



THE

SUFFOLK

PUNCH

MOTOR ROLLER LAWN MOWER

**OPERATING & MAINTENANCE
MANUAL**

Works and Service Department :

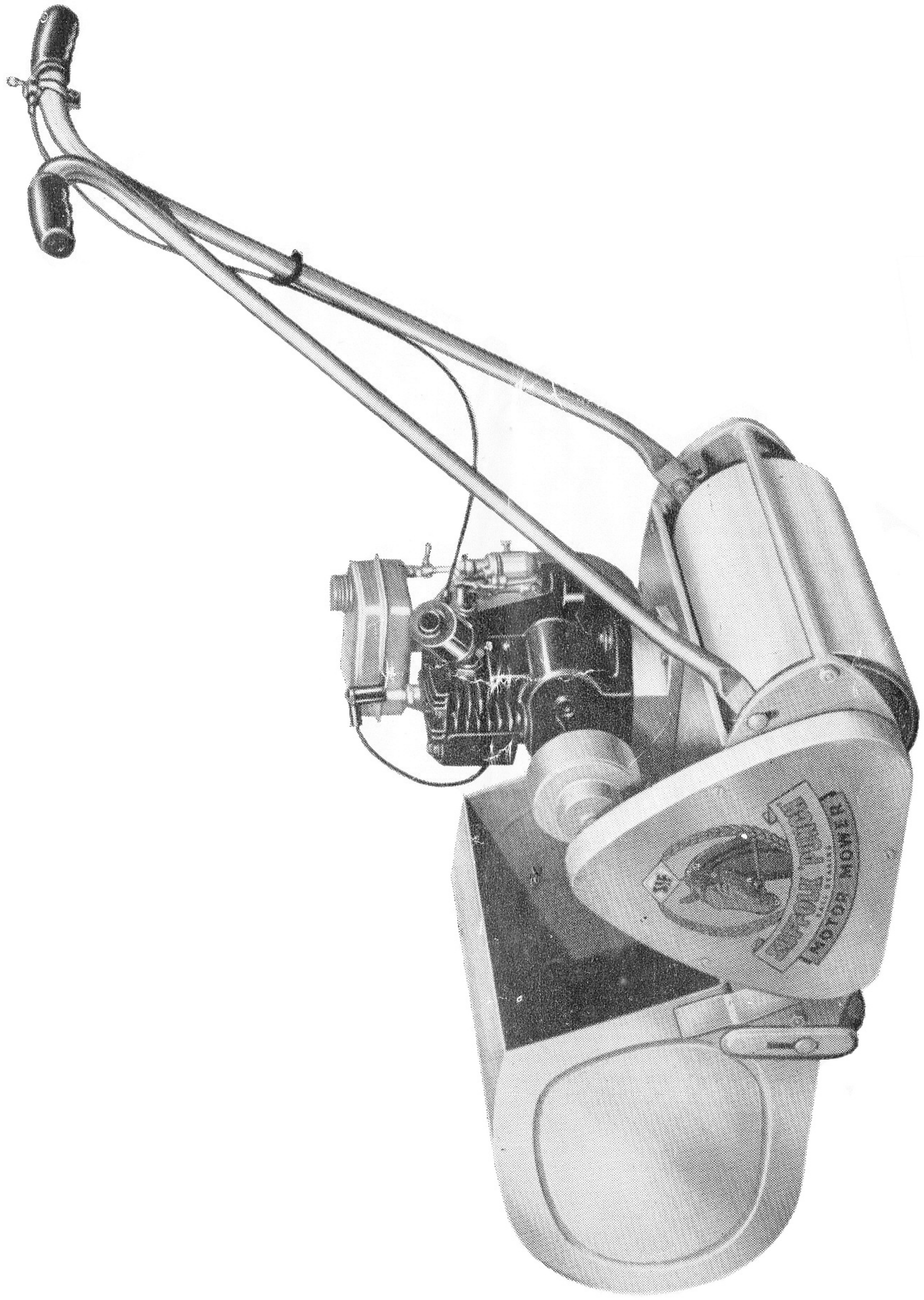
SUFFOLK IRON FOUNDRY (1920) LTD.,

STOWMARKET, 183

SUFFOLK,

ENGLAND.

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"THE SUFFOLK PUNCH" Motor Roller Lawn Mower

The Suffolk Punch Motor Lawnmower

INSTRUCTIONS

for the Operation and Maintenance

I. GENERAL ADVICE.

II. OPERATING INSTRUCTIONS.

1. Preparation for use.
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I. GENERAL ADVICE.

The Suffolk Punch Motor Lawnmower is sent out from the factory in perfect condition, and when received should be carefully examined to see that it has not been damaged in transit.

If damaged in any way, your dealer should be advised at once.

Flush out petrol tank with a small quantity of petrol before filling for the first time.

Do not start the engine in your shed or garage unless the doors are open. Exhaust gases are poisonous.

Before starting, always check that there is petrol in the tank and sufficient oil in the crank case. Top up if necessary. Oil and grease working parts regularly. A grease gun is provided in the tool kit.

Before mowing, make sure your lawn is quite free from stones, and other obstructions, i.e. pieces of bones, wood, etc. which might cause damage to the cutting cylinder.

If any obstacle should get caught, **NEVER ATTEMPT TO CLEAR OBSTACLE OR REVOLVE CYLINDER BY HAND WHILE ENGINE IS RUNNING.**

Never drive the machine over gravel paths without keeping the revolving cutting cylinder well clear of the ground.

The petrol tank should not be filled while the engine is running. Petrol spilling on a hot engine can be dangerous.

DO NOT MIX OIL WITH PETROL. The S.I.F. engine is a 4 stroke type and is designed with separate oil lubrication. It is wise to filter your petrol through a fine wire gauze when filling the tank. The tank holds $1\frac{1}{2}$ pints—enough for $1\frac{1}{2}$ hours normal use.

Do not race the engine. A speed of 3 miles per hour is recommended. At this speed the machine can mow a tennis court in less than 15 minutes.

After use, always wipe blades with oily rag.

If your mower is going to be stored for any length of time, drain the engine completely of fuel to prevent gum deposit forming on essential parts. Remove sparking plug, pour a teaspoonful of engine oil, S.A.E.20., into the cylinder, and turn the engine round slowly by hand to spread the oil. Replace the sparking plug.

II. OPERATING INSTRUCTIONS.

I. PREPARATION FOR USE.

(a) Fill the petrol tank with any good commercial grade of petrol. The tank will hold $1\frac{1}{2}$ pints which is sufficient for $1\frac{1}{2}$ hours running under average working conditions. **DO NOT MIX ANY OIL WITH THE PETROL.**

(b) Unscrew the upper (2) of the two square headed oil plugs from the front of the sump at the base of the engine and fill with $\frac{1}{2}$ pint of any one of the following recommended oils or equivalents. When filling turn starting pulley slowly by hand to expel any air trapped in the sump after first tilting the mower backwards slightly. After filling replace plug.

See illustration on Page 5

Do NOT use a new engine without first filling sump with oil.

RECOMMENDED LUBRICATING OILS.

Ambient Temp.	Shell	B.P.	Wake-field	Vacuum	Esso
Below 32° F	X-100 20/20W	Energol SAE 20W	Castrolite	Mobiloil Arctic	Essolube 20
32° F— 90° F	X-100 30	Energol SAE 30	Castrol XL	Mobiloil A	Essolube 30
Above 90° F	X-100 40	Energol SAE 40	Castrol XXL	Mobiloil AF	Essolube 40

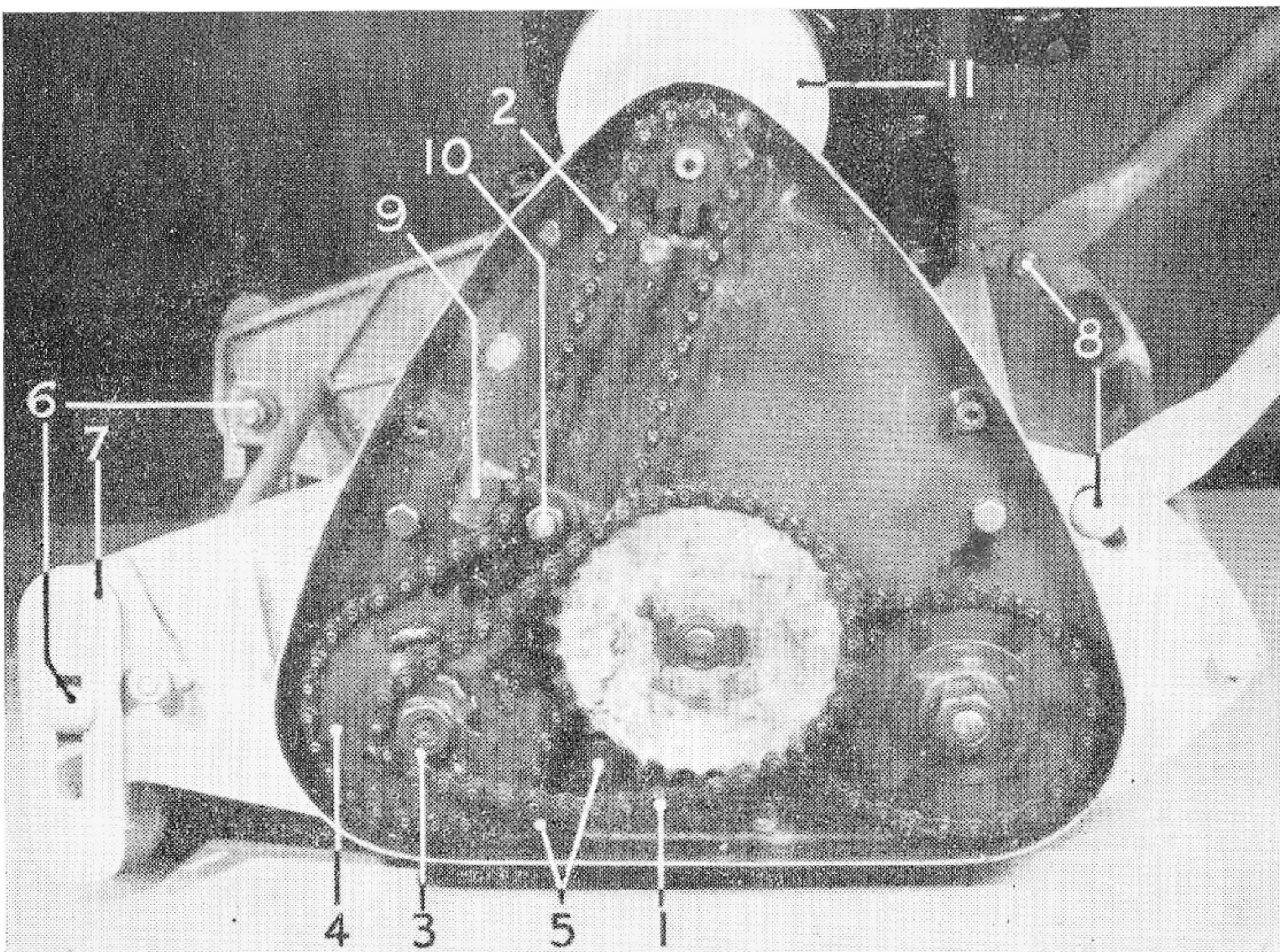
(c) Lubricate all grease points of the machine with the grease gun provided.

(d) Set the handles of the machine in the position most comfortable for your height, by slackening the bolts (8) at the base of the handle. Re-tighten bolts when desired position is obtained.

See Illustration below

(e) Set the position of the wooden rollers at the front of the machine to give the desired height of cut by slackening bolts (6). Retighten bolts after setting. If the grass is long it is advisable to set for high cutting at first. Then lower machine to normal height required for season.

See Illustration below



II.

2. TO START ENGINE WHEN COLD.

(a) Make sure that the hand clutch is out of engagement.

See Section II, Para. 4, on Page 5.

(b) Turn on petrol by means of petrol tap immediately under petrol tank. Tap should be turned downwards.

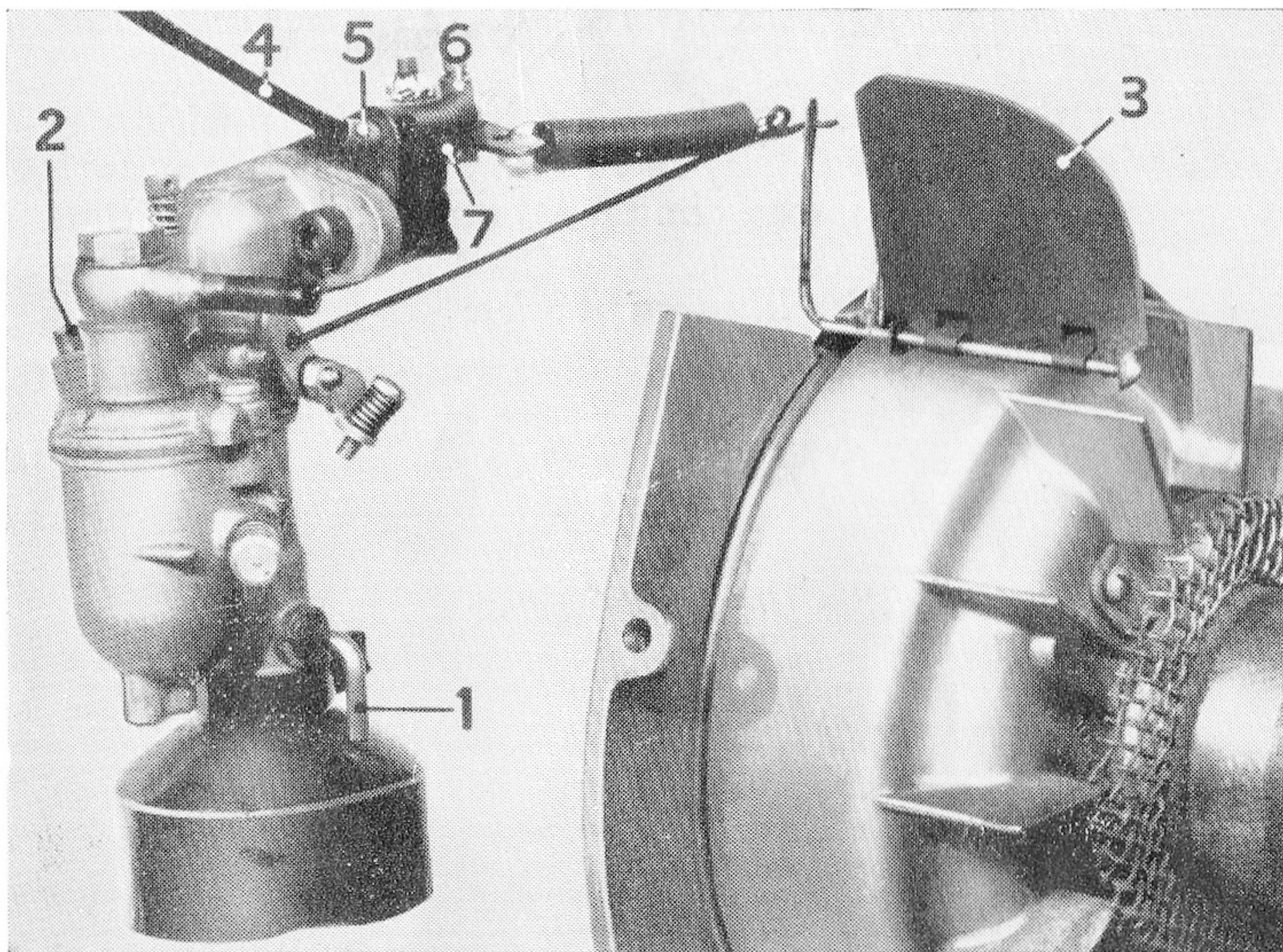
(c) Close the air strangler by turning the small lever (1) at the side of the carburetter to horizontal position.

See Illustration below

(d) Open control lever on handle bar about one third of its full opening.

(e) Press the tickler (2) on top of the carburetter float chamber until the petrol just commences to overflow.

See Illustration below



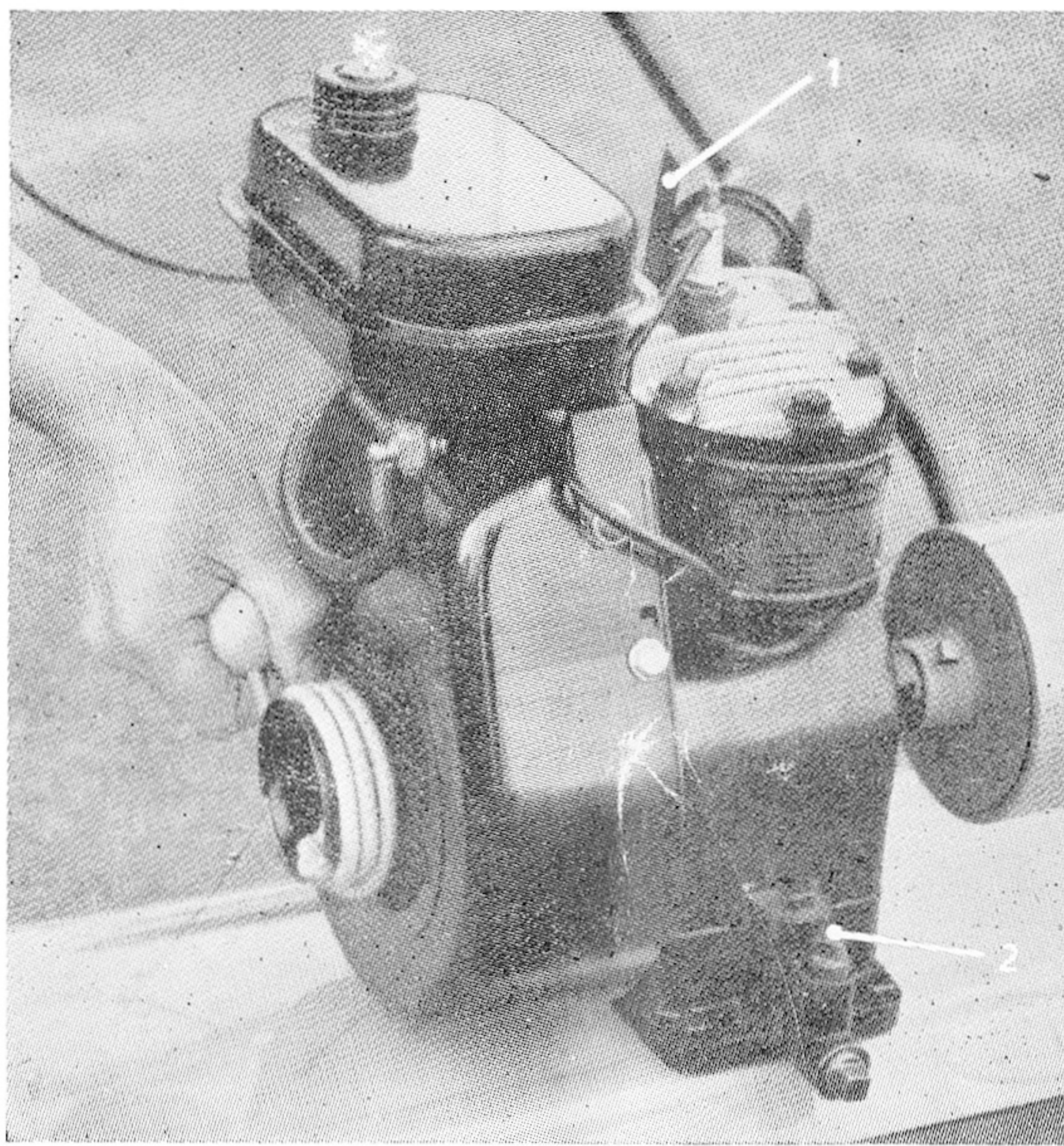
(f) Fix the knot at the end of the starting cord into the slot in the pulley and wind the cord round the pulley in a clockwise direction, leaving just sufficient cord to grip securely. Grip wooden knob as shown in illustration. Do not wind the cord round the hand. Then pull upwards sharply when the cord will release automatically.

See Illustration on Page 5

(g) After engine has started, gradually open strangler as engine warms up. When engine is warm and running smoothly, partially close control lever so that engine is idling.

(h) When engine is idling, engage the hand clutch. Machine will not move forward but is now ready for use.

(i) Open control lever slowly and machine will then smoothly move off.



II.

3. TO START ENGINE WHEN HOT.

The same procedure should be adopted except that it should not be necessary to close the strangler or to flood carburetter by pressing tickler.

II.

4. USING THE MOWER.

The mower is driven by the engine through a centrifugal clutch (II) which is automatic in operation, so that a single control lever gives the operator full command of the machine.

An additional hand operated clutch is fitted on the outside of the centrifugal clutch to enable the engine to be disconnected from the mower for starting. To disengage, pull the outer cover of this hand clutch outwards (about $\frac{1}{2}$ ") over the spring loaded ball on the transmission shaft. To re-engage, push inwards.

See Illustration on Page 3.

The dual drive mechanism consists of a special clutch fixed to the rear roller, which enables the mower either to be self-propelled, or to be pushed by the user with the engine still driving the cutting cylinder.

The rear roller dog (Ref. 103 Dual Drive Assembly Illustration) is at the bottom right-hand corner of the chain case.

For the engine to drive the rear roller, the teeth on this dog must be FULLY engaged with the slots in the centre (57) of

the rear sprocket (56). In this position the engine drives the dog (103) which engages by an internal slot with the pin (110) passing through the rear roller spindle.

To dis-connect the power from the rear roller, pull the dog outwards (about $\frac{3}{8}$ ") against the spring (109) and turn it clockwise or anti-clockwise, approximately $\frac{1}{4}$ turn to hold it in position.

To re-connect the power to the rear roller, **FIRST ENSURE THAT THE ENGINE IS IDLING.** Turn the dog in the opposite direction from when disconnecting the engine, about $\frac{1}{4}$ turn, until it springs back into position. If the dog does not initially **FULLY** engage, it will automatically do so as soon as the engine is speeded up sufficient for the cutting cylinder to turn.

The following procedure for using the machine should be adhered to :

- (a) Allow engine to warm up before starting mowing.
- (b) Engage hand operated clutch **ONLY WHEN ENGINE IS IDLING.**
- (c) Engage Dual Drive Clutch **ONLY WHEN ENGINE IS IDLING.**
- (d) Pull open control lever smoothly. As the lever is opened up the machine will automatically take up the drive and move forward. Should the machine at any time fail to take up the drive when the control lever is fully opened, close the control lever and free the cutting cylinder by turning the clutch shaft. **DO NOT ATTEMPT TO TURN THE CYLINDER BY HAND.**
- (e) Do not race the engine. A speed of 3 m.p.h. is recommended.
- (f) Reduce speed on corners by closing the lever slightly until you get used to the control of the machine.
- (g) To stop the mower, close the control lever fully. This will stop the mower but not the engine.
- (h) To stop the engine after finishing mowing, turn the petrol off. This will not stop the engine immediately since there will still be some petrol in the carburetter to be used up before the engine finally receives no fuel. A little economy in petrol may be obtained by turning off the petrol a few minutes before finishing mowing.
- (i) To stop the engine quickly in the event of an emergency, press the Ignition Cut-out Switch on to the top of the Sparking Plug and keep pressed until the engine stops.

II.

5. CUTTING ADJUSTMENTS.

The only parts other than the handles (see Para. II. 1 (d)) that may require adjusting are the cutting cylinder and the front roller, for height of cut.

- (a) Cutting Cylinder.

If at any time the mower is found not to be cutting satisfactorily, a slight adjustment may be required to the cutting cylinder.

To bring the cylinder closer to the cutting edge of the bottom blade, screw the two adjusting nuts on the platform immediately above the cylinder in a clockwise direction. Care should be taken to ensure that the cutting blades **JUST TOUCH** the cutting edge of the bottom blade equally all along its length. It is unnecessary to set cylinder blades **HARD** on to the bottom blade.

(b) **Front Rollers.**

The height of cut is governed by the position of the front wooden rollers. To adjust these rollers, slacken the nut and bolt (6) securing each roller bracket (7) to the side plate of the machine, set the position of the brackets in the desired position and re-tighten.

See Illustration on Page 3

The range of adjustment is from zero to about $1\frac{1}{2}$ inches which will enable the machine to cut grass several inches high if required.

Care should be taken to ensure that the height of the roller bracket is the same at each end of the roller.

II.

6. FAILURE TO START.

If after a reasonable number of trials the engine should not start, this may be due to one or more of several causes, such as :

(a) Lack of petrol through tap not being turned on or fuel supply choked, or failure to flood the carburetter.

(b) Too much petrol through excessive flooding causing wet sparking plug. If so, remove and dry the plug, turn engine over smartly with control lever closed. Replace plug.

(c) Control lever open too wide. One quarter to one third is correct.

(d) Sparking plug dirty or gap between points incorrect. Clean or adjust if necessary. Gap should be .020 in.—.022 in.

(e) No spark. Remove plug and place plug body on top of cylinder with lead attached and turn starting pulley. There should be a spark at the points. If not, clean and adjust gap between points.

If, after all above items have been checked, the engine still will not start, a more detailed examination will be required.

See section on 'Engine'.

III. MAINTENANCE & REPAIRS.

I. ENGINE.

A description of the engine together with instructions for maintenance will be found towards the end of this booklet.

III.

2. CUTTING CYLINDER—REMOVAL.

The cylinder unit is held between the mower sides by four hexagon screws.

The removal of the unit for regrinding the cylinder is simple and the following procedure is recommended :

(a) Stand the mower on a low bench and tilt the machine backwards so that it rests on the handles. The front wooden rollers will then be uppermost.

(b) Take off the chain case cover by removing the three screws.

(c) Remove the intermediate chain (1) and the cylinder driving chain (2). *See Illustration on Page 3*

(d) Remove the hexagon nut (3) on the end of the cylinder spindle so that the chain wheels (4) on this spindle can be removed together with their key.

(e) Access will thus be given to the two hexagon screws (5) which fix the cylinder unit to the L.H. side of the mower, i.e. chain case side. Loosen these screws and also the corresponding screws on the R.H. side of the mower.

(f) Loosen the hexagon nuts at the R.H. side of the front and rear tie rods.

(g) Loosen the three slotted screws holding the engine platform to the R.H. side of the mower.

(h) Remove the four hexagon screws (5) which fix the cylinder unit to the mower sides. The unit can then be withdrawn downwards and clear of the mower. It is advisable to lower the R.H. end of the cylinder unit slightly in advance of the L.H. end.

(i) Remove the two pivot pins holding the bearing blocks to the soleplate and also the cylinder adjusting nuts. Take off the delivery plate by removing the three screws which hold it to the soleplate.

To re-assemble, reverse the procedure mentioned.

III.

3. CHAIN.

The cylinder driving chain (2) is fitted with a hook type chain adjuster (9) which can be adjusted to take up any variations in chain wear, by means of a nut (10). The intermediate chain (1) (*See illustration on Page 3*) may be adjusted by the following procedure :

1. Ensure cutting cylinder is adjusted correctly.
2. Slacken nut at centre of sprocket (Ref. No. 59) *See Mower Assembly illustration.* Move sprocket to give correct chain tension.
3. Tighten nut.

All chains should be kept well lubricated with grease.

Access to the chains is readily obtained by removing the three screws on the outside of the chain case and then withdrawing the cover.

III.

4. CENTRIFUGAL CLUTCH.

Access to the clutch is readily obtained by removing the screws which fix engine to the mower platform and withdrawing the engine. If it is suspected that the clutch is not operating

satisfactorily, this may be due to one or more of the following causes :

(a) Oil or grease on the linings of the clutch shoes (79) or on the inside of the clutch drum (83). Clean thoroughly with petrol or other degreasing agent.

(b) Clutch shoes unable to turn on pivot pins (81). Clean if necessary and free the obstruction.

(c) Linings of clutch shoes worn. This is not likely to occur except after very prolonged life. Remove shoes by withdrawing split pins (82) which secure the shoes to their pivot pins and fit new linings. Use new rivets.

(d) If after attention to the foregoing points the clutch is found still to be slipping, turn the spring adjusting screws in the clutch shoes in an anti-clockwise direction. This will allow the shoes to exert a greater pressure on the clutch drum.

After adjustment check that clutch is completely disengaged when engine is idling.

See Mower Assembly Illustration

III.

5. DUAL DRIVE CLUTCH.

Access to the dual drive clutch is readily obtained by the following procedure :

(a) Remove the plug button (111) by prizing out with a screwdriver. Circlip (108) can then be removed by springing it out of its groove. Washer (107), spring (109), dog (103), and Bush (104) can then be withdrawn.

(b) If it is required to remove the sprocket (56), first withdraw the pin (110). The second circlip (108) can then be removed together with washer (106). The sprocket can then be withdrawn.

To re-assemble, reverse the above procedure.

The teeth of the rear roller dog and the corresponding slots on the sprocket centre should always be kept clean.

See Mower Assembly & Dual Drive Assembly Illustrations

MOTOR MOWER SPARE PARTS LIST.

Ref. No.	Description.	Part No.	No. per set.
FRAME ASSEMBLY.			
1.	Engine Platform	L.3636	1
2.	Bolt for fixing Engine	91279	4
3.	Spire Nut Grip	SM/D/10/2/7	4
4.	Screw for fixing Engine Platform ...	95540	6
5.	Washer for fixing Engine Platform ...	3843	6
6.	Sideplate L.H.	L.4338	1
7.	Sideplate R.H.	L.3627	1
8.	Tubular Handle	L.3709	1
9.	Handle Grip	L.3742	2
10.	Bolt for Tubular Handle	98296	2
11.	Washer for Tubular Handle	93515	2
12.	Nut for Tubular Handle	93256	2
13.	Tie Rod—Rear	L.3644	1
14.	Nut for Tie Rod—Rear	NT/D.126	2
15.	Rear Roller	L.5509	1
17.	Distance Piece—Rear Roller	L.3646	2
18.	Rear Bearing Bush	L.3731	2
20.	Tie Rod—Front	L.3645	1
21.	Nut for Tie Rod—Front	NT/D.126	2
22.	Wood Roller Spindle	L.3650	1
23.	Wood Roller	L.3654	3
24.	Roller Bracket	L.3631	2
25.	Bolt for Roller Bracket	98312	2
26.	Washer for Roller Bracket	93515	2
27.	Nut for Roller Bracket	93256	2
CYLINDER ASSEMBLY.			
28.	Cylinder	L.3671	1
29.	Dust Cover for Cylinder Bearings ...	L.4380	2
30.	Cylinder Bearing	L.3729	2
31.	Cylinder Bearing Link L.H.	L.3628	1
32.	Cylinder Bearing Link R.H.	L.3629	1
33.	Grease Nipple for Cylinder Bearing Link	L.3841	2
34.	Nut for Cylinder Spindle	NT/D.166	1
35.	Pivot Pin	L.3651	2
36.	Nut for Pivot Pin... ..	93015	2
37.	Sleeve for Cylinder Adjustment ...	L.3652	2
38.	Screw for Cylinder Adjustment ...	L.3653	2
39.	Nut for Cylinder Adjustment	NT/D.106	2
40.	Spring for Cylinder Adjustment ...	L.4233	2
41.	Mills Pin for Soleplate	L.3842	2
42.	Delivery Plate	L.3655	1
43.	Screws for fixing Delivery Plate ...	L3329	3
44.	Washer for fixing Delivery Plate ...	3844	3
45.	Soleplate	L.3630	1
46.	Screw for Soleplate	94101	4
47.	Washer for Soleplate	93615	4
48.	Screw for Soleplate Bottom Blade ...	L3854	6
49.	Bottom Blade—Lipped	L.3708	1
96.	Felt Sealing Pad (not illustrated) ...	L.3858	1
CHAIN ASSEMBLY.			
50.	Chaincase—Inner Section	L.3632	1
51.	Screws for clutch shaft Bearing Housing	91252	3
52.	Washer for clutch shaft Bearing Housing	3844	3
53.	Driving Sprocket	L.3661	1

Ref. No.	Description.	Part No.	No. per set.
54.	Screws for Chaincase—Inner Section...	91253	3
55.	Washer for Chaincase—Inner Section...	3843	3
58.	Chain—36 pitches (Inter. to Drive) ...	L.3735	1
59.	Intermediate Sprocket	L.4406	1
60.	Intermediate Bearing Bush	L.4398	1
63.	Chain—40 pitches (Cylinder to Inter.)	L.3734	1
64.	Cylinder Sprocket	L.3663	1
65.	Distance Piece for Cylinder Spindle ...	L.3638	1
66.	Woodruff Key for Cylinder Spindle ...	L.3839	1
67.	Chain for 58 pitches (Drive to Cylinder)	L.3736	1
68.	Chaincase—Outer Section	L.4970	1
69.	Screws for Chaincase—Outer Section...	L.3758	3
70.	Chain Adjuster	L.3699	1
70a.	Nylon Slipper for Chain Adjustment (not illustrated)	L.4255	1
71.	Bolt for Chain Adjuster	91772	1
72.	Washer for Chain Adjuster	93615	1
73.	Nut for Chain Adjuster	93256	1

CLUTCH ASSEMBLY.

74.	Clutch Backplate	L.3656	1
75.	Woodruff Key for Clutch Backplate ...	L.3845	1
76.	Clutch Spring	L.3756	2
77.	Clutch Bush	L.3733	2
78.	Screw for Clutch Backplate	L.3846	1
79.	Clutch Shoe (sub-assembly)	L.5319	2
80.	Washer for Mills Pin	93515	2
81.	Mills Pin for Clutch Backplate	L.3725	2
82.	Split Pin for Mills Pin	L.3847	2
83.	Drum for Centrifugal Clutch	L.3658	1
84.	Driving Shaft	L.3659	1
85.	Ball for Driving Shaft.	L.3848	1
86.	Spring for Driving Shaft	L.4231	1
87.	Pin Cover	L.3660	1
88.	Circlip for Driving Shaft	L.3849	1
89.	Clutch Shaft Bearing Housing... ..	L.3642	1
90.	Grease Nipple	L.3841	1
91.	Clutch Shaft Bearing	L.3730	1
92.	Spacing Ring for Clutch Shaft	L.3643	1
92a.	Screw for Clutch Shoe (not illustrated)	L.4037	2
93.	Control Lever	L.3686	1
94.	Cable	L.3853	1
95.	Cleat for Cable	L.3840	1
98.	Bolt for Intermediate Sprocket (not illustrated)	91353	1
99.	Sleeve for Intermediate Sprocket (not illustrated)	L.4390	1
100.	Saddle for Intermediate Sprocket Bolt (not illustrated)	L.4396	1
101.	Washer for Intermediate Sprocket Bolt (not illustrated)	L.4247	1
102.	Nut for Intermediate Sprocket Bolt (not illustrated)	93136	1

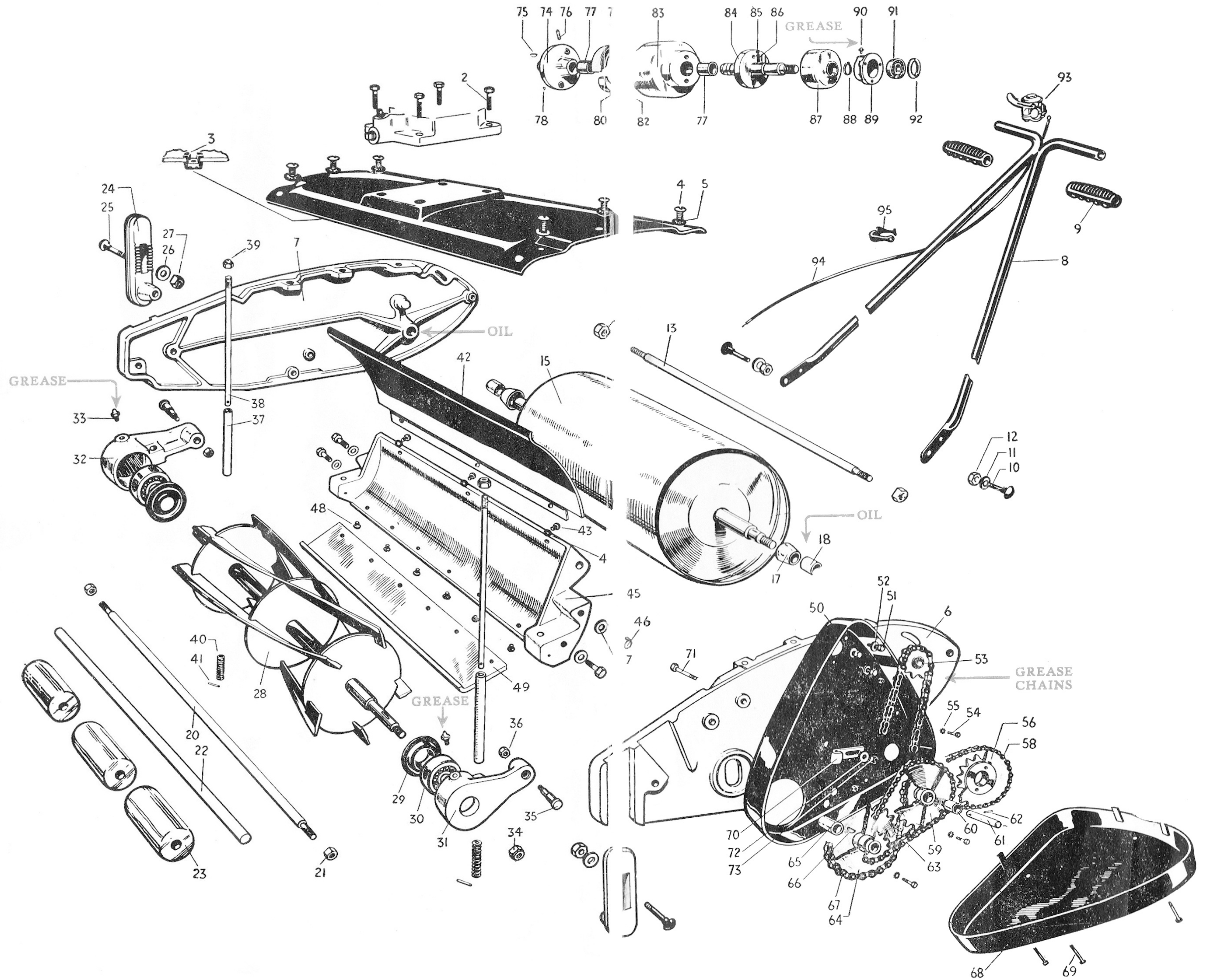
DUAL DRIVE ASSEMBLY.

56.	Rear Roller Sprocket	L.4675	1
57.	Rear Sprocket centre	L.4676	1
103.	Rear Roller Dog	L.4981	1
104.	Bush for Roller Dog	L.4972	1
105.	Bush for Rear Sprocket centre	L.4973	1

106.	Washer for Rear Roller Spindle—large	L.4974	2
107.	Washer for Rear Roller Spindle—small	L.4980	1
108.	Circlip for " " "	L.4976	2
109.	Spring for " " "	L.4975	1
110.	Mills Pin for " " "	L.4978	1
111.	Plug Button for Rear Roller Dog ...	L.4977	1
112.	Felt Washer 	L.4747	1
	Grassbox (not illustrated) 	L.4219	1
	Spanner (not illustrated) 	L.3850	1
	Grease Gun (not illustrated)	L.3851	1
	Adjustable Spanner (not illustrated) ...	L.3852	1

The above list to be read in conjunction with
MOWER ASSEMBLY & DUAL DRIVE ASSEMBLY
ILLUSTRATIONS

Mower Assemb y Illustration



The Suffolk Industrial Engine

Type 75 G.14

Models 1a & 1b

DESCRIPTION & INSTRUCTIONS

for Operation and Maintenance

I. DESCRIPTION.

II. OPERATION INSTRUCTIONS.

1. Preparation for use.
2. Starting the engine when cold.
3. Starting the engine when hot.
4. Speed Regulation.
5. Lubrication.
6. Ignition.
7. Stopping the engine.
8. Some causes of failure to start.

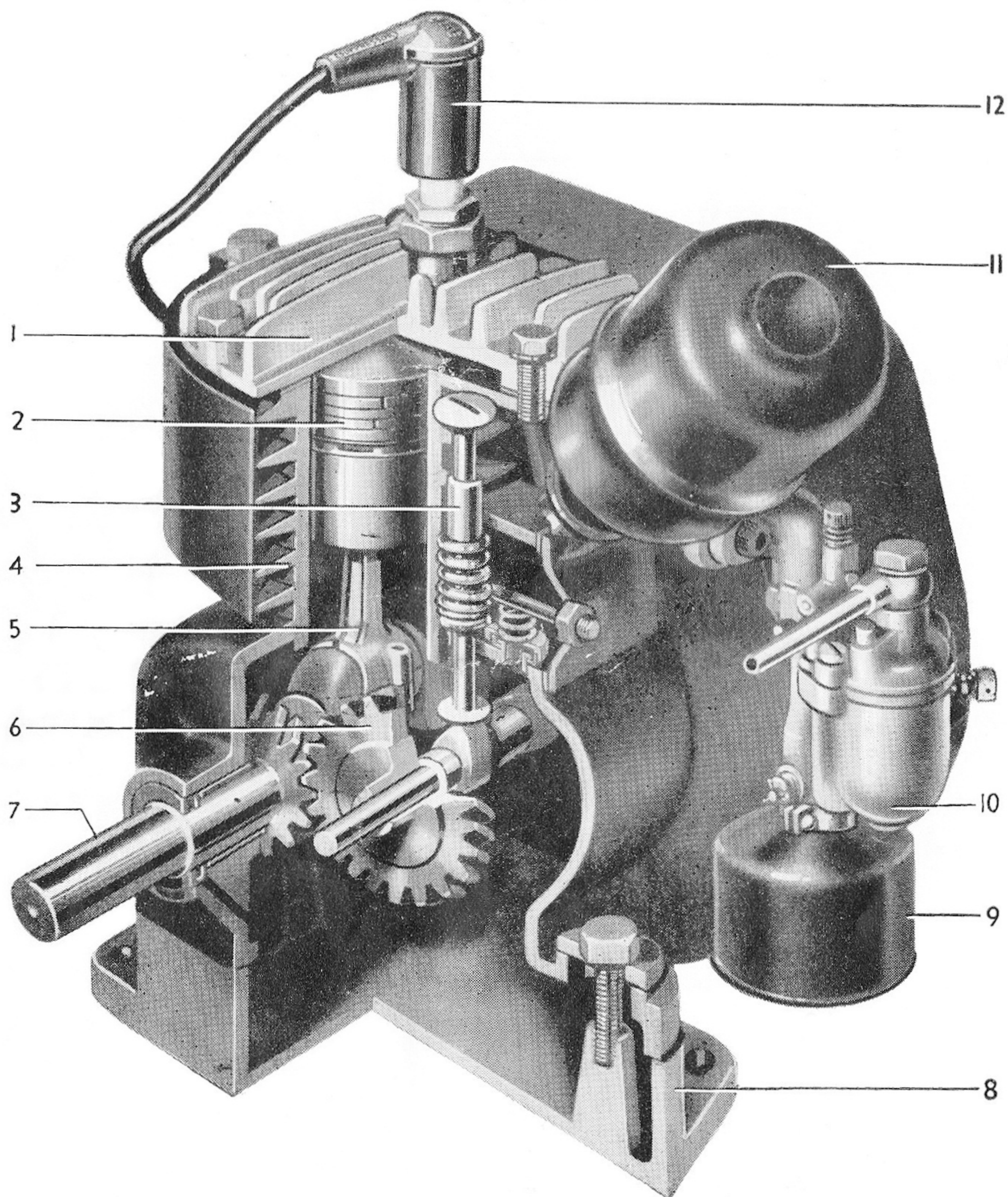
III. MAINTENANCE & REPAIRS.

1. Magneto Description.
2. Magneto Service Instructions.
3. Carburetter Description.
4. Carburetter adjustments and maintenance.
5. Control Cable adjustments.
6. Engine dismantling.

The Suffolk Industrial Engine

Type 75 G.14

Models 1a & 1b



- 1. CYLINDER HEAD
- 2. PISTON
- 3. VALVE ASSEMBLY
- 4. CYLINDER BLOCK

- 5. CONNECTING ROD
- 6. VALVE TIMING GEAR
- 7. CRANKSHAFT
- 8. SUMP

- 9. AIR FILTER
- 10. CARBURETTER
- 11. SILENCER
- 12. SPARKING PLUG

The Suffolk Industrial Engine

Type 75 G.14

Models 1a & 1b

I. DESCRIPTION.

Engine.	Petrol, four stroke, single cylinder, air cooled.
Cylinder Dimensions.	Bore, 50.8 millimetres. Stroke, 38.1 millimetres Cubic Capacity, 75 c.c.
H.P.	1.1 at 3,000 revolutions per minute.
Valves.	Mushroom. Side valve.
Valve Clearances.	Exhaust .015. Inlet .007. Inlet valve opens 2 degrees after Top Dead Centre. With above valve clearances the correct opening and closing of the valves will follow.
Camshaft.	One piece helical gear driven.
Piston.	Material, low expansion aluminium alloy. 1 Com- pression Ring, 1 Scraper Ring, 1 Oil Control Ring. Gudgeon Pin fixing by 2 circlips.
Connecting Rod.	Material, aluminium alloy. Big end bearing, plain and direct on crankshaft.
Crankshaft.	Material, Steel Forging. Dia. of take off—.75 in.
Main Bearings.	Steel backed white metal lined.
Ignition.	MAGNETO, FLYWHEEL TYPE. TIMING, 22 degrees before top dead centre. DRIVE direct main shaft. SPARKING PLUG, size 14 m.m. dia. Three eighths inch reach.
Carburetter.	Zenith 13TCA.
Lubrication System.	Special 'Oil-mist' method.
Fuel Tank Capacity.	1½ pints.
Fuel Consumption.	.8 pints per H.P. hour.
Overall Weight.	28 lbs.
Rotation.	Clockwise, looking at starting pulley.
Method of fixing.	By four bolts 5/16 in. dia. in base at 6 3/8 in. by 3 1/8 in. centres.
Overall Dimensions.	Height—13 1/2 in. max. Width—12 in. max. Breadth—12 in. max.

II. OPERATION INSTRUCTIONS.

1. PREPARATION FOR USE.

See Para. II 1, Page 2

2. TO START ENGINE WHEN COLD.

See Para. II 2, Page 4

3. TO START ENGINE WHEN HOT.

See Para. II 3, Page 5

4. SPEED REGULATION.

The speed of the engine is controlled by the lever at the end of the cable attached to the carburetter.

An automatic governor (3) is fitted which will maintain a constant speed whether the engine is running light or under load, according to the setting of the control lever. Adjustment to this device should not be attempted unless absolutely necessary.

See Illustration Page 4

5. LUBRICATION.

Complete lubrication of all working parts of the engine including valves, etc., is automatically ensured by the special 'oil-mist' method, whereby it is unnecessary to add upper cylinder lubricant.

The crank case should always be kept full of oil.

Do not remove the oil plug whilst the engine is running.

After every 30 hours running and preferably when the engine is hot, drain the oil by unscrewing the lower of the two square-headed plugs in the sump at the base of the engine. Flush out with flushing oil (not paraffin). Make sure drain plug is replaced and tightened before refilling with fresh lubricating oil.

6. IGNITION.

Ignition is fixed. If the magneto is removed for any reason, mark the relative position of engine and magneto in order that the timing should not be altered.

The magneto is timed to spark at 22 degrees before top dead centre.

7. TO STOP ENGINE.

Turn off petrol. This will not stop engine at once since there will still be some petrol in the carburetter to be used before the engine finally receives no fuel. A little economy in petrol may be obtained by turning off the petrol a few minutes before requiring engine to stop.

To stop the engine quickly in the event of an emergency, press the Ignition Cut-out Switch on to the top of the Sparking Plug and keep pressed until the engine stops.

8. FAILURE TO START.

If after a reasonable number of trials the engine should not start, this may be due to one or more of several causes, such as :

(a) Lack of petrol through tap not being turned on or fuel supply choked, or failure to flood carburetter.

(b) Too much petrol through excessive flooding causing too rich a mixture and wet sparking plug. If so, remove and dry plug. Turn engine over smartly a few times by hand with control lever closed. This will expel excessive petrol vapour. Replace plug.

(c) Control lever open too wide. One quarter to one third is correct.

(d) Poor spark arising from dirty plug. Remove and clean plug and adjust points. Gap should be .020 in.—.022 in.

(e) No spark. Remove plug and place plug body on top of cylinder with cable attached and turn starting pulley smartly. There should be a spark at the points of the plug. If not, clean and adjust gap between points. Also check that plug cable is in good condition.

(f) Lack of petrol can sometimes result from dirty filter at junction of petrol pipe and carburetter. Remove plug No. 1 (see *Illustration on Page 24*) at top of float chamber, lift out filter gauze carefully and wash in petrol. Replace filter gauze and screw back union. Do not overtighten.

Make sure that fibre washers are replaced correctly.

If after all above items have been checked, the engine still will not start, the following examination will be required :

(g) Carburetter.

If it is suspected that foreign matter may have entered carburetter, remove screws from lid of float chamber and remove float. Then clean out float chamber and needle seat.

For more detailed instructions, see section on Carburetter Maintenance.

(h) Magneto.

If after examining sparking plug and its cable, there is still no spark, remove the flywheel cover and check magneto.

See section on Magneto Service Instructions.

(j) Cylinder Compression.

Lack of compression may be caused by :

(i) Insufficient valve clearance. There should be a clearance of .015 in. between exhaust valve stem and cam and .007 in. between inlet valve stem and cam throughout the closed period of the valves respectively.

(ii) Valves sticking. Remove valve chest cover to see if valve stems are moving their full distance as engine is turned over.

If not, remove cylinder head, clean away any foreign matter under valve head, on valve stem and free the valve.

(iii) Joint between cylinder and head of cylinder not tight. This is not likely to occur unless the cylinder head has been removed and replaced incorrectly, or replaced with a faulty gasket.

III. MAINTENANCE & REPAIRS.

1. MAGNETO DESCRIPTION.

The Flywheel Magneto produces a high spark output at low speeds for easy starting, and maintains a maximum spark output over a wide timing range.

It consists of two main parts : a FLYWHEEL and a STATOR PLATE. The Flywheel contains in its rim a permanent magnet of special alloy.

The Stator Plate contains the H.T. Coil mounted on a laminated core, the condenser and the breaker mechanism, all of which are easily accessible.

2. MAGNETO SERVICE INSTRUCTIONS.

If the engine fails to start, and there is indication that the magneto is at fault, the following procedure should be adopted.

(a) Disconnect the H.T. lead from the spark plug, and hold it about $\frac{1}{8}$ " away from some unpainted portion of the engine. Turn the engine over smartly and a spark should jump this gap.

If no spark is visible, then

(b) Remove the magneto cowling by unscrewing the cowling fixing screws, and withdrawing the cowling complete with petrol tank, after first disconnecting the petrol pipe from the carburetter.

(c) Remove the flywheel. Unscrew the hexagon nut (L.H. thread) at the end of the crankshaft and draw off the starting pulley. If the Flywheel will not withdraw easily, grasp it firmly and while attempting to pull it off,

tap the end of the crankshaft with a mallet. Be careful not to damage the thread. Make sure that there are no metallic particles inside the flywheel.

(d) Check that the H.T. cable is not broken, disconnected from the coil, or damaged in any way. Also check other wiring.

(e) Check that the contact breaker points are clean.

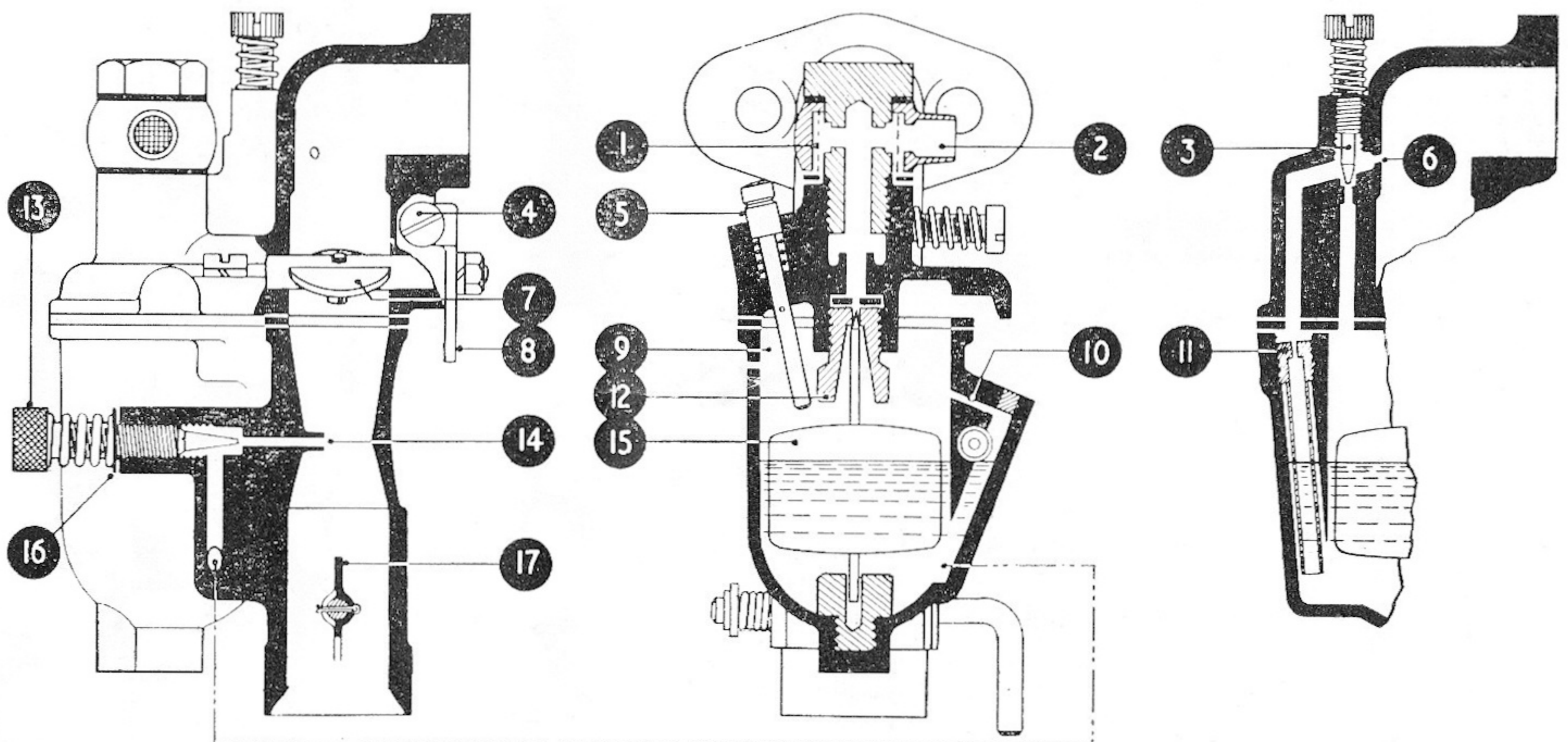
Turn the engine over until the points are fully open. Measure the opening with a feeler gauge. This opening should be .018"—.020" If the points need adjusting, loosen the large screw which locks the breaker plate and move the latter to give the correct opening by turning the small screw, which is eccentric. Then lock the large screw. Check the opening.

The breaker points setting should only be adjusted in the manner described ; at no time should the fixed contact be loosened to provide adjustment.

If either the fixed or moving points at any time need replacement, it is recommended that both be replaced at the same time.

(f) A weak or faulty condenser can be detected by badly burnt or pitted points, or a continuous blue spark across the contacts when running. A small white spark is normal. The condenser can be removed by undoing the screws holding the clamp and disconnecting the leads from it.

3. CARBURETTOR DESCRIPTION.



The 13TCA carburettor shown above has a high non-flooding angle in all directions, and consists of two principal castings. The upper portion or throttle body incorporates the right angle inlet bend and the fixing flange which is bolted directly on to the inlet port of cylinder; the lower portion consists of the float chamber (or bowl) and the air intake. The choke tube is cast integrally as part of the air intake.

Fuel Supply and Metering System.

Fuel entering the petrol elbow (2) is filtered by the gauze screen (1) and passes through needle seating (12) into the bowl (9). The combined float and needle (15) will rise and close the seating, cutting off further supplies of petrol when the correct level is reached in the bowl (it is not intended that this level should be altered). A tickler or flooder (5) is provided to enable the float to be depressed, and as a result the fuel level will be raised in order to assist starting when cold. A small overflow hole in the bowl above the normal fuel level prevents excessive flooding.

High Speed Operation.

Fuel metering at high engine speed is controlled by an adjustable main jet. The outlet of the main jet discharge tube (14) is placed at the restricted portion of the choke tube which forms part of the bowl. The main jet adjusting screw (13) has a tapered end which enters the tube (14), thus controlling

the quantity of fuel passing into the choke tube. The volume of petrol/air mixture passing into the engine is controlled by the butterfly throttle (7) which in turn is operated by the throttle lever (8). A small air-bleed hole (10) is provided in the main jet system ; air from the bowl is used for this purpose.

Idle Operation.

The slow running channel carries petrol from the combined jet and dip tube (11) to the small idling hole (6) on the engine side of the throttle. Air for slow running is taken from inside the carburetter, and is controlled by the vertical adjusting screw (3). Turning this screw clockwise enriches the slow running mixture and vice versa.

Easy Starting.

This is ensured by the air strangler or choke (17) and during very cold weather the tickler (5) can also be used. When the engine has been switched off a short period it is not usually necessary to use the choke when restarting ; it may, however, be an advantage to use the tickler in order to ensure an immediate fire when the engine is turned over.

4. CARBURETTER ADJUSTMENTS AND MAINTENANCE.

Adjusting Main Jet.

The main jet adjustment (13) is set by the engine manufacturer and should not be altered without good reason. This adjustment is always somewhat sensitive on small engines, consequently it should not be altered more than one-eighth of a complete turn until the effect of any such adjustment has been carefully noted. (The shallow notch in the head is provided only to indicate the position of the screw). Always make this adjustment with the engine under load at normal full speed with the throttle wide open. It is not satisfactory to adjust the main jet when the engine is running light on the speed governor with the throttle nearly closed. Turning the screw (13) clockwise, will reduce the fuel flow and weaken the mixture supplied to the engine. Turning it anti-clockwise will increase the flow and provide a richer mixture. **DO NOT FORCE THE SCREW INTO ITS SEATING AS THIS WILL DAMAGE THE TAPER** thereby making correct adjustment extremely difficult. If the setting is too weak it will result in lack of power and possibly overheating of the cylinder, together with poor pick up or cutting out when the load is applied. Do not attempt to operate on a very lean mixture, as better performance and fuel economy will be obtained if the mixture is set for full power. An excessively rich mixture will produce black smoke from the exhaust and may cause rapid carbon formation in the cylinder head and on the piston crown. Carbon will also quickly form on the sparking plug points, resulting in difficult starting. The head of adjusting screw (13) is drilled for a locking wire, and a small drilled lug on the bowl is provided for the other end of the wire. The washer (16) prevents fuel leaking from the head of the screw. Screw (13) should be set at about $1\frac{1}{8}$ complete turns in an anti-clockwise direction from the fully closed position.

Adjusting Idle Speed.

The throttle stop screw (4) should be turned clockwise to increase the idle speed. Conversely, turning anti-clockwise will reduce the speed at which the engine runs with the throttle in the closed position. It is usual to set the idling speed at 1000-1100 r.p.m. Smooth idling is ensured by regulating the mixture screw (3), the head of which is drilled for locking wire. In case of difficulty in obtaining satisfactory idling, make quite sure the gasket between the bowl and the barrel is in good condition and that the attachment flange on the barrel portion is perfectly flat. A thin gasket should always be used at this flange joint. Screw (3) should be set about $\frac{3}{4}$ of a complete turn in anti-clockwise direction from the fully closed position.

General.

Flooding may be caused by excessive engine vibration, dirt in the needle seating, a bent float needle, or possibly by the tickler (5) sticking down and depressing the float. Should the flooding continue after cleaning and checking the carburetter, the next step is to fit a new float and needle (15) and needle seating (12) as this part is subject to wear as a result of engine vibration. Periodically check and clean the filter gauze in the banjo fixing the petrol pipe to the carburetter. It is not intended that the petrol level should be altered.

5. CONTROL CABLE ADJUSTMENT.

The control lever is connected to the carburetter by the cable (4) which is located in the carburetter manifold by the ferrule (5). If after considerable use it is found that the cable has stretched, adjustment can be made by loosening the anchor screw (6) pulling the cable through the hole in the anchor and retightening the screw. This adjustment should be made with the control lever in the closed position and the throttle control spring (7) fully expanded.

See Illustration Page 4

6. ENGINE DISMANTLING.

1. Disconnect plug lead from sparking plug.
2. Remove sparking plug.
3. Disconnect petrol elbow from top of carburetter float chamber.
4. Remove cowl complete with petrol tank.
5. Remove air vane governor from magneto backplate and disconnect from throttle link.
6. Remove carburetter assembly at joint between inlet manifold and cylinder block.
7. Remove magneto flywheel, woodruff key, contact breaker cam, and cam spring.
8. Remove cylinder head and cylinder cowl.
9. Remove magneto stator plate, drawing plug lead through rubber grommet in magneto backplate.
10. Remove engine sump.
11. Remove big end setscrews, locking strip, oil splasher, and big end bearing cap.
12. Remove piston and connecting rod complete by drawing upwards through cylinder.
13. Remove rings from piston, one circlip and gudgeon pin.
14. Remove magneto backplate.
15. Remove crankshaft.
16. Remove valve chest cover, breather retaining spring and crankcase breather.
17. Compress valve springs and remove cotter pins.
18. Remove camshaft by tapping out camshaft spindle TOWARDS magneto end of engine with a brass drift.
19. Remove tappets.

TO RE-ASSEMBLE, REVERSE THE ABOVE PROCEDURE.

ENGINE SPARE PARTS LIST.
Parts Common to Models 1a and 1b

Ref. No.	Description.	Part No.	No. per set.
1.	Cylinder Head	E.3507	1
2.	Washer for Cylinder Head	93514	6
3.	Set-Screws for Cylinder Head	96100	6
4.	Cylinder Head Gasket	E.3546	1
5.	Cut-out Switch (not illustrated)	E.3969	1
6.	Spark Plug... ..	E.3808	1
7.	Washer for Spark Plug	E.3809	1
8.	Piston	E.3513	1
9.	Gudgeon Pin	E.3517	1
10.	Wire Circlips	E.3518	2
11.	Compression Ring	E.3514	1
12.	Scraper Ring	E.3515	1
13.	Oil Ring	E.3516	1
14.	Cylinder Block	E.3506	1
15.	Valve Seat Insert—Exhaust	E.3534	1
16.	Exhaust Valve Guide	E.3532	1
17.	Inlet Valve Guide	E.3533	1
18.	Inlet Valve and Exhaust Valve	E.3526	2
19.	Valve Spring Cotter Pin... ..	E.3531	2
20.	Inlet Valve Spring	E.3529	1
21.	Exhaust Valve Spring	E.3528	1
22.	Valve Spring Retainer	E.3968	2
23.	Cylinder Cowl	E.3562	1
24.	Paper Gasket for Flywheel Magneto Backplate	E.3859	2
25.	Camshaft Spindle	E.3525	1
26.	Camshaft Spindle Retaining Plug	E.3559	1
27.	Crankshaft	E.3524	1
28.	Key for Magneto Flywheel	E.3597	1
29.	Washer for Crankshaft	93515	1
30.	Nut for Crankshaft (left-hand thread)	93401	1
31.	Cam Spring (see Magneto)	E.5052	1
32.	Main Bearing	E.3536	2
33.	Oil Seal	E.3813	2
34.	Breather Baffle	E.3561	1
35.	Drive Screw for Breather Baffle	E.3814	1
36.	Tappets	E.3535	2
37.	Camshaft	E.3510	1
38.	Washer for Crankcase Breather	E.3594	1
39.	Body	E.3555	1
40.	Disc Valve	E.3557	1
41.	Breather Cap	E.3556	1
42.	Breather Retainer Spring	E.3558	1
43.	Stud for Valve Chest Cover	E.3544	1
44.	Baffle for Valve Chest Cover	E.3560	1
45.	Gasket for Valve Chest Cover	E.3549	1
46.	Cover for Valve Chest	E.3543	1
47.	Washer for Stud	93513	1
48.	Nut for Stud	93013	1
49.	Connecting Rod	E.3520	1
50.	Big End Bearing Cap	E.3521	1
51.	Oil Splasher	E.3522	1
52.	Locking Strip	E.3523	1
53.	Screws for Big End Bearing Cap	94111	2
54.	Sump Casting	E.3509	1
55.	Paper Gasket for Sump	E.3547	1
56.	Washer for Bolt—Asbestos	E.3749	1
57.	Collar for Bolt	E.3566	1
58.	Bolt for Sumps	91312	1
59.	Dowels for Sump	E.3819	2
60.	Setscrew for Sump	94113	1
61.	Washer for Setscrew and Bolt	E.3821	2

Ref. No.	Description.	Part No.	No. per set.
62.	Drain Plug... ..	E.3822	1
62a.	Filler Plug	E.4276	1
62b.	Dip Stick for Filler Plug (not illustrated)	E.4275	1
63.	Flywheel Magneto Backplate	E.3508	1
64.	Screw for Fixing Fan Governor Brackets	95259	2
64a.	Washer for Fixing Fan Governor Brackets	93510	2
65.	Screw for Flywheel Magneto Cowl ...	96039	2
66.	Washer for Flywheel Magneto Cowl ...	93513	2
67.	Grommet	E.3826	1
68.	Screw for Flywheel Magneto Backplate	94075	4
69.	Washer for Flywheel Magneto Backplate	E.3828	4
70.	Cam—Contact Breaker	See Magneto	1
71.	Flywheel		1
72.	Starter Pulley	E.3552	1
73.	Flywheel Magneto Cowl	E.3553	1
75.	Pressed Steel Screw Cap	E.3589	1
76.	Washer for Petrol Tap	E.3829	1
77.	Petrol Tap	E.3593	1
78.	Nut for Fixing Screw—Tank	NT/D.086	3
79.	Washer—for Tank	93513	3
80.	Fixing Screw for Tank	94513	3
81.	Inlet Manifold	E.3511	1
82.	Stud for Throttle Lever	E.3565	1
83.	Nut for Throttle Lever	NP/U.106	1
84a.	Washer for Throttle Lever	93510	1
85.	Throttle Lever	E.3564	1
86.	Screw for Throttle Lever	95278	1
87.	Gasket for Inlet Manifold	E.3551	1
88.	Screw for Carburetter Assembly ...	93402	2
88a.	Screw for Inlet Manifold (not illustrated)	96075	2
89.	Spring Washer for Inlet Manifold and Carburetter Assembly	93713	4
90.	Carburetter	E.5416	1
91.	Gasket for Carburetter	E.3550	1
93.	Securing Clip for Air Cleaner ...	E.3581	1
94.	Screw for Securing Clip	95275	1
95.	Nut for Securing Clip	93231	1
96.	Air Cleaner Assembly	E.3570	1
97.	Fan Governor and Governor Blade Assembly	E.3538	1
98.	Throttle Link	E.3545	1
99.	Governor Spring	E.3964	1
100.	Elbow for Exhaust Silencer	E.3567	1
101.	Exhaust Silencer	E.4000	1
102.	Lock Nut for Exhaust Elbow	E.3568	1
103.	Starter Rope (not illustrated)	L.3620	1
106.	Control Lever (not illustrated) ...	E.3686	1
108.	Petrol Elbow (not illustrated) ...	E.5417	1

NOTE—On some models, Exhaust Elbow, Ref. No 100 is incorporated with the silencer

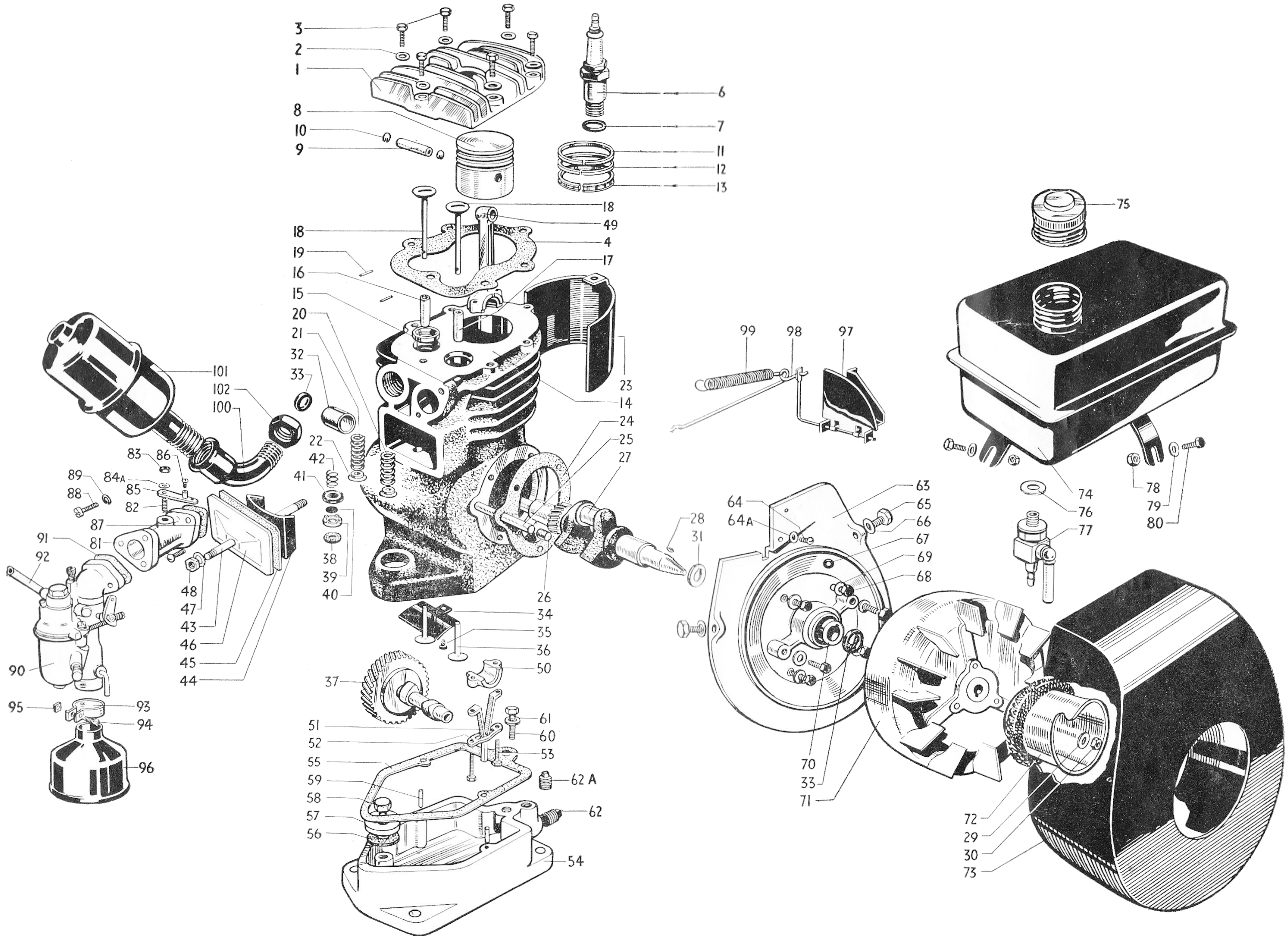
Parts peculiar to Model 1a

74.	Petrol Tank	E.3805	1
92.	Petrol Tube (not illustrated)	E.3693	1
107.	Cable (not illustrated)	E.3853	1

Parts peculiar to Model 1b

74.	Petrol Tank	E.4046	1
92.	Petrol Tube (not illustrated)	E.4061	1
104.	Elbow for Air Cleaner (not illustrated)	E.4136	1
105.	Screw for Elbow for Air Cleaner (not illustrated)	E.4137	1
107.	Cable (not illustrated)	E.4132	1

Engine Assembly Illustration

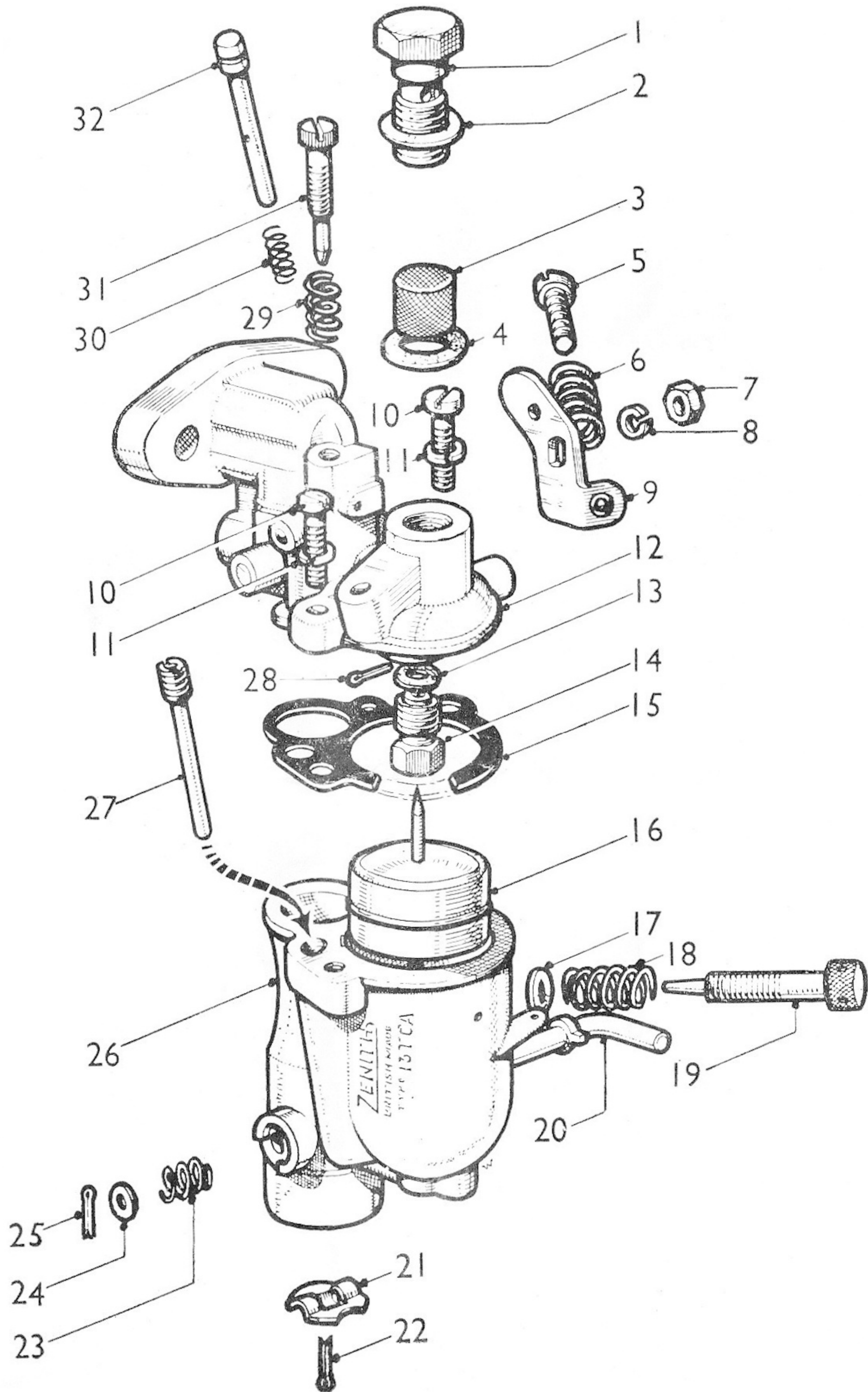


SPARE PARTS LIST FOR ZENITH CARBURETTER.
TYPE 13.TCA. C1433C.

Ref. No.	Description.	Part No.
1.	Plug for Petrol Elbow	013891
2.	Washer for Ref. No. 1	11007
3.	Filter Gauze	013893
4.	Washer for Ref. No. 1	11007
5.	Throttle Stop Screw	015547
6.	Spring for Ref. No. 5	08539
7.	Nut fixing Throttle Lever	P-16639
8.	Spring Washer for Ref. No. 7	04692
9.	Throttle Lever	015824
10.	Screw fixing Bowl to Barrel (2 off)	07967
11.	Spring Washer for Ref. No. 10 (2 off)	015536
12.	Carburetter Barrel (assembled with Throttle, Throttle Spindle, Throttle Lever and Tickler)	017075
13.	Washer for Needle Seating	08523
14.	Needle and Seating	016465
15.	Gasket (Bowl to Barrel)	015532
16.	Float and Needle Assembly	016620
17.	Washer for Adjustment Needle	16709
18.	Spring for Adjustment Needle	09846
19.	Adjustment Needle	013637
20.	Strangler Spindle	015530
21.	Strangler Flap	013635
22.	Split Pin fixing Ref. No. 21	05370
23.	Friction Spring	013650
24.	Retaining Washer for Ref. No. 23	08860
25.	Split Pin	05370
26.	Carburetter Bowl	017042
27.	Slow Running Tube	015461
28.	Split Pin for Tickler	05890
29.	Spring for Air-regulating Screw	015458
30.	Spring for Tickler	015454
31.	Air-regulating Screw	015457
32.	Tickler Stem	016469

This list to be read in conjunction with
EXPLODED ILLUSTRATION OF CARBURETTER on Page 24

Carburettor Illustration

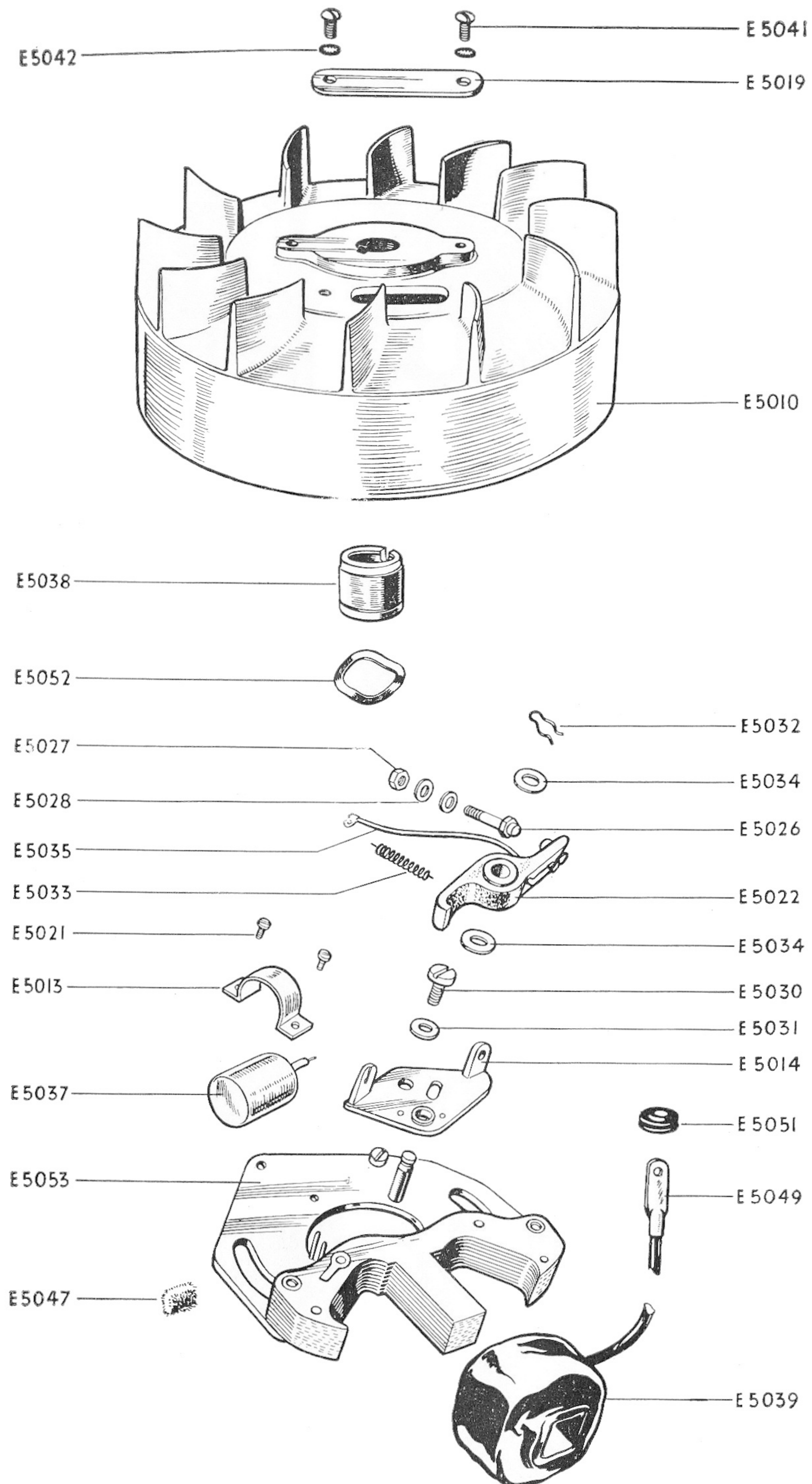


MAGNETO SPARE PARTS LIST

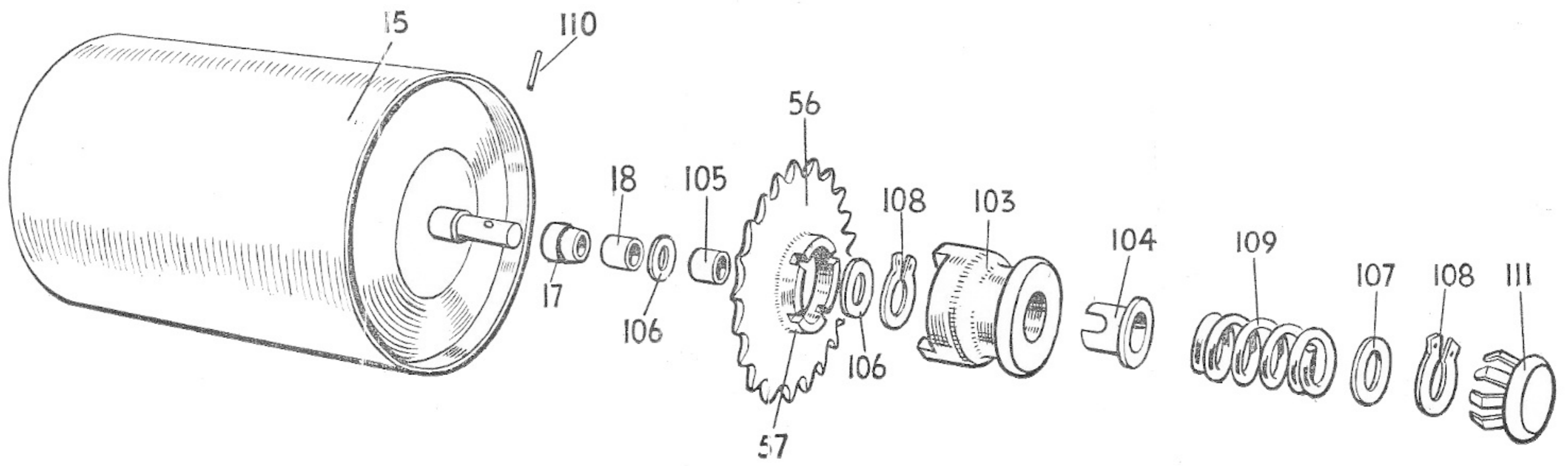
Part No.	Description	No. per Set
E5010	Flywheel	1
E5013	Clip for condenser	1
E5014	Adjuster Plate	1
E5019	Inspection Cover	1
E5020	Eccentric Rivet	1
E5021	Screw for Condenser Clip	2
E5022	Breaker Arm and Contact	1
E5026	Contact Point and Bolt	1
E5027	Nut for E5026	1
E5028	Washer for E5026	2
E5030	Screw, Locking Adjusting Plate	1
E5031	Washer for E5030	1
E5032	Spring Retainer	1
E5033	Breaker Spring	1
E5034	Washer	2
E5035	Wire and Sleeving	1
E5037	Condenser	1
E5038	Cam Sleeve	1
E5039	Coil	1
E5041	Screw for E5019	2
E5042	Washer for E5041	2
E5047	Pad—Lubricating	1
E5049	Lead—High Tension	1
E5051	Grommet Rubber	1
E5052	Wave Washer	1
E5053	Stator Assembly	1

This list to be read in conjunction with
MAGNETO ASSEMBLY ILLUSTRATION on Page 26

Magneto Assembly Illustration



Dual Drive Assembly Illustration



14" PUNCH

When ordering spare Cutting Cylinders please note the following amendments to the Spare Parts List:

<u>Ref. No.</u>	<u>Description.</u>	<u>Part No.</u>	<u>No. Per Set.</u>
28	Cylinder	L.5873	1

All other items as listed.

RS.3704.

