

The Dennis Motor Mower

INTRODUCTION

This manual has been prepared to enable the user to carry out all necessary maintenance and repair operations on the Dennis Motor Mower.

Care taken in following out these instructions, as well as regularity in their application, will ensure that the best results are obtained together with long life and economical operation.

These instructions are substantially the same for both the open and enclosed types of mower.

In cases of difficulty, or if any further information and advice is required, our Service Department will be pleased to answer any enquiries.

All enquiries should state the number of the mower and engine.

DESCRIPTION (Fig. 1).—The Dennis motor mower is designed to give maximum efficiency with care of operation. It is a rigid mechanical structure and has been carefully built to give full adhesion between the driving rollers and the ground. Adequate power is supplied by the Dennis single-cylinder side-valve engine driving the rollers and cutters through twin clutches, thus giving independent control of the cutting cylinder.

The driving and cutting controls are mounted on the left-hand side of the handlebar, and the throttle control on the right.

A tow-bar for a trailer seat is provided at the rear of the mower.

The information given in this manual is designed to enable the user to maintain the efficiency of the Dennis motor mower by regular attention and lubrication.

FRAME.—This is constructed from deep section rigid side plates suitably stayed with steel cross-members.

A tow-bar is provided at the rear, and the handle bar risers are diagonally braced. The handlebar itself is chromium plated.

ENGINE (Figs. 4, 5 & 6).—The Dennis power unit is a single cylinder, air-cooled, four stroke, side-valve petrol engine of 85 mm. x 105 mm. bore and stroke, developing up to 7 b.h.p. The cylinder is finned and cowled to pass a steady stream of cool air from the fan.

It has a cast iron piston, and a counter-balanced crankshaft made from a solid steel stamping.

The large diameter big-end and main bearings are specially designed for hard continuous service.

The side valves have enclosed springs and

tappets, and the clearance can be adjusted by means of nuts on the valve stems.

Lubricating oil is contained in a separate chamber cast integral with the crankcase. An oil pump driven by an intermediate wheel in the timing gear case supplies oil under pressure to the main and big-end bearings. Excess oil is returned from the crankcase to the oil chamber by the scavenge wheel of the pump. The oil chamber is provided with a dip-stick and a drain plug, to which is attached a gauze filter.

Cooling is by a belt-driven fan running on ball bearings; the fan is adjustable for belt tension.

The carburettor is of the single lever type. An air valve and tickler, together with an efficient air cleaner, are fitted.

Ignition is provided by a gear-driven high tension magneto, with an impulse starter for easy starting.

STARTING AND RUNNING THE ENGINE.—Fill the petrol tank (1½ galls.). Turn on the tap of the petrol filter. Remove the cap of the oil container with the dip-stick and fill up with Shell X100 S.A.E. 50 oil to within ¼ in. of the "full" mark on the dip-stick. The capacity of the oil container is 5 pints. When the engine is warmed up the oil will expand and reach the "full" mark. On no account run the engine when the oil level is at, or below, the DANGER mark on the dip-stick. Now lightly flood the carburettor by means of the tickler and close the air valve. Insert the starting handle in the lower position, and give the engine two or three complete turns. Open the throttle lever approximately ¼ in., and pull up the starting handle against compression.

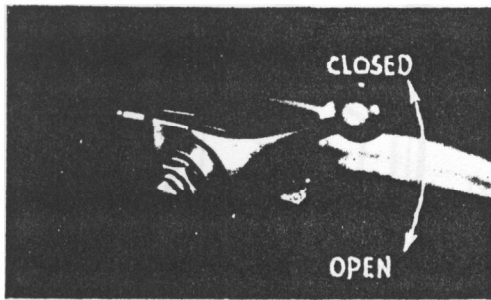


Fig. 2. View of Throttle

Do not swing the handle downwards. Open the air valve as soon as the engine fires. When the engine is running, open the throttle slightly.

If the engine fails to start because of over-flooding, open the compression tap in the head of the cylinder and give the engine two or three sharp turns. This will blow the petrol out of the cylinder. Close the compression tap and turn the engine again, when it should start.

To start the engine when hot, engage the starting handle in the forward starting position, lift the exhaust valve by means of the rod, and give two or three sharp turns of the handle. Do not use the air valve when starting up a hot engine, but a wider throttle setting may be desirable.

MAINTENANCE OF ENGINE

Petrol Filter.—This should be cleaned periodically. Undo the duct screw holding the float chamber and remove the mixing

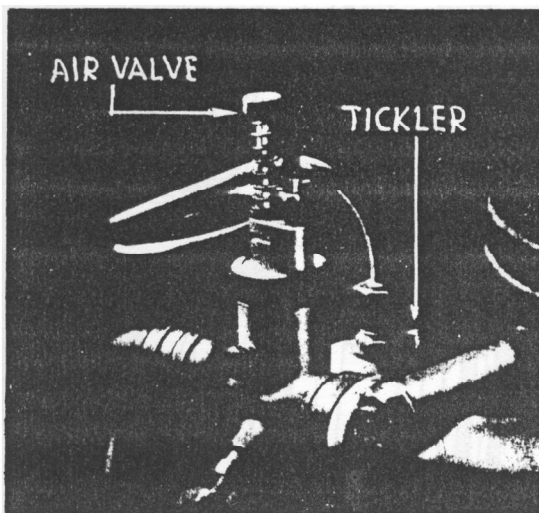


Fig. 3. View of Air Valve and Ticker

chamber. Remove the jet seating adaptor in which the filter is situated. Clean and replace the filter, and see that the petrol pipe is clear. Later models are also fitted with a bowl filter.

Air Cleaner.—It is most important that the air cleaner is periodically cleaned. Remove the cleaner by undoing the clip securing it to the air inlet pipe. Unscrew the wing nut on the top of the casing and remove the element. Thoroughly clean the element in paraffin. Remove the old oil from the container and refill with clean oil up to the level of the mark stamped on the outside of the container. Do not exceed this mark. Reassemble and replace the filter on the inlet pipe.

Fan Belt.—The fan belt should be kept reasonably tight. If it is correctly adjusted, it should be possible to pull or push with the finger, one side of the belt, one inch out of the straight line. To adjust the belt loosen the two setscrews on the fan spindle locking plate (4), Fig. 4. Using a hammer and punch, strike heavily on the bent portion of the fan spindle (3) to loosen it in its tapered socket. Then insert the special "C" wrench between the locking plate and the engine cylinder, so that it engages with slots on the fan spindle, and turn the spindle upwards. Tighten up the locking screws after adjustment.

Magneto.—This requires no attention beyond keeping the exterior clean and free from dirt and moisture.

Spark Plug.—Clean the plug with a wire brush when necessary and see that the spark gap is within 0.018 to 0.025 in.

Fig. 4. Sectional View of the Engine

1. Setscrews for fan spindle locking plate.
2. Nipple for fan bearing lubrication.
3. Fan spindle.
4. Fan spindle locking plate.
5. Fan pulley.
6. Fan.
7. Compression tap.
8. Fan cowling.
9. Fan cowling retaining nuts.
10. Spark plug.
11. Cylinder.
12. Combustion chamber.
13. Piston.
14. Cooling fins.
15. Gudgeon pin.
16. Connecting rod.
17. Exhaust valve lifter.
18. Valve tappets.
- 19 & 21. Starting dogs.
20. Camshaft.
22. Main bearing.
23. Crankcase.
24. Big-end bearing.
25. Crankshaft.
26. Flywheel and Fan belt pulley.

• See last page for details of paper element type.

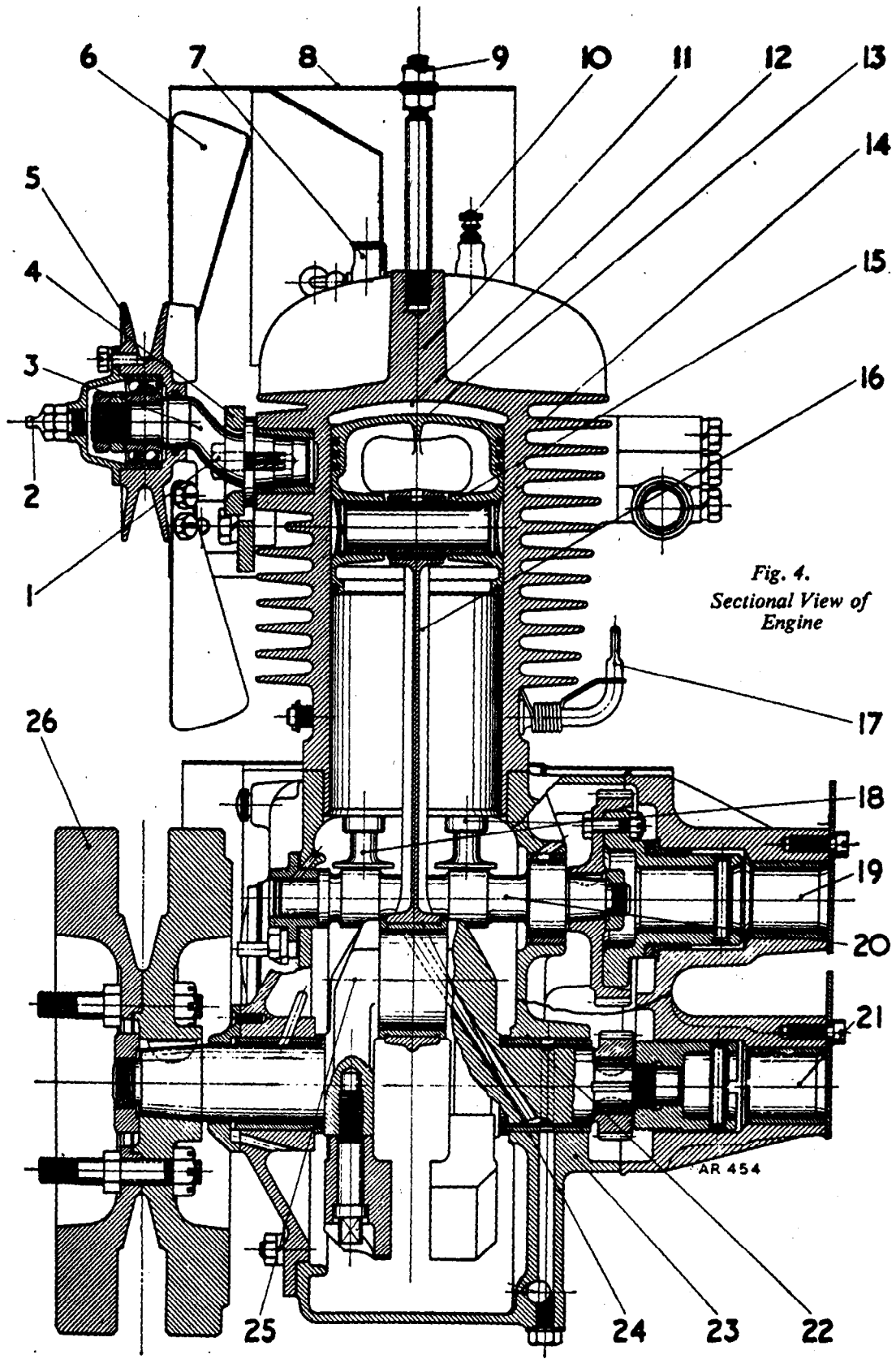


Fig. 4.
Sectional View of
Engine

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DECARBONISATION (see Figs. 4, 5 and 6).—When decarbonisation becomes necessary, the cylinder (11) will have to be detached from the crankcase.

(1) Turn off the petrol and remove the flexible feed pipe to the carburettor.

(2) Remove the fan cowling (8).

(3) Unscrew the two bolts (1) behind the fan attaching it to the cylinder and remove the fan and bolts.

(4) Detach the air cleaner from the air inlet pipe and remove the carburettor and inlet assembly.

(5) Remove the exhaust pipe and silencer assembly.

(6) Undo the nut (32) attaching the valve tappet cover (31) to the cylinder block. Remove the cover and using the spanners provided, unscrew the collars on each valve stem. Then with the valve caps removed the valves and springs can be withdrawn.

(7) Unscrew the three nuts (41) attaching the cylinder to the crankcase, when the cylinder can be lifted off exposing the piston (13).

(8) Scrape the carbon away with a suitable tool, taking care not to mark or scratch the machined surface of the piston head.

(9) The valve seats should now be ground in using carborundum and oil mixed to a paste. With a brace, carefully grind the valve in to its seating. See that the brace is held perpendicular and not thrusting sideways, otherwise the seatings will be made oval. Clean the valves and the seatings, and see that they are dry.

(10) Refit the valves in the cylinder before replacing the cylinder on the crankcase.

(11) Having assembled the cylinder and valves check as follows for valve timing: The inlet valve should open $\frac{3}{32}$ in. before top dead centre, and close $\frac{9}{16}$ in., measured on the piston travel, up the compression stroke. Firing point for ignition is top dead centre. The valve tappet clearances obtained by means of the adjusting nut provided are .004 in. for the inlet valve, and .006 in. for the exhaust valve.

(12) Unscrew the drain plug (36) at the bottom of the sump, clean the gauze strainer (21 Fig. 7) and drain off the old oil. Replace the plug and fill up with clean oil, as already instructed under "STARTING THE ENGINE".

TRANSMISSION.—A universal joint on an extension of the crankshaft (there are three such joints in the case of the 36 in. mower) transmits power from the engine to the primary shaft, which in turn drives the cutter clutch. A duplex chain from the primary shaft running in an aluminium oil bath, drives the roller clutch. Each clutch shaft runs on two bearings. A third bearing is used for declutching.

Fabric-lined cone clutches are operated by levers, working through cams. Power is delivered to the cutter and propelling roller, by enclosed roller chains, the tension of which can be altered by adjustable jockey wheels on roller bearings.

DRIVING CHAINS (Fig. 8).—The driving chains must not be allowed to develop excessive slackness. To adjust the chains, slacken off the nut on the inner end of the jockey pulley spindle (48 & 49), now slide the spindle down its slot until the driving chain is steady but not too tight. Retighten the nut on the spindle. If all adjustment has been taken up, remove a half link from the chains, and readjust as described above.

DRIVING ROLLER.—The driving roller is made in three sections, the drive being delivered to the centre section, to which the side rollers are connected by a differential gear. This enables the mower to be easily steered, and obviates skidding on the turf.

NOTE: Driving rollers should be frequently lubricated by the nipples at each end and also on non oil bath type machines through the three holes (closed by setscrews) in the centre roller.

OIL BATH TYPE.—Any mower after No. 7000 may be fitted with an oil bath type driving roller in which the differential gearing runs in oil and is totally enclosed. Wear and maintenance are thus substantially reduced. The oil bath contains $1\frac{1}{2}$ pints of lubricating oil and every 6 months the old oil should be drained off through the single plug hole provided and the bath replenished with a measured quantity ($1\frac{1}{2}$ pints) of clean new engine oil.

DEFLECTOR PLATE.—It is important to see that the deflector plate is close to the cutter to ensure the grass being thrown into the box. If it is desired to deposit the grass on the lawn instead of the box, remove the standard deflector by unscrewing the bolts

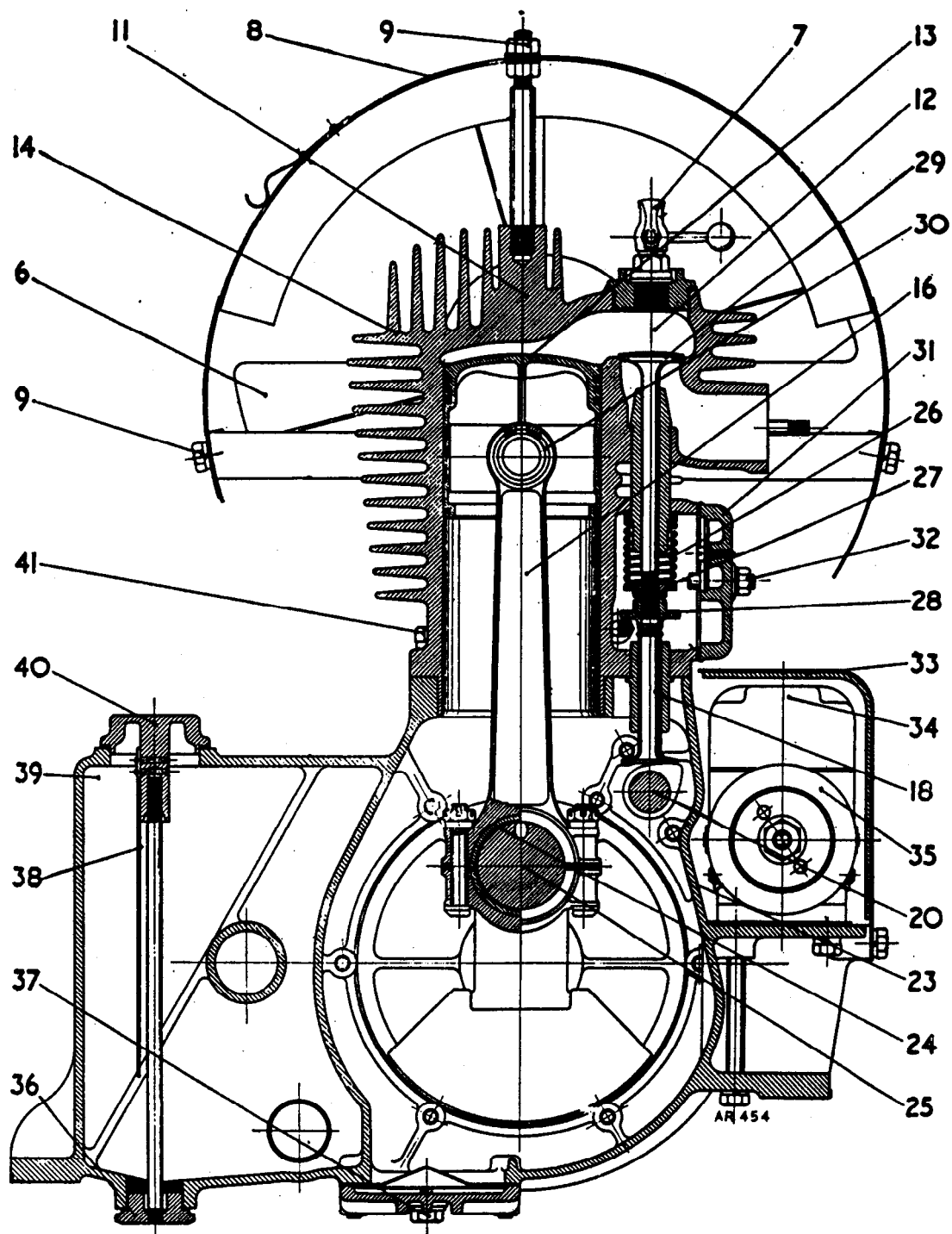


Fig. 5. Sectional View of Engine, showing Valves, etc.

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|--------------------------------|-------------------------------------|--|
| 6. Fan. | 20. Cam shaft. | 33. Magneto cover. |
| 7. Compression tap. | 23. Crankcase. | 34. Magneto. |
| 8. Fan cowling. | 24. Big-end bearing. | 35. Coupling for magneto drive. |
| 9. Fan cowling retaining nuts. | 25. Crankshaft. | 36. Oil draining plug. |
| 11. Cylinder. | 26. Valve springs. | 37. Sump draining plug. |
| 12. Combustion chamber. | 27. Valve spring retaining collar. | 38. Dipstick. |
| 13. Piston. | 28. Valve tappet adjusting nut. | 39. Oil Chamber. |
| 14. Cooling fins. | 29. Valve. | 40. Oil Filler plug. |
| 16. Connecting rod. | 30. Gudgeon pin. | 41. Bolts attaching cylinder to crankcase. |
| 18. Valve tappets. | 31. Valve tappet cover. | |
| | 32. Retaining nut for tappet cover. | |

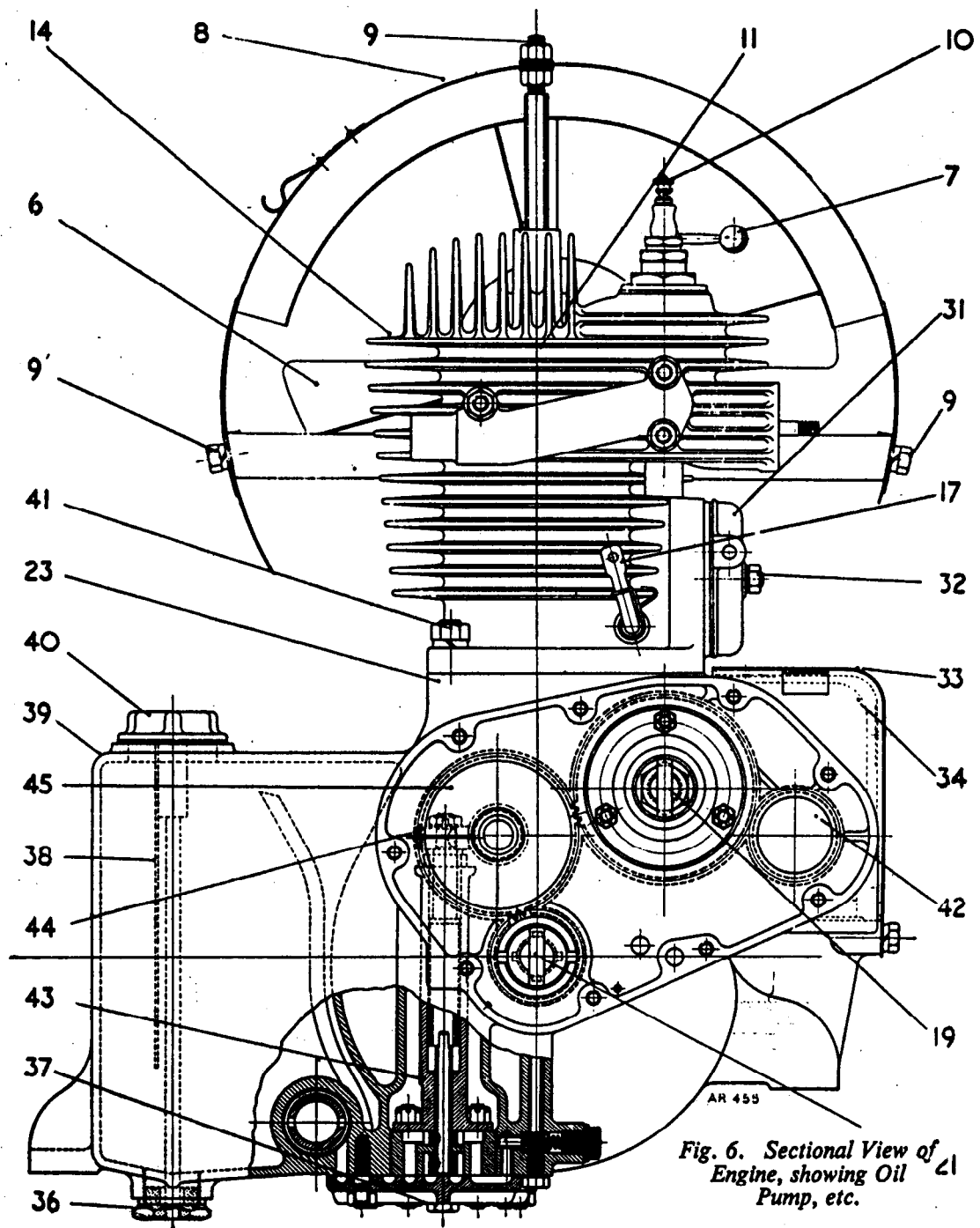


Fig. 6. Sectional View of Engine, showing Oil Pump, etc.

- 6. Fan.
- 7. Compression tap.
- 8. Fan cowling.
- 9. Fan cowling retaining nuts.
- 10. Spark plug.
- 11. Cylinder.
- 14. Cooling fins.
- 17. Exhaust valve lifter.
- 19 & 21. Starting dogs.

- 23. Crankcase.
- 31. Valve tappet cover.
- 32. Retaining nut for tappet cover.
- 33. Magneto cover.
- 34. Magneto.
- 36. Oil draining plug.
- 37. Sump draining plug.
- 38. Dipstick.

- 39. Oil chamber.
- 40. Oil filler plug.
- 41. Bolts attaching cylinder to crankcase.
- 42. Magneto driving wheel.
- 43. Oil pump.
- 44. Driven wheel for oil pump.
- 45. Intermediate wheel driving oil pump.

where it is fastened to the plate carrier. The special deflector can then be fitted.

SHEAR BLADE.—This is lipped at the cutting edge, and mounted on a steel frame pivoted from the side frames.

Adjustment of the shear blade to the cutter is effected by slightly slackening off the bolts in both main side plates. The shear blade

blades. On no account must the shear blade be adjusted so that it is hard against the cutting blades. This will result in the shear blade becoming distorted and wavy, and if used in that condition it will produce an uneven surface over the lawn being cut.

TO START CUTTING.—Press the hand lever (2) slowly forward until the cam slides

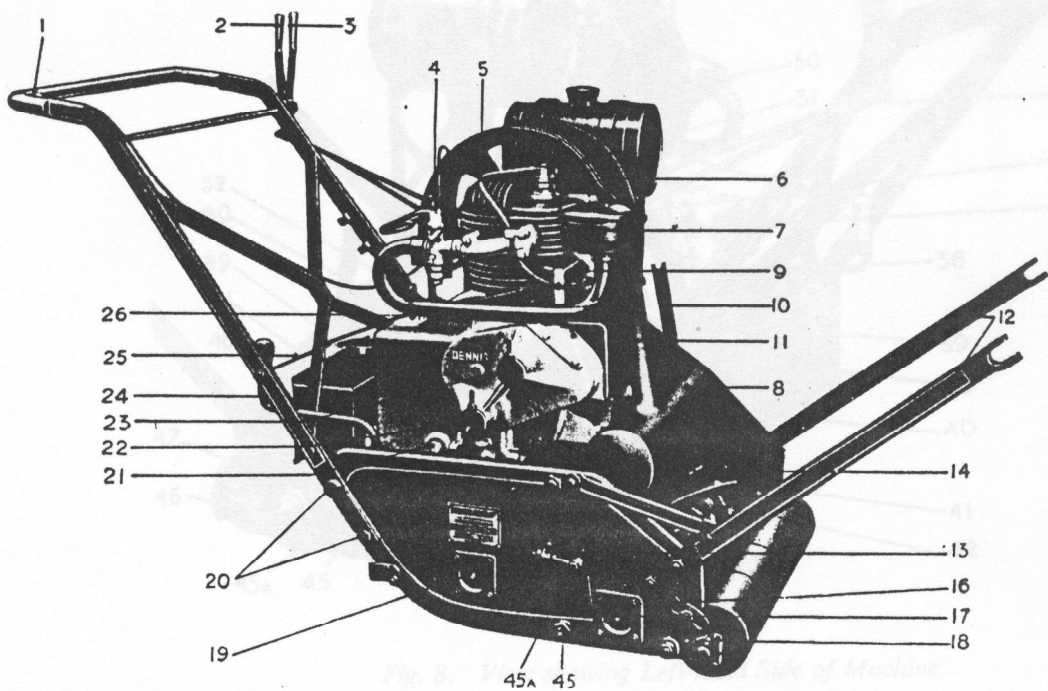


Fig. 7. View showing Right-hand Side of Machine

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|-----------------------------------|--|--|
| 1. Carburettor control lever. | 11. Magneto. | 20. Nuts for adjusting handle height. |
| 2. Cutter clutch lever. | 12. Grass box arms. | 21. Filter and drain plug for oil container. |
| 3. Driving roller clutch lever. | 13. Shear blade adjusting link. | 22. Starting handle bracket. |
| 4. Slow-running adjustment screw. | 14. Deflector plate. | 23. Geared-up starting handle bracket. |
| 5. Carburettor. | 16. Adjusting nuts for front rollers. | 24. Starting handle. |
| 6. Fan cowl. | 17. Pressure-gun nipple for cutting cylinder. | 25. Exhaust valve lift-rod. |
| 7. Air cleaner. | 18. Pressure-gun nipple for front rollers. | 26. Oil container cap and dip-rod. |
| 8. Silencer. | 19. Pressure-gun nipple for main roller bearing. | |
| 9. Valve tappet cover. | | |
| 10. Props for grass box. | | |

carrier, which is pivoted on the bolt (45) can then be adjusted by turning the nuts on the link (13) until the correct setting with the cutter is obtained. Secure the shear blade in position by tightening up the bolts (45 & 45A). The links can then be secured by tightening the nuts thereon to the brackets.

The adjustment should be made so that the shear blade just brushes the cutting

out of its recess. The clutch will then move to the "in" position and the cutter will rotate. To stop the cutter pull the lever back to the vertical position. The clutches may be used together or independently, speed being controlled by the throttle lever.

NOTE : To stop the engine, pull back exhaust valve lifting rod ; the oil supply to the engine ceases when the engine stops running.

CUTTING HEIGHT.—This is regulated by moving the two bolts on both sides of the machine, the brackets carrying the rollers will then move to the required position.

In order to ensure a level cut care must be

HEIGHT OF HANDLES.—To adjust the height of the handles, loosen the bolts attaching the handles to the risers, select a suitable position on the quadrant and re-tighten the bolts.

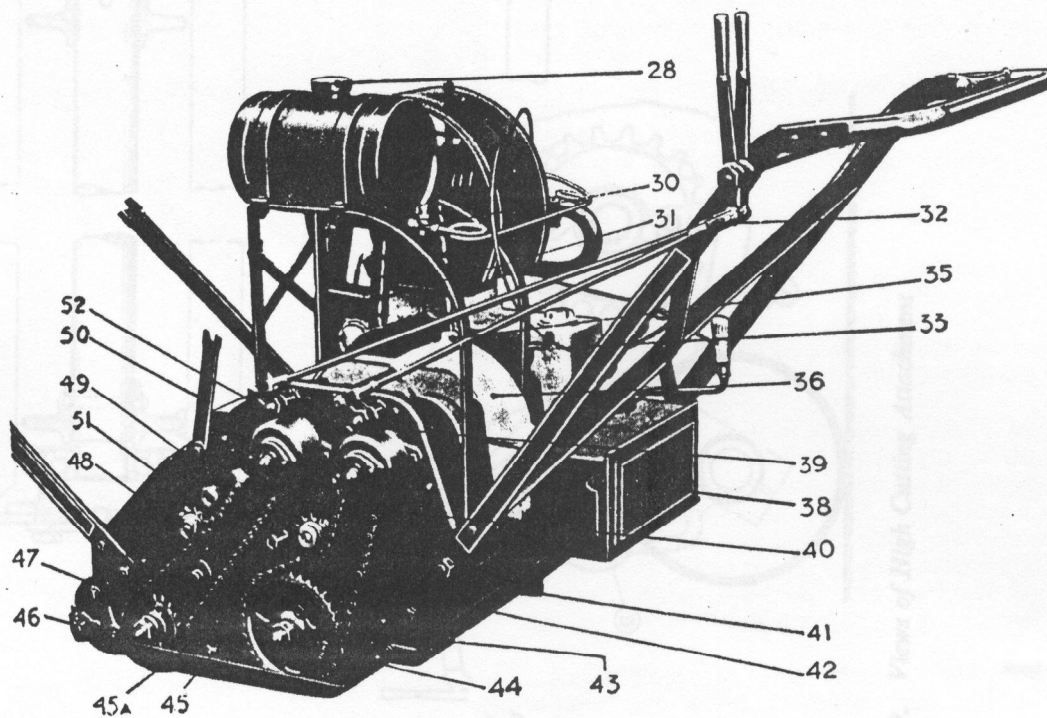


Fig. 8. View showing Left-hand Side of Machine

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|---|--|---|
| 28. Petrol tank filler cap. | 40. Pressure-gun nipples for lubricating outer bearings of gearbox shafts. | 45a. Locking screw for shear blade carrier. |
| 30. Petrol tap. | 41. Draw bar of trailer seat. | 46. Pressure-gun nipple for cutter shaft bearing. |
| 31. Vee belt driving fan. | 42. Driving roller driving chain. | 47. Cutter chain wheel. |
| 32. Hand lever and control rod ends. | 43. Driving roller chain wheel. | 48. Jockey-wheel for cutter cylinder chain. |
| 33. Support bracket for grass box (see Fig. 4). | 44. Pressure-gun nipple for driving roller shaft bearing. | 49. Jockey-wheel for driving roller chain. |
| 35. Oil filler plug for gearbox. | | 50. Grass box support arm. |
| 36. Gearbox. | | 51. Cutter driving chain. |
| 38. Tool box. | | 52. Cam controlling cutter roller clutch. |
| 39. Cam controlling driving roller clutch. | | |

taken to see that the pointers on the bracket point to the corresponding holes in both main side plates; the bolts can then be tightened to fix the roller in the new position.

TO REMOVE CUTTER.—To remove the cutting cylinder proceed as instructed under paragraph headed "THE HIGH CUTTING ATTACHMENT—." Note that the necessary extractor screws are provided in the tool kit.

THE HIGH CUTTING ATTACHMENT INSTRUCTIONS FOR FITTING.—

Remove side chain cover.

Remove bottom chain cover.

Remove nut (1) and tab washer from cutting cylinder chain sprocket.

Take out connecting link in chain and remove chain.

Remove chain sprocket (2) by means of

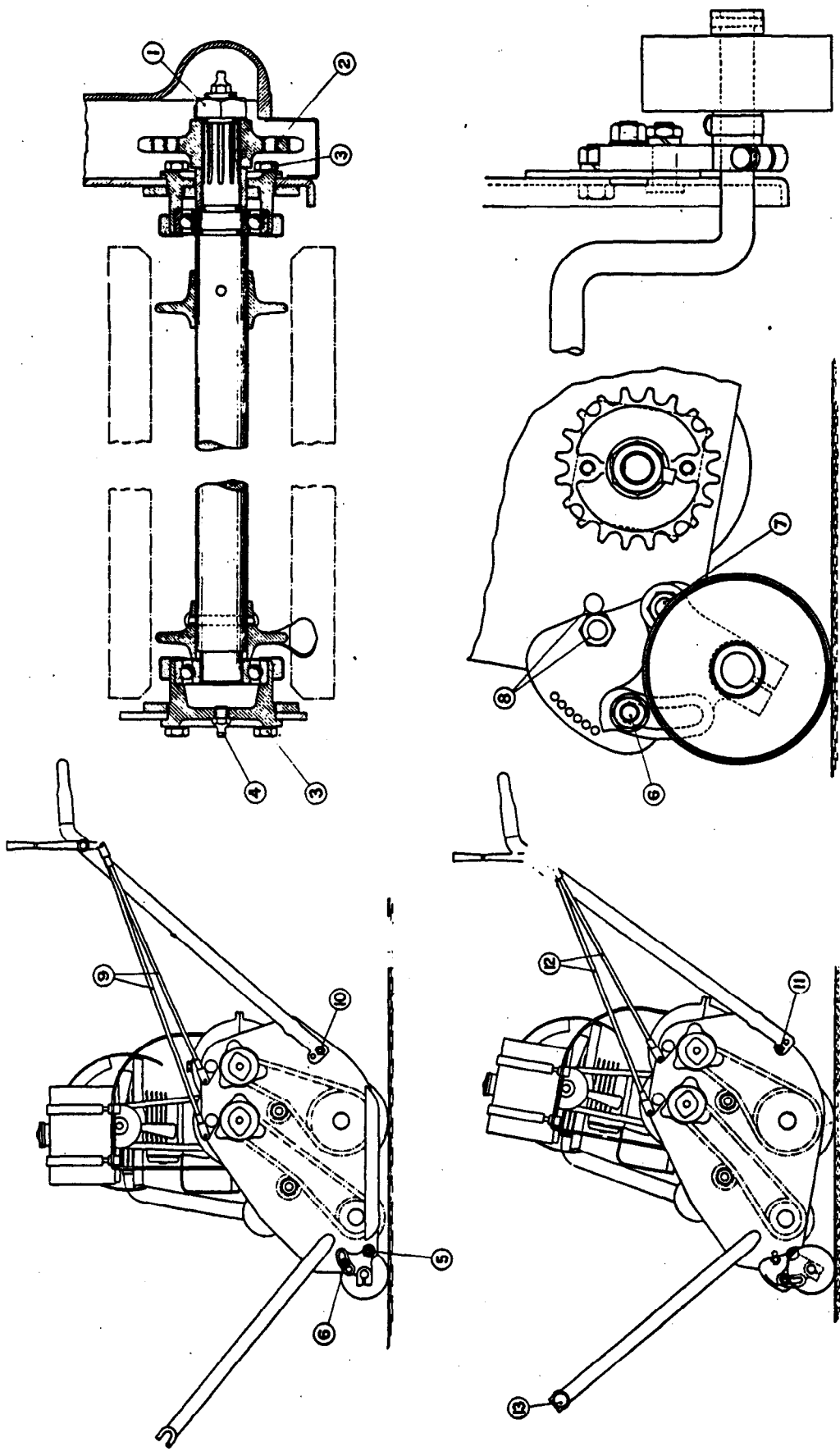


Fig. 9. Views of High Cutting Attachment

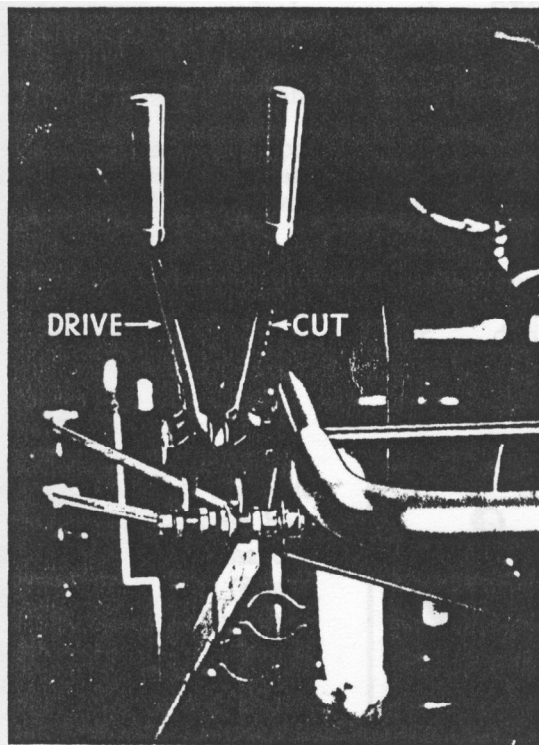


Fig. 10. View showing Control Levers on Left-hand Side of Handlebars

two $\frac{3}{8}$ in. B.S.F. extractor screws provided in tool kit.

Take out the eight setscrews (3) holding the cutting cylinder bearing housings.

Take out the greaser (4) in the R.H. bearing housing and withdraw the R.H. bearing housing by means of an extractor bolt screwed into the greaser hole.

Remove the L.H. bearing housing by tapping on the R.H. end of cutter shaft or by using a screw-driver in the slots provided to force off the housing.

Lift out cutting cylinder.

Remove front roller assembly by taking out the four bolts (5 and 6) holding the quadrant brackets.

Remove quadrant brackets from front roller assembly.

Slack off shear blade carrier to ensure ample space for fitting new cutting cylinder.

Remove deflector plate.

Put four-blade cutting cylinder into position.

Replace bearing housings and bolt into position.

(The overall length of the cutting cylinder is made to a gauge at the Works and the new cutter should fit in place of the old one without any alteration in the number of shims fitted under the flange of the L.H. bearing housing.)

Refit chain sprocket, tab washer and nut.

NOTE : The tab of a washer should only be bent up once, after that a new tab washer should be fitted.

Adjust the shear blade carrier and lock in position.

Refit the chain.

Fit new deflector plate for high cutting.

Remove two rollers from the high cutting front roller assembly by removing collars and taper pins.

Slide quadrant brackets on to high cutting front roller shaft but do not tighten pinch bolt.

Bolt quadrant brackets and plates on to front of mower by means of the new longer pivot bolts provided (7).

Bolt plate to side of mower using $\frac{1}{2}$ in. bolts in either of the two holes (8) in the mower side plate depending on the height to which grass is to be cut.

Bolt quadrant bracket to plate by means of bolt (6) taken from original assembly. Further height adjustment can be made by moving the quadrant brackets in the normal way.

Reassemble the two front rollers and collars, and drive in taper pins. Then tighten pinch bolt on quadrant bracket.

Fit balance bar (13) in place of grass box.

Replace chain cases.

The mower is now ready for service.

LUBRICATION.—Pressure gun nipples are fitted to the following points for grease injection when necessary:—

- (a) Pressure gun nipple for cutting cylinder.
- (b) Pressure gun nipple for front rollers, one nipple each side of the mower.
- (c) Pressure gun nipple for main roller bearing.
- (d) Pressure gun nipple for lubricating outer bearings of gearbox shafts (two nipples).
- (e) Pressure gun nipple for driving roller shaft bearing.
- (f) Pressure gun nipple for cutter shaft bearing.
- (g) Pressure gun nipples on the two jockey wheels.

(h) Two pressure gun nipples on each clutch.

(i) Pressure gun nipple on fan spindle.

See that the clutch forks are kept well greased.

Oil the clutch cams and the pins on which they move, the driving chains and small chain wheels. Oil the hand lever pivots and control rods.

Keep oil in the gearbox to the level of the plug near the bottom. To refill, remove the plug (35) and use clean engine oil.

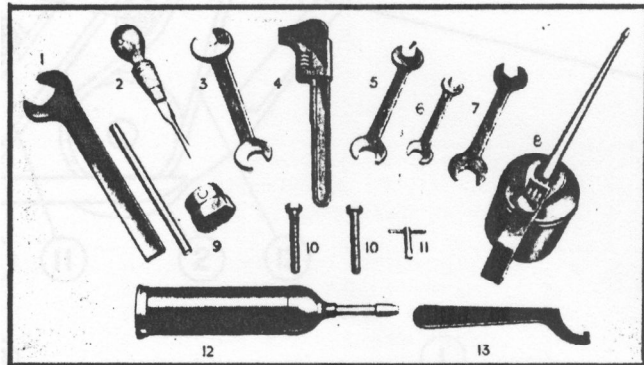
Oil the bearings of the trailer-seat roller.

STORING.—When storing the mower ensure that the oil and petrol are drained off. See that the machine is thoroughly clean and dry. Lubricate all the nipples with a pressure gun. Ensure that the shear blade, cutter and roller are clean and dry in order to prevent the formation of rust.

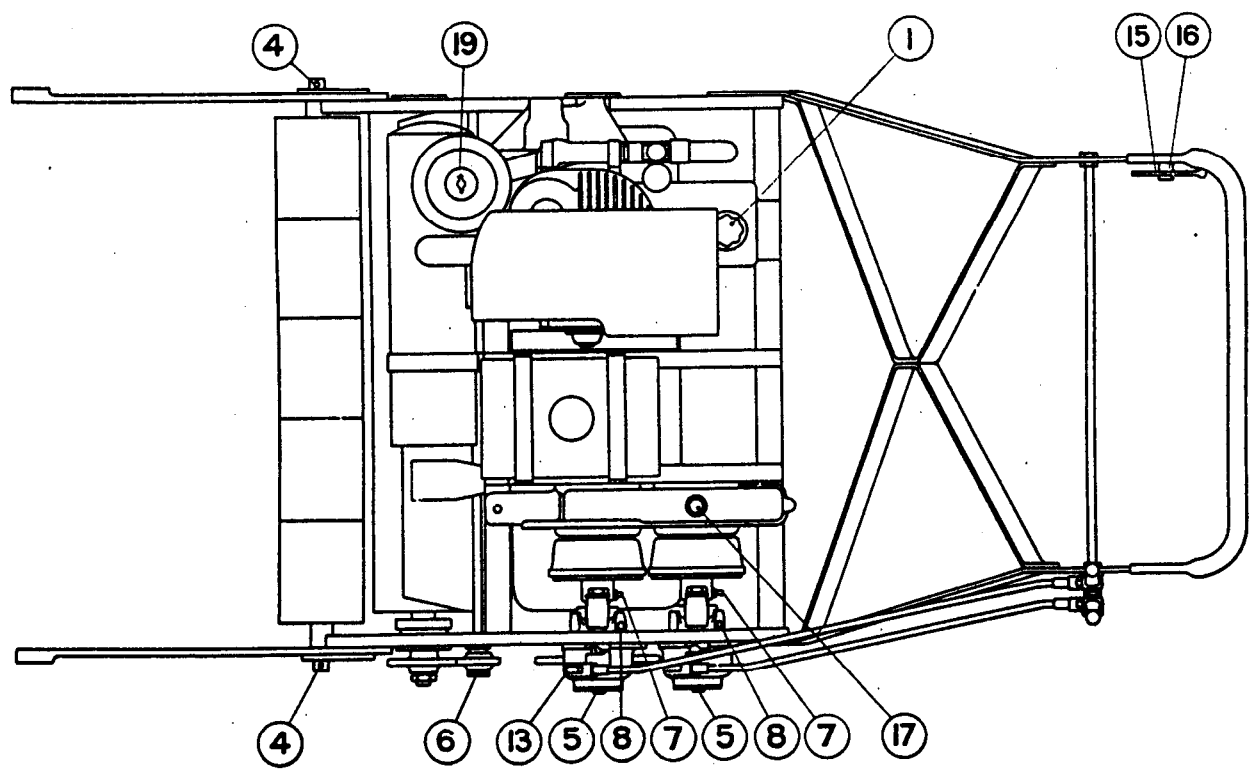
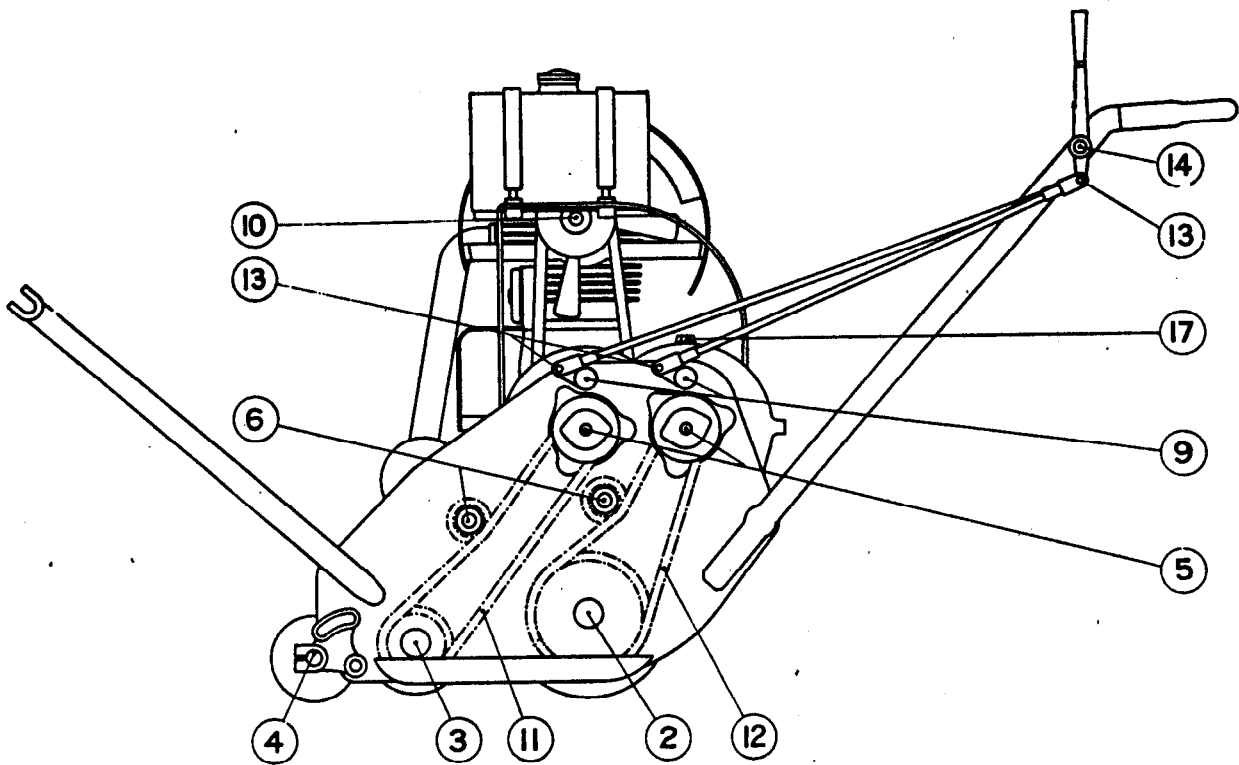
Smear all chromium plated surfaces with a light covering of vaseline.

Observance of the above simple precautions will prolong the life and efficiency of the mower and keep it in good condition during the period of storage.

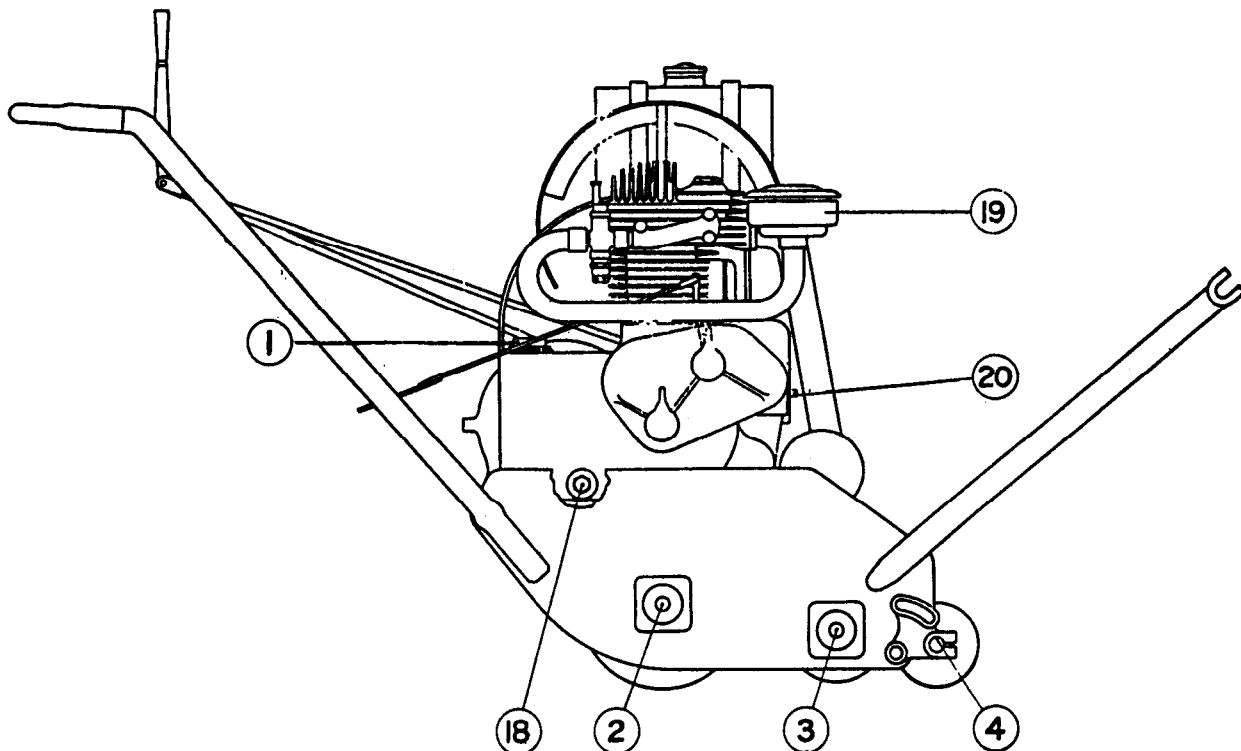
Every mower is supplied complete with the following :—Grass box, deflector plate, starting handle, pressure-gun (12), oil can (8) and a tool box containing four D.E. spanners (3, 5, 6 and 7), shifting spanner (4), valve-cap box spanner (9), jet key (11), screwdriver (2), chain-wheel withdrawal screws (10), tappet spanner (1) and fan-adjusting C-spanner (13), extractor screw (not shown).



Note.—All machines on leaving the works are filled with the correct grade of lubricating oil and grease. The recommended grades are Shell X-100 SAE .50 for the engine and gearbox sump, and Shell Retinax A or RB for pressure gun lubrication.



N.B. See also page 6 for instructions on lubricating the driving rollers and differential gear



A CLEAN MOWER GIVES THE BEST SERVICE			
1	DAILY. CHECK THAT OIL PUMP IS WORKING. WHEN THE ENGINE IS RUNNING. BY MAKING SURE THAT OIL IS BEING RETURNED TO THE OIL CONTAINER, VIA THE PIPE VISIBLE THROUGH THE OIL FILLER HOLE. TOP UP WITH ENGINE OIL TO FULL MARK ON DIP STICK WHENEVER NECESSARY. ON MOWERS PRIOR TO ENGINE N° 400E140 FILL TO 1/2" BELOW FULL MARK.		
	DAILY, WHEN IN CONSTANT USE, OR AFTER EVERY 10 HOURS RUNNING, GREASE THE FOLLOWING POINTS.		
LDC NO	PART	POINTS	METHOD
2	DRIVING ROLLER.	2	NIPPLE
3	CUTTING CYLINDER.	2	" "
4	FRONT ROLLER.	2	" "
5	OUTER BEARING FOR CLUTCH SHAFTS.	2	" "
6	JOCKEY WHEELS.	2	" "
7	CLUTCH CENTRES	2	" "
8	CLUTCH WITHDRAWAL BEARINGS.	2	" "
9	CLUTCH OPERATING CAMS.	2	" "
10	FAN CENTRE.	1	" "
	OIL THE FOLLOWING.		
11	CUTTER DRIVE CHAIN.	1	OILCAN
12	ROLLER DRIVE CHAIN.	1	" "
	OIL OCCASIONALLY.		
13	CONTROL ROD ENDS.	4	OILCAN
14	HAND LEVER PIVOT.	1	" "
15	BOWDEN WIRE FOR THROTTLE CONTROL	1	" "
16	THROTTLE LEVER PIVOT.	1	" "
17	EVERY 100 HOURS RUNNING, CHECK OIL LEVEL IN GEARBOX. TOP UP WITH ENGINE OIL TO LEVEL PLUG IN SIDE OF GEARBOX.	1	PLUG
18	AFTER FIRST 200 HOURS RUNNING AND AFTER THAT WHENEVER OIL BECOMES DISCOLOURED AND DIRTY, DRAIN ENGINE OIL, CLEAN FILTER, AND REFILL WITH CLEAN OIL.	1	DRAIN PLUG AND FILLER
19	EVERY 50 HOURS RUNNING, REMOVE AIR FILTER, CLEAN OUT, WASH ELEMENT THOROUGHLY IN PARAFFIN, REFILL OUTER CASING TO LEVEL MARK, WITH CLEAN ENGINE OIL. FILTER WILL REQUIRE CLEANING MORE FREQUENTLY IF WORKING IN DRY DUSTY CONDITIONS, AND LESS FREQUENTLY IF THE GROUND IS WET AND THERE IS NO DUST.		
20	EVERY 200 HOURS RUNNING, OIL MAGNETO WITH ENGINE OIL. ON MOWERS PRIOR TO THE 1950 MODEL IT IS NECESSARY TO REMOVE THE MAGNETO COVER TO REACH THE OILER.	1	OILCAN
	WHENEVER THE MOWER IS STORED FOR THE WINTER, SEE THAT IT IS WELL CLEANED, THAT THE CUTTING CYLINDER AND SHEAR BLADE ARE SMEARED WITH GREASE TO PREVENT RUST AND THAT ALL POINTS LISTED ABOVE ARE LUBRICATED.		

* See last page for details of paper element type.

AIR FILTER WITH PAPER ELEMENT

To clean the element, remove the wing nut and cowl and withdraw the element. Shake the element gently to remove loose dust; then, if possible, blow compressed air gently through the filter element from the inside to free remaining dust. Never attempt to clean the element with liquid cleaning fluids. Frequency of cleaning depends on operating conditions; normally, cleaning will be necessary every 100 hours. As operating conditions and climates vary so much it is difficult to make a general rule for the correct time interval between the fitting of new filter elements. However at long intervals, best determined by actual operating experience, it will be necessary to renew the filter element. NEVER RUN THE ENGINE WITHOUT THE AIR FILTER.

SETTING TIMING

With piston at top dead centre and crank shaft pinion mark X uppermost, line up idler, camshaft and magneto pinions as per diagram.

