over slowly once, then give the starter short, snappy pulls.

When the motor starts, ease off on the throttle and move the choke lever back to running position. Run the motor just fast enough to turn the chain and operate the oil pump plunger until the chain is thoroughly lubricated.

For the first week, at least, treat the Model H.A. like a new car. Give it plenty of time to warm up before starting to cut.



MINOR MOTOR ADJUSTMENTS

When starting to cut, you may find that the motor requires minor carburetor adjustments to give full power.

If it stops or falters in the cut, it probably is because the fuel mixture is too "lean".

In that case turn the main adjustment screw about 1/8th of a turn to the left. That should remedy the trouble, but if the saw still falters turn the screw just a little more to the left.

If the saw seems sluggish in the cut and smokes heavily it probably means the mixture is too "rich". In this case, the main adjustment screw should be adjusted to the right until the saw operates at full power.

Additional instructions for carburetor settings are given on page 13.

Flooding: If you suspect the engine has flooded while starting, close the shut-off valve and move the choke lever to running position for the second starting attempt. Hold the throttle open and pull the starter until the engine comes to life. When it does be sure to reopen the shut-off valve.

Caution: Check these points!

1. Read this manual carefully.
2. Make sure the fuel and chain oiler tanks are correctly filled.
3. Make sure the chain is correctly tensioned.
4. Make sure the cutter bar and strut frame are clamped securely in place.

OPERATING INSTRUCTIONS

If you have not previously operated a chain saw, it would be wise for you to begin by making bucking cuts before attempting to fell trees. For practice, buck a few stove lengths from a 10-inch log and try to get the "feel" of the saw.

A slight forward and backwards rocking motion to the machine gives the operator extra "feel" as to what is happening in the cut. It also eases the load on the motor and allows faster cutting.

The change from bucking to falling positions is accomplished by pressing the swivel release trigger and rotating the front end of the machine by means of the handle bar. The front end will lock automatically in any of eight positions when the swivel trigger is released.

Be generous with the chain oiler. Shoot two or three good squirts of oil into the cutter bar groove after each 10 or 12 inch cut.

In cutting pitchy wood or in cold weather, thin the chain oil with kerosene. The kerosene helps the oil flow more freely in cold weather and in pitchy wood it helps keep resin from fouling the chain. Under extreme conditions the kerosene and oil could be mixed 50-50.

Whenever the saw is not to be used for several days turn off the fuel shut-off valve while the engine is running so as to burn up the fuel in the carburetor system. For extended storage, drain the fuel tank and clean the engine of all sawdust and dirt.



OPERATING INSTRUCTIONS

Plan your work carefully. Have a secure place to stand and make sure of a safe exit path in case anything goes wrong when a tree starts to fall.

When starting a cut, don't race the motor and jam the saw into the wood. Bring the engine up to full cutting speed and start the cut easily.

Because of the Model H.A. saw's fast cutting action, you will not have to exert pressure to force it through the wood. A light, but firm, touch will get more wood cut. In fact, if you apply heavy pressure, you may overload the machine and thus make the clutch disengage. If that happens ease off on the load to allow engine to regain speed.

When coming to the end of a cut, be prepared to ease off on the throttle to hold the engine down to regular cutting speed and release throttle immediately the cut is finished.

Finally, remember that chain saws are potentially dangerous, both to you and the forest wealth where you operate.

SAFETY TIPS

Never operate a chain saw in a closed room; the exhaust fumes can be deadly.

Never touch or try to stop a moving chain with your hand.

Keep your body away from the moving chain at all times.

Never carry your saw in the bush with the engine running. A branch or twig may open the throttle and make the chain revolve.

Never operate the saw if the chain is dull or if repairs are needed.

Never start cutting until you have a clear place to work, a secure place to stand and a safe exit path from a falling tree.

Never attempt to sharpen or remove the chain while the engine is running.

Never ask anyone to hold the saw while starting the motor.



KEEP THE FORESTS GREEN

Your Model H.A. saw is one of the best on the market for fire safety. But a survey of forest fires between 1950 and '52 in B. C., Washington, Oregon and California showed that power saws could be blamed for 167 blazes. These fires, according to the survey, were caused by spark or carbon discharges, leaking or spilled fuel, hot exhausts, backfiring motors, loose wiring and miscellaneous causes.

So do not take chances. Our forests are green gold to the chain saw operator.

Don't smoke in dangerous areas.

DON'T SMOKE IN DANGEROUS AREAS

If you do smoke in the bush during the summer dry spell, break all used matches and shred all cigarette butts to make sure they're out cold.

Refuel your saw on an area that's been cleared down to bare ground.

Use a funnel to avoid spilling fuel.

Make sure fuel is not leaking from the machine. If gas is spilled on the saw, wipe it off or let it evaporate before starting the motor.

Move the saw 10 feet at least, from the fueling spot before starting the motor.

Keep the saw free of sawdust and other inflammable material.

Keep the sparkplug and wire connections tight.

Keep a filled fire extinguisher and shovel handy.

Keep the muffler on the saw.

Clear inflammable material away before starting a cut.

Let a hot saw cool for two or three minutes before refueling.

Check carbon spark discharge by running the saw under full load in the dark or by holding a piece of white paper in the exhaust stream near the muffler port.

Sparks will show in the dark and hot carbon will burn small holes in the paper. If either of these signs appear, clean the excess carbon from the exhaust ports and the muffler. Directions for this are given on page 14.

PREVENTATIVE MAINTENANCE

One of the best ways to prevent trouble is to eliminate possible causes. This sound policy is known as preventative maintenance. It is followed by major firms from coast to coast and it saves thousands of dollars annually in repair bills and costly shut-downs. To realize the full value of your investment in the Model H.A. chain saw, make this your policy, too. Check your machine daily for minor faults and set up a system of regular inspections and tune-ups.

ONCE A DAY

Give your machine a good cleaning, making a particular effort to remove sawdust and dirt from as much of the head and cylinder fins as you can reach without taking off the cooling shroud. For best results use a brush or compressed air.

Make sure the air intake screen on top of the fuel tank is clean. Unscrew the bolt in the centre of the screen and lift it off. Wash it in a clean mixture of gasoline. Be careful not to spill any dirt into the air passage while removing the screen, and **DO NOT** put the gasoline used for washing in the fuel tank.

Clean off any dirt from around the carburetor breather hole. Don't let any dirt enter the hole.

If you're working the saw hard, it is a good idea to check and clean the air screen and breather hole at least twice a day.

Inspect the cutting chain to see if it needs sharpening or if it has become fouled with pitch or other substances. A light touch-up with the file, even if the chain is not dull, and a good cleaning and oiling at the end of the day will be time well spent. Check the tension, too, and adjust it if necessary. If pitch is fouling the chain, clean it off with kerosene.

Tighten all nuts and bolts to make sure all parts are secure—exhaust manifold and shroud, starter and blower housings, gas tank cap, sediment bowl, fuel line, sparkplug, air intake screen, oil tank cap and strut.

Do not use compressed air near the breather hole in the carburetor or it will collapse the float.

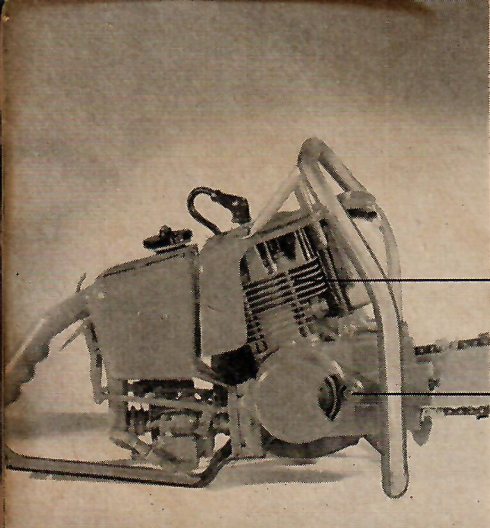
PERIODIC INSPECTIONS AND TUNE-UPS

Fuel System: Check the fuel system regularly for dirt. If the carburetor sediment bowl is dirty, take it off and wash it in pure gasoline. You remove it by unscrewing the cup and thumb nut at the bottom of the bowl.

While you have the bowl off, clean the fuel filter which is a screen between the strainer cover and the sediment bowl. Wash it carefully in pure gasoline.

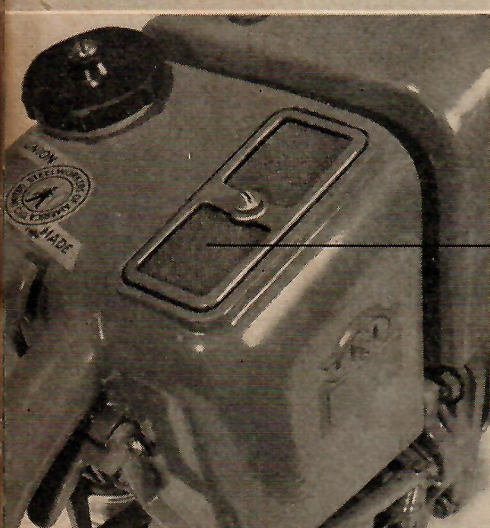
Before reassembling the filter and sediment bowl, check the gasket for a leak-proof fit. If it is damaged, replace it with a new one. It is wise to check the bowl in the carburetor on the right hand side of the machine (facing from the rear) for dust. This is done by removing the large nut which is next to the elbow bend in the fuel line. The fuel will drain out when this is removed and dirt should be carried out with it.

If dirt is found in the carburetor bowl, drain the fuel tank and wash it out thoroughly with pure gasoline and then refill it with clean fuel mixed to the correct specifications.

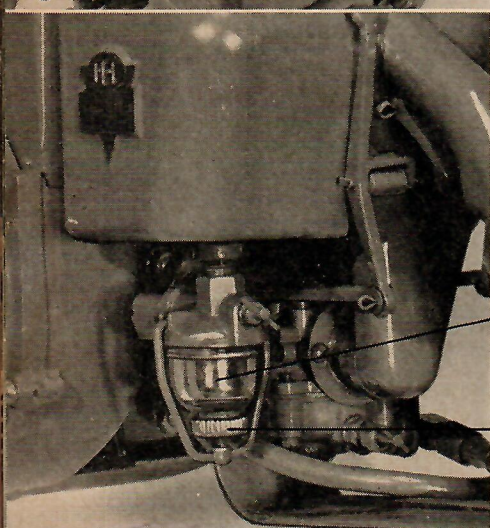


Fins

Tighten all nuts and screws

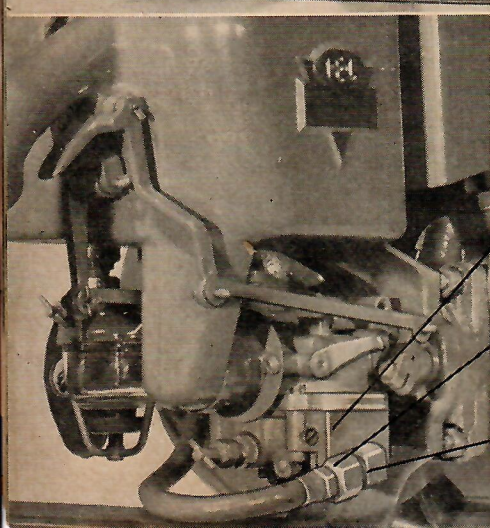


Air intake



Sediment bowl

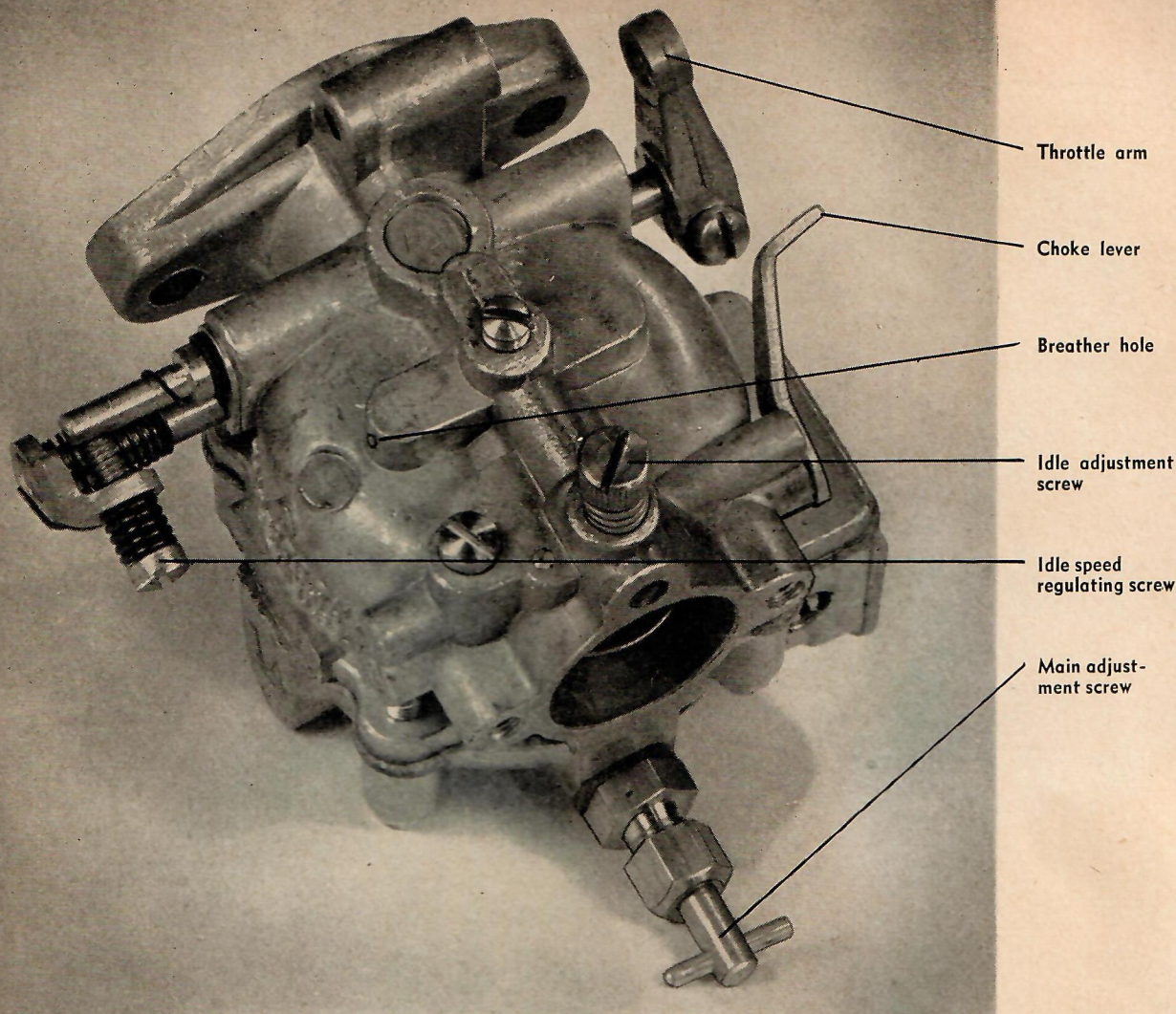
Thumb nut



Carburetor bowl

Large nut

Elbow bend



CARBURETOR SETTINGS

Occasionally you may have to readjust the carburetor settings. This could be necessary after taking down the carburetor for repairs or for other reasons, which, for convenience, are listed in the trouble shooting chart.

In making the adjustment, three setting screws are used:

1. Idle speed regulating screw which controls the idling speed.
2. Main adjustment screw which controls the fuel mixture when the throttle is open.
3. Idle adjustment screw which controls the fuel mixture at idling speed.

To begin, turn back No. 1, and gently shut off Nos. 2 and 3. Then open the idle speed regulating screw until the throttle arm just starts to move, then open the screw a half turn. The main adjustment screw should be opened a full turn and the idle adjustment screw a half turn. These are factory settings which nine out of ten times give fine motor performance. But some further adjusting may be necessary.

Start the motor and, with the throttle about half open, turn the main adjusting screw to the right or left until

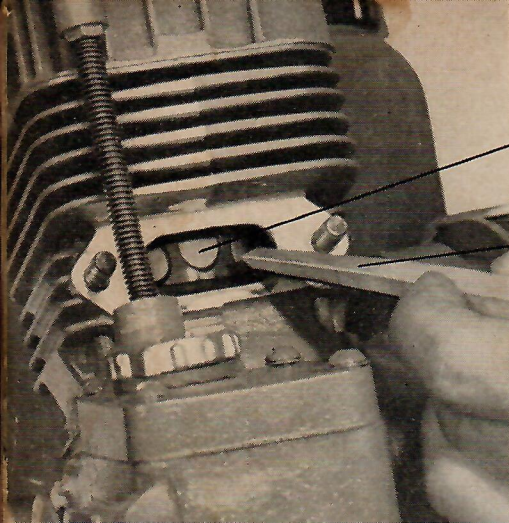
the motor runs at maximum speed. You will be able to tell when this is reached because the motor noise will rise to a peak and then start fading off if you turn the valve too much one way.

When this is set, close the throttle and observe how the machine idles. If it is too fast, or if the motor falters, adjust the idle speed regulator screw right or left until the motor idles at a slow but steady speed that will not engage the clutch and start the chain turning.

It may be necessary to give the air idle screw some slight adjustments to the right or left in conjunction with the idle speed regulator in order to get the idling speed just right. Both of these screws affect the idling speed and a little experimenting may be necessary to "balance" them correctly.

When the carburetor has been set correctly, a wisp of blue smoke should come from the exhaust muffler when the motor is running. This indicates it is burning oil and that the moving parts are being lubricated.

The above directions, under most conditions, should give the correct settings. You may find, however, that when you start cutting, the motor requires some further adjusting to give full power.



Exhaust ports

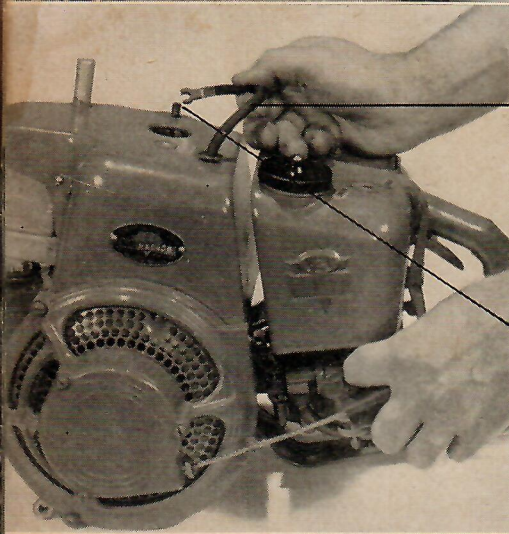
Wooden scraper

CARE AND MAINTENANCE

Cylinder and Head Fins: At least once a week if the machine is operating steadily, remove the cooling shroud and give the cylinder head and fins a good cleaning.

The Model H.A. motor is air cooled. If air cannot flow freely over the fins, the motor will overheat and damage the piston and cylinder. Therefore it is important that all sawdust and dirt be removed so there will be no obstruction to block air circulation.

To remove the cooling shroud, take off the handle-bar. Remove the screw in the top of the shroud—push the ignition wire down through the shroud to get some slack and roll shroud off side of cylinder taking care not to damage ignition wire connected to ignition switch. Leave the muffler in place while cleaning the cylinder head and fins.



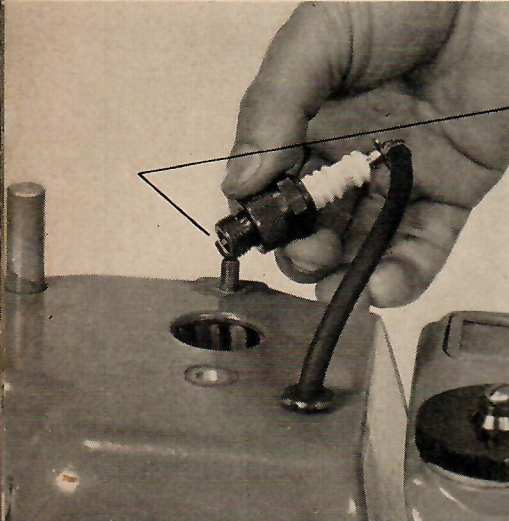
High tension wire

1/4-in. gap

Brush the head and fins well and scrape off any dirt that sticks. If compressed air is available, use it instead of a brush, but be careful to keep the air blast from the carburetor breathing hole.

Exhaust Ports: While you have the shroud off it's a good idea to check the exhaust ports and muffler for carbon deposits. Clogged ports will cut engine power and efficiency.

If you are operating the machine normally and on correct fuel specifications, cleaning the ports every two weeks should be adequate. To clean the ports, remove sparkplug and muffler, being careful not to damage the gasket.

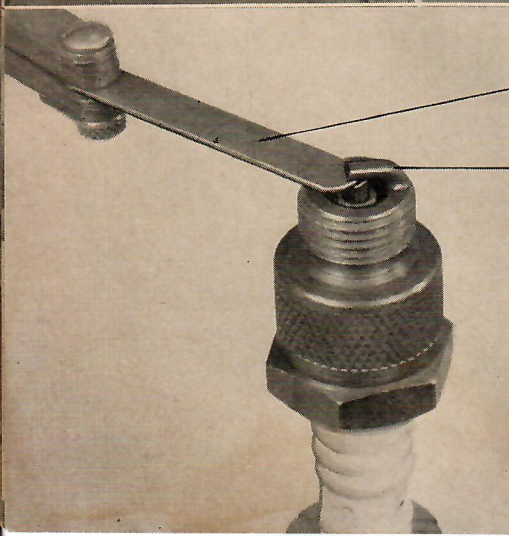


Electrodes

Then turn the crankshaft over by means of the starter until the piston is at the bottom of the stroke. Scrape the ports with a wooden tool. **Never use a metal tool.** Before re-assembling the machine, blow or shake out any carbon which may fall into the cylinder during the cleaning operation.

Muffler: Inspect the muffler and remove carbon from it while you have it off the machine.

Ignition: Much of the wiring also can be checked while the shroud is off. To avoid shorts, tape any wiring that appears worn and re-route it around points that are causing wear.



.025 inch feeler gauge

Side electrode

Magneto: The Model H.A. saw is fitted with a Wico fly-wheel magneto, one of the best in the field, and ordinarily it will function for a long period without need of adjustment or repair. But if engine trouble develops, the magneto should be checked to make sure it is working properly. To check it, remove the high tension wire and take out the sparkplug. Hold the wire so the metal connector on it is about 1/4-inch from a clean metal part of the engine (**not near the gas tank**). Then, while the wire is in this position, turn the engine over a few times by pulling the starter.

MAGNETO

If a fat blue spark "jumps" off the end of the wire, the magneto is in good condition. If there is no spark, the condenser is faulty and it will be necessary to replace it and probably the breaker points.

If the spark is red or orange, the trouble lies in the coil and it will have to be replaced. It is advisable to see your dealer about replacing these parts.

Sparkplug: Check the sparkplug periodically because it is affected by carbon. If the fuel mixture is too rich, it will foul the points and cause the plug to short out.

If you suspect the plug is cracked and not delivering spark to the engine, you can check it by taking it out and, with the high-tension cable attached, laying it on the cooling shroud and turning over the motor in the same fashion as checking the magneto. A fat blue spark should jump the gap between the electrodes.

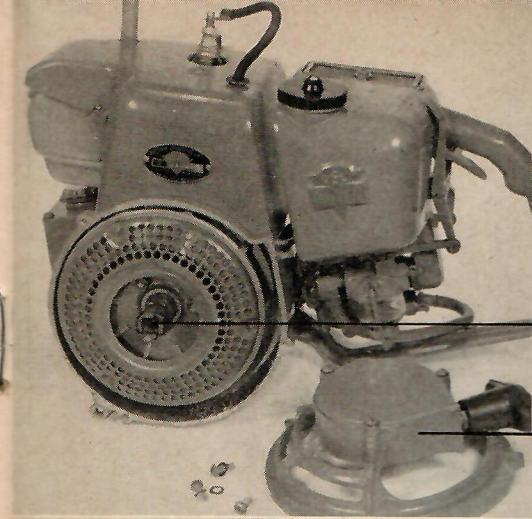
Clean the sparkplug and adjust the gap to .025 inch, using a feeler gauge. Don't attempt to adjust the gap by bending the centre electrode or you may crack the insulator. Always bend the side electrode.

To get at the magneto, take off the starter and fan wheel housing and undo the flywheel nut on the crankshaft. (Left hand thread). Remove the flywheel by using a puller which can be obtained from your I.E.L. Service Dealer (Part No. T 2951).

If the condenser is faulty, the breaker points will appear pitted and frosty. Install a new condenser and breaker assembly. The breaker point gap should be set at .020 inches.

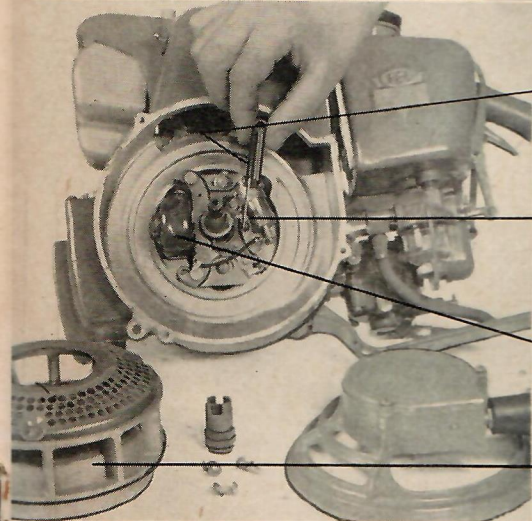
It will be necessary to take out the stator plate to change the coil. When replacing the plate be sure that the ridge on it lines up correctly with the timing mark on the edge of the aluminum housing. If timing is faulty after reinstallation, a timing light should be used to reset the spark. It should be timed at 27° before top dead centre. A timing light will be available at your service dealer's.

Clutch: The idler bearing in the clutch should be lubricated regularly by putting a few drops of oil on the wick in the end of the crankshaft. Be careful doing this as clutch slipping will occur if oil is spilled on the shoes or lining. If this happens, wipe off the excess oil. To get at the clutch, remove the strut and the snap-off cover on the clutch drum. To increase the life of the clutch, the machine should be operated at speeds high enough to prevent the clutch slipping when the saw is in the cut.



Flywheel nut

Starter and fan wheel housing

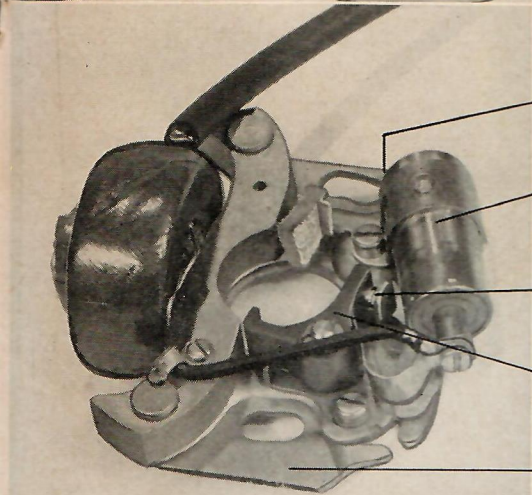


timing mark

.020 inch gap

coil

Flywheel



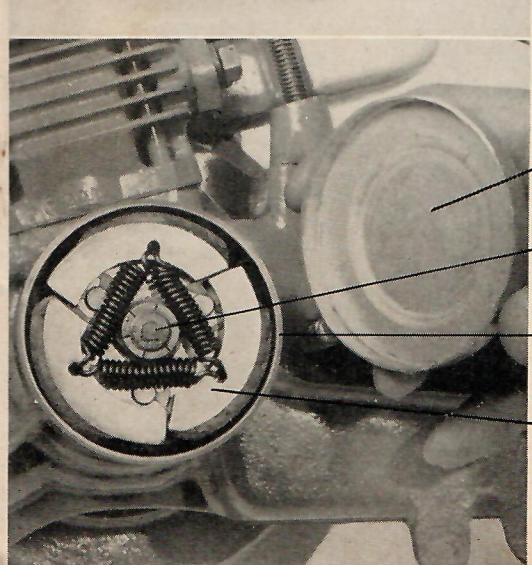
Ridge

condenser

Breaker points

Breaker assembly

Stator plate

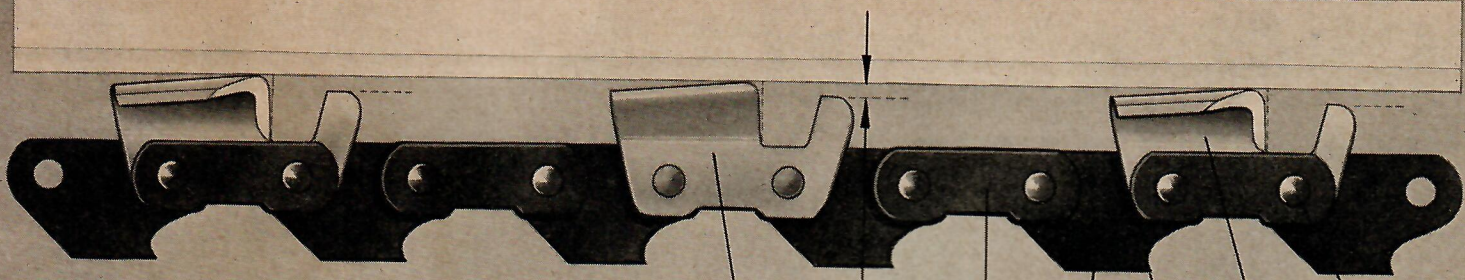


Snap-off cover

Wick

Clutch drum

Clutch shoes



Left Cutter Joint Height Side Link Center Link Lug Right Cutter Rivet

CHAIN CARE

To get peak efficiency with the Model H.A. saw, the chain must be kept in top condition.

If the chain is correctly sharpened, properly lubricated and jointed, it will cut smoothly and be easier on the motor, cutter blade, the chain itself—and the operator.

If it is dull or incorrectly sharpened, the chain will pound, bind and grab in the cut, loosening the teeth and rivets, and causing excessive wear on the cutter bar, chain and sprocket.

Therefore, careful study and application of the time-tested methods of chain maintenance in this section of the manual are most important.

General Information: If you're a new owner, some of the terms applied to power saw chains may need explanation. For a clearer understanding study the accompanying photos.

Joint—Is the height between the top edge of the cutter and the top of the runner.

Runner—Is a little depth gauge just ahead and part of each tooth that controls the depth the cutter sinks into the wood.

Set—Is the amount the cutter teeth are curved out from the chain's centre line to make sure the cut is wide enough to accommodate the cutter, bar and chain.

Centre-links—Link up the cutter teeth and provide the driving lugs that fit into the cutter bar groove and the sprocket.

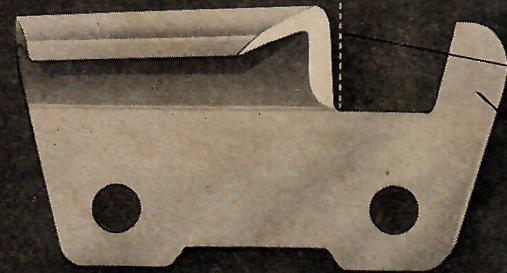
Side-links—Connect cutters and centre links.

Left-hand and right-hand cutters alternate in the chain and each has two cutting faces—side and top.

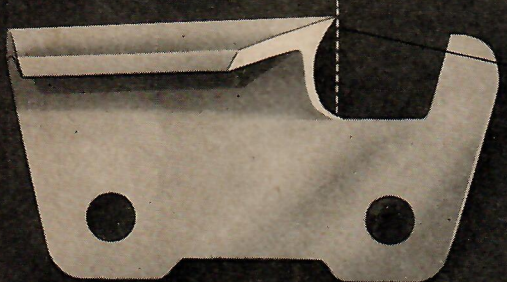
The chain was precision ground and made with a joint of .020 inch when it left the factory, but the joint can be changed to suit particular conditions.

In the ordinary course of events, however, it will not be necessary to change the joint. Years of experience have shown that .020 inch is best for average conditions.

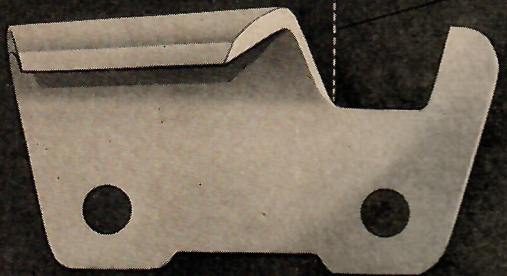
There also is ample set in the cutters when the chain leaves the factory and it is highly unlikely this will have to be changed.



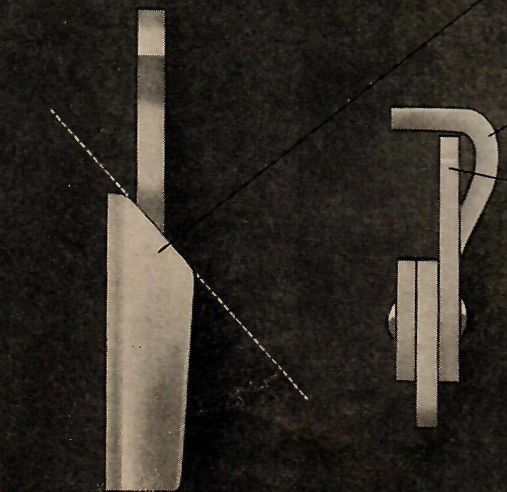
RIGHT
Correct slope



WRONG
Hooked



WRONG
Too much slope



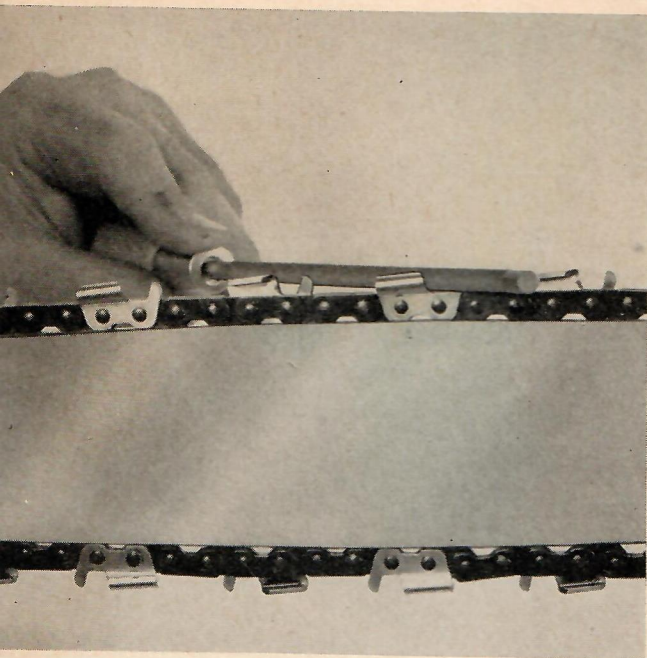
Cutter face
35°

Cutter

Runner



Correct filing is essential to obtain fast and accurate cutting with your saw. Improper filing not only reduces cutting speed, it places a strain on the clutch and other parts of the engine. This can only result in increased maintenance costs.



The above illustration shows one-fifth of the diameter of the file above the tooth. Because of the position of the camera the hand appears to be too high to give the correct filing angle. Make certain the file fits the contour of the cutting face.

SHARPENING INSTRUCTIONS

To obtain the greatest efficiency from your chain:

1. Keep the same cutting angles on all teeth. The side face must be vertical; the top face raked back about 35° .
2. Use the right size file—only a $\frac{1}{4}$ " full round.
3. Keep all the joints the same depth.
4. Keep length of each cutter tooth the same.
5. Keep the chain well lubricated.
6. Keep the chain correctly tensioned.

Sharpen the chain on the cutter bar with the motor shut off. Tighten chain firmly on the bar to hold secure.

Make a practice of touching up the teeth with the file at noon and in the evening. Frequent touch-ups are better than waiting until the chain is really dull.

Take a firm grip on the file and use it with a steady thrust, adding a slight twisting motion. Angle the file to fit the contour of the cutting faces. Don't press down on the file, but run it evenly against the full contoured face, making certain that it also is bearing against the top cutting face.

Keeping about one-fifth of the diameter of the file above the top cutting edge of the tooth will give a nice hollow-ground cutting edge which will cut fast and dull slowly. Don't file off any more metal than is necessary to give a sharp edge.

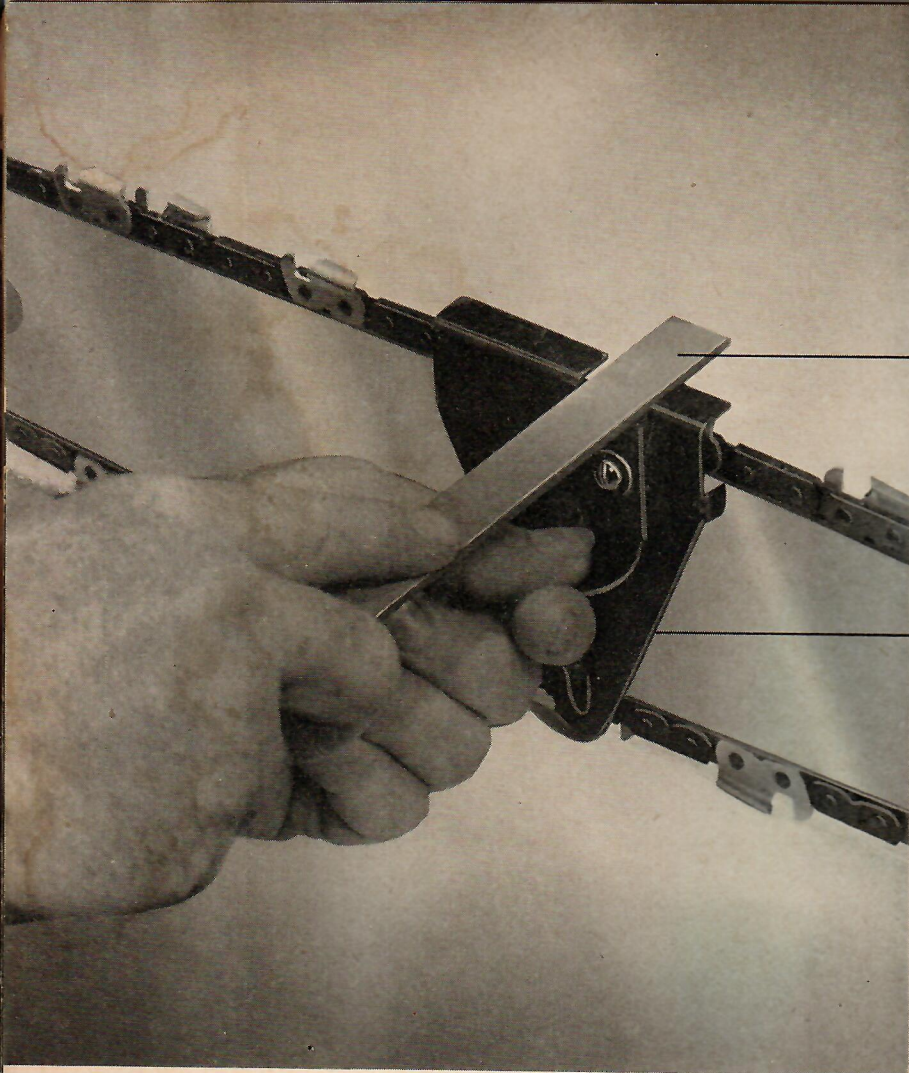
Make sure your file is really sharp because the chain teeth are made of a heat-treated steel alloy. Also, a dull file can surface harden the cutter edges and make them extremely hard to sharpen.

Be careful to keep the cutter teeth the same length. If the teeth are not uniform, the longer ones will take a bigger bite and cause the saw to cut in an arc.

When you have finished sharpening the chain, slack off the chain slightly and run it free while oiling it heavily to make sure that all filings are flushed from the cutter bar groove. Be sure to re-tension the chain correctly. To save loss of time while working in the bush, it is wise to keep a spare, correctly sharpened chain on hand, if the cutter edges are damaged by hitting a stone or other hard object.

CAUTION

1. Use only a **sharp**, $\frac{1}{4}$ -inch full round file.
2. Maintain accurate joint and length of tooth.
3. Re-tension chain correctly after filing.



Flat file

Jointing gauge

JOINTING AND CUTTER BAR MAINTENANCE

JOINTING

As the cutter teeth become shorter through repeated sharpening, the joint clearance becomes shallower.

Only an experienced filer should attempt to change the joint. But I.E.L. can supply a gauge (Part No. WA 6) which is specially designed to simplify joint filing.

To check the jointing, use this gauge, or place a steel straight edge along the top edges of the cutting teeth and slip a .020 feeler gauge between it and the top of the runners. If the joint is correct, you should feel just the slightest drag on both sides of the feeler gauge.

If it is too loose, the teeth will have to be filed back to suit. If the gauge won't enter the gap, then the runners must be filed down to fit. In filing them, maintain the rounded corners. Improperly filed runners will make some teeth cut more than others and the saw action will be rough and tend to cut off-line.

RIVETS

The rivets in the chain should be periodically inspected. They are heat-treated and were hand-fitted at the factory and if the chain is kept correctly maintained there should be little trouble.

If the rivets start to loosen, place the chain on an anvil and tighten them with a light hammer. Be sure, however, that you don't tighten them too much or the chain will not be flexible.

CUTTER BAR

Make sure the chain is correctly tensioned and lubricated at all times. If it is too loose, it may come off. If it is too tight, it will damage the end of the cutter bar.

Make sure the groove is clean at all times.

Check the cutter bar for wear at regular intervals and turn it over from time to time to make sure the wear is distributed evenly.

As wear takes place, a sharp edge is left on the extreme edge of the groove and this should be removed with a file when it becomes noticeable.

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE FAILS TO START	<p>Empty fuel tank</p> <p>Ignition switch off</p> <p>Fuel shut-off valve closed</p> <p>Engine not choked</p> <p>*Main adjustment screw valve improperly set</p> <p>*Over choking (flooding)</p> <p>*Magneto</p> <p>*Sparkplug</p> <p>*Water or dirt in fuel system</p>	<p>Refill with correct fuel mixture.</p> <p>Turn on.</p> <p>Open valve.</p> <p>Move choke lever towards operator.</p> <p>Close and reopen one full turn.</p> <p>Unchoke, close fuel shut-off valve and pull starter 3 or 4 times. Open shut-off valve, and start. If engine is continually flooded the carburetor is at fault and should be checked by your service dealer.</p> <p>Remove wire from sparkplug and remove plug. Hold by insulating material so metal end is 1/4" from clean, unpainted metal surface. Pull starter sharply. There should be a strong blue spark across the 1/4" gap. If no spark, the trouble is either breaker points, coil or condenser or shorted wire.</p> <p>Clean and dry electrodes. Re-attach sparkplug wire and hold metal seat of plug against engine. Pull starter. A blue spark should jump gap between electrodes. If no spark, replace with new plug. If plug was wet and magneto spark was strong, the trouble is probably heavy over-choking. Turn the motor over several times to clear it.</p> <p>Drain fuel tank and carburetor. Clean sediment bowls and filter. See page 12.</p>
ENGINE CONSISTENTLY HARD TO START	<p>Check all points above marked with asterisk</p> <p>Muffler clogged</p> <p>Air screen blocked</p> <p>Reed valve sticking</p> <p>Poor compression</p>	<p>Remove and clean.</p> <p>Remove and clean.</p> <p>Check and replace if damaged. Replace gaskets if damaged.</p> <p>See your service dealer.</p>

TROUBLE	PROBABLE CAUSE	REMEDY
ENGINE CUTS OUT OR MISFIRES	<p>Short circuit in ignition system</p> <p>Partial stoppage in fuel system</p> <p>Fouled, wet or defective sparkplug</p> <p>Breaker points sticking or burned</p> <p>Coil failure</p>	<p>Check all wires and connections. Tape where necessary; secure all connections.</p> <p>Clean out carefully.</p> <p>Clean or replace.</p> <p>See Page 15 or your service dealer.</p> <p>See Page 15 or your service dealer.</p>
ENGINE LACKS POWER	<p>Incorrect fuel mixture</p> <p>Main adjustment screw valve incorrectly set</p> <p>Cylinder exhaust ports clogged</p> <p>Muffler clogged</p> <p>Air intake screen clogged</p> <p>Worn or sticking piston rings</p> <p>Improper timing</p>	<p>Drain tank, refill with correct mix.</p> <p>Correct the setting. If excessive smoke, it is open too far. If revs drop off when under load, it is closed too far.</p> <p>Clean. See page 14.</p> <p>Clean. See page 14.</p> <p>Clean. See page 12.</p> <p>See your service dealer about replacements.</p> <p>See page 15, or your service dealer.</p>
ENGINE OVERHEATS	<p>Cylinder fins clogged with dirt or sawdust</p> <p>Carburetor set too lean</p> <p>Incorrect fuel mix. Not enough lubricating oil.</p> <p>Cylinder exhaust ports clogged</p> <p>Improper timing</p> <p>Air flow blocked</p>	<p>Clean. See page 14.</p> <p>Adjust main adjustment screw valve. See page 8.</p> <p>Drain tank; replace fuel with correct mix.</p> <p>Clean. See page 14.</p> <p>See page 15, or your service dealer.</p> <p>Remove shroud and starter cover. Clean fan. See page 14.</p>
ENGINE FALTERS ON ACCELERATION	<p>Idle mixture too lean</p> <p>Air leak into crankcase</p> <p>Muffler loose</p>	<p>Adjust. See page 8.</p> <p>Check all nuts, bolts and gaskets.</p> <p>Check assembly; see if gasket damaged; replace if necessary.</p>

TROUBLE	PROBABLE CAUSE	REMEDY
CHAIN CUTS OFF LINE	Improper filing Cutter bar worn down on one side or damaged Teeth on runners not all sharpened uniformly	See filing instructions page 17. Replace bar. See your dealer. Check and file correctly. See filing instructions page 17.
CHAIN STALLS IN CUT	Clutch slipping Cutter bar and chain pinched in log	Check linings, if worn out, replace. See dealer. Oil on clutch shoes and drum. Remove. Use wedge if necessary to open cut wider to free bar and chain.
CHAIN MOVES WHEN THROTTLE IS CLOSED	Idling speed too fast	Back off on idle speed regulating screw.
CHAIN CUTS ROUGHLY, DIGS IN OR RIDES UP IN CUT	Top and front angles on cutters incorrectly filed.	See filing instructions page 17.
CHAIN OILER STOPS PUMPING	Oil tank empty Dirt in pump assembly Sawdust or dirt blocking oil passage to cutter bar Oil not entering pumping chamber Pump damaged	Fill with clean, No. 10 or No. 20 oil. Remove and clean pump and feed lines. Reassemble. Clean. Use lighter oil. In winter weather thin with kerosene. See dealer.

Don't force the saw into the cut. Maintain a gentle pressure to obtain maximum cutting speed. Oil the chain and bar frequently—keep the chain sharp and correctly filed at all times.

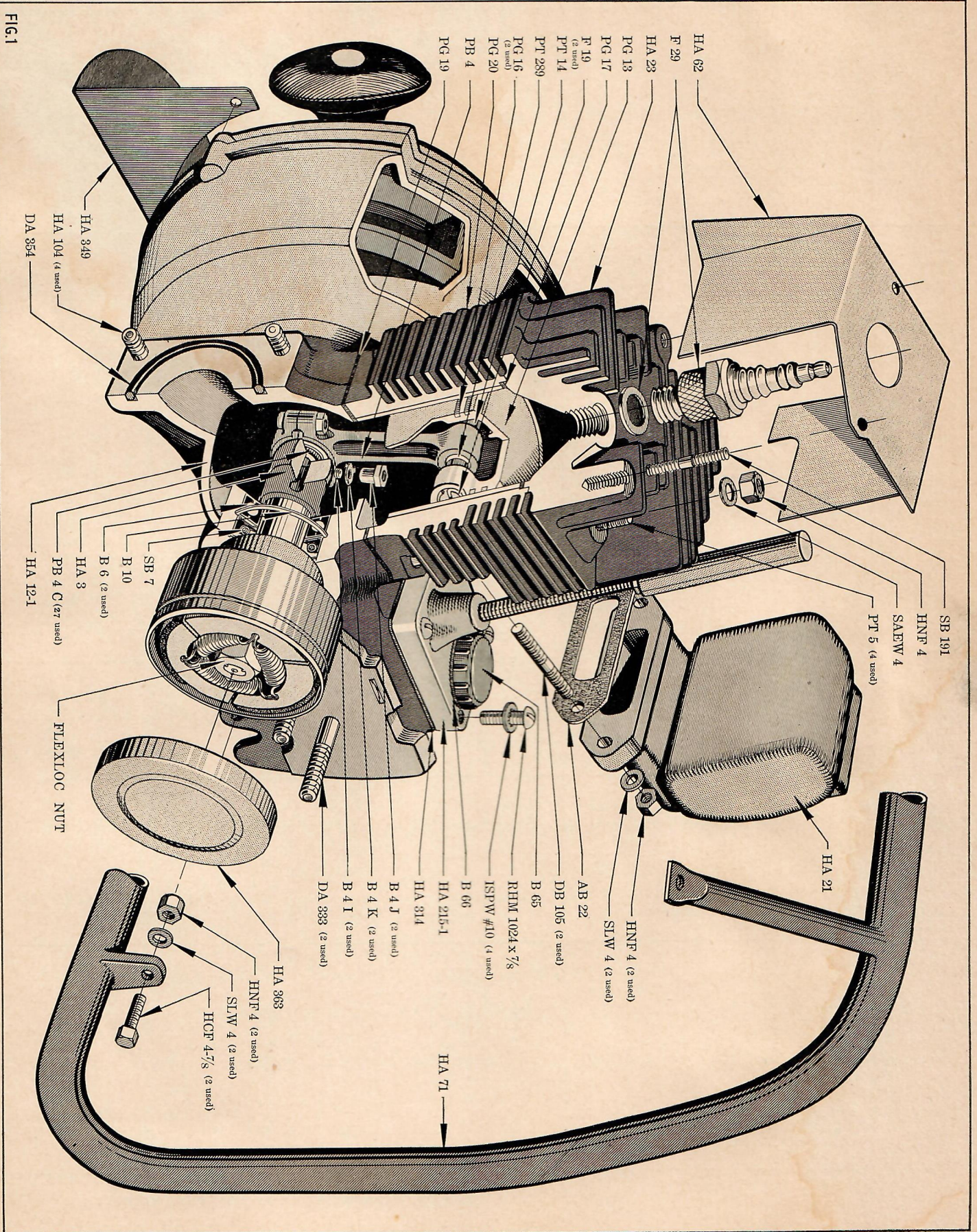


FIG. 1

FIG. 1 — ENGINE

PART NO.	PART NAME	PART NO.	PART NAME
AB 22	Exhaust Gasket	HCF 4 x 7/8	Rear Handle Bolts (2 used)
B 4 J	Con Rod Nut (2 used)	HNF 4	Cylinder Head Nut
B 4 K	Con Rod Washer (2 used)	HNF 4	Exhaust Nut (2 used)
B 4 I	Con Rod Bolt (2 used)	HNF 4	1/4 inch nuts (2 used)
B 6	Main Bearing (2 used)	ISPW No. 10	Lock Washer (4 used)
B 10	Clip Ring	PB 4	Con Rod
B 65	Oil Filler Cap	PB 4 C	Loose Needles (27 used)
B 66	Oil Filler Cap Gasket	PG 13	Piston
DA 333	Strut Stud (2 used)	PG 16	Piston Rings (2 used)
DA 354	Swivel Grommet	PG 17	Cylinder Head Gasket
DB 105	Exhaust Stud (2 used)	PG 19	Cylinder Base Gasket
F 19	Wrist Pin Retainer (2 used)	PG 20	Cylinder Block Assembly
F 29	Spark Plug and Gasket	PT 5	Cylinder Head Stud
HA 3	Crankshaft	PT 14	Wrist Pin
HA 12-1	Crankcase Assembly	PT 289	Needle Bearing
HA 21	Exhaust Body	RHM 1024 x 7/8	Oil Body Screws (4 used)
HA 23	Cylinder Head	SAEW 4	Cylinder Head Washer
HA 62	Inner Shroud	SB 7	Drive End Seal
HA 71	Front Handle	SB 191	Cylinder Head Stud
HA 104	Swivel Stud (4 used)	SLW 4	Exhaust Washer (2 used)
HA 215-1	Oil Pump Body Complete	SLW 4	1/4 inch Lock Washer (2 used)
HA 216	Plunger Rod		
HA 218	Oil Rod		
HA 314	Oil Knob		
HA 349	Oil Gasket		
HA 363	Starter Plate		
	Clutch Cover		

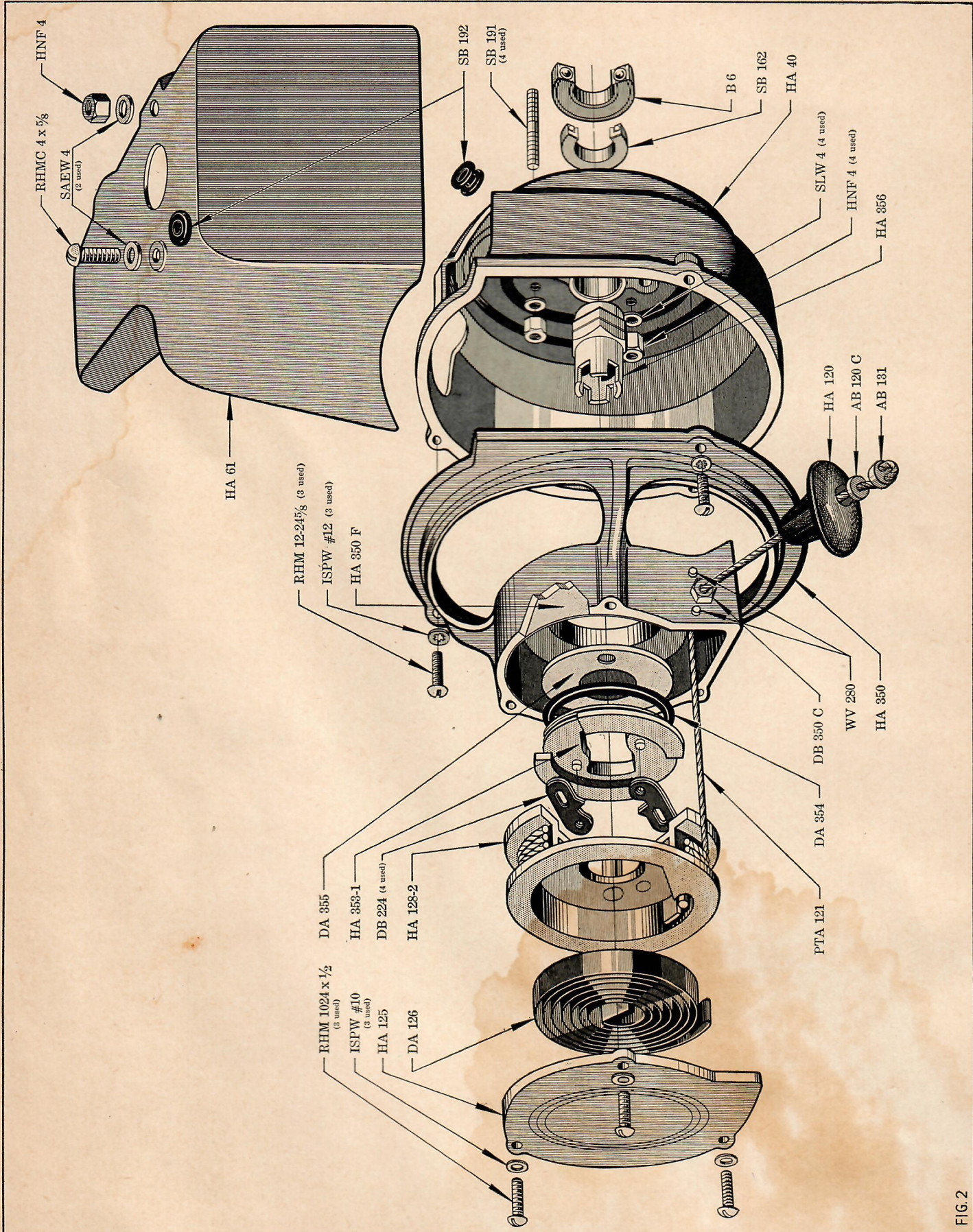


FIG. 2

FIG. 2 - STARTER ASSEMBLY

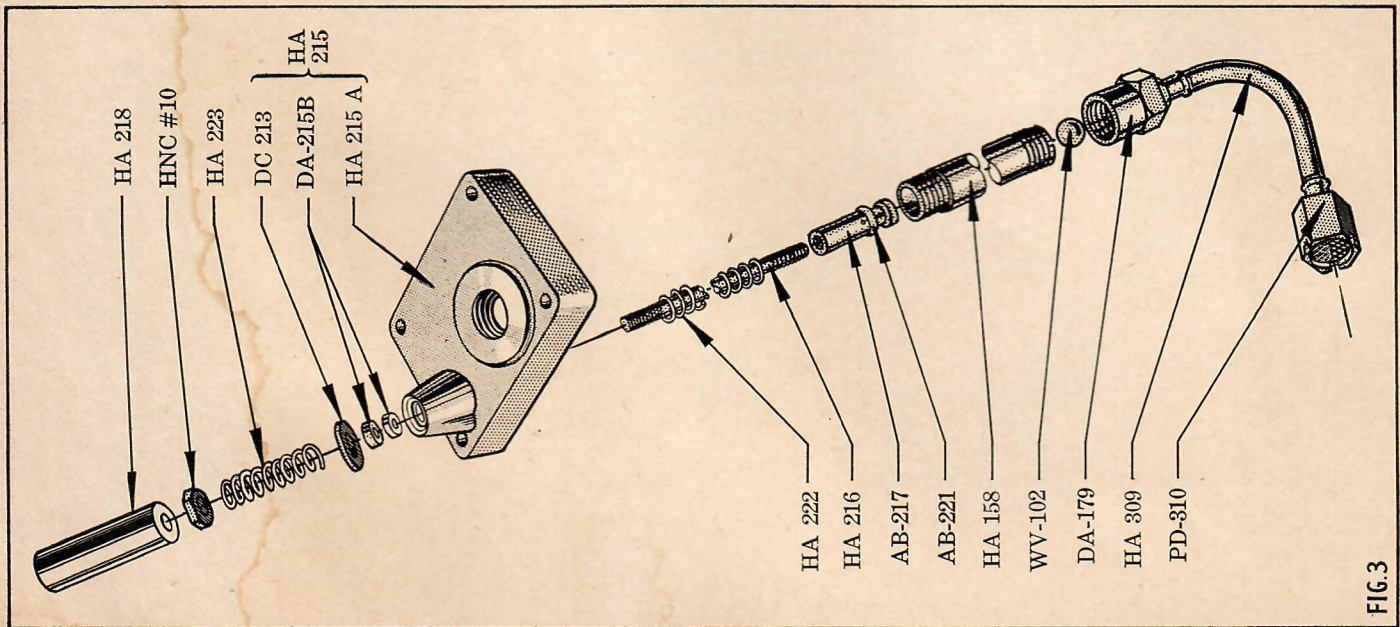
PART NO.	PART NAME
AB 120-C	Starter Rope Washer
AB 131	Starter Rope Anchor
B 6	Crankshaft Bearing (2 used)
DA 126	Starter Spring
DA 354	Slip Plate Ring
DA 355	Starter End Plate
DB 224	Starter Pawl (4 used)
DB 350-C	Starter Rope Bushing
HA 40	Fan Housing
HA 61	Outer Shroud
HA 120	Starter Handle
HA 125	Starter Cover
HA 128-2	Starter Pulley Complete with Pins
HA 350	Starter Housing Unit
HA 350-F	Starter Liner
HA 353-1	Starter Slip Plate and Pin Assembly
HA 356	Driver Nut
HNF 4	Shroud Nut
HNF 4	Fan Housing Nut (4 used)
ISPW	Starter Cover Washer (3 used)
ISPW	Starter Housing Washer (3 used)
PTA 121	Starter Rope Assembly
RHMC	4 x 5/8 Shroud Screw
RHM	1024 x 1/2 Starter Cover Screw (3 used)
RHM	1224 x 5/8 Starter Housing Screw (3 used)

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FIG. 3 - OIL PUMP ASSEMBLY

PART NO.	PART NAME
SAEW 4	Shroud Washer (2 used)
SB 162	Magneto End Seal
SB 191	Fan Housing Studs (4 used)
SB 192	Ignition Wire Grommet
SLW 4	1/4 inch Lock Washer (4 used)
WV 280	Rivet (3 used)
HA 215-1	Oil Pump Assembly Complete
AB 217	Plunger
AB 221	Plunger Grommet
DA 179	Oiler Intake Connector
DA 215-B	Oiler Gland
DC 213	Washer
HA 158	Oiler Pump Barrel
HA 215	Oiler Body
HA 215-A	Oiler Body Unit
HA 216	Plunger Rod
HA 218	Oiler Knob
HA 222	Internal Spring
HA 223	External Spring
HA 309	Flexible Suction Line
HNC	No. 10 Knob Lock Nut
PD 310	Suction Head
WV 102	Check Valve

FIG. 3 - OIL PUMP ASSEMBLY



3 914

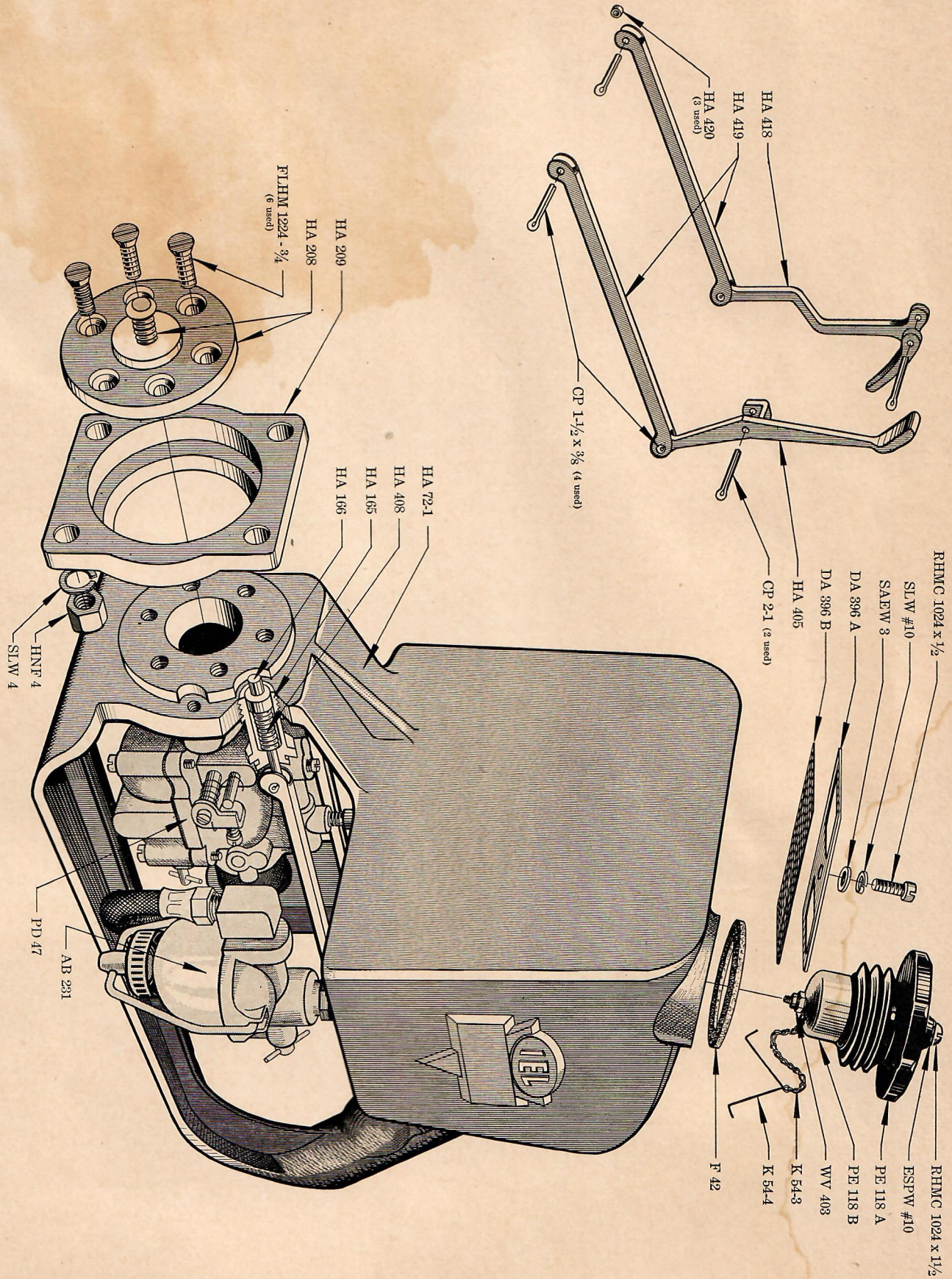


FIG. 4

FIG. 4 - REAR HANDLE ASSEMBLY

PART NO.	PART NAME
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AB 231	Fuel Filter
AB 232	Fuel Filter Adapter
CP 1-1/2 x 3/8	Control Link Cotter Pins (4 used)
CP 2-1	Control Hinge Pin
DA 396-A	Air Cleaner Plate
DA 396-B	Air Cleaner Screen
ESPW No. 10	Filler Cap Washer
F 42	Filler Cap Gasket
FLHM 1224-3/4	Valve Plate Screw (6 used)
HA 72-1	Rear Handle Complete with Carb. Studs
HA 165	Swivel Lock Body
HA 166	Swivel Lock Pin
HA 208	Reed Valve Unit
HA 209	Swivel Ring
HA 405	Swivel Lever
HA 408	Swivel Lock Spring
HA 418	Throttle Trigger
HA 419	Control Link (2 used)
K-54-3	Filler Cap Chain
PD 47	Carburetor
PE 118-A	Filler Cap Only
PE 118-B	Vent Cup
PEA 118	Filler Cap Assembly
PT 49	Male Elbow
RHMC 1024 x 1/2	Air Cleaner Screw
RHMC 1024 x 1 1/2	Screw
SAEW 3	Air Cleaner Washer
SLW No. 10	Air Cleaner Lock Washer
WV 90-9 1/4	Fuel Line
WV 403	Filler Cap Nut

FIG. 5 - CLUTCH ASSEMBLY

PART NO.	PART NAME
----------	-----------

DA 331	Washer (2 used)
DA 332	Strut Nut (2 used)
DB 331	Strut Washer (2 used)
FLHM 1224- 1 1/4	Screws
HA 3	Crankshaft Drive End
HA 85	Oil Wick
HA 87	Sprocket
HA 337	Chain Adjuster Pin
HA 339-1	Strut Assembly
HA 362	Clutch Driving Key

PART NO. PART NAME

HA 365	Clutch Driver
HA 366	Clutch Driver Pin (3 used)
HA 367	Clutch Shoe Assembly (3 used)
HA 369	Clutch Spring (3 used)
HA 378	Clutch Drum
HA 381	Guide Plate
HA 384	Inside Sprocket Washer
SLW 5	Strut Lock Washer (2 used)
WV 29	Sprocket Bearing
WV 135	Clutch Driver Clip (3 used)
WV 263	Rivet (6 used)
WV 407	Clutch Driver Nut

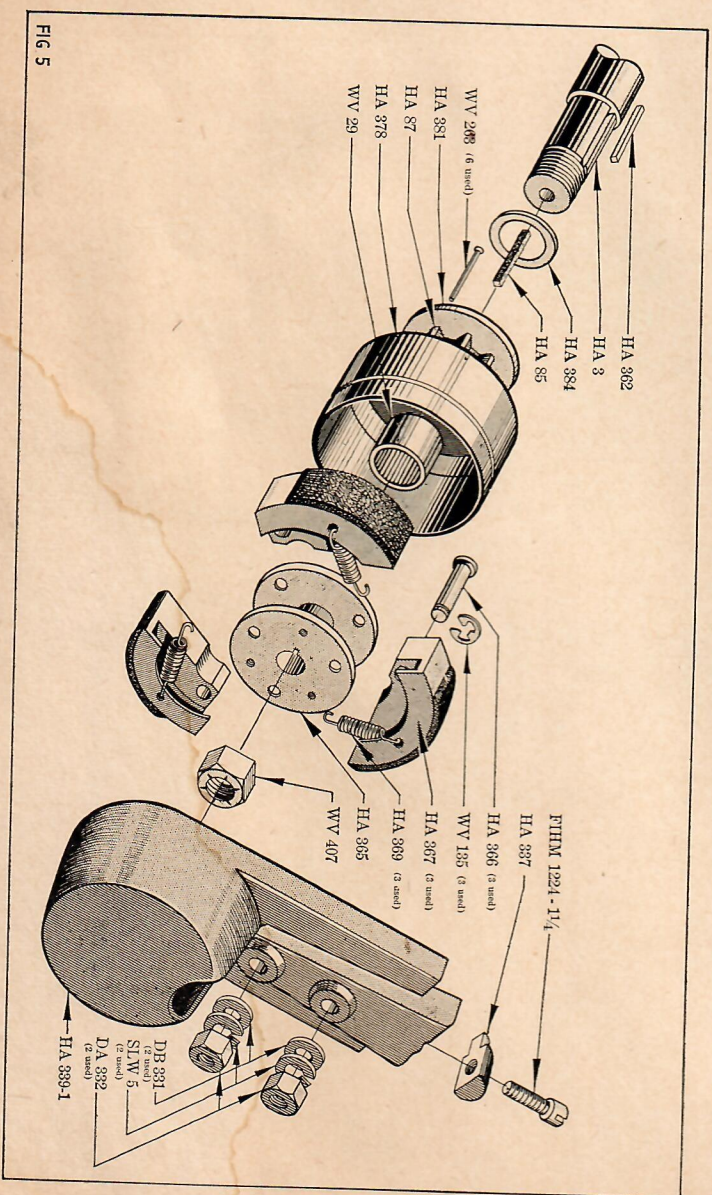


FIG. 6 -- CARBURETOR ASSEMBLY

PART NO.	PART NAME
0120	6-32 x 1/6 Screw
0240	8-32 x 1/6 Screw
0676	Gasket
0702	Packing Gland
0703	Packing Nut
0705	Packing
0788	Spring
0992	Lockwasher
01830	Throttle Lever
02395	1/4-32 Headless Plug Screw
02510	Gasket
02531	3/8 Welch Plug
03311	10-32 Headless Plug Screw
03739	Choke Shutter
03860	Choke Friction Plunger Spring
05095	8-32 x 9/16 Fill. Hd. Screw
05204	4-36 x 1/8 Rd. Hd. Screw
05454	Choke Friction Plunger
05725	Idle Adj. Screw Spring
06062	8-32 x 1" Screw & Lockwasher (4 used)
06910	Idle Adj. Screw
07804	Float Assembly
07896	1/2-20 Plug Screw
07900	Gasket
07901	Float Pinion Pin
07903	Float Bowl Gasket
07912	Choke Friction Plug Screw
08179	Nozzle
08515	Bypass Tube Assembly
08598	Throttle Stop Lever
08646	Throttle Shutter
08647	Throttle Return Spring
09518	Throttle Shaft
09519	Throttle shaft and lever
09678	Throttle Shaft Clip
09901	Throttle Stop Lever Pin Stud
DB 105	Carburetor Complete
PD 47	Carburetor Intake Adapter
PT 391	Carburetor Intake Grommet
HA 392	Intake Adapter Screws (2 used)
RHM	
832-3/8	
SLW No. 8	Intake Adapter Washer (2 used)
HNW 4	Carburetor Mounting Nut (2 used)

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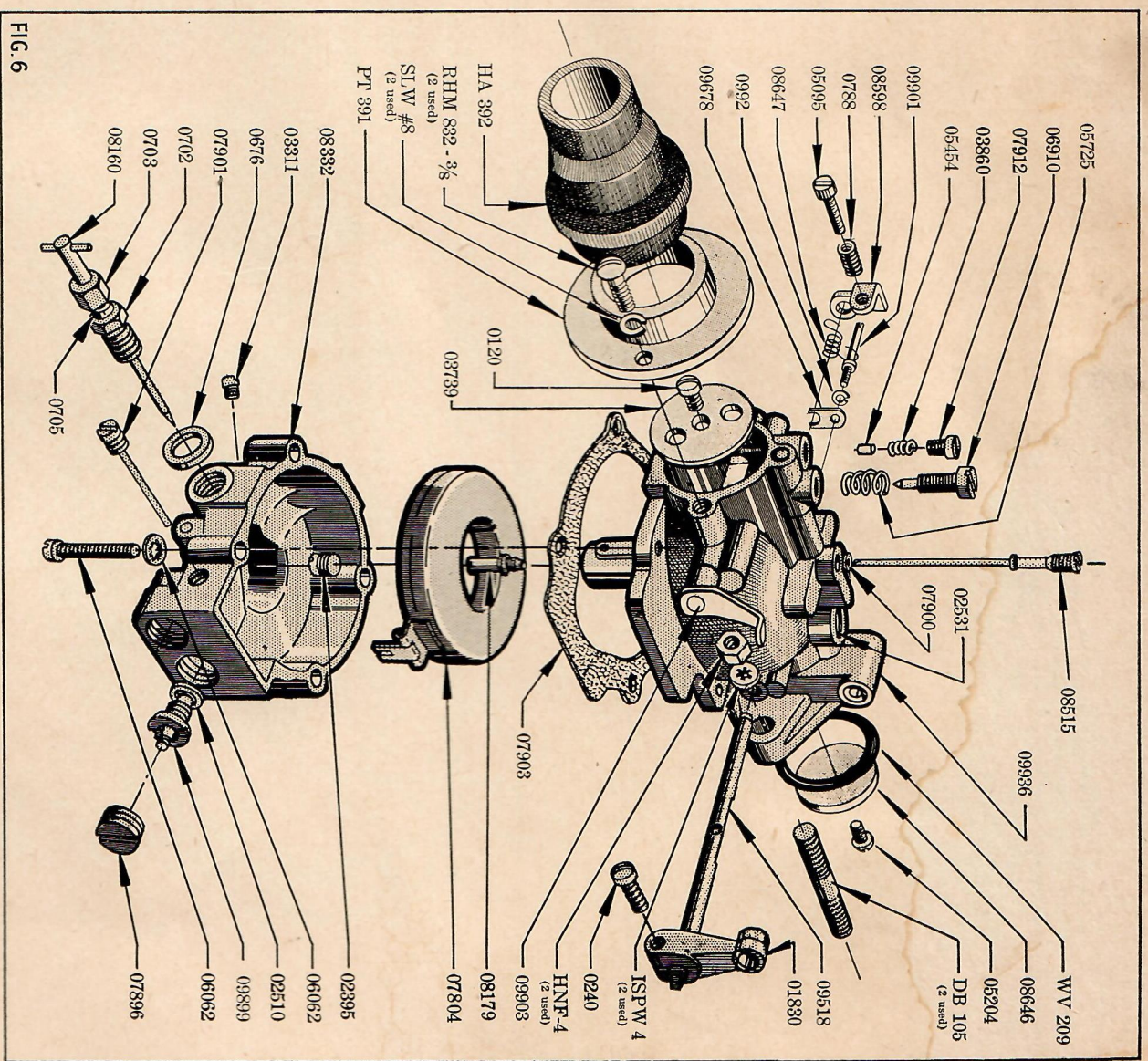
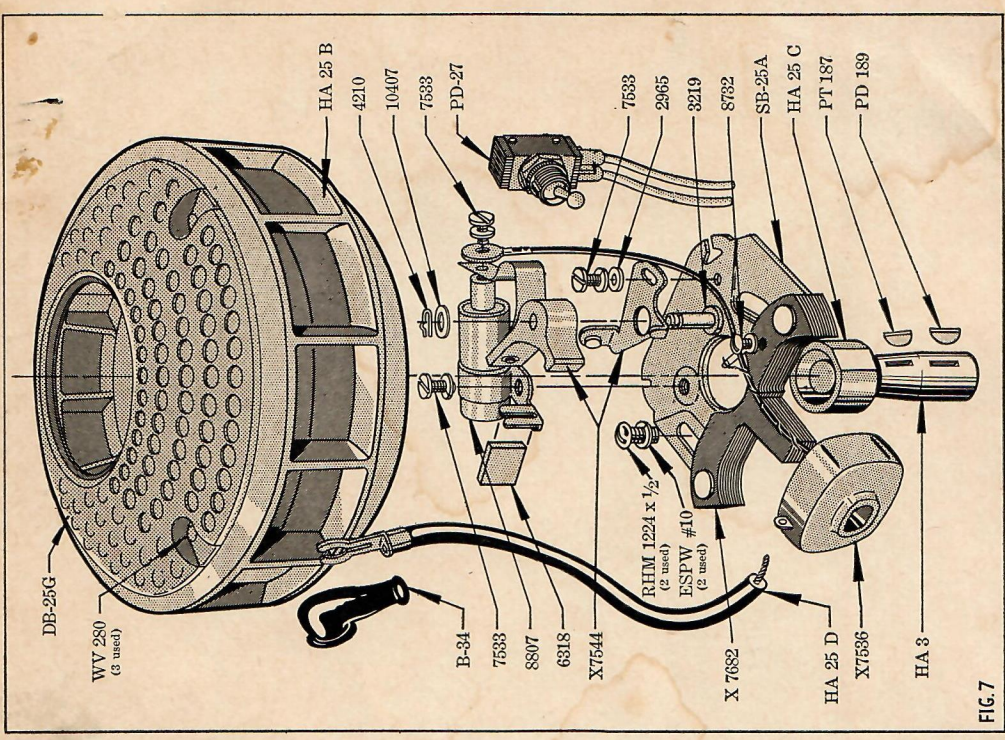


FIG. 6

ISPW 4	Carburetor Mounting Lockwasher (2 used)	08332	Float Bowl Service
W V209	Carburetor Seal	03311	Matched Inlet Needle & Seat
08160	Needle Valve Adj. Screw (complete)	0676	Choke Shaft & Lever
		07901	Body Service
		0702	
		0703	
		08160	
		0705	
		08332	
		03311	
		0676	
		07901	
		0702	
		0703	
		08160	
		0705	
		08332	
		03311	
		0676	
		07901	
		0702	
		0703	
		08160	
		0705	

FIG. 7 - IGNITION

PART NO.	PART NAME
B 34	Spark Plug Cover
DB 25-G	Rotary Screen
ESPW No. 10	Mag. Stator Washer (2 used)
HA 3	Crankshaft Mag. End
HA 25-B	Flywheel Unit



PART NO. PART NAME

HA 25-C	Magneto Cam (Wico Y-7513)
HA 25-D	Ignition Wire
PD 27	Ignition Stop Switch
PD 189	Magneto Cam Key
PT 187	Key
RHM 1224 x 1/2	Mag. Stator Screw (2 used)
SB 25-A	Mag. Stator Complete
WV 280	Rivet (3 used)
2965	Fixed Contact Clamp Screw Washer
3219	Breaker Arm Pivot Washer
4210	Breaker Arm Lock (1 used)
6318	Cam Wiper Felt
75333	Condenser Screw (1 used)
75333	Fixed Contact Clamp Screw (1 used)
75333	Condenser Connection Screw (1 used)
8807	Condenser Breaker Point Spacer Washer
10407	Coil Group Breaker Contact Set
X 75386	Stator Plate Replacement Assembly (includes Stator Plate and Coil Core)
X 7544	
X 7682	

FIG. 8 - FUEL FILTER

PART NO.	PART NAME
AB 231	Fuel Filter Complete
AB 232	Adapter with Screen
F 49	Street Elbow
PT 49	Male Elbow
WV 90-91/4	Fuel Line
0705	Main Adj. Screw Packing
07759	Strainer Bowl
07761	Strainer Gasket
07762	Strainer Screen
07765	Cup and Thumb Nut
07769	Shutoff Valve and Packing Nut
07770	Strainer Cover
07772	Clamp Wire and Stud

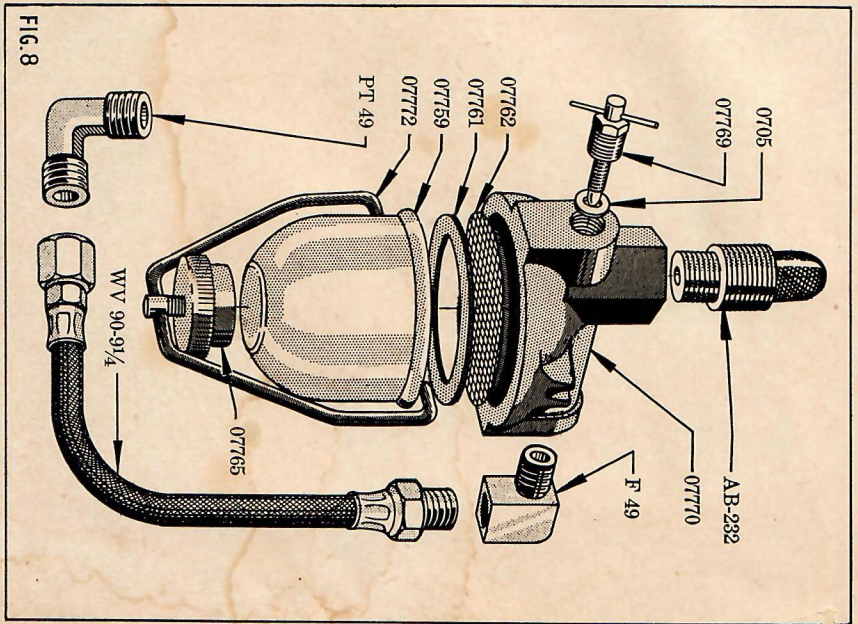
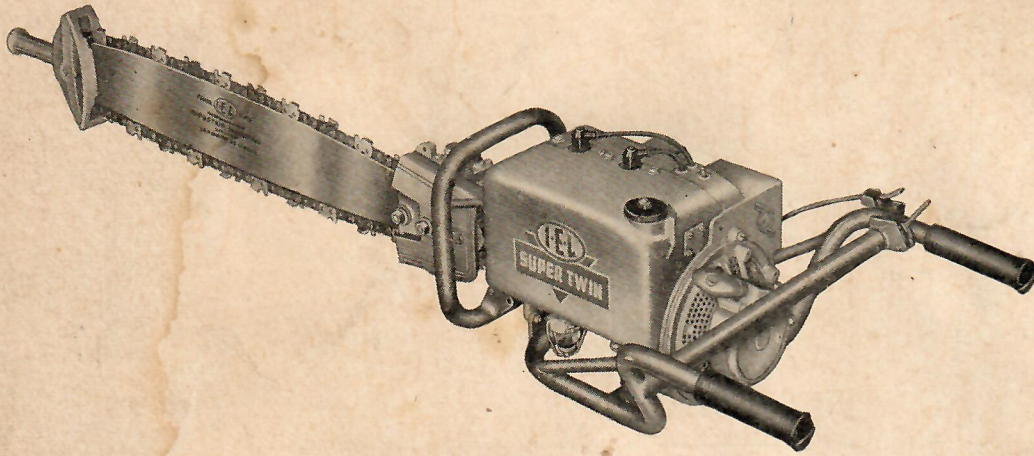
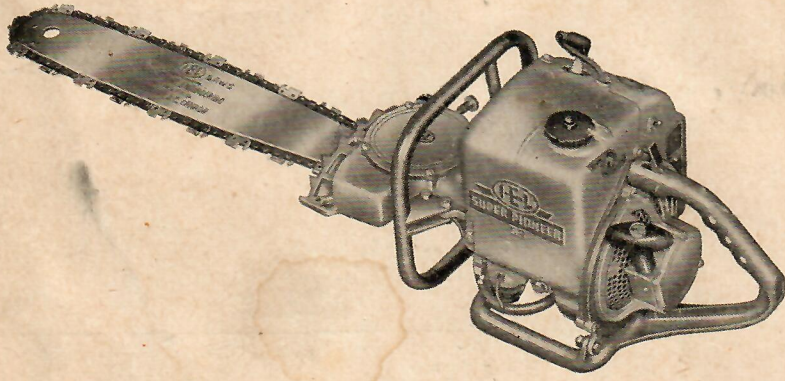


FIG. 8

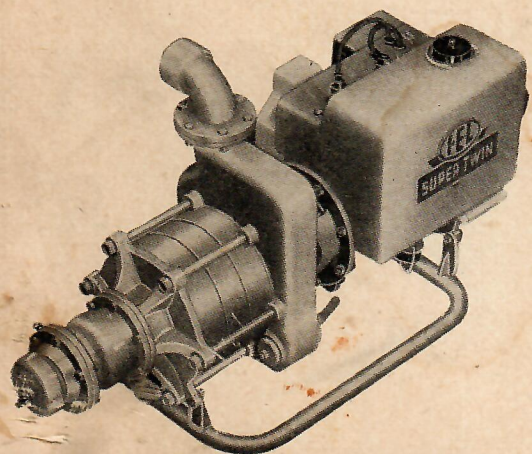
I.E.L.'s FAMOUS FAMILY



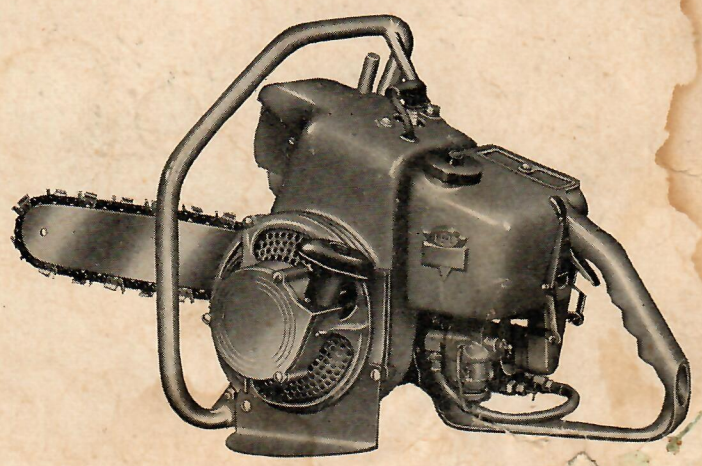
I.E.L.'s Super Twin



I.E.L.'s Super Pioneer



I.E.L.'s Portable High-pressure Pump



I.E.L.'s Model H.A.