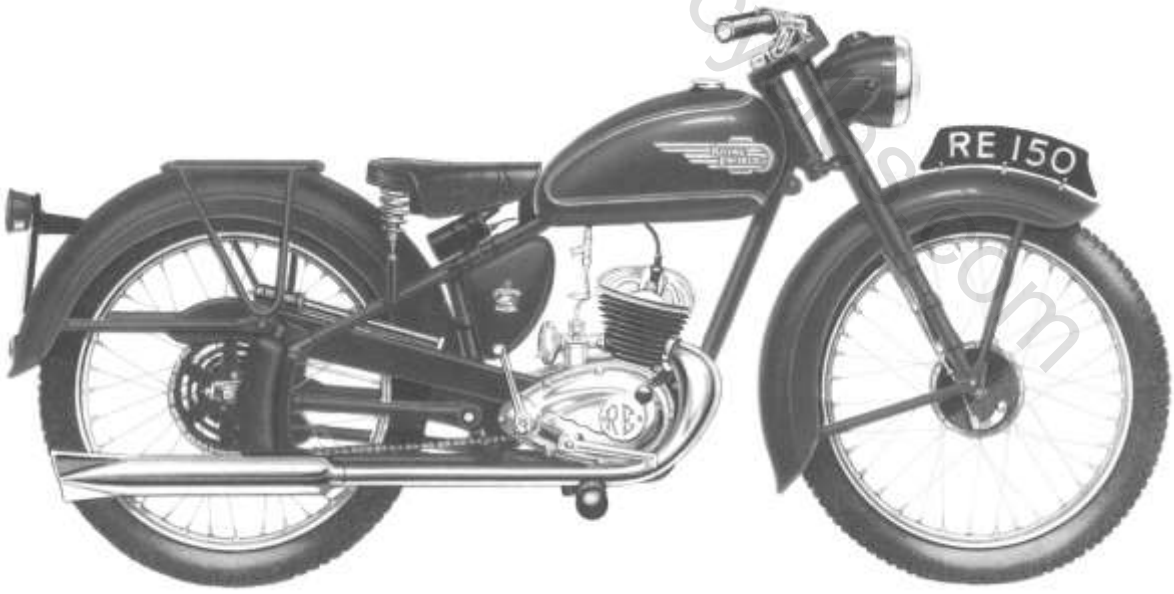
WORKSHOP
MAINTENANCE MANUAL
FOR THE

Royal Enfield

148cc ENSIGN I, II and III
and
148cc PRINCE
Including AIRFLOW Models



MAN 2

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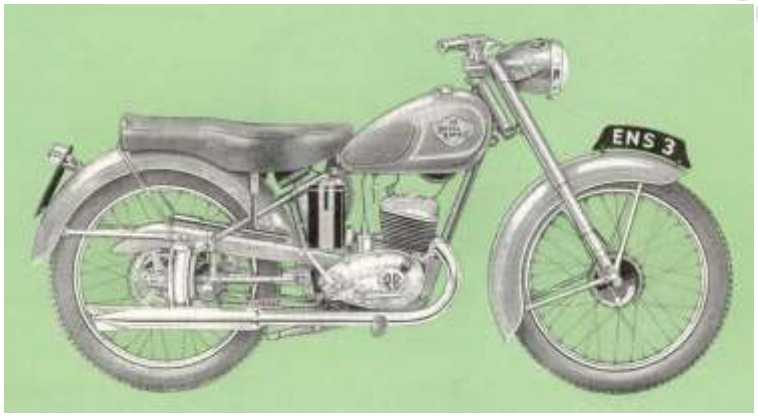
LIST OF ILLUSTRATIONS

ROYAL ENFIELD "ENSIGN I, II, III" AND "PRINCE"

1954 150cc ENSIGN

1956 150cc ENSIGN II

1959 150cc ENSIGN III



1959 150cc PRINCE

TECHNICAL DATA

ENGINE.

Cubic Capacity	148 c.c.
Stroke	60 m.m.
Bore	56 m.m.
Compression ratio	6½ to 1
Piston Dia. — Bottom of Skirt — Fore and Aft	2·2009 ins.—2·1999 ins.
Piston Dia. — Bottom of Skirt — Sides	2·1969 ins.—2·1959 ins.
Piston Dia. — Top of Skirt— Fore and Aft	2·1989 ins.—2·1997 ins.
Piston Dia. — Top of Skirt— Sides	2·1939 ins.—2·1929 ins.
Piston Dia. — Top of Skirt— Middle Land	2·1906 ins.—2·1886 ins.
Piston Dia. — Top of Skirt— Top Land	2·1859 ins.—2·1839 ins.
Piston Ring Dimensions, "Ensign I"— Width	⅛ in.
Radial Thickness	·084 in.
Gap in Unworn Cylinder	·012 in.—·008 in.
Clearance in Grooves	·004 in.—·002 in.
Oversize Piston and Rings available	·015 in. and ·030 in.
Piston Ring Dimensions, "Ensign II, III" and "Prince"— Width	·124 in. / ·123 in.
Radial Thickness	·086 in.—·0816 in.
Gap in Unworn Cylinder	·012 in.—·008 in.
Clearance in Grooves	·005 in.—·002 in.
Oversize Piston and Rings available	·010 in., ·020 in., ·030 in., and ·040 in.
Piston Boss, Internal Diameter	·4960 in.—4958 in.
Gudgeon Pin Diameter	·4960 in.—4958 in.
Small End Bush, Internal Diameter (fine bored or reamered, after fitting)	·4970 in.—·4965 in.
Big End, Internal Diameter	1·2238 ins.—1·2234 ins.
Crankpin Diameter (centre portion)	·7238 in.—·7234 in.
Roller Diameter	·2496 in.—·2495 in.
Crankcase (Crankshaft) Bearings— Internal Diameter 20 m.m. / External Diameter 47 m.m. / Width 14 m.m.	S.K.F. 6204

TRANSMISSION.

Sprockets—Engine	14 T. × ⅜ in. P. × ·210 in. W.
Primary (Driven)	29 T. × ⅜ in. P. × ·210 in. W.
Final Drive	14 T. × ½ in. P. × ·189 in. W.
Rear Wheel	47 T. × ½ in. P. × ·189 in. W.
Chains—Front (Renolds No. 110038) 46 pitches (Endless);	⅜ in. P. × ·225 in. W. × 2·50 in. roller dia.
Rear (Renolds No. 110044), 111 pitches,	½ in. P. × ·205 in. W. × ·335 in. roller dia.
Chain Adjustment—Front	¾ in. (to ⅞ in.) slack.
Chain Adjustment—Rear	½ in. slack at tightest spot.
Gear Ratios— First	20·35 to 1
Gear Ratios— Second	11·75 to 1
Gear Ratios— Top	6·95 to 1
Gearbox Ball Bearings. All models— Large—Internal Diameter 20 m.m. / External Diameter 47 m.m. / Width 14 m.m.	S.K.F.6204
Small. All models except "Prince"— Internal Diameter 12 m.m. / External Diameter 37 m.m. / Width 12 m.m.	S.K.F.6301
Small. "Prince"— Internal Diameter 15 m.m. / External Diameter 42 m.m. / Width 13 m.m.	S.K.F.6302
Gearbox, Layshaft Bushes, Internal Diameter (reamered after fitting)	·5005 in.—·5000 in.
Gearbox, Kickstarter Spindle Bush, Internal Diameter (reamered after fitting)	·751 in.—·750 in.

FRAME AND WHEELS.

Wheel Hub Bearings. (All "Ensigns" front and rear, and "Prince" front wheel)— Internal Diameter 10 m.m. / External Diameter 30 m.m. / Width 9 m.m.	S.K.F.6200
"Prince" rear wheel— Internal Diameter 12 m.m. / External Diameter 32 m.m. / Width 10 m.m.	S.K.F.6201

(Front and rear rims are interchangeable.)

Wheel Spokes— Front, brake side	7⅞ in. long.
Front, other side	8¼ in. long (7¼ in. "Prince.")
Rear, brake side	7¼ in. long (all models).
Rear, other side	8¾ in. long (7⅞ in. "Prince").
Front spokes	12g. screwed, ·115 in. dia. × 56 T.P.I.
Rear spokes	10g.—12g. butted, screwed, ·115 in. dia. × 56 T.P.I.

(Spoke lengths measured from under bed into head to the end of the thread.)

Brake Linings—Front and Rear	5 ins. dia. × 1 in. wide. Material, "Ferodo" MR. 41.
Steering Head Balls—	$\frac{5}{16}$ in. dia., 44 to set (22 in each race).

CARBURETTOR.

Type and Number	Amal type, 223/6
Jet Sizes, Main	100
Needle	107
Taper Needle Position	Clip in No. 3 groove.

IGNITION.

Contact Breaker, Maximum Opening	·015 in.
Ignition Setting	$\frac{1}{32}$ in.—$\frac{7}{32}$ in. before t.d.c. 32° advance.
Sparking Plug—Size	14 m.m. × ½ in. reach.
Sparking Plug—Type	Lodge CN (Champion J.8 or K.L.G. F.20).
Sparking Plug—Gap Setting	·015 in.—·018 in.

GENERAL.

Petrol Tank Capacity (gallons)	"Ensign," 2, "Prince," 3.
Petrol—Oil Mixture	24—1. (2 measures oil to each gallon of petrol).
Gear Box Capacity	½ pint.
Chain Case Capacity	⅛ pint.

All Nuts on these Machines have R.H. Threads.

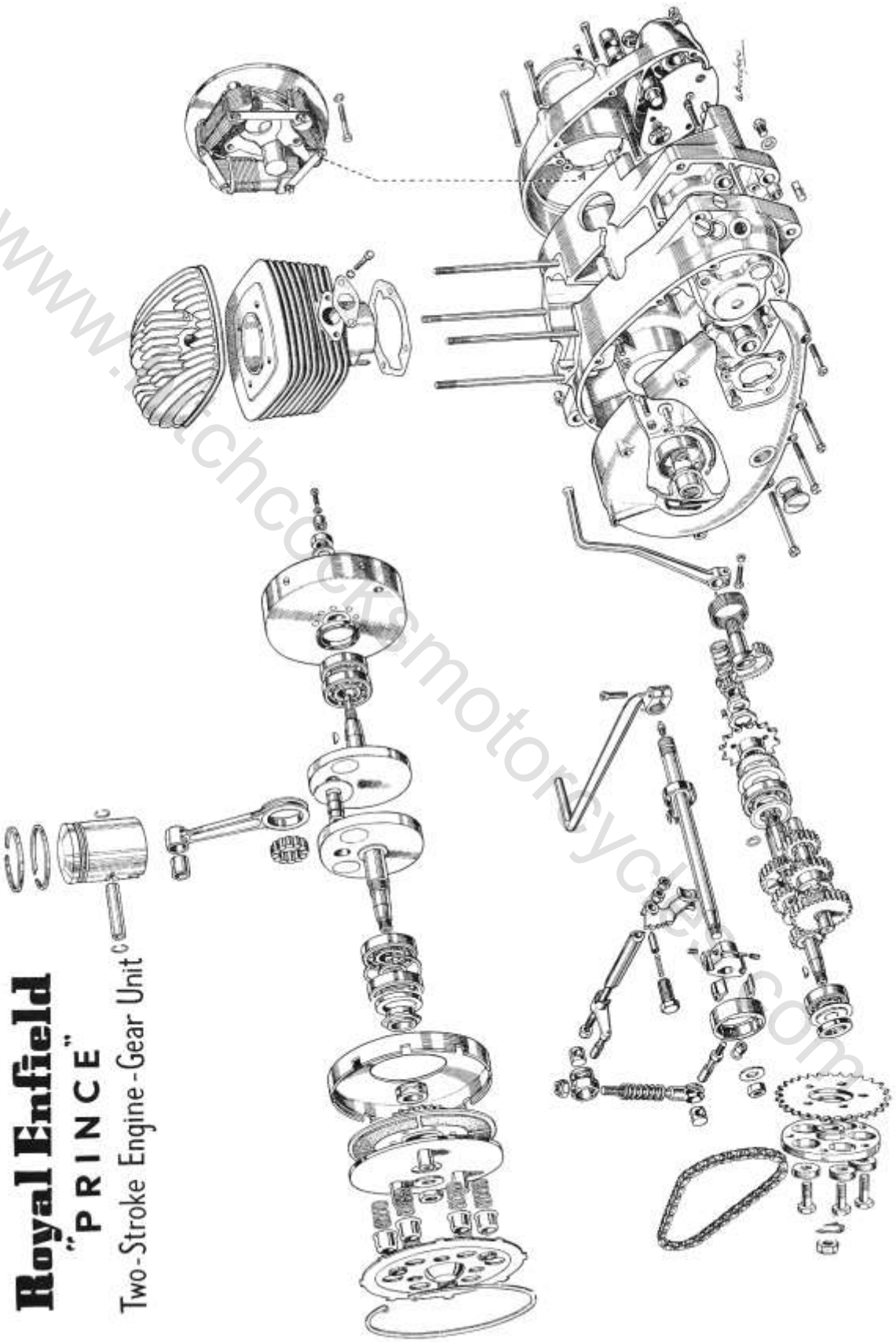


Fig. 1

ENGINE

1. DECARBONISING.

Decarbonising will be necessary at more frequent intervals than is the case with engines of larger capacities, and to obtain best results it is advisable to carry out this operation after every 2,000 – 4,000 miles. On the other hand, the amount of work involved is much less than with a 4-stroke engine.

REMOVING DECOMPRESSOR LEVER.

Fig. 2

Before removing the cylinder, remove the exhaust pipe and silencer and disconnect the petrol pipe from the tank. Unscrew the knurled ring at the top of the carburettor body and withdraw the carburettor slides. The carburettor may now be removed by taking out the two pins that secure it to the cylinder. Detach the release valve cable from the handlebar (Fig.2) and unscrew the valve from the cylinder head. Remove the H.T cable and unscrew the sparking plug. Remove front tank bolt and lift the front of the tank.

The cylinder and head may now be removed by unscrewing the four cylinder head nuts. If the cylinder head has become stuck remove the cylinder and head together, when the joint may be broken with a sharp rap on the inside of the head with the head of a hammer.

To remove the piston, first remove the wire circlip from one end of the bearing hole and push out the gudgeon pin from the other end. If tight, tap out gently with a hammer and drift, taking great care to support the piston firmly in order to prevent bending the connecting rod.

Since the "Ensign III" and "Prince" have no release valve, this instruction does not apply to these models and all subsequent reference to the Decompressor in this book may be disregarded when dealing with these two machines.

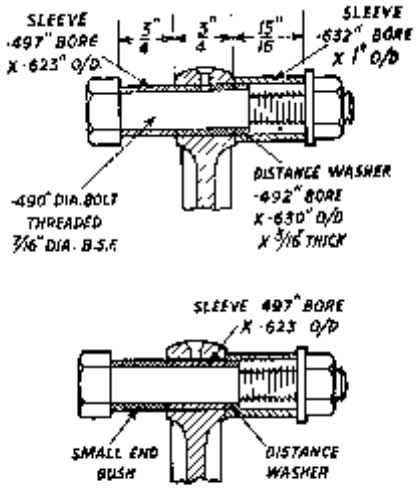
1. Removal of Carbon.

When scraping away carbon from the cylinder head and piston, work very carefully to avoid damage to the metal surfaces , bearing in mind that they are of comparatively soft aluminium alloy. Be particularly careful with the piston ring grooves, which must on no account be burred over or chipped. Do not omit to scrape away the carbon from the inside of the piston above the top ring only. The exhaust and transfer ports in the cylinder must also be scraped clear of carbon.

The silencer will also require decarbonising. This can be done by holding a piece of 3/8" diam. Steel rod about 15" long in a vice, threading the silencer over it and working it about so as to clear away the carbon from the ½" centre holes in the baffles. An alternative method of treating the silencer and exhaust pipe is to swill them in a solution of potash, using a solution of 4oz of commercial potash to one gallon of water.

3. Big End Bearing.

Before reassembling the piston, examine the condition of the big end bearing. This consists of a single row of ¼" diameter rollers ½" wide. Owing to the narrowness of the bearing, the slightest trace of wear will result in a considerable amount of sideplay in the connecting rod. If, however, a definite up and down play can be detected, the engine should be dismantled for a replacement bearing.



REMOVING AND REPLACING SMALL END BUSH.

Fig. 3

4. Small End Bearing.

The gudgeon pin should be a push fit in the piston when cold, and a free working fit (.001" clearance) in the small end bush can be removed if worn without removal of the engine from the frame, by using a draw bolt, as shown in Fig.3. both for extracting and for fitting the new. After fitting, the bush must be reamered to suit the gudgeon pin, and an oil hole drilled, using the hole in the top on the connecting rod as a guide.

PISTON RING GAPS AND STOPS.

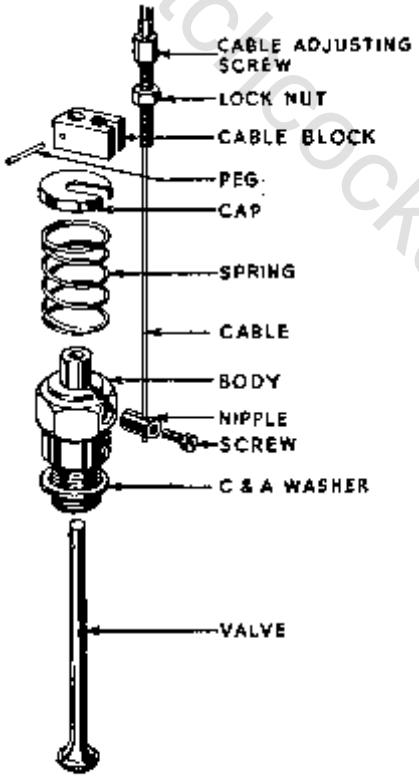
Fig. 4

5. Reassembly of Piston.

If the piston rings are in good condition they may be replaced, taking care to fit them in their original grooves and the tight way up, as indicated by the recess provided for the locating pegs (Fig.4) If, however, the rings show black or brown marks on their working surface, or if their gaps when in position

in the barrel are more than ¼" , new rings should be fitted. The correct gap for new rings is .008" - .012" The gap should be measured in the least worn part of the cylinder which will be found at the extreme top or bottom.

The original bore of the cylinder is 2.20475" - 2.20425". If wear at any point exceeds .008" - .010" the cylinder should be rebored and an oversize piston fitted. Pistons are available 0.15" and 0.30" oversize. The original diameter of the piston measured fore and aft is 2.2009" – 2.1999" at the bottom and 2.1989"-2.1933" at the top of the skirt. The diameter measured on the side is .004" less. The original clearance between the rings and the grooves is .002" - .004" If the piston skirt or the ring grooves show more than .005" wear the piston should be replaced. When replacing the piston, use new circlips to retain the gudgeon pin and see that each piston ring is free in its groove. Take care to fit the piston the right way round i.e., with the cut – away in each side of the skirt registering with the transfer openings in the crankcase.



EXPLODED VIEW OF DECOMPRESSOR

Fig. 6

6. Decompressor.

If the decompressor valves hold compression and operate freely, there is no need to interfere with it except to remove the carbon from the head of the valve. If the valve is leaking it will be necessary to re-grind it on its seat. This can be done without completely dismantling it, as follows. Having disconnected the control wire from the handlebar, unscrew the decompressor from the cylinder head. Compress the spring with the fingers and remove the spring cap. Now unscrew the adjustable screw and locknut from the cable block and pull the cable sideways out of the block. Push the spring upwards and pull the cable nipple out of the body. Note that this nipple is not of the solderless type, the screw in it being merely an added security in case the heat of the engine softens the solder. It will now be found possible to thread the wire and nipple through the spring, leaving the decompressor body and spring detached from the control cable.

The spring cap should now be replaced. The valve may be ground in by applying a thin coating of grinding paste on the seat of the valve and twisting it to and fro by means of the cable block at its upper end and occasionally lifting the valve from its seat. Do not rotate the valve through a complete revolution before lifting, as this will groove the seat. After grinding in wash the whole assembly thoroughly with clean petrol, opening and shutting the valve with the fingers while doing so. Make sure that all trace of grinding paste has been removed. If the paste should get into the cylinder, serious damage would be caused. If the valve shows a tendency to stick open in the body but other wise is satisfactory, this can usually be cured by washing in petrol, though in this case it will not be necessary to disconnect the control cable.

If the valve is badly burnt or bent it must be replaced. To do this the decompressor must be further dismantled by removing the small mills peg from the cable block. This will also be found necessary in order to renew the spring.

7. Reassembling Engine after Decarbonising.

When reassembling the engine see that all parts are perfectly clean, and put clean oil round the piston, particularly round the rings. A cylinder base joint must be made of paper. If the old paper washer has adhered to the face, all traces must be removed, as it is most important that a perfect gas seal is obtained at this point. Take care that the piston rings are correctly assembled in the position as shown in Fig.4.

If the cylinder head has been removed, make sure that the joint surfaces are perfectly clean and free from burrs or other marks which may cause a leak. Remake the joint with gold size shellac or similar compound. If any trouble is experienced in making a satisfactory joint the faces should be lapped together, using a fine valve paste and taking care to remove all traces of lapping compound before replacing the cylinder head. Do not omit the washers beneath the cylinder head nuts. Tighten down the cylinder head nuts diagonally, in order to obtain a uniform pressure, and check for tightness when the engine is warm.

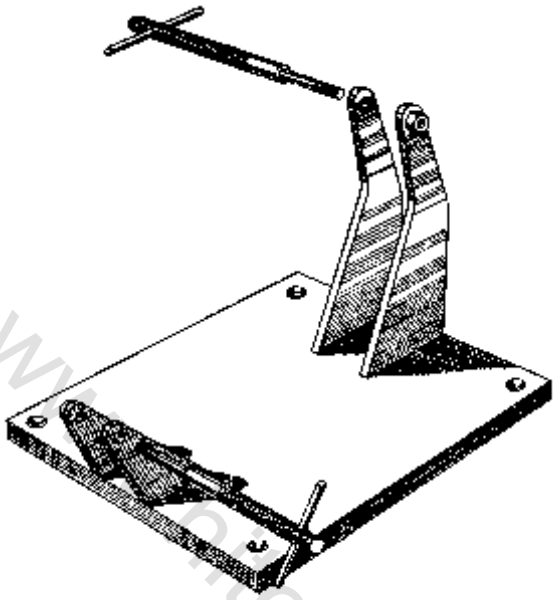
Refit and adjust the decompressor cable.

COMPLETE OVERHAUL.

7. Removal of Engine from Frame.

To remove the engine from the frame, first remove the carburettor, then disconnect the exhaust pipe and remove the decompressor cable from the handlebar. Remove rear chainguard. Disconnect the rear chain by means of spring link fastener and remove the chain. Disconnect clutch control cable from handlebar. Unscrew the nuts from four bolts securing the engine

and withdraw the bolts. The engine may now be lifted out of the frame.

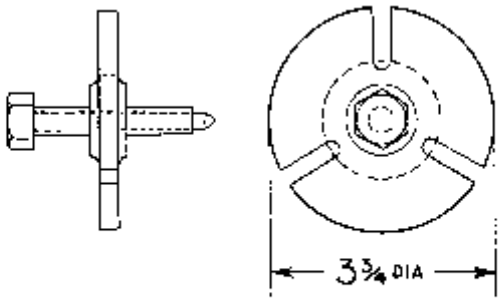


FIXTURE FOR HOLDING ENGINE.
Fig. 6

9. Dismantling Crankcase.

Owing to the unit construction of the engine it is impossible to dismantle the crankcase without disturbing the gears. The following description, however, assumes that the gearbox is in order and that the unit is being opened to attend to the engine. (The gearbox will be dealt with in a subsequent paragraph.) it will be found a great convenience to hold the engine in a fixture, such as shown in Fig.6. First remove the cylinder head, cylinder and piston, as described in section 1. Now remove the primary chain cover by unscrewing the nine attachment screws. A tray should be placed under the engine to catch the oil which should run out.

Owing to the primary chaincase being endless, it will be found necessary to remove the clutch and countershaft sprocket simultaneously. To do this proceed as follows:

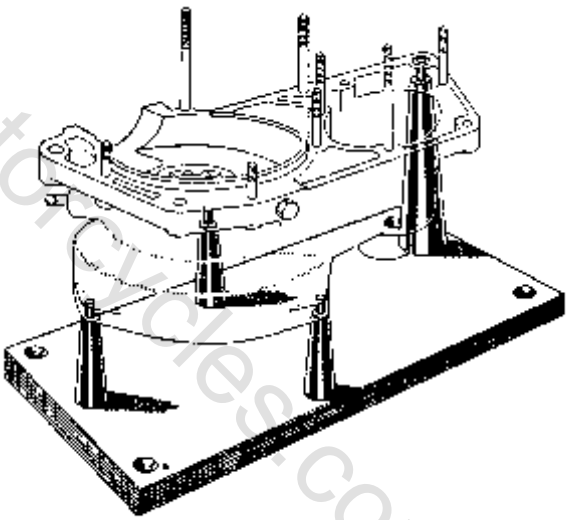


CLUTCH DRIVING PLATE EXTRACTOR.
Fig. 7

Depress pressure place of clutch, using tool shown in Fig.6. Remove large circlip. This will permit the withdrawal of the pressure plate, together with the six springs and thimbles. Remove nut securing driving plate and, using extractor (Fig.7.) and three screws, release driving plate from taper on mainshaft. Remove countershaft sprocket nut and release from taper, using extractor (Fig.8) The primary chain , together with the countershaft sprocket and remaining clutch parts may now be removed. Remove woodruff key from gear shaft.

COUNTERSHAFT SPROCKET NUT EXTRACTOR.
Fig. 8

Next remove the foot change mechanism from its shaft. To do this, first remove the hexagon nut on the end of the gear change shaft, and the three screws which secure the outer plate. A sharp tap with a lead or hide hammer on the end of the shaft will free the pawl block from the taper end of the shaft. Remove the pawl block and ratchet ring, also the key from the taper. Remove driving shaft nut and gear indexing plunger.

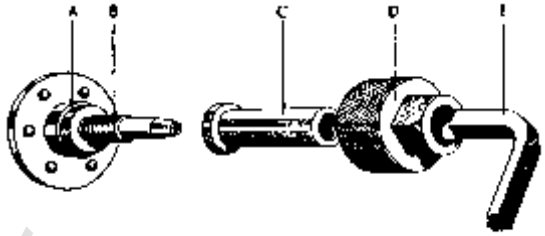


FIXTURE FOR HOLDING CRANKCASE.
Fig. 9

In order to deal with the flywheel side of the engine, the crankcase should now be placed on a fixture, as shown in Fig.9.

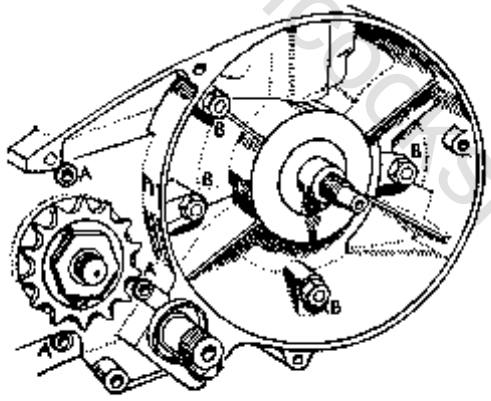
Remove the foot change lever from the shaft. Unscrew five cover screws and one nut (at the rear) and remove the flywheel cover, complete with the kick starter mechanism. Now remove the contact breaker cam from the spindle. An extractor thread is provided in the cam. Having unscrewed the security screw it will be found that by inserting a 5/16" B.S.F screw into this thread the cam can be readily removed.

Now unscrew the flywheel retaining nut and extract the flywheel, using extractor shown in Fig.10. Remove key. Unscrew kickstart ratchet from gearbox mainshaft.



MAGNETO FLYWHEEL EXTRACTOR.
Fig. 10

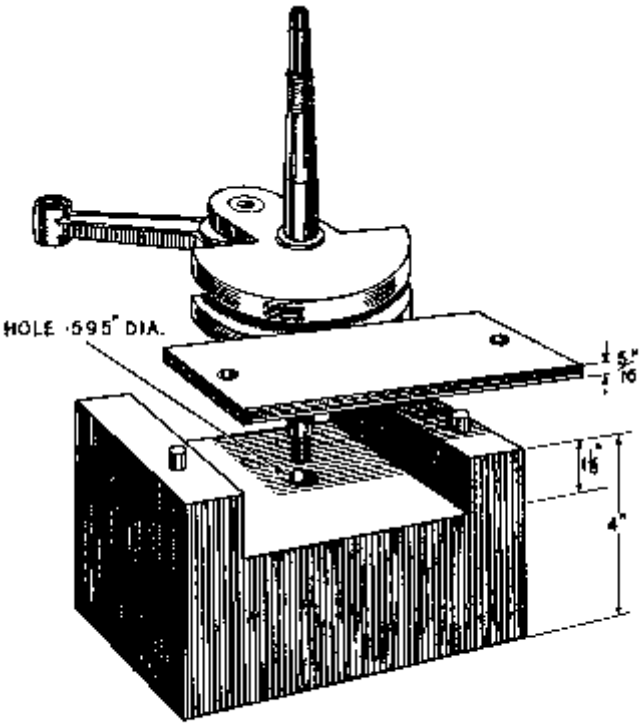
Referring now to Fig.11. It will be necessary to remove the three Allen screws marked A, and the four nuts marked B, and the case is ready for parting.
Tap the underside of one of the cylinder studs in the upper half of the case gently to break the crankcase joint and lift the upper half of the case away, leaving the gearbox shaft, gear wheels and crankshaft in the lower half. The crankshaft may now be withdrawn.



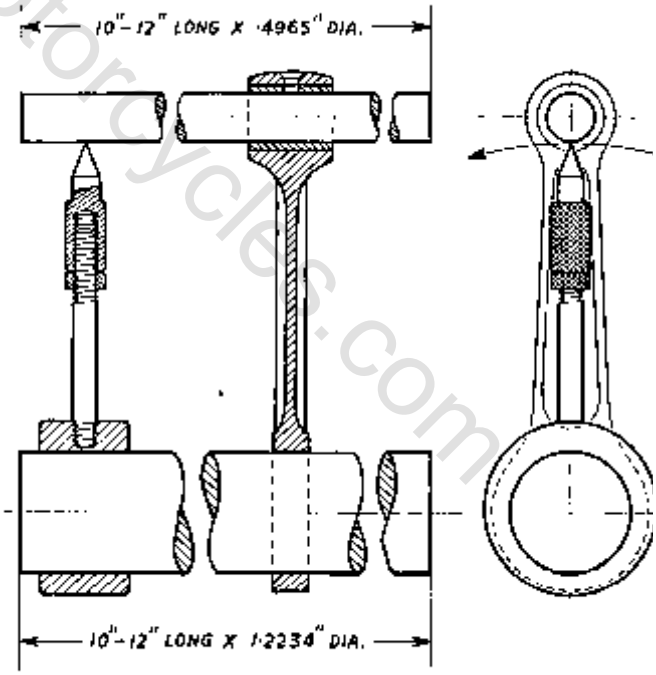
EXPOSING GEAR MECHANISM, CRANKSHAFT AND ENGINE BEARINGS.
Fig. 11

10. Dismantling the Crankshaft.
The crank webs are a press fit on the crank pin and a special fixture is desirable to hold the crankshaft when pressing the pin out of the first crank web, as it is impossible to support the crank web immediately below the point of application of pressure. A suitable fixture is shown in Fig.12.
This fixture may be used for "Ensign III" and "Prince," but it will be noticed that the crank discs are fully circular instead of being bob weights as in other "Ensign" models.

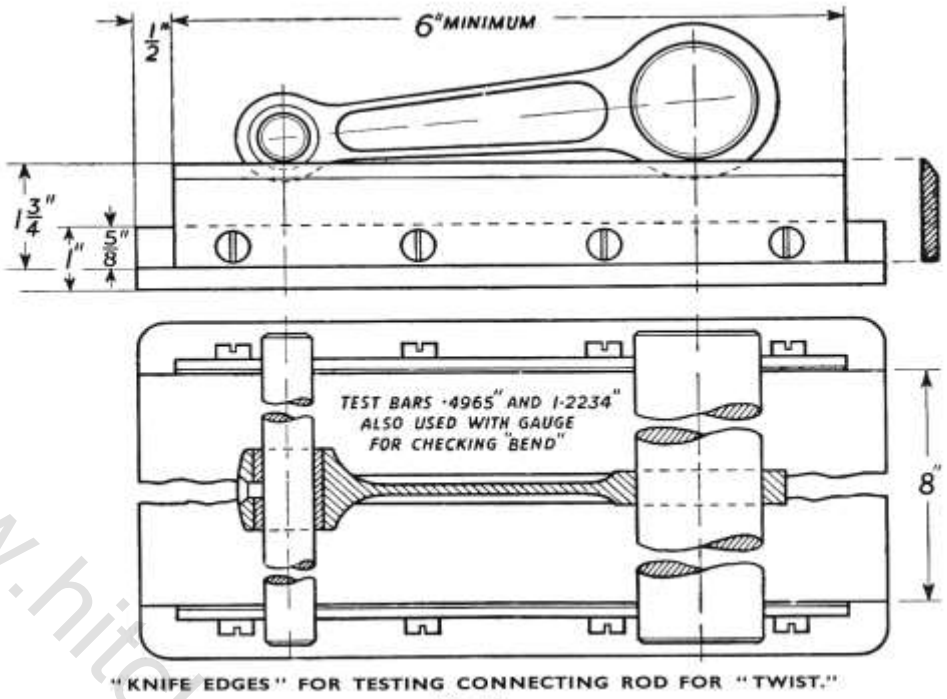
11. Connecting Rod.
The original bore of the big end of the connecting rod is 1.2236", and that of the small end bush .497". If the roller track of the big end is worn it will be necessary to replace the complete rod. If the small end bush is worn in may be pressed out and a new one fitted (Section 4). Before reassembly, check the connecting rod for Bend or twist, using fixtures as shown in fig 13



FIXTURE FOR SEPARATING CRANKSHAFTS
Fig. 12



TEST BARS AND GAUGE FOR CHECKING CONNECTING ROD FOR "BEND."
Fig. 13

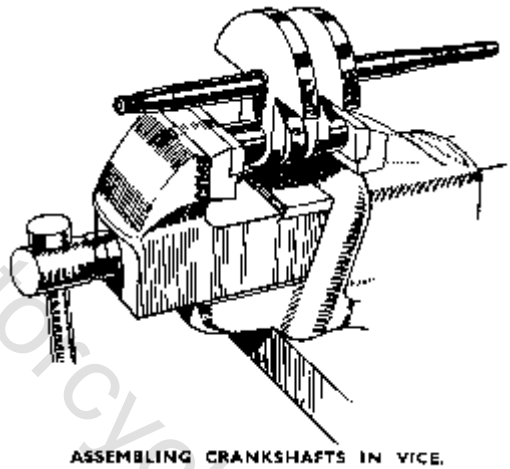


"KNIFE EDGES" FOR TESTING CONNECTING ROD FOR "TWIST."
Fig. 14

and 14. It is one of the features of a two-stroke engine that the load of a connecting rod is less than for a four-stroke engine of equal power and consequently a light section rod can be used with safety.
This, however, can be easily damaged by careless handling and so must be treated with the utmost care once it has been set. Any bend or twist made apparent by testing should be corrected by gripping the big end in a vice with smooth jaws and setting the rod by means of a long well fitted rod through the small end bush.

12. Big End Bearing.
The original diameter of the centre portion of the crank pin is .7236" rollers are available is sizes differing by .0001" ranging from .2492" to .2500". A suitable size of roller must be selected to obtain a bearing which runs freely with a minimum of clearance. The maximum permissible clearance for a new bearing is from .0003" to .0005". When assembling the big end bearing a piece of fine string should be wrapped round the rollers to hold them in position on the crank pin while assembling them into the connecting rod.

13. Reassembly of Crankshaft.
Special fixtures are necessary to reassemble the crankshaft if this is to run dead true without subsequent setting. It is, however, quite easy to assemble and true the shaft without any special apparatus. To do this, drive the crank pin into one crank web, with one of the hardened thrust washers between the crank web and the centre portion of the crank pin, then grip the engine shaft vertically between lead jaws in a vice with the inner face of crank web horizontal. Assemble the big end bearing and connecting rod, pouring a little clean Oil between the rollers.



ASSEMBLING CRANKSHAFTS IN VICE.
Fig. 15

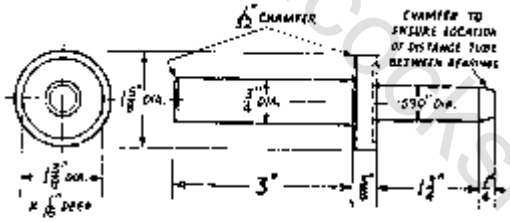
Place the second hardened thrust washer, and the second crank web over the exposed end of the crank pin. Tap the crank web to about half way down the crank pin end and drift applied over the crank throw hole. Remove the partially assembled crankshaft from the vice and check it roughly for truth by placing a straight edge across the edges of the balance weights as nearly as possible 90° from the crank pin. Tap the partly assembled crank web round the pin if necessary to line up the balance weights. Now grip the crank web between the jaws of a vice with a short tubular distance piece between the jaws and the webs (Fig.15.), and screw up the vice to drive the pin home into the crank web.
The crankshaft must now be carefully trued by placing the whole assembly between centres and checking the truth of the shafts with a dial micrometer. The shafts must run true within .001". When finally tuned up, make sure that the connecting rod has .008" to .015" side clearance.

14. Removing and Refitting Crankshaft Bearings.

If, owing to a bearing failure it is found necessary to replace the mainshaft bearings, these may be removed by heating the crankcase on a hot plate to a temperature of approximately 250˚F., when the bearings will fall out. In the case of the driving side, however, only the inner bearing will fall out. It will then be necessary to remove the circlip, which retains the outer bearing. A sharp tap of the case on a wooden block will then be found sufficient to dislodge the second race. The oil seals may be pushed inwards.

The reassembly of the bearings is best carried out with the case warmed as for dismantling.

Deal first with the driving side crankcase. Press in the distant washer, followed by the first ball bearing, using drift, as show in Fig.16. Press well home and fit the circlip. Place small distance washer on inner race and press in second ball bearing, using the drift (Fig.16.) as before. The timing side crankcase should be dealt with in the same manner, with the exception that, there is no circlip to fit, both bearings may be pressed in together. Now press in the oil seals using the same drift (Fig.16.) until the outer case of the seal is flush with the face of the housing.



DRIFT FOR INSERTING CRANKCASE BALL BEARING.

Fig. 16

15. Dismantling the GearBox.

Having divided the crankcase as explained in the previous paragraph, the gears and shafts may be withdrawn. In the case of the 26-tooth final drive pinion, however, it will be necessary to remove the chain sprocket. To do this undo the keeper screw and retaining nut. The sprocket is fitted on splines on the final drive sleeve and can be removed with the aid of two screwdrivers or tyre levers placed behind it. If it is necessary to remove the ball bearings, this may be done as described for main engine bearings.

The striking arm mechanism is mounted on a hollow spindle through which passes a ¼" stud which secures at one end the operating arm and at the other the striking arm. If it is required to remove the operating lever it will be necessary first to remove the locknut at the front end and, using the pair of locknuts at the rear, unscrew the stud from the lever bars.

If it is required, however, to remove the striking arm, it is merely, necessary to unscrew nut and locknut from the rear of the stud and slide the arm away.

16. Reassembling the Gear.

First reassemble the striking arm in the driving side crankcase. The main and layshafts complete with their respective gears may now be slid into the position with the striking arm located as far forward as possible. To not omit to place the phosphor bronze trunnion on their pegs and make sure that they locate correctly in the grooves in the sliding gears. Before closing the gearbox it should be packed about a quarter full of soft grease with engine oil added after assembly.

Having thus assembled the gear shafts, place the engine crankshaft in position in the driving side crank case and replace the timing side crank case, making sure of a sound joint by using, gold size shellac or similar jointing compound. When replacing studs in driving side crankcase, care must be taken to use the correct length of stud for each position. Reference to Fig.17. will make this quite clear. The longest stud, approx. 3 3/8" overall should located at A. B, C, and D are Allen screws, the shortest one, 1" under the head, is used at B, the other two 1 ¾" under head are used at C and D. at E, screw in stud 2" overall. Of the remaining three studs use 1 5/8" at F, 2 7/8" at G, and 2 1/8" at H. Replace all washers and tighten down all nuts and screws evenly.

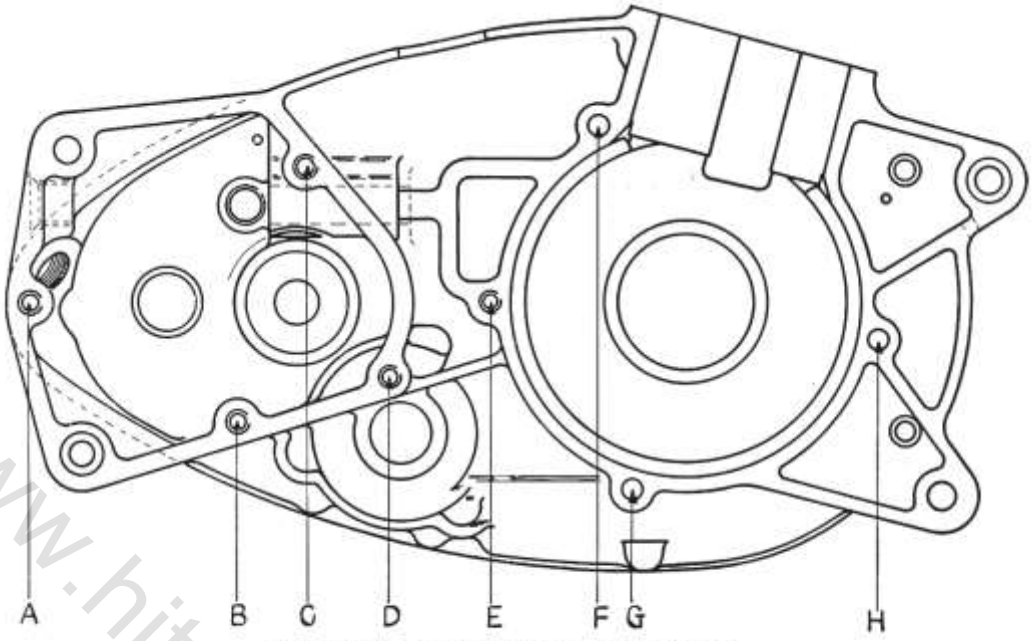
The gear change spindle should next be assembled. Pass the nose of the shaft through the clearance hole on the timing side crankcase, slide on the distance collar, and push through the bush on the driving side crankcase. Place the key in the taper nose and assemble the pawl block with pawls, plunger and springs in the ratchet ring. Replace the nut on the spindle end and tighten. Replace the cam plate and secure with three cheese head screws. Replace and tighten up driving side crank nut and slide the floating bush on the driving shaft. Couple up the gear change linkage and adjust for gear positions, using the Simmonds nut at the top of the coupling rod. (Fig.18.)

17. Reassembling the Primary Drive and Clutch.

First place the clutch friction in position in the clutch drum. Wrap the primary chain round the engine sprocket and countershaft sprocket and assemble on both shaft simultaneously, the engine sprocket to the floating bush and the countershaft onto the countershaft nose. Secure the countershaft sprocket with the nut. Assemble the thrust plate on the end of the engine shaft and secure with nut and washer. Now assemble the six thimbles in the outer plate and place the six springs in position.

In order to compress the springs sufficiently to assemble the spring circlip it will be necessary to use a tool (fig.7.) by inserting three ¼" B.S.F screws in these holes and screwing into the thrust plate, the outer plate may be depressed until it is possible to slip the circlip into its groove before removing the plates and screws.

The chain cover may now be replaced, taking care that the clutch operating pad and ball thrust are in position and that the clutch operating cable and return spring are correctly assembled on the drum. Make the joint with shellac or similar jointing compound and screw home evenly with nine cheese head screws.



POSITIONS OF STUDS IN CRANKCASE.

Fig. 17

There is some difference in the clutch on the "Ensign III" and "Prince", but the method of assembly is unaltered.

Note also, that a shock absorber is incorporated with the sprocket on the gearbox mainshaft. This takes the form of rubber inserts on a stout plate which is bolted to the sprocket, the bolt ends are riveted over when fixed (See Fig.1.) An oil seal replaced the felt washer at the drive side bearing and there is a rubber ring in a groove around the opposite end of the gearbox mainshaft.

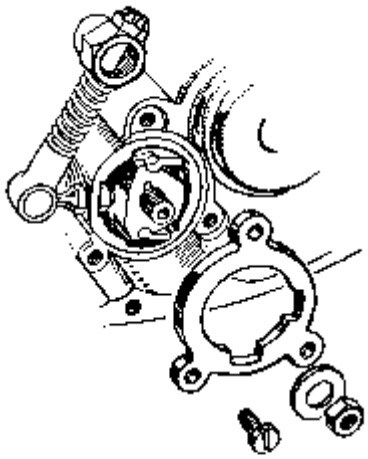
18. Reassembly of Timing Side.

The generator flywheel should now be replaced. It is important to see that the flywheel is correctly on the key in the engine shaft nose. Tighten up retaining nut with washer under it. Now replace the final drive gearbox sprocket and secure with nut and keeper screw. Next, screw on the kickstart ratchet. Assemble the gear change return spring on its arm.

The kick-starter mechanism is a self contained unit housed in the rear of the outer cover. If it is found necessary to replace any of its parts, unscrew the two screws which secure the cover. The contents of this chamber are the kickstart quadrant and return spring and a small pinion provided with a ratchet face to mesh with the ratchet on the gearbox mainshaft. This pinion is mounted on a dead spindle and has a light spring behind it. A cam face on the kick-starter quadrant holds this pinion back against the spring until the quadrant is rotated, when the pinion is pushed forward by the spring, and the ratchet teeth mesh with those on the mainshaft. With the kickstart gear reassembled and its gear in place the timing side may now be reassembled. It will now be found necessary to rotate the kickstart quadrant against the spring in order that the kickstart stop, which is fastened in the crankcase, may enter the chamber. When released the quadrant will then take up its correct position against the stop. Replace the five screws and one nut and, at the rear and screw down firmly.

Replace the kickstart crank and the gear change lever. Now replace the contact breaker cam and time the engine as follows:-

Set the engine so that the piston is 5/32" to 7/32" before the top stroke. Turn the cam in a clockwise direction until the contact points are just about to open; this can be determined by feel. With the engine and cam in these positions tap the cam lightly on to the taper shaft and secure with screw. Check the timing to make sure that the cam has not moved when tightening.



ACCESS TO THE FOOT-CHANGE MECHANISM, BY REMOVAL OF THE CIRCULAR PLATE, NUT, BOLT AND WASHER.

Fig. 18

WHEELS

19. Removal and Replacement.

Rear Wheel. Place the machine on the stand, unscrew the brake adjustment wing nuts, disconnect the rear chain at the spring link, and loosen the two spindle nuts and slide the wheel out of the slotted fork ends. When replacing the wheel, remember to fit the spring link so that the open end points away from the direction in which the chain travels.

Front wheel. Place the machine on the stand. Disconnect the front brake by means of the pin through the stirrup (having first removed the small split pin) and unscrewing the adjusting sleeve. Disconnect the speedometer cable. Remove the spindle nuts and drop the wheel out of the fork ends.
After removal of either wheel the machine will be found to stand securely on the centre stand and the remaining wheel.

20. Tyres.

The tyres should be examined carefully for cuts and excessive or uneven wear; also for signs of under-inflation, such as cracked side-walls or damaged fabric.
When removing the tyre always start close to the valve and see that the edge of the cover at the other side of the wheel is well down into the well of the rim. When replacing the tyre, fit the part of the valve last. If the correct method of fitting and removing the tyre is adopted, it will be found that the covers can be manipulated with the small levers in the tool kit.

21. Rims.

Rims, which are running slightly out of truth, can be trued up by tensioning the spokes, but if the rims are badly buckled, twisted or dented they must either be straightened or new ones fitted. Buckled rims cannot be trued, without tightening some of the spokes excessively.

22. Spokes.

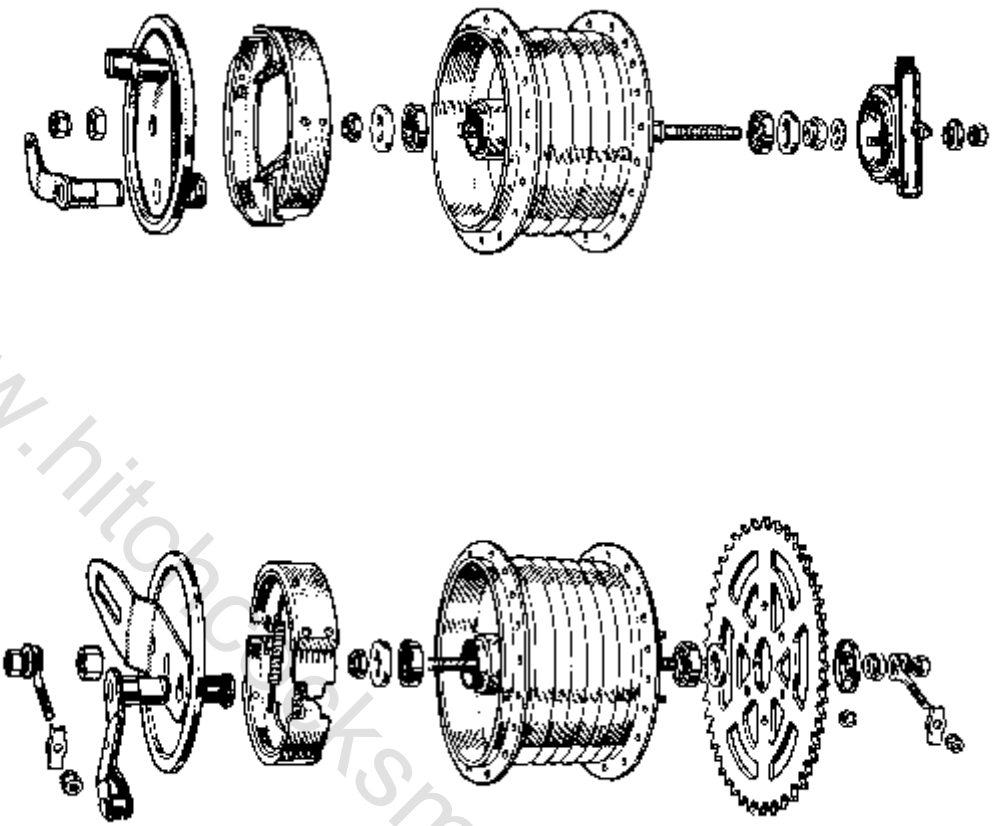
Examine the wheels for broken or loose spokes and replace or tighten. Loose spokes are liable to break owing to the load coming on them suddenly as the wheel revolves. Loose or broken spokes throw an undue strain on the other spokes in their vicinity.

23. Brakes. (See Figs. 19 and 20.)

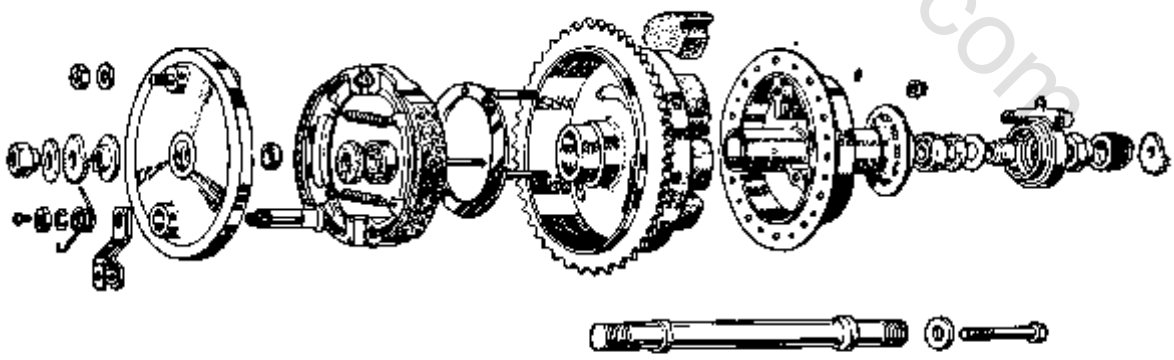
The brake drums and linings require cleaning from time to time to ensure that there is direct contact between the lining and the drum. The presence of oil, grease, moisture, or even dry dust will impair the efficiency of the brake. To dismantle the brake remove the wheel from the machine, remove the right hand spindle nut completely and unscrew the distance piece which fits on the spindle between the inside of the fork end and the brake cover plate. The cover plate can then be lifted off complete with the operating cam and lever and shoes. Remove the two tension springs between the brake shoes and lift the shoes away.
The colour of the linings varies from deep yellow to dark brown according to the severity with which have been used and the temperature at which they have been running. *Their appearance should be polished.* Do not "rough up" the linings with a file in order to remove the normal polished surface. The removal of this merely shortens the life of the lining. The presence of grease or mud will probably be shown by dull black streaks on the linings. The best way to remove these is to scrape the black with a knife or hacksaw blade, then to reassemble the brake and run the machine for a short period in second gear with each brake in turn hard on. This will burn out the last traces of grease and will be found to restore the efficiency of the brake once the linings have cooled down. Alternatively grease can be burnt out of the linings with the aid of a blow- lamp. Washing the linings with petrol usually results in washing the grease into them, and is not recommended.
If new linings are necessary, make sure that those fitted are of the correct size and type. The lining material for both brakes is Ferodo M.W., and the dimensions for both front and rear wheel are 5" diameter by 1" wide by 3/16" thick. When fitting new linings secure the rivets at the end of the linings last, so as to avoid buckling the lining.
The brake cam, cam bearing and the pivot pin should be lightly smeared with grease before reassembling the brake if this has been dismantled for cleaning or any other purpose.

24. Wheel Bearings. (See Figs. 19 and 20.)

The wheels are fitted with non-adjustable ball bearings SKF 6200. If these develop an appreciable amount of play, they must be removed and replaced.
To remove the bearings, first take the wheel out of the machine, then remove all nuts and locknuts from the spindle and drive the spindle out of the hub with a wooden on leather mallet. This will bring one of the bearings with it, leaving the other one in the hub barrel. The bearing on the spindle can then be driven off and then the spindle reinserted in the hub and driven through in the opposite direction, when it will bring the second bearing out of the barrel.

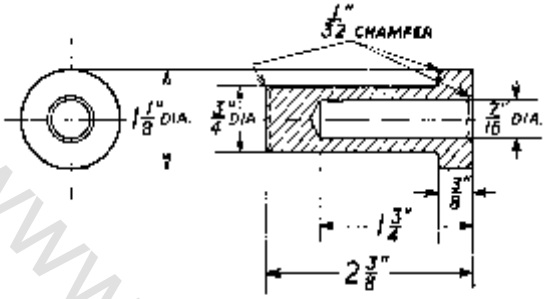


EXPLODED VIEW OF FULL WIDTH FRONT HUB.
Fig. 19



EXPLODED VIEW OF REAR HUB.
Fig. 20

To replace the bearings the drift shown in Fig.21 will be found suitable. Two of these drifts are required, one being used to support the first bearing after fitting it and the spindle into the hub, while the second one is then used to drive in the second bearing.



DRIFT FOR FITTING JOURNAL TYPE HUB BEARINGS.

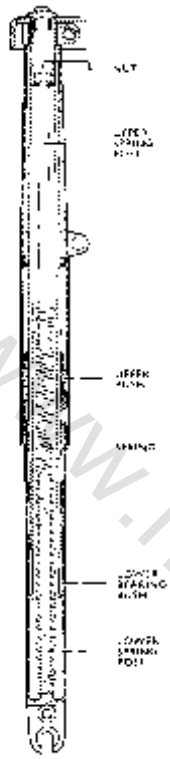
Fig. 21

The inner faces of the bearings should bear against the shoulders on the spindle just before the outer races bottom in the recesses in the hub barrel. If this is not the case, excessive strain will be placed on the balls when the locknuts are tightened up. If the bearing shows signs of tightening when these nuts are screwed home, a thin shim should be fitted on the spindle between the shoulder and the inner race of one of the bearings.

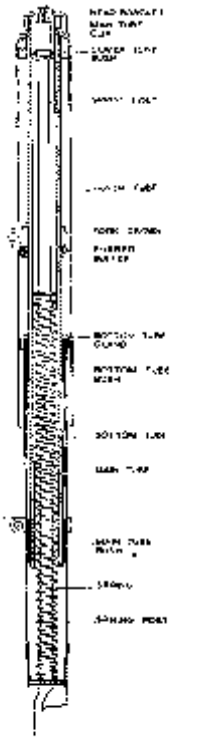
25. Rear Sprocket. (See Fig.20)

Make sure that the rear wheel sprocket is securely fastened to the hub. Nuts and locknuts are not provided on the four pins which secure the sprocket to the hub and these must be thoroughly tightened.
On wheels having full-width hubs, the sprocket is held to the hub shell by six self-locking nuts, which screw onto six studs. Otherwise, maintenance of both front and rear wheels may be carried out as described above. (See Fig. 19 and 20.)

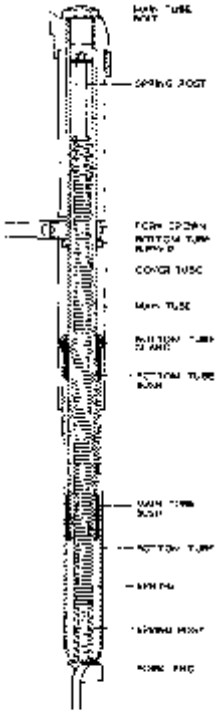
FRAME AND FORK



FRONT FORK
("Early Ensigns")
Fig. 31



SECTION OF FRONT FORK
(" Ensign I & II ").
Fig. 33



SECTION OF FRONT FORK
(" Ensign III " and " Prince ").
Fig. 34

FRONT FORK

26. Construction. " Ensign I and II" have the main tube held in the fork crown at the base of the steering stem and at the top beneath the fork head fascia plate by means of clamp bolts and nuts. **"Ensign III" and "Prince"** have the main tube attached to the "casquette" head by means of a large hexagon-headed bolt and a clamp bolt at the fork crown. At the bottom of each main tube is a split bush, while a second bush not split, is located in the upper end of the sliding member, being held there by a hexagon nut.
Secured in the sliding member is a long stud to a scroll at the base of which the spring is screwed. At the top end, the spring is held in a similar manner to another stud which is anchored to the top of the main tube by a nut. An upper cover tube has an aluminium collar at its top end and is secured to the clamp bolt passing through the fork crown. A rubber buffer is slid over the main tube between the fork tube and the sliding member.

27. Dismantling. (Early "Ensign" models.)
First remove the wheel in the normal manner, then give each sliding member a sharp left-hand twist. This will disengage one end of the spring from its scroll and allow the sliding member to be withdrawn either bringing the spring with it or leaving it behind, according to which end of the spring has become disengaged from the scroll. If the spring remains attached to the upper spring post it can be freed by giving it a sharp left-hand twist. There is no need to disturb the fork head or nut unless a new spring is fitted which, when tightened onto scrolls, may not allow the fork end to be aligned square with the wheel spindle unless a twist is applied to the spring. If this occurs, the fork head must be removed and the nut slackened to enable the fork end to be lined up correctly.
The lower bearing bush is split longitudinally into two parts and can readily be removed for replacement purposes. The upper
bush, however, is permanently fixed in the upper end of the sliding member and in the event of a new bush being required it is necessary to fit a new or reconditioned sliding member complete.

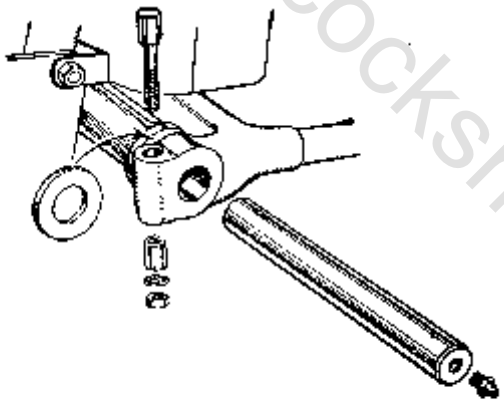
28. Dismantling. (Later "Ensigns" and "Prince")
Remove the wheel in the usual manner then, sharply twist the sliding member to disengage the spring from the scroll. Withdrawal of the sliding member may bring the spring with it, but if it remains attached to the upper scroll, a twist to the left will free it.
Removal of the hexagon nut at the top of the sliding member will free the top bush, and the bottom bush, being split, may be removed without difficulty. Should a change of spring be necessary, it may be noticed when this is screwed onto both scrolls, that the fork end is not square with the wheel spindle. To square it up, remove the fork head, slacken the nut holding

the upper spring bolt, turn the fork end until it is square on the wheel spindle, tighten up the spring bolt nut and replace the fork head.
Do not forget to supply the fork legs with oil, after re-assembly.
When re-assembling, slip the large hexagon nut over the main tube, followed by the circular bush and the split bush in its place at the bottom of the tube. Push the sliding member over the tube until the upper bush may be slid into place and secured by the hexagon. Engage the spring with the scroll and screw it home.
Older models had the upper bush permanently fixed to the sliding member and in this case, renewal of the bush requires a new or reconditioned sliding member.

REAR SUSPENSION.

29. "Ensign" Rear Suspension.

In the rear springing fitted to the "Ensign," a swinging rear wheel fork pivots on a spindle located in the transverse lug on the saddle tube. The ends of the spindle are clamped in the lugs on the swinging arm by wedge type clamp bolts, and greasers are provided at either end of the spindle. Thrust washers are inserted between the clamp lug and the frame lug.



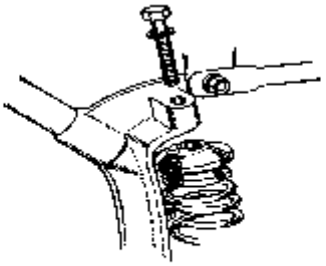
On each side, the rear frame pivot is secured by wedge bolts. Thrust washers are inserted between the moving and fixed parts of the frame.

Fig. 25

At each rear fork end is a circular socket with a scroll formation inside it into which each spring is screwed. The upper half of the spring has widely separated coils and in the lower half the coils are closer together. At the top and bottom each spring is anchored by scrolls which are locked in position in the fixed portion of the frame by pins having spring washers beneath their heads.

30. Dismantling.

Undo the clamp bolts securing the spindle in the front ends of the swinging fork (Fig.25.) Remove the pins and spring washers anchoring the springs (Fig.26.) Knock out the spindle when the fork, thrust washers and springs will be freed. Unscrew the springs from their rear anchorage.



The rear springs are screwed on to scrolls, top and bottom, and these are held by bolts having spring washers.

Fig. 26

When replacing the fork and springs, screw the wide coil of the spring into the socket from below until in tightens on the close coils. Fit the scrolls, top and bottom. Fit the spindle through the clamp lugs and frame lug, inserting the thrust washer between these parts. Tap the spindle home until an equal amount shows at either end and tighten the clamp bolts.
Put the upper and lower ends of the springs in position and screw in the locking pins with their spring washers. Measure the distance between each leg of the swinging arm and the upper part of the fixed portion of the frame. This measurement must be the same on either side or the wheel and frame will be out of alignment. Correct any discrepancy by screwing the spring up or down in its socket.
On the "Prince" the spring boxes may be removed by taking out the pins anchoring the top ends, swinging the unit rearwards, removing the nuts retaining the bottom ends, and sliding the spring boxes complete from the pivot pins.

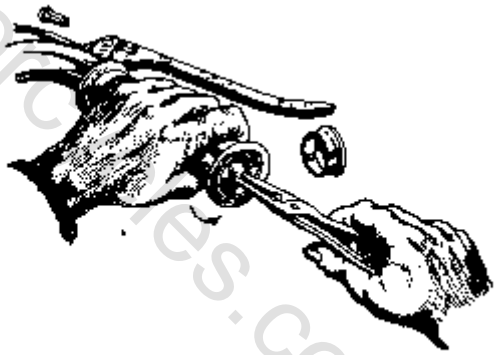


Fig. 27

31. Handlebar Controls.

To remove the cable from the twist grip and levers on the handlebars proceed as follows:-

Twist Grip. Remove throttle slide from carburettor and disconnect from cable. Remove end cap from handlebar, pull on outer casing and remove slotted ferrule at entry into handlebar then push inner cable nipple out of trunnion near outer end of grip, push to one side and pull out (Fig.27)

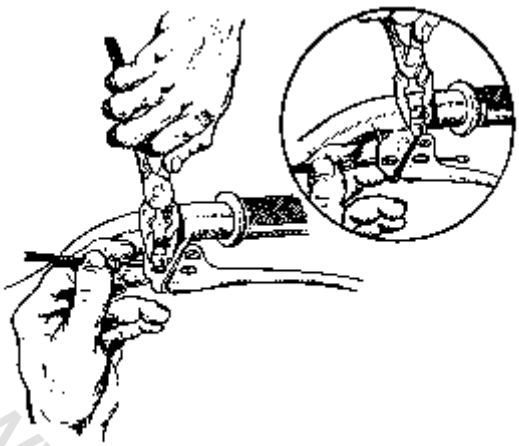


Fig. 28

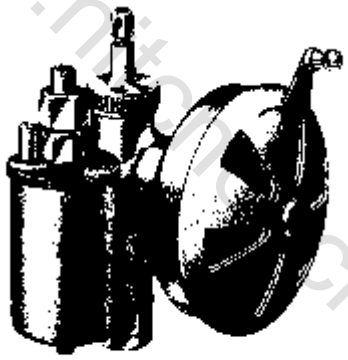
Decompressor. Slacken adjustment as much as possible, pull outer casing and remove slotted ferrule. Pull lever out of saddle and slide cable out of lever. (Fig.2)

Clutch and Brake. Obtain as much slack as possible in cable by disconnecting brake at lower end of cable or shortening mid-cable adjuster as much as possible and removing slotted ferrule. Pull outer casing and ferrule out of nipple in lever saddle, remove nipple and push wire out of nipple in lever and remove the latter. (Fig28)

CARBURETTOR

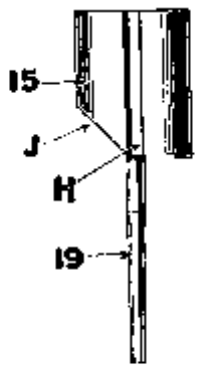
Complete Amal Carburettor – Type 223/6 **Strangler Unit only – Type 224/100**
Mixing Chamber only – Type 223/023

General Description.
The carburettor is of the taper needle type similar to that used on the larger Royal Enfield motor cycles. The following differences should, however, be noted: -
(1) The float chamber is integral with the mixing chamber; (2) there is no pilot jet or adjustable air control for slow running. (3) there is no air slide. Fig 29 shows a general view of the outside of the carburettor. It will be seen that a large shutter type air strangler is fitted to facilitate starting from cold. An air filter is fitted immediately behind the strangler. The float chamber is of the top feed type.



GENERAL VIEW OF CARBURETTOR.
Fig. 29

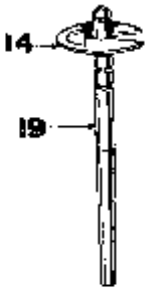
32. Construction of Carburettor.
Fig.32. shows a section through the carburettor which makes its construction quite clear. To withdraw the throttle slide (15) unscrew the knurled mixing chamber top (11). The taper needle (19) is held in the throttle slide (15) by means of a spring clip (14) which is held in place by the throttle return spring (12) (See Figs. 30. 31 and 32.) Access to the main and needle jets (21 and 18) is obtained by unscrewing the jet plug (22) at the bottom of the mixing chamber. The float (2) is secured to the float needle (1) by means of a clip soldered to the top of the float and engaging in a groove in the float needle.



THROTTLE SLIDE.
Fig. 30

33. Method of Tuning.
Main Jet. This affects the mixture strength from about three-quarters to full throttle but has little or no effect at smaller throttle openings. The standard jet is No.100 and it is unlikely that any alteration will be required.

Needle and Needle Jet. The taper needle working up and down in the needle jet as the throttle is opened and closed controls the mixture strength over the range of throttle openings most often used i.e. from say one-quarter to three-quarters open. The needle can be raised or lowered in the throttle slide thus regulating the mixture strength. Raising the needle enriches the mixture, lowering it weakens the mixture. To alter the position of the needle disconnect the throttle slide from the control wire and spring. Then push the needle and clip (Fig.31) out of the slide, spring the clip off the needle and replace it one groove



TAPER NEEDLE AND CLIP.
Fig. 31

higher or lower as required. Replace the needle and clip in the slide and couple up to the control wire and spring, finally replacing the spring in the carburettor body.
The standard setting for the needle is with the clip in No.3 groove (counting from the top). After the engine is fully run in it may tend to fourstroke more than is desirable, in which case the taper needle should be lowered by refitting the clip in No.2 groove.
The needle jet size in No.107.

Throttle Slide. The shape of the lower edge of the throttle slide affects the mixture of the throttle positions up to about one-quarter open. When the engine is idling the mixture is controlled mainly by the depth of the step formed at the bottom of the slide. This determines the air space over the jet for a given throttle opening and at very small throttle openings has a considerable effect on the suction of the jet. At slightly larger throttle openings the mixture is controlled mainly by the shape

of the cutaway at the back of the throttle slide (J in Fig.30). The steeper the slope the weaker will be the mixture and vice versa. There is a number stamped on the bottom of the slide which indicates the amount of the cutaway – the higher the number the greater the slope of the cutaway. The standard throttle valve has No.5 cutaway and a step 1/32" deep. It is unlikely that any modification will be required and it is, perhaps, necessary to issue a warning against filing the valve in an attempt to obtain perfect two-stroke when idling.

33. Carburettor Troubles.

This carburettor is so simple that trouble with it is very unlikely. It is designed to use a reasonably large jet so that choked jets are very rare since any particles, which will pass the filter in the tank will also pass the jet. In the case of new machines, however, it occasionally happens that a piece of cork from the petrol tap lodges either in the main jet or at the fuel needle seat (A. Fig.32).

Another possible trouble is that an accumulation of fine silt passes the filter and collects in the recess at the bottom of the float chamber, thus preventing the fuel needle from dropping. If this occurs it will be found impossible to flood the carburettor and any attempt to do so will result in the float being pushed down the needle, thus cutting off the feed altogether. The remedy is to remove the float chamber lid, remove the float and float needle, insert a small twist-drill in the recess at the bottom of the float chamber and twist it between the finger and thumb. This will clear the accumulated silt out of the recess. When reassembling the float chamber make sure that the spring clip on the float engages with the groove in the float needle.

If the carburettor floods the cause is either (a) the tickler sticking; (b) a bent float needle (c) dirt on the float needle seating, or (d) a punctured float. Never use grinding compound to lap the needle onto its seating, only run it in lightly by twisting between finger and thumb.

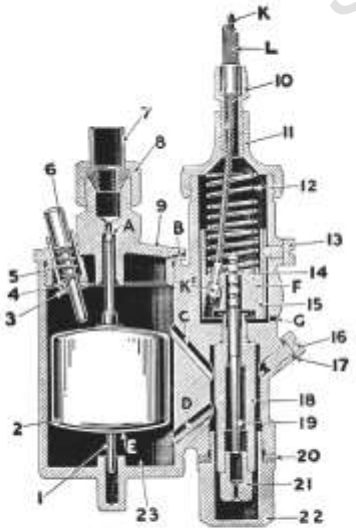
34. Air Cleaner.

The air cleaner behind the carburettor should be cleaned by washing in petrol about every 2,000miles. The gauze should then be dipped in oil and allowed to drain though this is not absolutely necessary since it will very soon become wet with oil from the blow back from the engine. A certain amount of blow back occurs with all two-stroke engines and the presence of the gauze screen to catch this is a valuable aid to economy of fuel.

35. Causes of High Petrol Consumption.

If the petrol consumption is excessive, first look for leaks either from the carburettor, petrol pipe, petrol tap or tank. The presence of oil in the petrol will readily indicate any small leaks, which might otherwise pass unnoticed. Make sure also that the air cleaner is not choked and that the main and needle jets are screwed up tightly. If all the above points are in order, it may be necessary to lower the taper needle one notch in the throttle slide or, if they are badly worn, to replace, the needle and needle jet. Before doing so, however, make sure that the fault does not lie in the rest of the machine by checking such points as the following:- (a)Brakes binding; (b) chains tight or dry ; (c) insufficient oil in gearbox ; (d) engine requires decarbonising ; (e) ignition timing incorrect ; (f) sparking plugs defective.

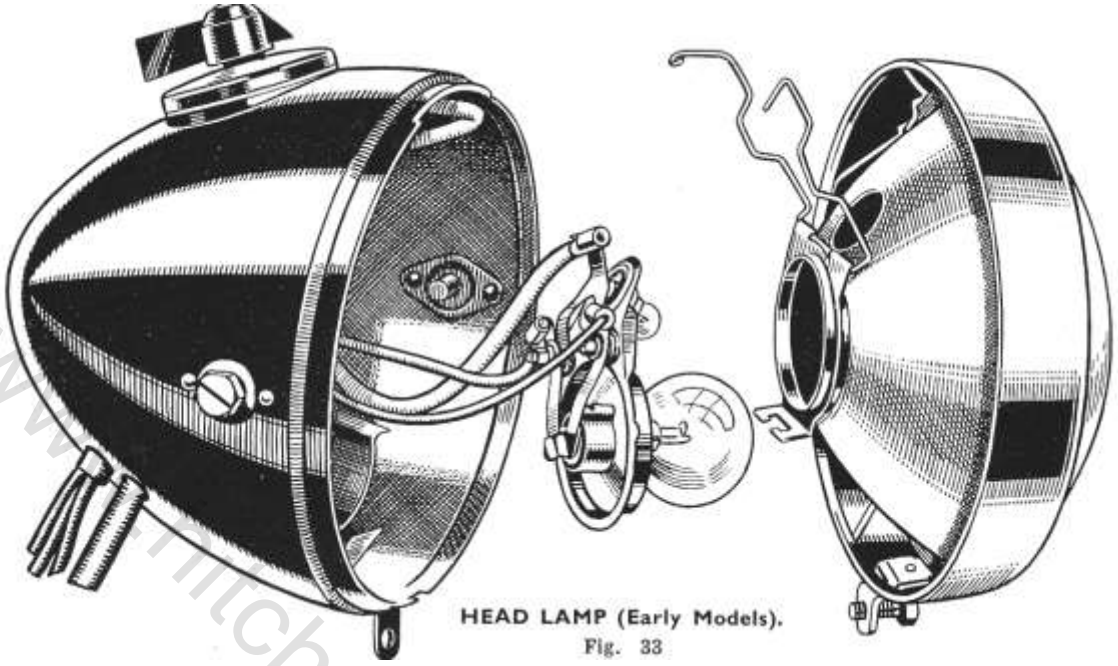
(1) Float Needle.
(2) Float.
(3) Tickler Cotter.
(4) Tickler Bush.
(5) Tickler Spring.
(6) Tickler.
(7) Petrol Pipe Union Nipple.
(8) Petrol Pipe Union Nut.
(9) Float Chamber Cover.
(10) Cable Adjuster.
(11) Mixing Chamber Top.
(12) Throttle Spring.
(13) Throttle Valve Location Screw.
(14) Jet Needle Clip.
(15) Throttle Slide.
(16) Feed Hole Screw.
(17) Feed Hole Washer.
(18) Needle-Jet.
(19) Jet Needle.
(20) Jet Plug Washer.
(21) Main Jet.



SECTION OF CARBURETTOR.
Fig. 32

(22) Jet Plug.
(23) Float Chamber.
A. Petrol Feed Needle Seat.
B. Air Vent Hole in Float Chamber Cover.
C. Air Release Passage from Jet Chamber into Float Chamber.
D. Petrol Feed Passage from Float Chamber to Main Jet.
E. Point of attachment of float needle to the float by a spring bow.
F. The choke bore of the Carburetter.
G. Drain hole from mixing chamber.
H. Guide groove in the throttle.
J. Cutaway of the throttle.
(See Fig. 30.)
K. Throttle cable.
K1. Throttle cable nipple.
L. Throttle cable outer cover.

LIGHTING



HEAD LAMP (Early Models).
Fig. 33

SPARKING PLUG.

36. Type and Gap Setting.

The following plugs are recommended as being the most suitable for these machines: -

Lodge CN, Champion L8 or L14, KLG F20.

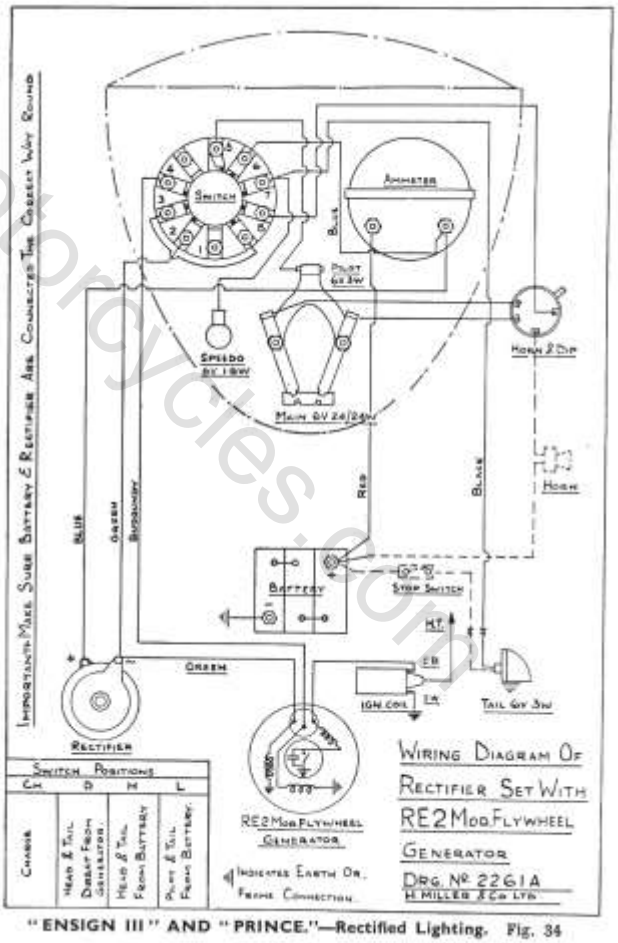
With an exception of the KLG F20 these are of the non-detachable type, and if fouled with carbon or oil must be cleaned by sandblasting or other similar process.

Experience has shown that starting is likely to be difficult if the gap between the plug points exceeds .20". On the other hand, too small a gap causes erratic running particularly before the engine is fully warmed up. We recommend that the gap should be set to .015" which gives good running and a reasonable life before the gap becomes too wide for easy starting. When setting the gap always bend the side point, never the central electrodes.

LIGHTING CIRCUIT.

37. Testing.

The headlights can be obtained only when the engine is running and the low-tension connection is plugged into its socket. If, under these conditions, there is no response to switching on the lights, remove the low-tension connection from the flywheel generator and connect it to one terminal of a 6-volt battery, earthing the other terminal. If the lights now respond correctly, the trouble is in the lighting coils in the flywheel generator (See Section 38.) If lights are still not available the trouble is either in the wiring circuit, the switch or the bulbs. The wiring diagram is shown in Fig.34, and is so simple that it is hardly worth testing the connections electrically, being probably easier to follow each lead if certain lights are available but not others e.g., headlamp but not the tail lamp, the trouble is most probably that one bulb is burnt out.



"ENSIGN III" AND "PRINCE."—Rectified Lighting. Fig. 34

38. Lighting Coils, Testing.
Current for the lights is obtained from the lighting coils in the flywheel generator. These can be tested by connecting one terminal of a 2-volt battery to the inside of the insulated socket on the coil plate and the other terminal of the battery to the coil plate itself with an ammeter in the circuit. The current passed should be of the order of 13-14 amperes. Do not apply this current for more than a second or so, as this test is practically a short circuit on the battery. If no current flows there is probably a break in one of the two coils, which are not connected in parallel.
Note. Remove the coil plate from the engine before carrying out this test, otherwise demagnetisation of the flywheel will occur.

HEADLAMP. (Early models.)
39. Removing Lamp Front and Reflector.
To remove the lamp front and reflector undo the screw at the bottom of the lamp. (Fig.34.). When replacing the front locate the top of the rim first then engage the screw and tighten it securely.
To remove the bulb holder release the securing springs and push them gently apart so that the holder can be withdrawn from the reflector.
To remove the reflector from the lamp front release the four securing spring clips inside the rim of the lamp, after to which the reflector together with the bulb holder can be lifted away. When replacing the reflector, make sure that it is the right way up with the pilot lamp at the top.

HEADLAMP. (Later Models.)
This type of lamp has the switch, ammeter and speedometer mounted in the lamp body. The lamp front and reflector are held by a bottom screw as described above, but the main and pilot bulbs are socketed into the reflector and contact is made from a back plate which is held by a bayonet joint to the main bulb holder. (Fig.35.)

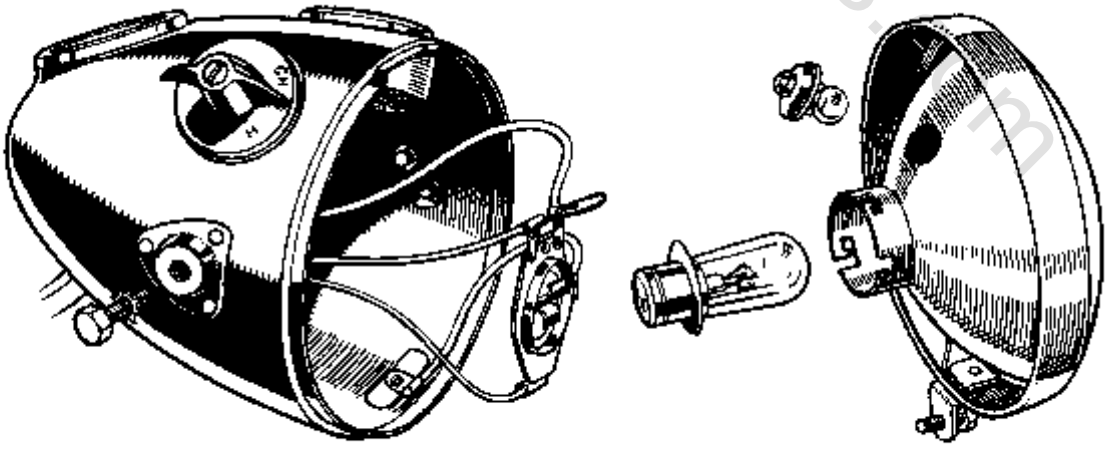
40. Setting and Focusing.
The lamp must be set to ensure that the main beam is projected horizontally and the dipped beam below the horizontal. There is no means of focusing the bulb which is correctly placed in the position to give the best results. Make sure that the main bulb is fitted the right way round, one side of the cap is clearly marked "TOP".

41. Cleaning.
Care must be taken when handling the reflector to prevent it becoming finger-marked. It can, however, be cleaned by polishing with a fine chamois leather. Metal polished must not be used.

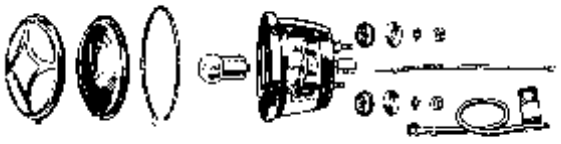
42. Bulbs.
The correct bulbs are:-
"Ensign I and II"
Headlamp: 6 volt, 24 and 24 watt with small bayonet cap,
Pilot Bulb: 2.5 volt, 0.2amp, screw fitting,
Tail Lamp: 6 volt, 3 watt, single contact with small bayonet cap,
Speedometer Light: 6 volt, 1.8 watt (3 amp) with miniature bayonet cap.
Do not use a small capacity bulb in the headlamp or it will burn out quickly. Do not use a larger capacity bulb for the pilot light or the dry battery will quickly become exhausted.

"Ensign III" and "Prince."
The correct bulbs for use in this set are as given above with the exception that the pilot bulb is of the same type as that used in the tail lamp, i.e., 6 volt, 3watt single contact with small bayonet cap.

TAIL LAMP. (Miller Type 36E.)
43. To Remove the Bulb.
To obtain access to the bulb remove the wire circlip and lift away the chromium plated bulb holder. The bulb can now be removed in the normal manner.



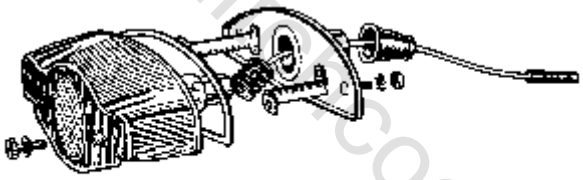
HEAD LAMP (Later Model). Fig. 35



TAIL LAMP (Early Models).
Fig. 36

The bulb fitted as standard is 6 volt, 3 watt. If trouble is experienced with the bulb burning out at high engine speeds it is permissible to use a 12-volt, 6 watt bulb which will not give such a bright light at the rear and a rather brighter light from the headlamp.

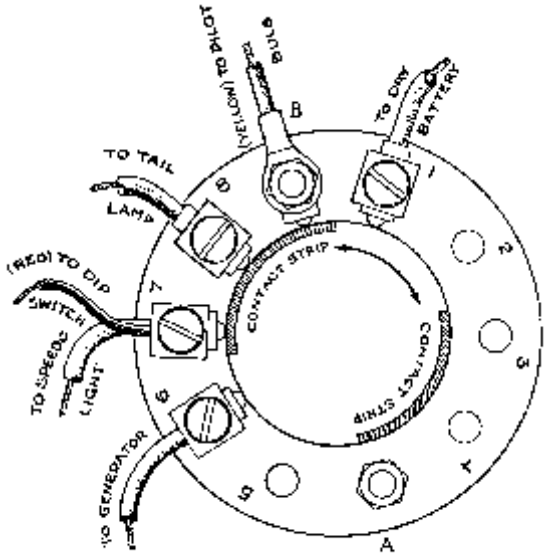
TAIL LAMP. (Later Models.)
To remove the bulb from this lamp, undo the two screws securing the plastic lamp front; take away the front, being careful with the rubber gasket, and remove the bulb from the back plate. (Fig. 37.)



TAIL LAMP (Later Models).
Fig. 37

SPEEDOMETER LIGHT.
44. Bulb.
The bulb fitted to this is 6 volt, 1.8 watt. This bulb is arranged to light only when the engine is running and the head light is switched on, thus preventing waste of current from the dry battery.

PARKING BATTERY.
45. Dry Battery.
The head lamp is arranged to accommodate a standard twin cell cycle lamp type of dry battery. When the battery becomes exhausted it should be removed as it will otherwise cause corrosion to occur inside the lamp.

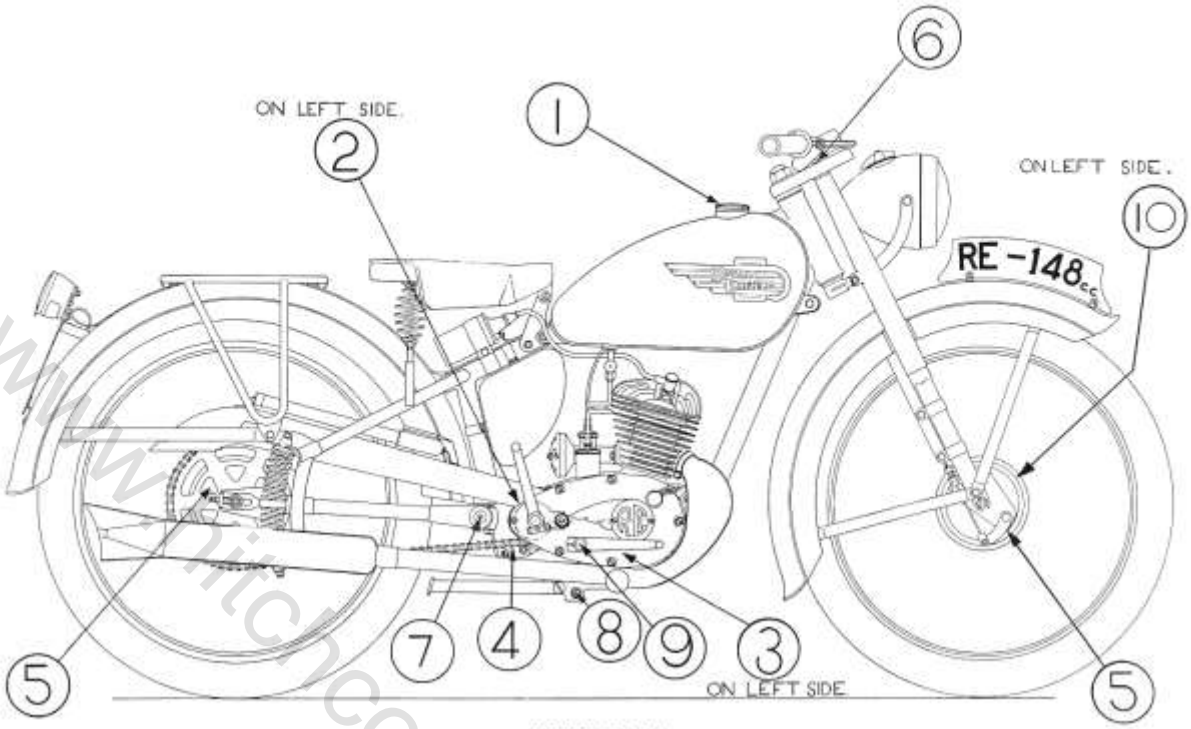


LAMP SWITCH.
Fig. 38

LIGHTING SWITCH.
46. Operation of the Switch.
The connections to the switch are shown in Fig.38, which also shows the contacts. As shown, the switch lever is in the "OFF" position. Both the dry battery and the lead from the generator are isolated so that no current flows.
When the moving contacts are turned one division in an anti-clockwise direction the lead from the generator is connected to the tail lamp, speedometer bulb and through the dipswitch to the main bulb.
When the contacts are turned one division in a clockwise direction from the contacts shown the dry battery is connected to the tail lamp and the pilot bulb.
To remove the switch from the lamp first remove the lamp front and reflector then remove the nuts from terminals "A" and "B" and the centre screw which controls the switch control lever to the centre. The body of the switch can now be withdrawn into the lamp and the top and lever lifted away from the outside. When replacing do not omit the washer between the top of the switch and the body of the lamp.

ROYAL ENFIELD "ENSIGN I, II, III" AND "PRINCE"

LUBRICATION CHART



"ENSIGN I"
Fig. 39

Location No.	Part	Lubricant
1	PETROL TANK FILL UP (2 measures per gallon) ..	Castrol Grand Prix Shell X 100 Motor Oil 50 Mobiloil D Esso Extra Motor Oil 40/50 Energol S.A.E. 50
2	GEARBOX TOP UP (Capacity ¾ Pint)	
3	CHAINCASE TOP UP	
4	REAR CHAIN	Engine Oil or Grease
6	FORK TOP UP	Castrolite Mobiloil Arctic Esso Extra Motor Oil 20W/30 Shell X 100 Motor Oil 20/20W Energol S.A.E. 20
5	WHEEL HUBS	Castrolease (Heavy)
7	CHAINSTAY PIVOT	Mobil Grease (No. 4)
8	STAND PIVOT	Shell Retinax A
9	GEAR CHANGE LEVER PIVOT	Esso Grease*
10	SPEEDOMETER DRIVE	Energrease C.3

* Known as Esso Cup Grease in some Overseas Countries

"AIRLFOW" FAIRING

To remove the "Airflow" fairing, first remove the dual seat and petrol tank, disconnect all electric leads from the battery and other units, undo the two screws which hold the headlamp to the fairing and take away the lamp and all harness.

A bracket round the steering head protrudes forward and provides the front upper fixing (two bolts) for the "Airflow."

On the front down tube is a clip held by four nuts and bolts. This clip has a cross member welded to it and bolts (passed through eyes at the ends of a tubular loop formed in the glass fibre casing) screw into the ends of the cross member.

A third fixing point is to a cross member from the front engine mounting, long hexagons forming spacers. Steel washers and rubber buffers are used on either side of the glass fibre at this point the rubber being next to the glass fibre, of course.

SPARES for ROYAL ENFIELD & AMAL

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