The

ATCO

ALL BRITISH

MOTOR MOWER

DE LUXE

Manual of Instruction

THE

MANUAL OF INSTRUCTION

IN THE

USE, CARE AND MAINTENANCE

OF THE

"ATCO" ALL-BRITISH MOTOR MOWER

CHARLES H. PUGH LTD.

Head Office and Works:

TILTON ROAD, BIRMINGHAM

Telegrams: "Accuracy, Birmingham" Telephone: Victoria 0161 (3 lines)

PLEASE HAND THIS MANUAL TO WHOEVER IS IN ACTUAL CHARGE OF THE MACHINE

TO BE KEPT IN AN EASILY ACCESSIBLE PLACE FOR READY REFERENCE.

NOTE:—

Instructions which apply only to machines fitted with the four-stroke type of engine are printed in italics. The bulk of the text applies either to all models or to those fitted with two-stroke engines only.

FOREWORD

The name "ATCO" is generally recognised as representing the highest attainment in Motor Mower production. Over seventy years' engineering experience is embodied in the machine which has earned this pre-eminent place among the essentials of modern lawn culture and maintenance. The experience gained in manufacturing and servicing-in-use well over 30,000 "ATCO" Machines has enabled us to incorporate in the "Atco Motor Mower de Luxe" all the features which tend towards perfection in motor mowing.

Like any other mechanical device, however, the machine requires care and attention in order that the best service may be obtained. Great consideration has been given throughout the design to the probability that the user would, in numerous cases, be possessed of little mechanical experience, and for this reason all minor adjustments have been made as simple as possible to carry out.

A "FOUR-STROKE" ENGINE IS FITTED ON THE 24", 30", AND 36" MODELS, AND A "TWO-STROKE" ENGINE ON THE 12", 14", 16" AND 20" MODELS; THE DIRECTIONS GIVEN FOR PREPARING THE FUELS AND LUBRICATING OILS FOR THE TWO TYPES OF ENGINES ARE OF THE UTMOST IMPORTANCE, AND SHOULD BE RIGIDLY CARRIED OUT.

Great attention should be paid to the instructions in connection with lubrication and cleanliness.

It is not suggested that the operator should undertake any major repair, but we believe that the instructions given in this manual will prove of real use, and obviate, in trivial cases, the delay and expense incurred in sending unnecessarily for our Service mechanic. In this way unnecessary expense to the owner of the machine will be obviated.

CHARLES H. PUGH, LIMITED.

IMPORTANT

We do not authorise any of our Agents or Representatives, other than Managers and Depot Managers, to advertise, incur any debts, or transact any business whatever on our account, other than the sale of goods ; nor are they authorised to give any warranty, or make any representation on our behalf other than those contained in our forms of guarantee.

THE

ATCO

GUARANTEE.

Engine No.....

As a Guarantee of the excellence of our materials and workmanship, if any defect due to faulty material or workmanship should appear within twelve months from the date of our Agent's sale, we undertake on return of the defective part to our nearest Depot, carriage paid, to make good or replace the same free of charge. All other conditions, warranties or liabilities whatsoever whether statutory or otherwise are excluded.

CHARLES H. PUGH LTD.,

Date.....

Our obligations under the Guarantee have been willingly and generously recognised, and we shall continue to conduct our business on these lines. **IT IS IMPORTANT TO MENTION, HOWEVER, THAT OVERCOMING MINOR RUNNING TROUBLES (UNLESS DUE TO DEFECTS IN MANUFACTURE) CANNOT BE INCLUDED IN FREE SERVICE UNDER GUARANTEE.** We refer chiefly to engine stoppages due to such simple causes as a dirty carburetter, choked jet, oiled-up plug, accumulation of petrol and oil in crankcase of two-stroke engine, etc. These troubles can be quickly and easily located, and remedied by careful study of the instructions given hereafter.

IF OUR SERVICE MECHANIC IS CALLED IN EXCLUSIVELY THROUGH ONE OF THE ABOVE-MENTIONED CAUSES, OR FOR SIMPLY MAKING ORDINARY RUNNING ADJUSTMENTS, THE EXPENSES OF HIS JOURNEY AND TIME MUST, OF COURSE, BE MET BY THE OWNER.

Sparking Plugs, being a speciality not of our design or manufacture, cannot be replaced free under our guarantee. Those fitted, however, are of first-class quality, and especially suited to the class of work.

SERVICE

The " Atco " Motor Mower is manufactured under ideal production principles such as are only possible where large numbers are being made. Service, in the form of repairs, under guarantee or otherwise, is also undertaken by our own Service Organisation under similar production principles, special machinery (not ordinarily available) being employed, ensuring an absolutely sound job at a reasonable cost.

Early in the history of " Atco " Motor Mowers, it was recognised that it was of paramount importance to ensure that delays in mowing arrangements during the mowing season were guarded against. For this purpose we established the " Atco " Service Organisation.

Official Service Depots are established throughout the country. The addresses of these Depots will be found on the page following. Each of these is manned by a trained " Atco " staff and equipped with the special plant and rolling stock necessary to deal with all items of Service to " Atco " Motor Mowers.

It is important that repairs are not placed in the hands of those who, though they may be competent enough in other ways, do not possess the particular experience of this class of mechanism, or have not available the special plant necessary to carry out " Atco " Service in the best possible way. The use of the " Atco " Service Organisation means absolutely satisfactory work at a reasonable price. When, therefore, Service or spare parts for a machine are required, owners should always communicate direct with their particular " Atco " Service Depot, **the address of which will be found on a label on the inside of the tool box lid of the machine.** By so doing considerable time will be saved.

Applications for Service directed to our Head Office, instead of to the Service Depot concerned, have to be relayed to the appropriate area Depot, thus wasting at least a day.

"ATCO" SERVICE DEPOTS

LONDON (A).

LONDON ROAD, SUTTON, SURREY.

'Phone : Sutton 2700-2701.

CAMBRIDGE (B).

HILLS ROAD BRIDGE.

'Phone : 227.

BIRMINGHAM (C).

WHITWORTH WORKS, TILTON ROAD.

'Phone : Victoria 0161 (3 lines).
Wires : "Accuracy, Birmingham."

NEWPORT, MON. (D).

410, CHEPSTOW ROAD.

'Phone : 3470.

ORMSKIRK, LANCS. (E).

NEW ROAD.

'Phone : 239.

SHEFFIELD (F).

ROTHERHAM ROAD, ECKINGTON.

'Phone : Eckington 73.

DARLINGTON (G).

396, NORTH ROAD.

'Phone : 2671.

EXETER (H).

ALPHINGTON.

'Phone : 3882.

READING (I).

106, BATH ROAD.

'Phone : 1653.

GLASGOW (K).

KILMARNOCK ROAD, NEWTON MEARNS, by Glasgow.

'Phone : Giffnock 582.

DUBLIN.

37, GREAT STRAND STREET.

'Phone : 43416.

BELFAST.

E. GRAHAM, LTD., PACKENHAM STREET.

'Phone : 577.

GENERAL INSTRUCTIONS FOR WORKING

LUBRICATION (see chart between pages 14 and 15).

It is important to keep all working parts properly lubricated, and the "Atco" should not be used before seeing that all parts mentioned below are properly lubricated.

Lubrication by grease gun is provided to all possible points, the remainder being effected with the oil can. Both grease gun and oil can are supplied in the tool kit, together with a tin of grease, on which instructions for filling the grease gun are given. The grease gun should be applied at regular intervals to the grease nipples at the points marked on the chart with the letters "GG." The greases we recommend are :—

PRICE'S BELMOLINE D.

TECALEMIT.

MOBILUBRICANT (Extra Soft).

The grease nipples (G.G.) will be found at the following points :—

FRONT ROLLER SHAFT.

On the front roller shaft brackets, one at each end of the shaft.

CUTTER SHAFT.

One at each end on the portion of the bearing housing for the shaft which projects inside the side frames.

CLUTCH SHAFT.

(*a*) One on the bearing housing, outside the frame (clutch end).

(*b*) One which is screwed into the clutch end of the shaft itself. The end of the grease gun should be inserted inside the plated nut on the end of shaft to reach this.

(*c* One on the bearing housing, inside the frame, at the starting socket end of shaft.

COUNTERSHAFT.

(*a*) One at each end, on the portion of the bearing housing for the shaft, which projects inside the frames.

(*b*) One which is screwed into the end of the shaft itself, where the cutter release mechanism is situated. The end of grease gun should be inserted inside the plated nut on end of shaft.

REAR ROLLER SHAFT.

One at each end, on the portion of the bearing housing for the shaft which projects inside the frames.

LUBRICATION—*contd.*

REAR ROLLERS AND THE DIFFERENTIAL GEARING.

It is very important that these parts are kept well lubricated. On revolving the rollers slowly, there will be seen on each outside roller one, and on the centre roller three, brass nicked-head screws, sunk into the level of the surface of the rear rollers. The brass screws should be removed with a screwdriver when a grease nipple will be seen underneath. These should be greased generously with the grease gun and the brass screws should then be replaced, screwing them up reasonably tight.

The oil can should be used at the points marked on the chart (see pages between 14 and 15) with the letter " O." They are :—

(1) The four driving chains—reached by removing the covers.

(2) The clutch parts, inside the clutch-cover, accessible by twisting aside the oil hole cover-springs provided.

(3) *The two oil holes in the top of the brackets supporting the shaft of the magneto retard and advance mechanism on the 24 in., 30 in., and 36 in. machines only.*

LUBRICATION OF FOUR-STROKE ENGINE

As fitted to the 36 in., 30 in., and 24 in. De Luxe Models.

The above have separate lubrication.

When the tool box lid is opened, two circular tanks are disclosed. The cap on the larger one is marked " petrol," and the cap on the smaller one is marked " oil." The oil is fed to the engine through a mechanically operated pump fitted with sight feed. Machines are sent out with the pumps set so as to give an average amount of oil. A rule, however, which must be observed to ensure efficient lubrication, is to set the pump so that there is a faint blue haze issuing from the exhaust pipe when the machine has warmed up and is settling down to its work.

To adjust the setting of the oiling system, slack off the two countersunk screws (to be found on the front vertical side of the pump casing), and move the central adjusting piece by means of the raised arrow projection thereon (not more than a division at a time) to " more " or " less " as may be required, noting the alteration in the rate of the feed drops through the view hole, or sight feed chamber, until the above-mentioned state of affairs is arrived at. Then screw up the two screws.

The number of drops per minute required will, of course, vary with the amount of work the engine is called upon to perform.

THE OIL WE, OURSELVES, USE, AND STRONGLY RECOMMEND IS :—

PRICE'S MOTORINE " B " DE LUXE.

Other suitable oils are :—

Castrol " XL."
Mobiloil " T.T."
Adcol New Process Oil " N.P.304."

THE MAGNETO DOES NOT REQUIRE GREASING OR OILING.

LUBRICATION OF TWO-STROKE ENGINE

As fitted to the 12 in., 14 in., 16 in., and 20 in. De Luxe Models.

The lubricating oil is mixed with the petrol, in the proportion of one pint of lubricating oil to two gallons of petrol. This should be measured exactly and not guessed at. Water-cooled engine oil, as used for motor car engines, is **NOT SUITABLE.**

The mixture is known as " Petroil."

The object of the engine oil is to lubricate automatically the internal working parts of the engine, and it is very important that only the best quality and right class of oil be used, and that it is mixed in the correct proportion given.

THE OIL WE, OURSELVES, USE, AND STRONGLY RECOMMEND IS :—

PRICE'S MOTORINE " B " DE LUXE.

Other suitable oils are :—

Castrol " XL."
Mobiloil " T.T."
Adcol New Process Oil " N.P. 304."
Shell-Mex (Golden).

LUBRICATION
TWO-STROKE ENGINE

The petroil mixture should not be made in the "Atco" tank but in a separate vessel, so that it can be thoroughly well mixed by shaking. It will be found convenient to keep permanently a two-gallon petrol tin in which to make the mixture. This tin will always hold a pint of oil as well as two gallons of petrol, and should be well shaken up every time before filling the "Atco" tank. **IT IS ADVISABLE TO POUR THIS MIXTURE THROUGH A STRAINER WHEN FILLING TANK.**

THE MAGNETO DOES NOT REQUIRE GREASING OR OILING.

HOW TO START THE FOUR-STROKE ENGINE

As fitted to the 36 in., 30 in., and 24 in. De Luxe Models.

(1) *Turn on petrol and oil taps.*

(2) *Open carburetter throttle lever (A) (that is the longer of the two) about half-way to the left, and leave the air lever (B), the shorter one, closed, i.e., pushed as far as possible to the right.*

(3) *Put the clutch lever (C), on the left-hand side of the top rail, in the "out" position.*

(4) *Depress the knob* (D) *on the top of the carburetter two or three times so as to flood the carburetter slightly.*

(5) *Insert the starting handle in the socket (H) and rotate until the engine is on compression stroke with the handle on the upward pull. Then depress the exhaust valve lifter (M) and move the starting handle over the compression until in a convenient position for the down stroke. Loose exhaust lifter (M). Then swing the handle through the remaining three-quarters of the turn with a really sharp snatch on the upward pull, when the engine should start.*

(6) *When the engine is started, move the air lever (B) (that is the shorter one) towards the left, gently, so as not to stop the engine before it is properly warmed. Eventually it can be pushed as far as it can go, except when the machine is required to run very slowly. Regulate the speed of the engine by opening or shutting the (longer) throttle lever (A), and for the engine to " tick over," also regulate the air lever (B).*

(7) *With the engine running nicely and the machine in position on the grass, gently open the throttle with the thumb of the right hand, retaining the grip on the guiding handle. With the left hand gently release the clutch lever (C), when the machine will move forward. Both hands can then be used to guide the machine. Adjust the throttle lever until a reasonable working speed is obtained.*

HOW TO START THE TWO-STROKE ENGINE

As fitted to the 12 in., 14 in., 16 in., and 20 in. De Luxe Models.

(1) Turn on petrol tap.

(2) Open carburetter throttle lever (A), that is the longer of the two, about half-way to the left, and leave the air lever (B), the shorter one, closed, i.e., pushed as far as possible to the right.

(3) Put the clutch lever (C), on the left-hand side of the top rail, in the " out " position.

(4) Depress the knob (D) on the top of the float chamber two or three times, so as to flood the carburetter slightly.

(5) Insert starting handle in starting socket (H) and give it a sharp turn, when the engine should start.

(6) When the engine is started, move the air lever (B) (that is the shorter one) towards the left, gently, so as not to stop the engine before it is properly warmed. Eventually it can be pushed as far as it can go, except when the machine is required to run very slowly. Regulate the speed of the engine by opening or shutting the (longer) throttle lever (A), and for the engine to " tick over," also regulate the air lever (B).

(7) With the engine running nicely, and the machine in position on the grass, gently open the throttle with the thumb of the right hand, retaining the grip of the guiding handle. With the left hand gently release the clutch lever (C), when the machine will move forward. Both hands can then be used to guide the machine. Adjust the throttle lever (A) until a reasonable working speed is obtained.

NOTE.—If for any reason the engine of the two-stroke type has been continually wound round and the engine has not started, surplus petroil will accumulate in the crankcase, and would eventually prevent the engine from starting. In such a case the crankcase should be cleared. Remove the drain plug which will be found in a lug at the bottom front of the crankcase. This can be done from the front of the machine with the box spanner provided. Then the oil will drain out and fall on to the forward scraper. After the surplus oil has drained away give several sharp turns with the starting handle, after which replace the drain plug.

ALWAYS KEEP PETROL TAP TURNED "OFF" WHEN MACHINE IS NOT IN USE, AND ALWAYS TURN THE PETROL TAP OFF BEFORE QUITE FINISHING THE WORK IN HAND. THEN LET THE ENGINE RUN UNTIL THE FLOAT CHAMBER IS EMPTY, AS THIS MAKES STARTING UP EASIER NEXT TIME THE MACHINE IS USED.

TO STOP THE MACHINE WITHOUT STOPPING THE ENGINE

Place clutch lever (C) in the "out" position and press throttle (A) and air lever (B) to the right, adjusting one with the other until the engine just "ticks over."

TO STOP THE ENGINE

Move the carburetter throttle lever (A) to the right as far as it will go.

CUTTER RELEASE MECHANISM

A CUTTER RELEASE MECHANISM to enable the machine to be propelled forward at the operator's discretion, with the cutter stationary, is embodied on the right-hand end of the front countershaft (N).

TO RELEASE CUTTER DRIVE so as to propel the machine without the cutter revolving, slacken (with the spanner provided) the large plated nut (K) on the right-hand end of the front countershaft, turning the spanner in a clockwise direction until it comes up against the stop nut (L). The machine can then be used as a roller.

CARBONISATION OF ENGINE

In all internal combustion engines, after they have been run for some time, a carbon deposit gradually forms inside the cylinder head, on the top and inside of the piston, behind the piston rings, and in the ports. This is due to no defect in the engine, but is formed by the organic matter in the lubricating oil becoming burned, due to the high temperatures of the exploded gases in the cylinder, and to dust, etc., taken in from the atmosphere through the carburetter. The deposit gradually becomes thicker and thicker, eventually causing the engine to run hot and the power to fall off. This deposit would eventually stop the engine from running altogether if left long enough. Periodically, therefore, depending among other things upon the amount and nature of the work the machine has to do, the process known as **DECARBONISING** is necessary. It is partly for this work, and for the prompt regrinding of cutters, that our Service Organisation has been established. When decarbonising is necessary, the appropriate Service Depot should be communicated with, and the work will be carried out immediately by one of our trained mechanics at a reasonable cost.

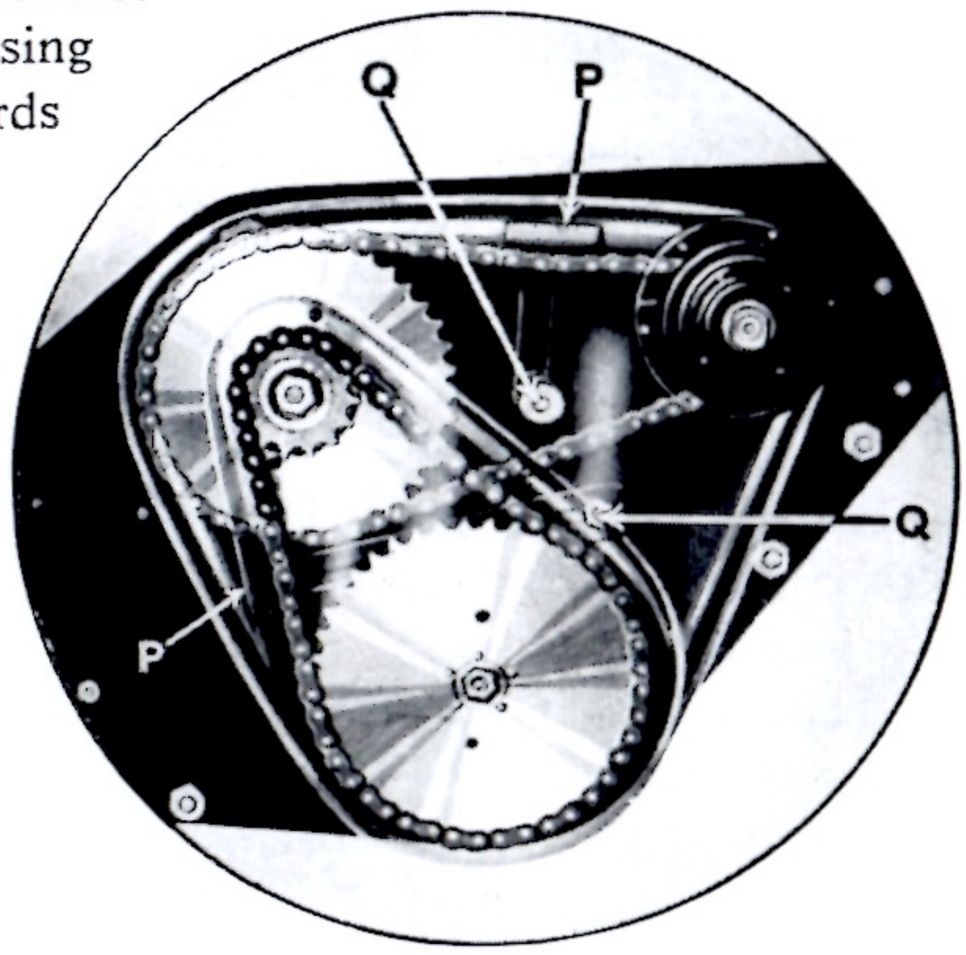
ADJUSTMENT OF CHAINS

IT IS VERY IMPORTANT THAT ALL DRIVING CHAINS BE KEPT AT THE CORRECT TENSION. IN COURSE OF TIME, WEAR TAKES PLACE, AND IF THE CHAIN BECOMES TOO LOOSE IT MAY JUMP THE TEETH OF THE SPROCKET WHEEL AND CAUSE DAMAGE. AT THE SAME TIME IF ADJUSTED TOO TIGHTLY UNDUE STRAIN IS THROWN ON ALL THE BEARINGS AND EXCESSIVE WEAR TAKES PLACE.

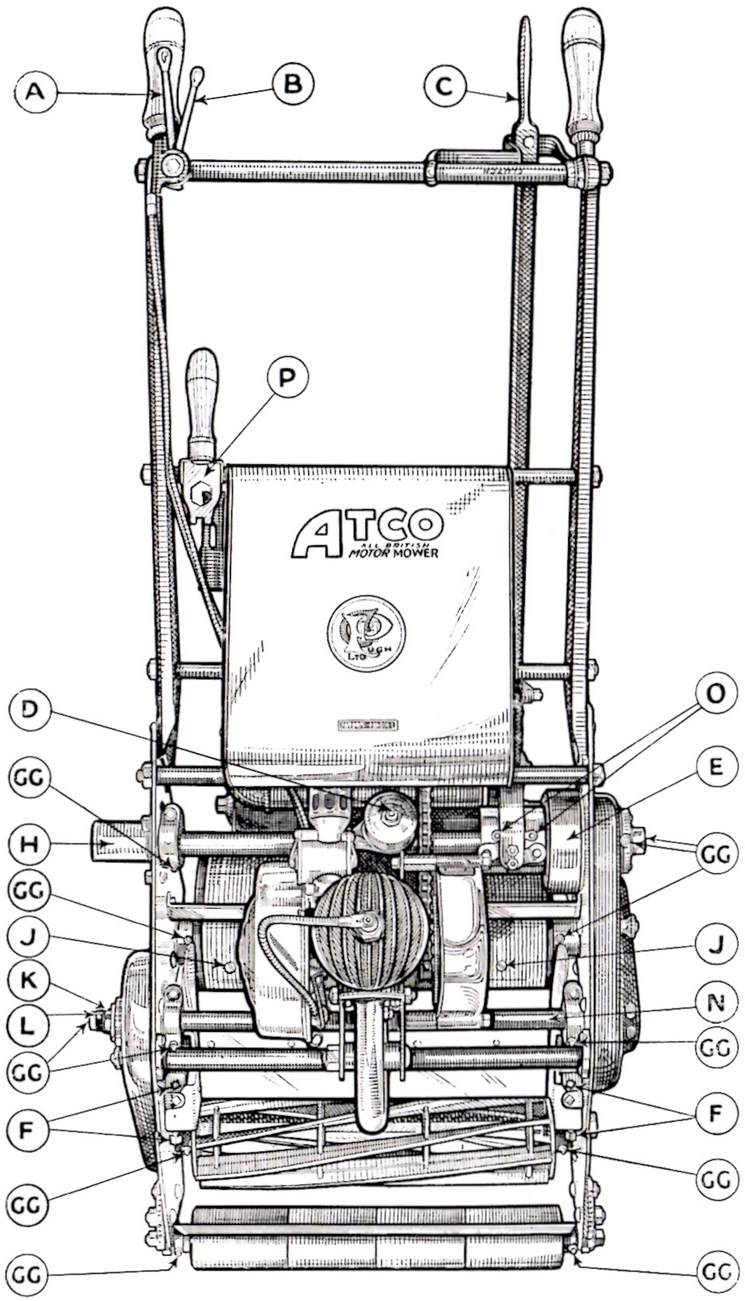
Patent tensioners (P) are provided on each chain, with the exception of the engine-to-clutch-shaft chain.

TO ADJUST THIS PARTICULAR CHAIN, first slack off the two nuts on the ends of both the front and rear engine plate bolts. Then, by using the square box spanner provided, which will fit the end of the double collared adjusting screw (to be found projecting between the engine plates at the rear, under the tool box), the whole engine will move backwards or forwards so as to alter the chain wheel centres, thus adjusting the chain simply and to a very fine adjustment in whichever way is required.

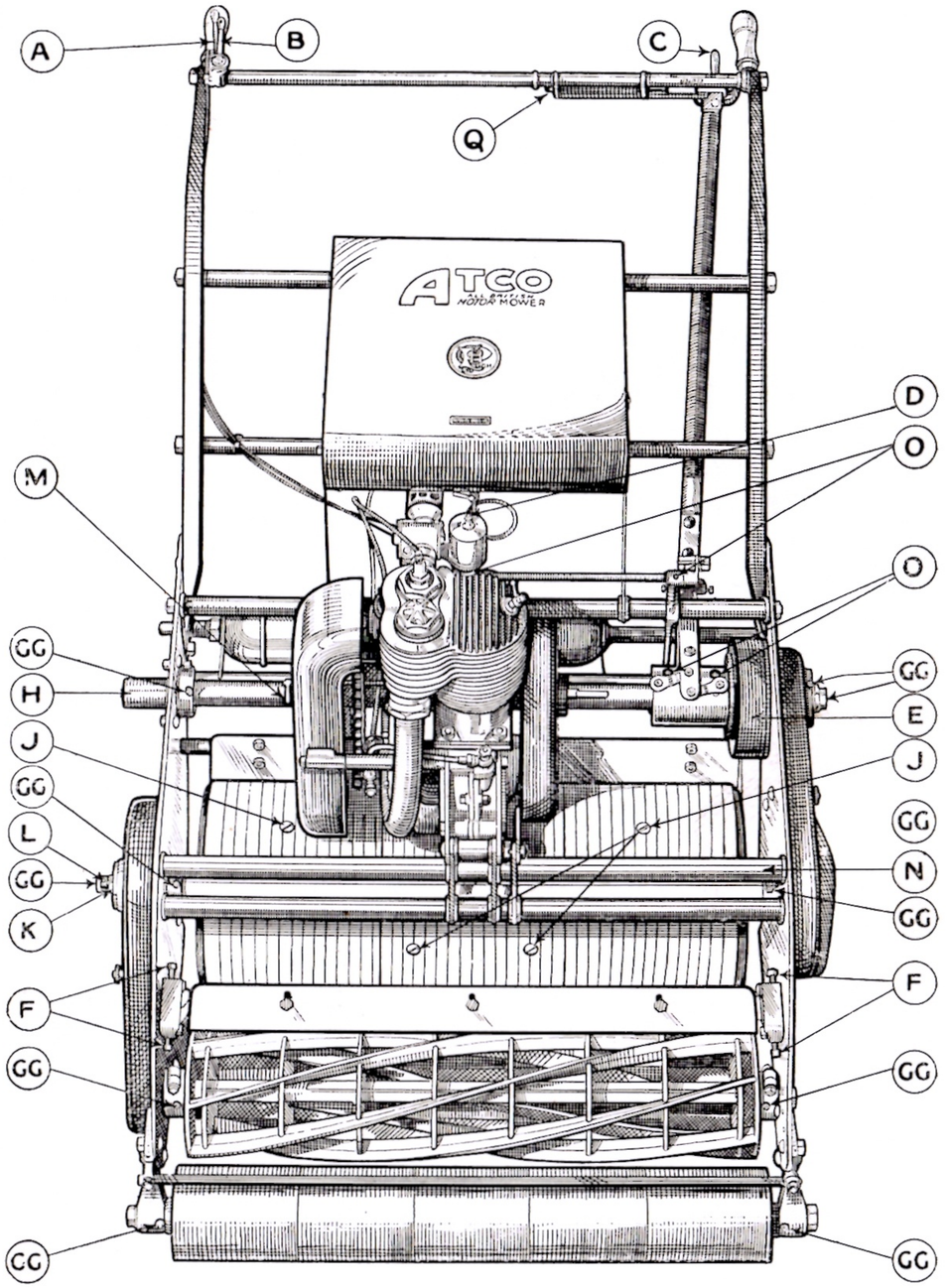
TO ADJUST ALL OTHER CHAINS, it is merely a matter of slacking off the two or nuts (Q) which hold the patent chain tensioners (P) in contact with the chains and pressing the tensioners gently inwards until the slack is taken up. The securing nuts must then be re-tightened. Care should be taken not to put the tensioners on too hard. The tensioner is correctly set when there is approximately 3/8 in. play in the chain on the opposite side from the tensioner.



Key illustration and greasing and oiling chart for machines fitted with 2-stroke and 4-stroke engines



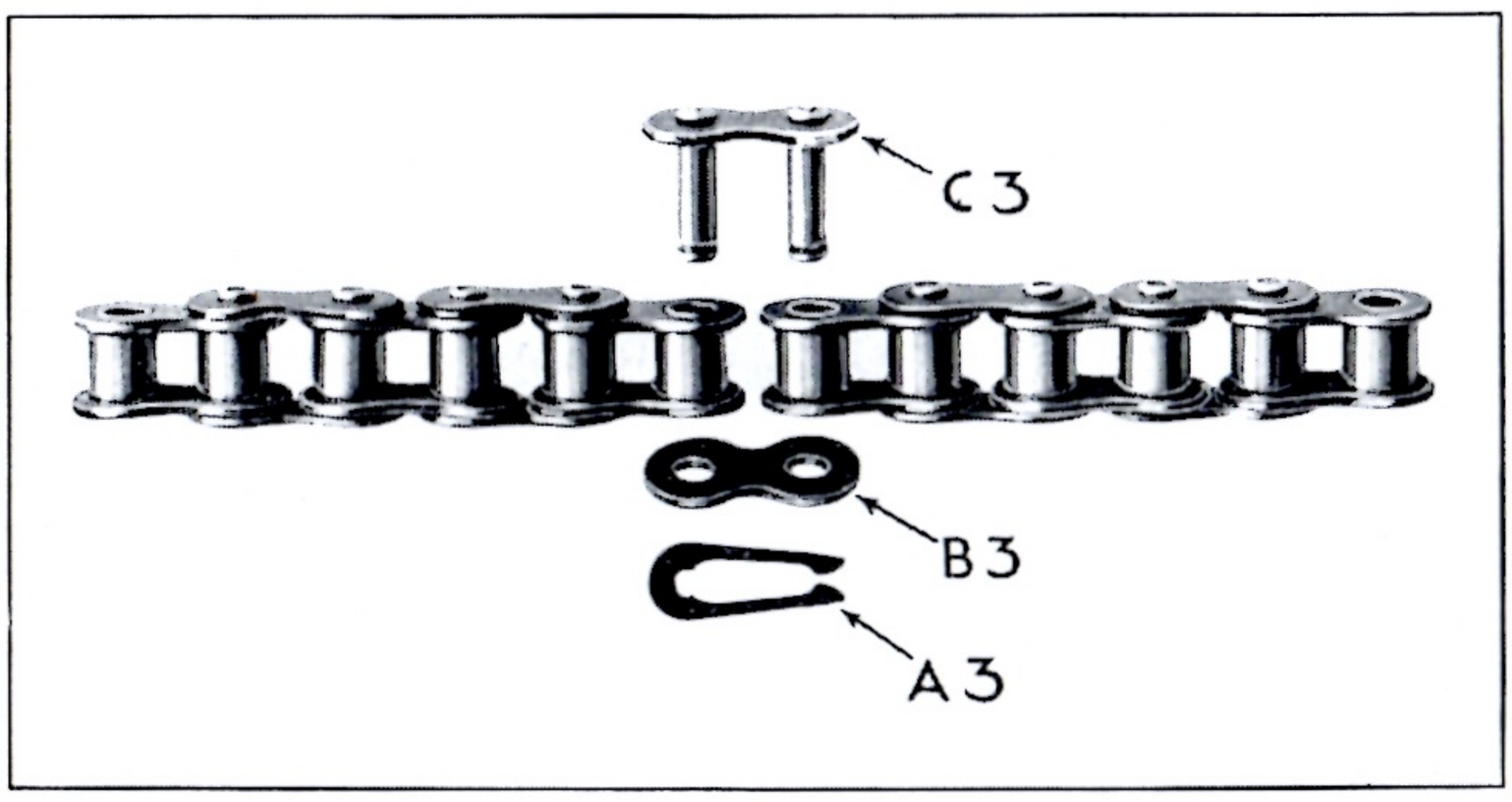
A—Throttle lever.
B—Air lever.
C—Clutch lever.
D—Tickler press button on float chamber.
E—Clutch.
F—Conveyor (and sole plate) adjusting screws.
GG—Grease gun nipples.
H—Starting socket.
J—Screw plugs to greasing tubes in rear rollers.
K—Cutter release (plated) nut.
L—Stop nut for "K."
M—Exhaust lifter lever.
N—Countershaft.
O—Oiling holes.
P—Spanner bracket for sparking plug.
Q—Adjusting screw for pneumatic regulator.



TO TIGHTEN THE MAGNETO CHAIN, *the four square-headed set screws underneath the base of the magneto must be slackened off. The magneto can then be moved bodily along in its guide until the chain is just nicely free, when the four screws must be tightened up again,* **CAREFULLY, WITHOUT USING UNDUE STRENGTH.**

All chain adjustments are extremely simple, and render it an easy matter to ensure all drives being maintained in perfect adjustment.

TO UNCOUPLE THE DRIVING CHAINS.—Turn the wheels round until the spring coupling on side of the connecting link is most accessible, then with a coin or screwdriver press hard against the split end. Thus the retaining link (A3) can be "sprung" off, after which the side plate can be removed, and the connecting link (C3) withdrawn from the other side. Connect up in the reverse order, taking care not to omit the loose plate (B3).



NOTE.—When replacing the chains be sure and fit the spring link so that it is pushed into place the reverse way to the direction of motion of the chain when working.

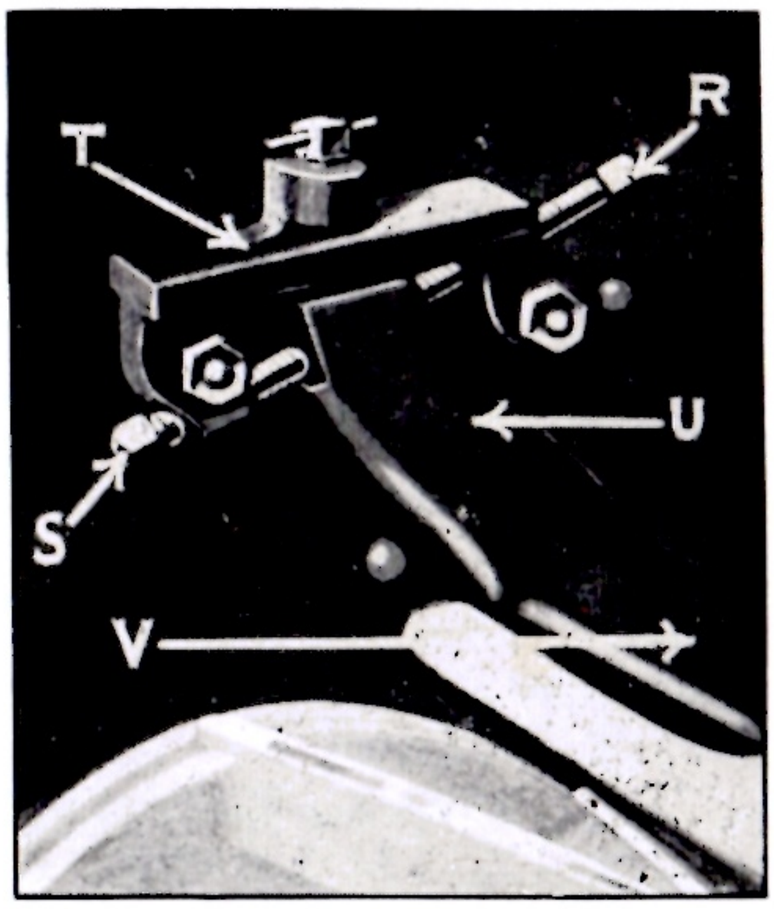
ADJUSTMENT FOR HEIGHT OF CUT.

Slack off the two bolts which hold the brackets of the front roller shaft and let the rollers come forward for a shorter cut, or move them nearer to the rear rollers for a longer cut. See that both ends of the shaft are set equally by means of the graduated scale provided.

TO SET THE SOLE PLATE CLOSER TO THE CYLINDRICAL CUTTER.

The main nuts securing the conveyor to the side frames should not be touched. An extended arm (U) will be found on the top of each side of the main conveyor casting (V), and the rectangular ends of these arms move in gaps formed in two castings (T) bolted to the inside of both main side frames.

To bring the sole plate into closer contact with the cylindrical cutter, slack back both the square-headed screws (R) which bear on the side of the rectangular ends referred to above by, say, **A QUARTER OF A TURN AT A TIME** (or less) and follow this up by screwing up the two square head bolts (S) on the opposite side of the rectangular ends, until the ends of the conveyor arms are tightly gripped between the two screws.



Revolve the cutter by hand and test, by cutting paper, that the cutter is just "brushing" the sole plate along its whole length. The revolving blades must not rub too hard on the fixed blade or undue wear will take place. The continued sharpness of the cutting cylinder and sole plate depends on the proper adjustment of one to the other.

NOTE.—On 24 in., 20 in., 16 in., 14 in., and 12 in., which are fitted with a forward delivery scraper, it is necessary to remove the scraper before adjusting the sole plate to cutters.

REGRINDING CUTTERS AND SOLE PLATE.

UNDER OUR SERVICE SCHEME, CUTTERS AND SOLE PLATE ARE RE-GROUND WITHOUT PUTTING THE MACHINES OUT OF COMMISSION EVEN FOR A DAY.

IF OWNERS WILL COMMUNICATE WITH THEIR SERVICE DEPOT, A MECHANIC WILL BE SENT PROMPTLY WITH AN EXCHANGE SET OF CUTTERS AND SOLE PLATE.

THESE HE WILL FIT TO THE MACHINE, TAKING AWAY THE OLD ONES WITH HIM, WHICH WILL BE RECONDITIONED BY US FOR FURTHER USE IN ANOTHER MACHINE. IN THIS WAY THE USUAL DELAY WHEN CUTTERS REQUIRE REGRINDING DURING THE MOWING SEASON IS AVOIDED.

TO ADJUST THE CLUTCH

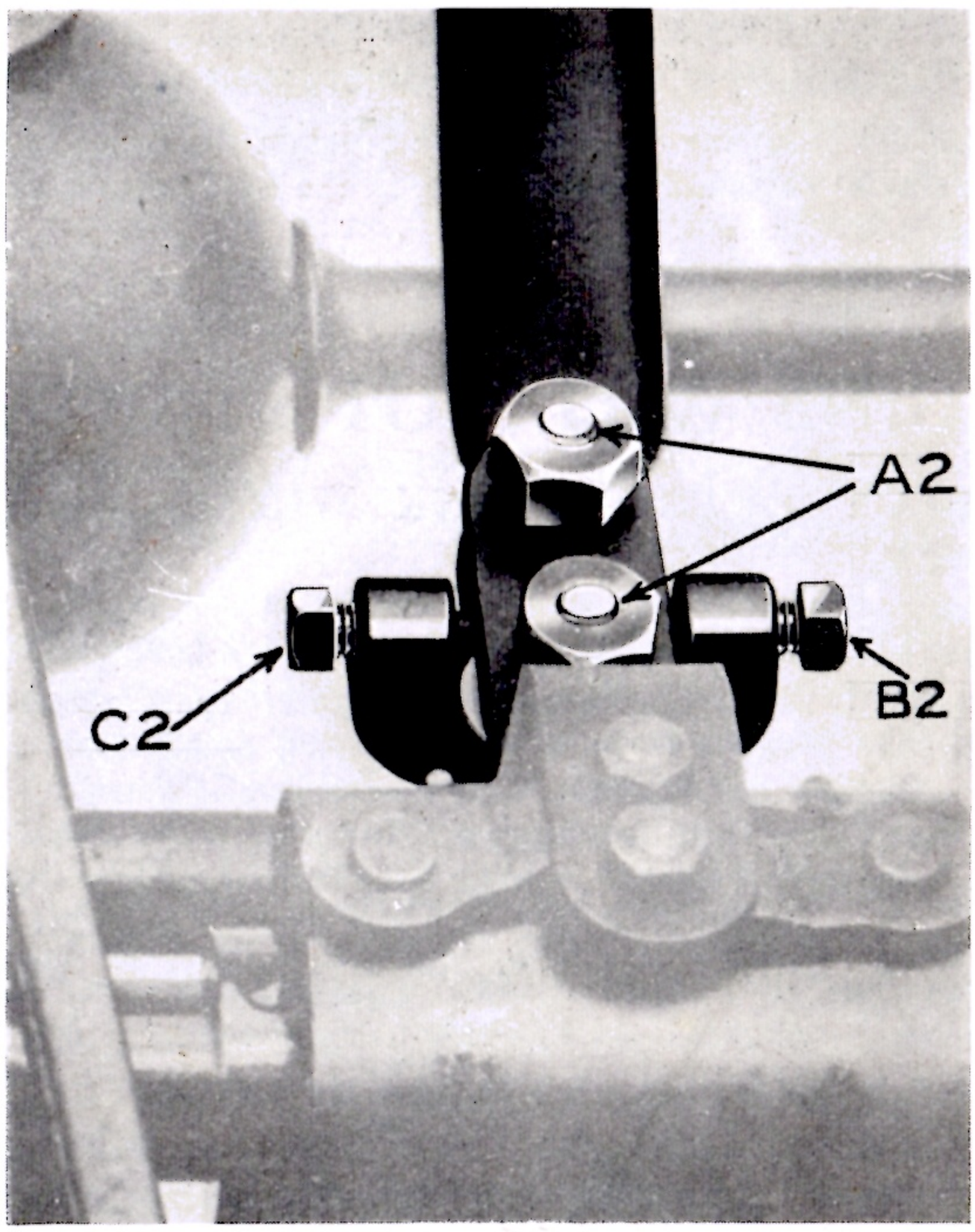
If the clutch slips it may be due to either :—

(*a*) The clutch needs "setting up."

(*b*) *The clutch lever pneumatic regulator, which is only fitted to the 36 in., 30 in., and 24 in. machines, being set too closely.*

TO MAKE THE CLUTCH GRIP MORE

Loosen the two hexagon nuts (A2) and then slack back the square-headed screw (C2) about half a turn. Then tighten up the square-headed screw (B2) and hexagon nuts (A2) and try the machine. If not adjusted sufficiently repeat the operation.



If, however, **YOU OVER-ADJUST THE CLUTCH SO THAT A "FREE ENGINE" IS NOT OBTAINED** when the clutch lever is in the "out" position, reverse the operation, i.e., slack back screw (B2) and tighten up screw (C2), finally ocking up nuts (A2).

NOTE.—*If it is desired to weaken the action of the pneumatic Regulator, this can be done by unscrewing the cheese-headed screw (Q) with spring pointer attached, which will be found at the end of the main barrel of the fitting.*

SHOULD ENGINE DIFFICULTIES ARISE—

In ordinary use the only difficulties that are likely to occur are :—

(*a*) Engine will not start.

(*b*) Engine starts but runs badly, missing fire, and spitting back through the carburetter, etc.

(*c*) Engine stops suddenly for no apparent reason.

In the following paragraphs we tabulate the order in which search should be made for the cause, in the event of one of these troubles occurring :—

ENGINE WILL NOT START

INSPECT PETROL TANK WHICH MAY BE EMPTY

SEE THAT PETROL TAP IS TURNED ON

and flood the carburetter slightly (particularly when the weather is cold) by depressing small knob (D) on the top of the float chamber—holding it down for a few seconds then releasing it. In some cases, particularly in cold weather, it may be advantageous to continue pressing the knob (D) for a few seconds after the engine has started ; this latter hint only applies to two-stroke engines.

TEST FOR DEFECTIVE PLUG

Unscrew sparking plug, and, having attached the cable again, lay same on top of cylinder, taking care that the brass piece in end of cable is not touching cylinder. Revolve engine sharply by means of starting handle, when there should be a series of strong bright sparks pass from the tip of the centre rod of the plug to the outside point, every time that the engine is turned. If there is not, or if the spark is very irregular or weak in action,

the points need cleaning. To do this, unscrew the central hexagonal hollow-nut portion from the main body of the plug—making use of the spanner bracket (P) fitted on the handle rail of the machine for the purpose—when the central rod (or electrode) of the plug can be withdrawn.

The insulation should be wiped with a rag soaked in petrol, but should not be scraped unless the carbon is caked hard, and then only with great care to avoid damaging the insulator. Metal parts can either be wiped with a rag or soaked in petrol, washed in paraffin, or scraped.

After cleaning, and before screwing the plug together again, the surface of the points should be rubbed over with a piece of smooth emery paper, and the inside of the main body of the plug should be scraped and cleaned out. See that there is no grit in the joint between the insulator and the metal body, as otherwise it will be difficult to make the plug gastight. Reassemble the plug, adjust the points as described in the following paragraph, replace plug and connect up cable.

ENSURE THAT POINTS OF PLUG ARE CORRECT DISTANCE APART

If the points are set too close together, or too far apart, the plug will not work well. A small spanner is provided in the tool kit for adjusting the magneto contact maker points, and rivetted on to this spanner will be found—in the case of a two-stroke engine spanner, one, and in the case of a four-stroke engine spanner, two—" feelers."

The distance apart of the plug points should be adjusted, so that the feeler in the case of two-stroke engines, and the feeler marked " plug points " in the case of four-stroke engines, passes just freely between the points.

This setting can readily be accomplished with a pair of sharp-nosed pliers, by bending the side electrode towards or away from the central pin. The spark gap tends to alter in course of time, so the necessary testing and adjustment should periodically be made.

DRAIN THE CRANKCASE (IF A TWO-STROKE ENGINE) AS THIS MAY CONTAIN LIQUID PETROL AND LUBRICATING OIL

Unscrew the drain plug on the bottom front of the crankcase, and drain out any liquid from the crankcase. Turn the engine round half-a-dozen times and replace screw.

NOTE.—It is quite a good plan to drain the crankcase periodically whether trouble is experienced or not.

INSPECT MAGNETO POINTS FOR DIRT

On the correct setting of these points very largely depends the proper running of the engine, and, when once adjusted, they should last a very long time without being readjusted. They must, however, be kept clean.

The correct distance apart of the contact points, when fully opened, should be such that the feeler gauge, rivetted on to the small spanner provided in the tool kit for the purpose of adjusting and locking the contact points, will just slide between them.

IT IS A BIG MISTAKE AND A VERY EXPENSIVE ONE TO CLEAN THESE POINTS BY FILING.

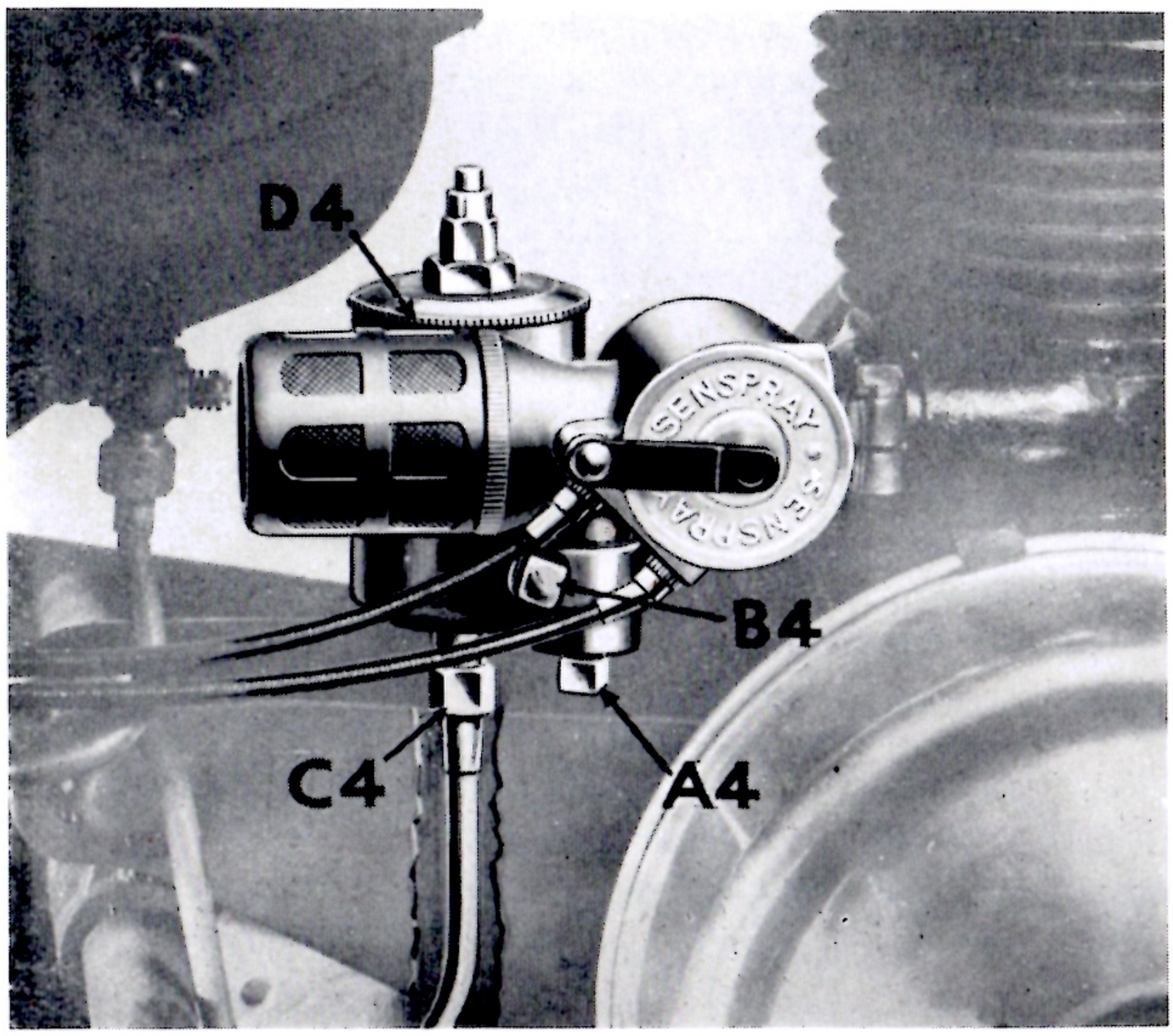
It is often quite sufficient to draw a piece of paper between them two or three times when the points are together. If this is not sufficient, use a piece of the finest possible grade emery paper, reversing the paper so that both points get brightened up. Then carefully wipe with a bit of clean rag. Oil must on no account be allowed in the contact breaker box of either make of magneto fitted.

INSPECT PETROL PIPE FOR STOPPAGE

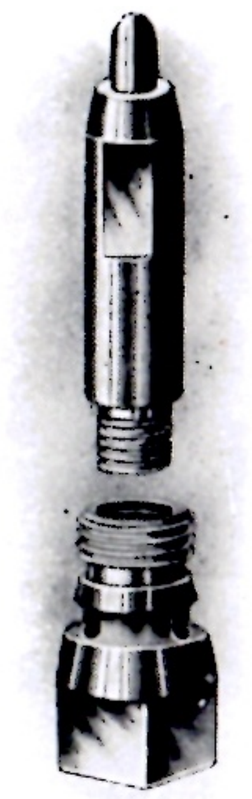
Having first turned off the petrol remove the petrol pipe and blow through it to see that it is clear.

TEST FOR STOPPED-UP JET

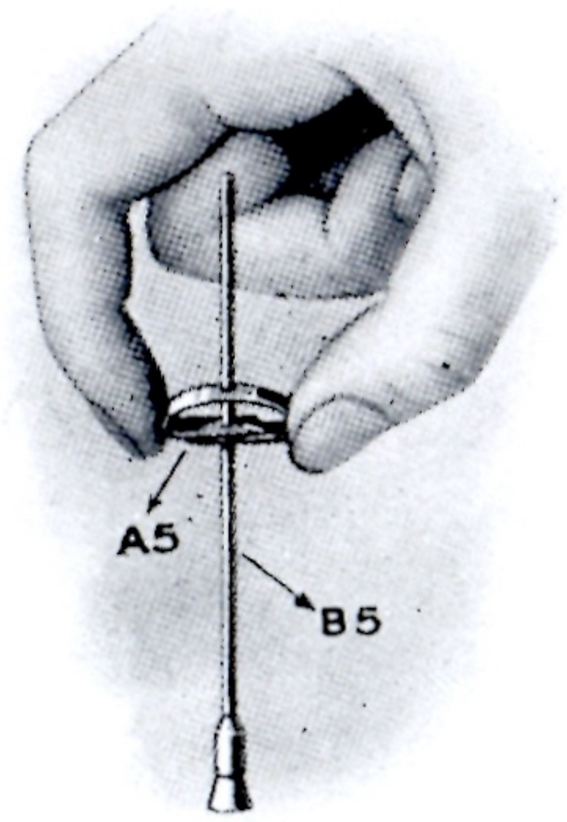
Having turned off petrol, unscrew jet holder (A4) at base of float chamber arm. This withdraws the jet with it, which may then be unscrewed from holder (see illustration). Examine the inside of both jet and holder for any small particle of foreign matter and remove same.



If there is dirt inside the jet it will be advisable to examine and clean out the inside of the float chamber at the same time. Unscrew petrol pipe union nut (C4) and remove float chamber cap (D4). Gently pinch together the ends of the valve spring clip (A5) as illustrated (below), when it may easily be drawn off the valve stem. The valve (B5) may then be slipped out downwards and the float and support for same lifted out, when any dirt in the float chamber can be removed. Push a pipe cleaner, or similar article, from end to end of the petrol hole which runs the length of the float chamber arm, from the taper seating of the jet holder into the float chamber. When replacing, great care must be taken to see that the valve clip (A5) registers properly in the nick cut round the stem of the valve to receive it, as this fixes the petrol level at the correct height.



NOTE.—On some engines, the clip (A5) will be found fitted in the reverse position to the one illustrated. This is because in these cases the position has been found to give the most satisfactory results during test.



If necessary, the float chamber can be detached from the body of the carburetter by removing bolt (B4) when the float chamber may be withdrawn downwards. The bolt (B4) must be taken right out, not merely slackened, before the float chamber can be removed.

EXAMINE THE TIMING OF THE ENGINE

This may be found to be incorrect, due, in the case of the two-stroke engine, to the fly-wheel magneto having slipped round on its shaft, or, in the case of the four-stroke engine, to the magneto sprocket having slipped round on the armature spindle. To check the timing proceed as shown in the following paragraphs.

TIMING OF THE TWO-STROKE ENGINE

AS FITTED TO THE 12″, 14″, 16″ AND 20″ "ATCO DE LUXE" MACHINES

The satisfactory working of the engine depends primarily on the correct timing of the magneto, which, for purposes of power lawn mowing, has proved to be as follows :—

The contact points of the make-and-break mechanism should just be opening when the top of the piston has reached a point which is 3/32 in. to 1/8 in. from the top of the upward or compression stroke.

The back (or stationary plate) of the magneto is anchored by a metal clip to the crankcase when the machines are assembled, in such a position that if the piston is brought to the top of its stroke, the contact maker points will open at the correct time **ONLY** when the **ARROW** on the brass arm of the rotating flywheel points vertically upwards. If it does not, **THE HEXAGON NUT SECURING THE FLYWHEEL TO THE ENGINE SHAFT MUST BE SLACKENED BACK AND THE FLYWHEEL TURNED ROUND GENTLY ON THE ENGINE SHAFT UNTIL IT DOES POINT AS DESCRIBED,** when the nut must be well tightened up by hitting the end of the spanner with a hammer. During this operation the piston must be kept on the top of its stroke, as first mentioned.

NOTE.—To ascertain when the piston is at the top of its stroke, remove the sparking plug, and insert a pencil, or straight stiff piece of wire, down the sparking plug hole on top of the cylinder and "feel" for the top of the piston, rotating the engine slowly at the same time with the other hand.

ALTERNATIVELY, by looking closely at the outside end of the engine shaft in the centre of the nut which fastens the flywheel to the shaft, it will be seen that this is marked with a nick or sawgate. When this mark is vertical, the piston is on top of its stroke, and when *both* this mark on the engine shaft *and* the arrow on the brass flywheel are pointing vertically upwards, the timing is correct.

TIMING OF THE FOUR-STROKE ENGINE

AS FITTED TO THE 24″, 30″ AND 36″ "ATCO DE LUXE" MACHINES.

The satisfactory working of a four-stroke engine depends not only on the timing of the magneto, but on the correct timing of the valves. The valve timing, however, is entirely dependent on the proper construction of certain internal parts of the engine, which are only accessible when the crankcase is dismantled, and which cannot, in fact, get out of adjustment when once assembled. It is not, therefore, necessary to give detailed instructions for timing the valves, and all that need be noted is that the inlet valve begins to open when the piston is 1/16 in. from the top dead centre before starting the suction stroke. The spark which is produced just as the contact maker points start to open, must be timed to occur when the piston is 1/4 in. from the top of the **COMPRESSION** *stroke, which is the upward stroke made by the piston when the inlet valve has shut. If the timing of the spark becomes upset, attention should first be given to the setting of the* **AUTOMATIC ADVANCE AND RETARD** *mechanism attached to the clutch lever adjusting bracket.*

The setting is correct if, **WITH THE CLUTCH LEVER AT THE "OUT" POSITION,** *the line, marked on the fixed (plated) outer portion of the magneto contact maker box, is at least 5/16 in. away from the one marked on the clip part which makes the angular movement when the clutch lever is moved. It should then be found that the "points" break on the piston top dead centre, with the clutch lever at the* **OUT** *position, and the piston will be 1/4 in.* **BEFORE** *top dead centre, when the clutch lever is at the* **IN** *position. If this is found not to be the case, it is probable that the magneto driving wheel has slipped round accidentally, so as to upset the timing, and the small hexagon headed screw, which secures the sprocket to the magneto shaft, should be slackened off, and the sprocket tapped at the back until it is quite free on the shaft. Then, having removed the cap from the contact maker box at the other end of the armature, turn the armature until the points are just starting to open. See that the piston is in the position described above. This is best done by removing the small priming cock from the top of the cylinder, and*

inserting a piece of stiff wire down the hole, rotating the engine **SLOWLY** *with the right hand, till the top of the piston, when in its highest position, can be felt. A mark can then be made on the wire level with the cylinder face, another 1/4 in. below it, and the piston placed in the correct position as indicated.*

NOTE.—*Great care must be taken not to nip off the end of the feeler wire, through the up-coming piston trapping the wire against the edge of the port, which may happen if the engine is rotated too quickly.*

All that remains to be done now is to tap the sprocket back gently on to its conical bearing, and firmly tighten up the screw which secures it to the magneto.

It is advisable to check the adjustment over again when everything is tightened up.

SHOULD ENGINE RUN BADLY, MISS FIRE, ETC.

This may be caused by :—

(*a*) Partially stopped jet or petrol pipe (see pages 20 and 21),

(*b*) Dirty or defective plug, or plug points not set correct distance apart (see pages 18 and 19).

(*c*) Dirty magneto contact points (see page 20).

(*d*) Water in petrol. This must be got rid of immediately.

(*e*) With "petroil" fuel, the mixture may not have been correctly made, or have been recently well shaken up (see pages 9 and 10).

(*f*) Air lever may be too far open, particularly on a cold day or before the engine has warmed up (see Note 6 on page 11).

(*g*) Piston rings may want renewing (see Carbonisation, page 13).

(*h*) Cable from magneto to sparking plug may be loosely connected or have developed a "short circuit" from such a cause as the insulation having been burnt off through the cable touching the hot cylinder.

(*i*) Engine timing may have altered (see pages 22, 23, 24).

ENGINE STOPS SUDDENLY.

This may be due to any of the causes given in "Engine will not start," or "Engine runs badly" hints (pages 18 and 25), and if the cause is not at once obvious, a methodical examination, as detailed previously, should not fail to reveal the cause of the trouble.

CLEANING MACHINE AFTER USE

ALWAYS CLEAN THE MACHINE AFTER USE.

FIRST TURN OFF PETROIL OR PETROL; THEN, AFTER BRUSHING ALL GRASS AND DIRT OFF THE MACHINE AND CUTTERS (KEEP A CLEAN PAINT BRUSH FOR THIS PURPOSE), CAREFULLY WIPE DOWN WITH A CLEAN RAG. THE ENGINE, CUTTERS AND BRIGHT PARTS SHOULD, AFTER DUSTING AND CLEANING, BE WIPED OVER WITH AN OILY RAG.

DON'TS

DON'T send for the Service mechanic until you have made sure that the stoppage is not due to some simple trouble which can be overcome by the man in charge.

DON'T forget to lubricate working parts, as described on pages 7 and 8 every day before starting work, or as may be found necessary. (See chart between pages 14 and 15.)

DON'T make the **PETROIL** mixture in the "Atco" tank, but thoroughly mix it first (see pages 9 and 10) in a separate tin.

DON'T leave the engine running idle, with the clutch out, any longer than can be helped. The "Atco" clutch is designed specially to prevent end-thrust on the shaft when the clutch is disengaged, yet the clutch springs must necessarily be compressed, which means that additional pressure is put on the ball races. This, if continued unduly, results in warming up and ultimately in overheating, involving unnecessary wear and expense. Close the throttle well down when the engine is run in the free position.

DON'T run with the chains either too tight or too loose.

DON'T forget to turn the petrol tap "off" when the work is done.

DON'T store the machine too near a stove, or in a damp place, or leave it in the rain continuously. It will repay careful handling.

DON'T **"RACE" THE ENGINE AND THE MACHINE UNDER ANY CIRCUMSTANCES. NOTHING IS GAINED BY DRIVING AT TOO GREAT A SPEED, ESPECIALLY OVER ROUGH GROUND. THE "ATCO" IS DESIGNED TO RUN AT THE MOST ECONOMICAL SPEED CONSISTENT WITH PERFECT LAWN MOWING.**

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