HANDBOOK

for the

HOWARD

810 c.c.

TWIN CYLINDER

ENGINE

ROTARY HOES LIMITED
WEST HORNDON · ESSEX
ENGLAND

Telegraphic Address
ROTOVATE BRENTWOOD

Telephone No.
HERONGATE 361

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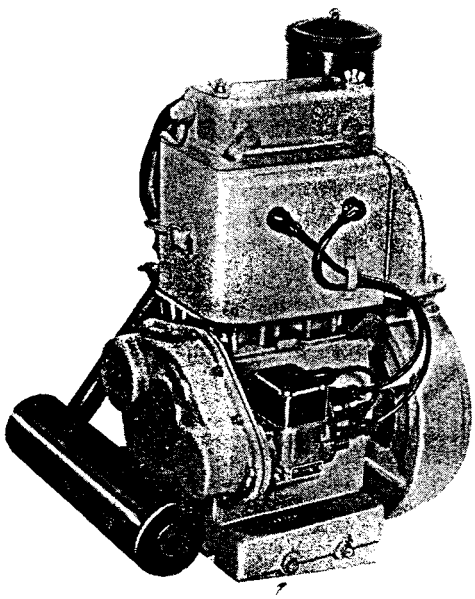
This book gives you practical guidance on using and servicing your machine. Major maintenance operations should be entrusted to your dealer.

FOR SPARES AND SERVICE CONSULT YOUR DEALER

HOWARD



360° twin engine

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General Description

The engine is a conventional 4-stroke "in line" twin cylinder type having a Crankcase made from high-grade cast iron. It is mounted on a rigid cast iron base which forms the oil sump and contains oiling troughs into which dippers on the end of the connecting rods dip at each revolution. Metering holes in the troughs, connecting with the main sump, maintain the oil level in the troughs.

The crankshaft, of high quality forged steel, is carried on ball bearings of ample load capacity and when fitted with the connecting rod assemblies, is very carefully balanced.

The Connecting Rods are of high quality steel having phosfor bronze bushes at the gudgeon pin end. The Crankshaft end bearings are of the split cap type containing white metal, steel backed, shell, half bearings.

The two Pistons of die cast aluminium alloy have compression rings and oil control rings with drain holes drilled in the bottom ring groove. The gudgeon pins are located by a circlip at each end of the gudgeon bosses within the piston.

The Cylinder Block is made from close grained cast iron and is provided with deep circumferential fins specially designed to provide a large cooling area.

The detachable Cylinder Head of close grained cast iron is deeply finned to assist cooling.

The Camshaft, of high grade steel, is driven by heavy spur gears.

The engine speed is controlled by a centrifugal governor. This is driven by a spur wheel, meshing with the Camshaft timing gear and operates the throttle by a simple lever mechanism. A hand operated throttle control lever is fitted for controlling the engine over the operating speed range.

The Flywheel Fan of cast iron is fitted directly on to the crankshaft and the cooling air supplied by this fan provides a draught over the cylinder head and the cylinder block which are finned for this purpose. The cowl is designed to direct the cooling draught to the necessary portions of the cylinder block and cylinder head.

The Oil Filler Cap on the side of the crankcase is of the screwed type and beneath this cap is a dipstick having high and low level marks.

The engine is available as a petrol or a petrol Vaporising oil version and special manifolds are available for these purposes.

An axial Fan unit situated at the top of the engine and driven by belt from the Crankshaft can be provided as an alternative to the flywheel fan where circumstances do not allow the flywheel fan to be conveniently used.

An Engine breather in the form of a non-return spring loaded ball is provided and situated in the forward end of the tappet cover. This allows air pressure built up within the Crankcase to escape without dust laden air being drawn in.

Specification

Engine:
Four-stroke, air cooled, twin cylinder.

Fuel:
Petrol or Petrol/Vaporising Oil.

Main Dimensions:
Bore 3.0", Stroke 3.5", Cubic capacity 810 cc.

B.H.P.
Petrol 10.5 @ 2,000 r.p.m. V.O. 9.5 @ 2,000 r.p.m.

Compression Ratio:
Petrol 4.85 to 1. V.O. 4.6 to 1.

Valves:
Type: Mushroom. Position: O.H.V. Push rod operated. Tappet clearances: Exhaust 0.006". Inlet 0.006". Seating face angle 45°.

Valve Timing:
Inlet opens 10° after Top Dead Centre. Closes 42° after Bottom Dead Centre.
Exhaust opens 48° before Bottom Dead Centre. Closes 8° after Top Dead Centre.

Camshaft:
Type: Steel Forging driven by Spur Gear.

Piston:
Material: Low Expansion alloy, Split Skirt. Rings: Compression and oil control types. Gudgeon Pin Fixing: Circlips in gudgeon bosses.

Connecting Rod:
Material: Steel Forging. Type of Big End Bearing: White Metal, Steel backed, half bearings.

Crankshaft:
Material: Steel Forging. Number of Bearings: Two (Ball Type).

Carburettor:
Make: Amal, Adjustable jets. Type: Petrol 348/10. V.O. 348/12.

Ignition:
Make: Wico. Type: A.1483HZ. Timing: Petrol 35° and T.V.O. 30° before Top Dead Centre. Drive: Gear driven from Camshaft Gear. Sparking Plug: Size 14-mm. Gap .025". Make KLG F50 or equivalent.

Lubrication System:
Splash Feed, Sump capacity 3-pints.

Fuel Consumption:
Half gallon per hr. on average working conditions.

Engine Weight:
200-lbs.

Rotation:
Anti/Clockwise, looking on flywheel.

STARTING & STOPPING

Starting:

(a) Be sure that there is petrol in the tank and that the oil in the sump is at the high level.
(b) Turn on the petrol tap.
(c) Flood carburettor.
(d) Set hand throttle lever a little open.
(e) For side or front starting, hold exhaust valve lifter in left hand, engage starting handle with right hand, give two turns or sufficient to get the engine turning over against compression when the lever is released. Let go of the exhaust valve lifter when the engine is turning and the engine will start.
(f) Allow the engine to run quietly for a few moments to warm up prior to moving off.
(g) To start the engine when hot, follow the same procedure as 'd' and 'e' when starting cold, **but do not flood the carburettor.**

A choke is provided on the carburettor but normally, this should only be used in very cold weather to assist starting. Excessive use of the choke will result in over-rich mixtures and failure to start.

General:

Experience will show when it is necessary to flood the carburettor and also the best setting of the hand throttle control. If the carburettor has been over-flooded, which would result in a wet engine and over-rich starting mixture, fully open the throttle and give the engine several turns to clear the richness, then start again with the throttle 1/4 open.

To stop the engine: Close the hand throttle lever and allow engine to tick over for a few seconds. Press the earthing strip on the side of the magneto and the engine will stop. Alternatively, lift the exhaust valve lifter until the engine stops.

RUNNING IN

The 'running in' period is really the most important period in the life of the engine and the handling given it by the user during this period will determine the sort of service the engine will give in its later life.

The engine will have had several hours running at the Works but generally the next 50-hours constitute the 'running in' period, so be sure that the engine has a sump **full** of oil and that there is upper cylinder lubricant in the fuel. Do not overload the engine during this period and run the risk of seizure or other troubles which may have a lasting effect on the engine. Remember the engine will not be at its best until it is "run in", give it a chance to settle down in the first hours of its life. Avoid sudden "revving up" especially if the engine is not running under load, and if your engine is a petrol/paraffin version do not allow it to tick over for long periods to avoid the risk of crankcase oil dilution and subsequent internal damage.

Be sure the air cleaner is working efficiently and the base contains the correct amount of oil. The oil level is marked on the base. Be sure, during this period and throughout the life of the engine that the oil is changed in the air cleaner **every day** and in dusty conditions **twice daily.**

Maintenance

Daily, or every 8-hours running.

Check oil level in sump.

Be sure that air cleaner to the engine is working efficiently and that the oil has been changed. (In dusty conditions change oil in air cleaner twice daily).

Be sure that the inlet to the fan is clear of obstructions and remove any grass, weeds, etc., choking the air passages between the fins on the cylinder barrel and head.

Check that outlet pipe to crankcase breather is not blocked.

Every 48-hours.

Change engine oil.

Lubricate carburettor and decompressor controls and linkage with a few drops of oil.

Every 96-hours.

Check and clean plugs. Reset points to .025".

Check and clean magneto points. Reset points to .018".

Check and clean carburettor (see carburettor section).

Check and adjust tappets to .006 clearance.

Check all nuts, setscrews etc., for tightness and attend to any oil leaks which may be apparent.

Note: Cylinder head overhaul is only necessary if bad starting or bad performance are predominant and should not be carried out unnecessarily.

LUBRICATION

In order to provide an equal amount of oil to each cylinder when the engine is not level the sump is divided into two separate sections. These are interconnected by holes drilled in the crankcase and action of the engine will ensure that the oil levels in each section are maintained and that there will be no build up in that compartment which is lower.

Oil is circulated within the engine by splash from a 'dipper' which forms part of the 'big-end' cap. Troughs of oil are arranged below these dippers and the oil level within the trough is maintained by holes connected to the oil supply in the main sump. The oiling of all parts is entirely automatic provided the oil level as shown on the dipstick is maintained.

The dipstick will be found below the cap on the sump filler. Unscrew the cap to obtain access to the dipstick. The top mark represents the high oil level and the bottom mark the low level.

Where uneven or sloping ground is to be cultivated it is essential that the oil level is maintained at the high level. Failure to comply with this point may result in 'oil starvation' with subsequent damage to the engine.

It is essential that only **high grade oils** are used in the engine. Those oils having a viscosity in accordance with the following chart:—

Summer: Temperature of 32°F.—90°F. SAE. 40.
Temperature of 90°F. or over SAE. 50.
Winter: Temperature of 10°F.—32°F. SAE. 30.

It is desirable to add one tablespoonful of upper cylinder lubricant to each gallon of fuel used.

CHANGE ENGINE OIL EVERY 48-HOURS WORKED.

Always drain the sump after the engine has been running when any dirt or sediment in the oil will be in suspension and will be removed with the oil. (Sump capacity 3-pints).

Always use clean oil and fill from clean containers.

When refilling sump, fill to top mark on dipstick, run engine for 30 seconds, stop and recheck.

Never run the engine with the sump filler cap removed.

GENERAL MAINTENANCE

Decarbonising The Engine:

This will only be necessary after at least 400-hours running, and should preferably be left to the service agent who has the facilities to do the work and check the extent of cylinder, piston and valve wear. If, however, it is essential for this work to be done on site the following method should be followed.

Remove H.T. plug leads, sparking plugs, governor lever, and air cleaner hose from carburettor. Turn off the petrol and remove petrol pipe from carburettor. Remove the two setscrews holding the silencer to the crankcase, also the two nuts and washers holding the manifold to the cylinder head. Remove manifold complete with silencer and carburettor. Remove exhaust valve "lifting control rod" from rocker cover. Remove front and rear half cowl by unscrewing four setscrews on the top of the fan housing. Take off the rocker cover the six cylinder head nuts and plain washers. Remove rocker assembly and then remove cylinder head.

Turn the engine over until the two pistons are at top dead centre. Clean off the carbon deposit with a blunt knife, do not scratch the piston but thoroughly clean off any carbon. Leave a ring of carbon about $\frac{1}{8}$" wide around the edge of the piston as this assists in maintaining an oil seal on "worn" engines. Follow the same procedure on the other piston.

Next remove the valves. Carefully mark the valve heads to ensure that they are replaced in the correct position. Place the cylinder head face down on a bench and with two screwdrivers compress the spring so that the split taper cotters can be removed. The valves can then be withdrawn from the cylinder head. The valve heads should be cleaned with emery cloth or sand paper and any carbon deposit removed from the valve pockets. Smear a small amount of **Fine** grinding paste on the bevelled face of the valve and placing a broad headed screwdriver in the slot in the head, rub the valve on its seating with an oscillating action. A light spring placed under the valve head will assist the action of grinding. Do not rotate the valve continually in one direction. The valve should show a continuous bright ring all round. If any breaks or thin places show, repeat the operation. Only the minimum grinding must be given to produce this condition. A deep recessed groove in the face will impair the seating of the valve. Any burnt or deeply pitted valves should be replaced by new ones. The valve seating should show a similar continuous bright ring of uniform width. If the seat width is much over 1/16" it is necessary to have it refaced and this should be attended to by your Service Agent at the first opportunity.

Remove all trace of grinding paste from the valve and seating by washing in petrol, re-assemble the valves, smearing a little clean oil on the valve stems.

Clean the face of the cylinder head and cylinder block and replace the gaskets which, if at all damaged, should be renewed. A slight smear of

grease on either side of gasket will assist future removal. When tightening up the cylinder head nut tighten each an equal amount until they are all dead tight and then reset the tappet clearance as follows:—

Turn the engine until number 1. piston is at Top Dead Centre with both valves closed. Unlock the lock nut on the tappet adjusting screw, and with a screwdriver set the clearance between the face of the rocker head and the valve stem to .006". Relock the locknut and recheck the clearance, adjust as necessary. Alternatively, to ensure that the cam follower is on the back of the cam and thus at the point of maximum clearance for the valve. turn the engine until No. 4. valve is down and set No. 1. No. 3. down to set 2. No. 2. down to set 3. No. 1. down to set 4.

Reassemble the engine, run for two or three minutes on little throttle. Stop the engine, remove the rocker assembly cover and re-tighten the cylinder head nut. Reset tappets, take care that the engine does not overheat.

Do not forget to fit back the cylinder cover to ensure a correct air flow before starting the engine.

(2) Pistons:

This again should be left to the Service Agent but if it is essential the following method should be followed:—

Remove the cylinder after following the same procedure of dismantling the engine for decarbonising.

Inspect piston rings and see that they are free to move in their respective grooves, that they are not worn, cracked or broken.

Inspect piston ring grooves and carefully clean if necessary (see para. 3.). See that the oil drain holes in the bottom ring groove of the piston are clean.

To remove a piston from a connecting rod, first remove circlip as follows:—

Insert a sharp pointed tool such as a scriber or similar tool into one end of the transverse slots in the gudgeon pin boss and under the tail of the circlip; lever circlip from its groove. Push out the gudgeon pin in the direction of removed circlip and lift piston clear of connecting rod.

(3) Removal & Replacement of Piston Rings.

To remove piston rings from their grooves a piston ring expanding tool may be used. If this is not available obtain several thin and narrow strips of metal and insert these between back of piston rings and piston. Work these strips around until all rings stand clear of their respective grooves. The rings may now be easily removed by sliding in an upward direction clear of piston. If rings are serviceable or if a new ring or rings are to be fitted, reverse the procedure of removal to replace.

Be sure to refit old rings into the grooves from which they were removed.

(4) Big and Small Ends.

The small end bush is a press fit in the connecting rod and is broaches to size after fitting to connecting rod. It may be removed by using a special drawbolt or by pressing out with a hand press. Reverse the above procedure when fitting a new bush. The big-end bearing is steel backed. The two halves of the bearing are secured in working position by two bolts.

(5) Main Bearings:

The main bearings are situated on either end of crankshaft. The bearings are a press fit on the crankshaft and a push fit in the crankcase.

(6) Crankshaft:

This is a steel forging of very stiff construction having $1\frac{1}{2}$" dia. big-end journals. When dismantling the journals should be checked for "scoring", ovality and wear.

Crankshaft re-grinding (if necessary) should should be undertaken only by firms who have the necessary facilities and specialise in this work. If the crankshaft has to be removed from the engine, and complete dismantling of the engine is unnecessary, the following procedure is suggested.:—

(a) Remove the engine sump.

(b) Remove timing gear cover and mark timing gears with No. 1 Piston at T.D.C.

(c) Remove cooling blast shroud and fan fly-Wheel.

(d) Remove big-end bolts and caps. Push connecting rods and pistons up their cylinder bores to clear Crankshaft.

(e) Remove the 3" internal circlip from its groove behind the front main bearing.

(f) Remove the six setscrews securing the fan housing to the crankcase.

(g) Remove timing pinion from crankshaft also woodruff key.

(h) The crankshaft can now be driven out of the crankcase by tapping the timing gear end. The fan housing will come away with the crankshaft.

Check the main bearing ball races for slackness and renew as necessary. The bearings should not be removed from the crankshaft merely for inspection. An engine which has been in use will have settled, and unless some part requires renewal or maintenance, it is advisable to leave mated parts undisturbed.

(7) Valves:

Examine valves for "pitting" on the seating. Check for wear on valve stems and their fit in guides. If stems are worn more than 0.006" fit new valves and guides. Number all new valves on head to correspond with the numbering of the old valves. Grind in valves until a continuous "high mark" is present the whole way round the seating, both on the valve and the valve seatings in the cylinder head.

Reset valve clearances to .006 when the engine has been finally reassembled.

(8) Valve Springs:

Valves springs deteriorate because of the fatigue resulting from the combined effect of heat and the normal working of the spring. After a considerable period, the springs become weak and then are prone to fail. This, of course, applies to all types of poppet valve engines. A new set of springs should be fitted whenever the engine under goes a major overhaul.

(9) Valve Rocker Assembly:

Wash the rocker-shaft assembly thoroughly in paraffin. Examine the rocker shaft for wear. Ensure that all rockers are free on the rocker shaft and that the oil holes in the rocker are free from obstruction.

When dismantling the rocker-shaft assembly carefully note the order of assembly of the various parts, rocker-shaft bearers, distance pieces, springs and rockers, to ensure reassembly on the rocker-shaft in their original positions.

(10) Governor:

Points of possible wear are:—

Ball Bearings.
Governor weight pivot pins.
Governor weight radius arm.

The adjustment is set and secured by a split pin and should not be disturbed unless some part requires renewal. The Governor is of robust construction and will give long trouble free service provided that the oil in the engine is maintained at the correct level.

(11) Valve Rocker Cover and Exhaust Lifters:

These must be cleaned and all joints where oil leaks may occur should be maintained in good condition.

If the oil sealing rubber washers on the exhaust lifter cams require renewal, they should be assembled so that the rubber is under pressure when sandwiched between the exhaust lifter lever and the sleeve.

When the rocker cover is assembled to the engine ensure that the exhaust lifters are not holding the exhaust valves open.

(12) Crankcase "Pressure Relief Valve" or "Breather".

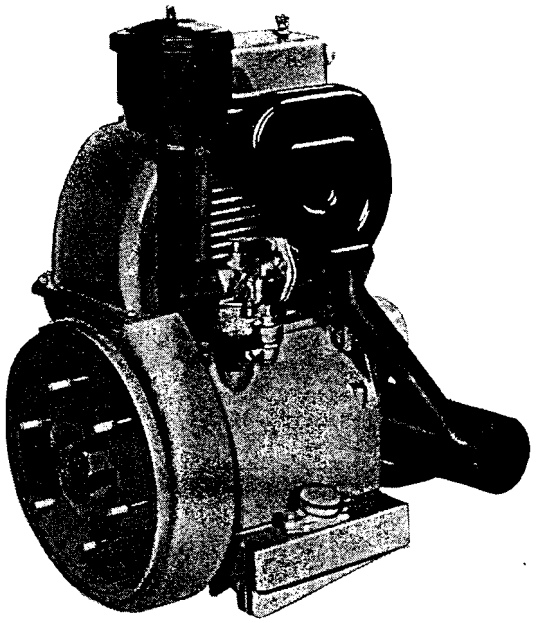
This is a non-return valve situated at the front of the Rocker cover. It is essential that this should be kept clear at all times and if it has to be stripped out for any reason the spring pressure should be reset to 0.5-lbs. p.s.i.

To clean, remove the banjo nut and remove the pipe and blow down the pipe. Check that there is no dirt in the non-return valve, in this event remove Rocker cover and clean with 'air' from the inside or wash in petrol to remove the obstruction.

CARBURETTOR SERVICING

Filter Gauze: The filter gauze is removed for cleaning by unscrewing the banjo bolt, withdrawing the banjo connection and the gauze itself. To clean gauze swill it in clean petrol, do not attempt to clean with rag or cotton waste.

Float Chamber: To remove the float chamber, first disconnect the petrol feed by removing the banjo bolt and withdrawing the banjo, then unscrew the float chamber screws, the float chamber complete with its float will now come away from the carburettor. Do not force or wrench the float as this will cause distortion, resulting in incorrect functioning. To clean the float chamber immerse it in clean petrol, keeping the float lightly depressed so that the float needle is kept in its open position and swill well.



To remove the float, float needle, or needle seating, first unscrew and withdraw the float hinge spindle; this will enable the float to be removed, then unscrew the needle seating which will bring with it the float needle. Before re-assembling the float chamber ensure that all its joint washers are in good condition, the needle seating washer is of a special thickness so only genuine spares should be used. To assemble the float mechanism, first fit washer on to the needle seating, then place the float needle in needle seating and screw the needle seating into the float chamber, tightening to make sure of a petrol tight joint, then fit the flat engaging the float hinge in the float needle and then insert and tighten the float hinge spindle. Check float to see that it moved freely up and down.

Pilot Jet. The Pilot jet is located beneath the air adjusting screw. To remove the pilot jet first unscrew and remove the air adjusting screw. A suitable screwdriver can then be inserted and the pilot jet unscrewed and removed by inverting the carburettor.

Main Jet. To remove the main jet first unscrew the two float chamber screws and remove the float chamber complete with its float, the main jet exposed can then be unscrewed from its holder.

Cleaning Jets. The jets should be washed in clean petrol and then blown through to ensure that their passageways are clear. Do not prod or ream jets with any sharp implement, as this might enlarge their passageways. Do not over-tighten jets when replacing.

Air Bleed Assembly. The air bleed assembly can be removed from the carburettor body with a screwdriver after the air chamber plug has been removed. It is unlikely that a stoppage will occur in the air bleed assembly. Clean in petrol if necessary.

Carburettor Body. It is seldom that a stoppage occurs in the body. To clean the passageways in body, remove float chamber air adjusting screw, pilot, jet, main jet, air chamber plug, air bleed assembly, and pilot hole plug screw. On earlier models a direct fit plug was fitted and is not removable. Immerse body in clean petrol and well swill, then blow through all passages and ensure they are clear. (A tyre-pump is quite useful for this purpose).

Adjusting Carburettor for Best Slow Running.

An air adjusting screw (24) and throttle stop screw (29) provide for setting the carburettor to obtain best slow running and idling speeds at small throttle openings. Larger throttle openings are governed by the proportions of the carburettor's main choke bore and main jet, and this is fixed by the makers to suit the engine requirments. The engine should be warm when adjustment is made to the carburettor, the ignition should be set for best slow running and the strangler valve kept in its fully open position throughout the adjustment procedure. With the engine at rest, first screw down the air adjusting screw as far as it will go, without strain, then unscrew it in an anti-clockwise direction approximately half a turn.

Unscrew the throttle stop screw so that the throttle valve can fully close. Next, with the throttle approximately $\frac{1}{4}$ open start the engine and throttle down to a fast idling speed. Now, first set the throttle stop screw to hold this position, and then unscrew it to allow the throttle valve to be further closed and the engine to slow down until it begins to falter, then screw the air adjusting screw in or out until the engine runs regularly and faster. Then, further unscrew the throttle stop screw until the closing of the throttle valve again makes the engine run slower and just begins to falter, then again adjust the air adjusting screw to get the best slow running. If after this second adjustment the engine is still running too fast, carry out the same procedure a third time. After each adjustment of the throttle stop screw and air adjusting screw, test that the engine does not falter or cut out when the throttle is opened fairly quickly, if the engine does falter or cut out the adjustment has been set for too slow running resulting in an over weak pilot mixture.

A worn throttle valve and spindle will cause air leaks and prevent correct slow running.

Possible Engine Trouble

(1) IF ENGINE FAILS TO START.

Check Fuel System:

The fuel supply may be turned off.
Fuel pipe may be choked or air lock.
Water or dirt in fuel.
Throttle may be too wide open.

Check Ignition System:

Perhaps the Magneto contact breaker point gaps need adjustment (.012").
Spark plug is dirty or faulty.
Spark plug point gaps need adjustment. These should be .020"—.025" gap.
Water or moisture in magneto.
Magneto contact breaker points are stuck or dirty.
High-tension lead is cracked or perished.

(2) IF ENGINE LACKS POWER OR RUNS IRREGULARLY:

Check Ignition System:

The spark plug may be dirty.
The spark plug point gaps may need adjustment.
The magneto contact points may be dirty or need adjustment.

Check Fuel System:

Perhaps the fuel pipe is partially blocked.
Perhaps the jets are partially blocked or are not correctly adjusted.

Check for Mechanical Faults:

The Valve springs may be weak or broken.
The Cylinder head gasket may be leaking.
A valve may be stuck open or badly burnt.
Ensure the valve clearance is correct.
There may be badly worn piston rings and/or cylinder bore, or badly worn valve guides.

(3) IF ENGINE STOPS SUDDENLY:

Check that there is nothing obstructing the machine if not:—

Check Fuel System:

The fuel tank may be empty. There may be water in the fuel or a Jet blocked by foreign matter.

Overheating owing to lack of oil.

Ignition System:

The Magneto contact breaker points may be stuck.

(4) IF THE ENGINE OVERHEATS:

Ignitions is probably retarded too far.

Spark plug may be dirty, or plug point gaps need adjustment.

Possibly there is insufficient or poor grade of oil.

The engine may require decarbonising.

The Valves may not be seating properly.

The engine cowling is blocked with grass or weeds.

Th Flywheel fan may be blocked with grass or weeds.

(5) CARBURATION FAULTS AND HOW TO REMEDY.

There are only two posible faults in carburation, either richness, or weakness of mixture. Before checking carburettor ensure that ignition and timing, etc., are functioning correctly.

Indications of:—

Richness.

Black smoke in exhaust.

Petrol spraying out of carburettor.

4-strokes 8-stroking.

Heavy lumpy running.

Sparking plugs sooting.

Excessive petrol consumption.

Weakness.

Engine starts and cuts out.

Spitting back in carburettor, Erratic slow running.

Sparking plugs show signs of intense overheating.

Hesitation when opening throttle.

Engine runs better if strangler valve is partially closed.

CAUSES OF FAULTY MIXTURE

Richness: Check that there is no continual flooding of float chamber caused by the float chamber valve not closing correctly, due to foreign matter on the float needle or its seating. Check that there is no accumulation of foreign matter in the petrol tank, especially in a new machine. Nearly all flooding on new machines is due to impurities (grit, fluff, etc.) in the fuel tanks so clear out the float chamber periodically until the trouble ceases. If the trouble persists, the fuel tank may be drained, swilled out, etc. On old machines, failure of the float chamber valve to close may be due to wear having taken place. Richness may be caused by a choked up air cleaner if one is fitted, and at low speeds can also be caused by incorrect adjustment of the air adjusting screw.

Weakness: Ensure that there is an ample supply of petrol reaching the carburettor float chamber, check that there is not partial or complete blockage of petrol passageway in the carburettor, the most likely place being the filter gauze, the main jet or pilot jet.

Weakness may also be caused by air leaks at the attachment joint of the carburettor to the cylinder, or inlet pipe, or at low speeds by the air adjusting screw not being correctly set. Discarding an air-cleaner, if originally fitted, may cause a weak mixture.