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1933 SUPPLEMENT

TO THE BOOK OF THE MATCHLESS

SINCE 1931, when this handbook was first published, considerable alterations have been made to the Matchless range which now numbers 12 machines, and it is the object of this Supplement to bring the book up to date for prospective buyers and owners of 1931-3 models. Of the nine machines manufactured in 1931 six (models A/2, B, X/3, X/R3, C, C/S) are retained this year with detail modifications only. The remaining three 1931 models have been dropped, but models D, D/S have served as the basis for

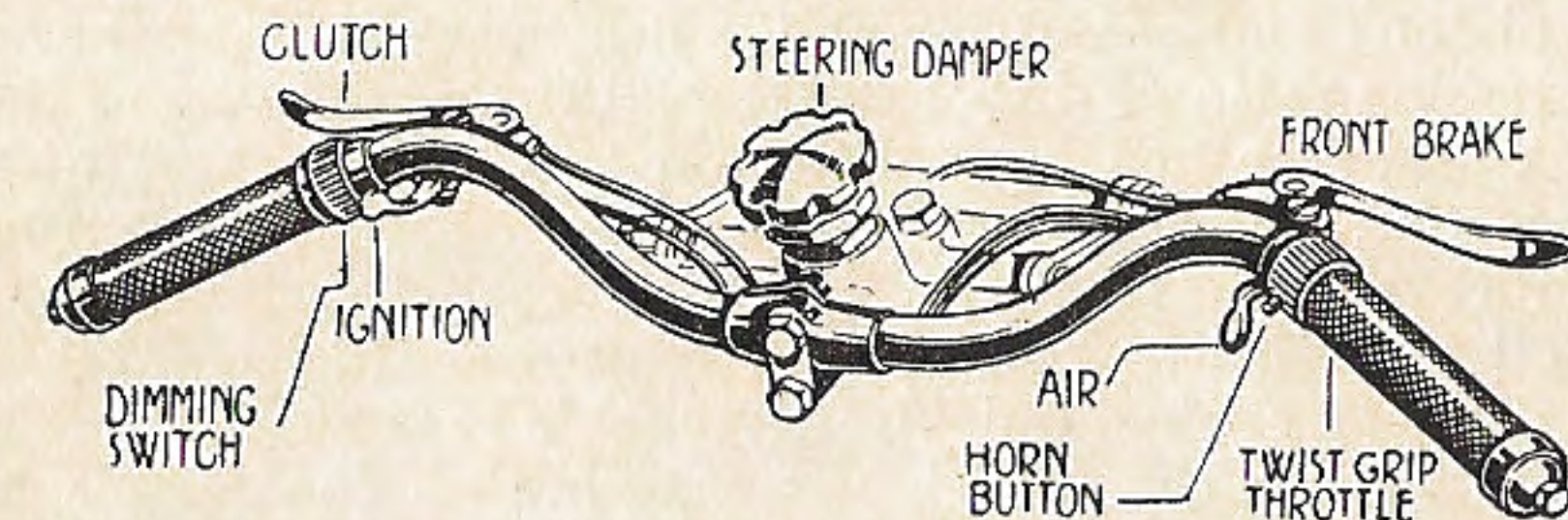


FIG. 78. SHOWING 1932-3 HANDLEBAR CONTROL LAY-OUT

two new 250 c.c. models. The other three new models (33/D5, 33/D6, 33/D3) were introduced last year and since weight is of no importance this year from a taxation point of view, Messrs. Colliers have made many detail improvements to them, especially in regard to appearance, equipment, and the strengthening of various parts. The sixth new machine is model 33/D80.

The 250 c.c. models are both eligible for the 30s. *per annum* tax. One is a side-valve (33/D7) and the other an overhead-valve model (33/D2).

Lucas electric lighting with electric horn is available on all models, a "Magdyno" set being fitted at £6 5s. extra, except in the case of model 33/D7, where a "Maglita" set is fitted at £5 15s. *De luxe* equipment (page 3) with illuminated instrument panel is also available for any model. This includes an air filter, except on models 33/A2, 33/XR3, 33/X3, and an ammeter, speedometer, ignition switch, and oil indicator on all models.

The Multi-cylinder Models. These have undergone the least alterations of all, though certain detail improvements have been made, some of which are common to the whole range. Model

33/A2 (the "Silver Arrow") has its monobloc Vee twin engine the same as originally introduced except that longer pistons are used and the exhaust port spacing is wider. Other alterations to this model are black tank panels with the "M" in chromium but not embossed, new, "clean" handlebars with integral controls (Fig. 78), a second gear ratio of 10.4 to 1. Model 33/B (the "Silver Hawk") has its four-cylinder overhead-camshaft engine unchanged but for slight modifications to the lubrication system. The fuel tank is altered similarly to model 33/A2; new handlebars are provided; second gear ratio is now 10.1 to 1.

Models 33/X3, 33/XR3 (The Big Twins), which incidentally are much used for police patrol work, are unchanged except for "clean" handlebars, entirely new fuel tanks, caged big-end roller bearings, "Invar-strut" pistons and closer gear ratios.

Models 33/C, 33/CS. No alterations have been made to the engines of these machines except for the use of special "Invar-strut" pistons and caged big-end roller bearings, together with a compression ratio of 5 to 1 for the 33/C engine. A new design of shock-absorber has been fitted on the engine shaft of both machines and second gear ratio has been raised from 10.6 to 8.7. Improvements to the C, C/S specification include new fuel tanks, oil tanks with fabric filters, improved silencers, oil-baths for the primary chains, quickly-detachable rear wheels, left-hand pedal control for the redesigned rear brakes (no longer interconnected with the front ones, but provided with water shields), and "clean" handlebars with integral controls.

NEW MATCHLESS FEATURES

Neater Controls. An excellent feature on all 1932-3 models is the fitting of a new type of "clean" handlebars of Matchless design with Bowden levers. The bars, which are adjustable for angle and of a slightly larger section than hitherto, are finished in highly polished black enamel with chromium-plated levers which are now integral fittings. As may be seen in Fig. 78, the throttle is operated by a long, thin twist-grip with a dummy to match. A new type rotary dimming switch and horn switch are also provided, and small trigger levers are now used for the ignition and air controls, which, with the throttle, open *inwards*.

New Fuel Tanks. A new design of bulbous saddle tank is fitted, and it has, except in the case of the "Silver Arrow" and "Silver Hawk," a different finish from that employed for 1932; an all-black highly polished stove-enamel finish with gold lining is used and the chromium initial "M" is embossed and held in place by two screws. A chromium-plated strip runs down the centre of the tank top. The new tanks are certainly of most striking appearance and have the same capacity as before (2½ gal.,

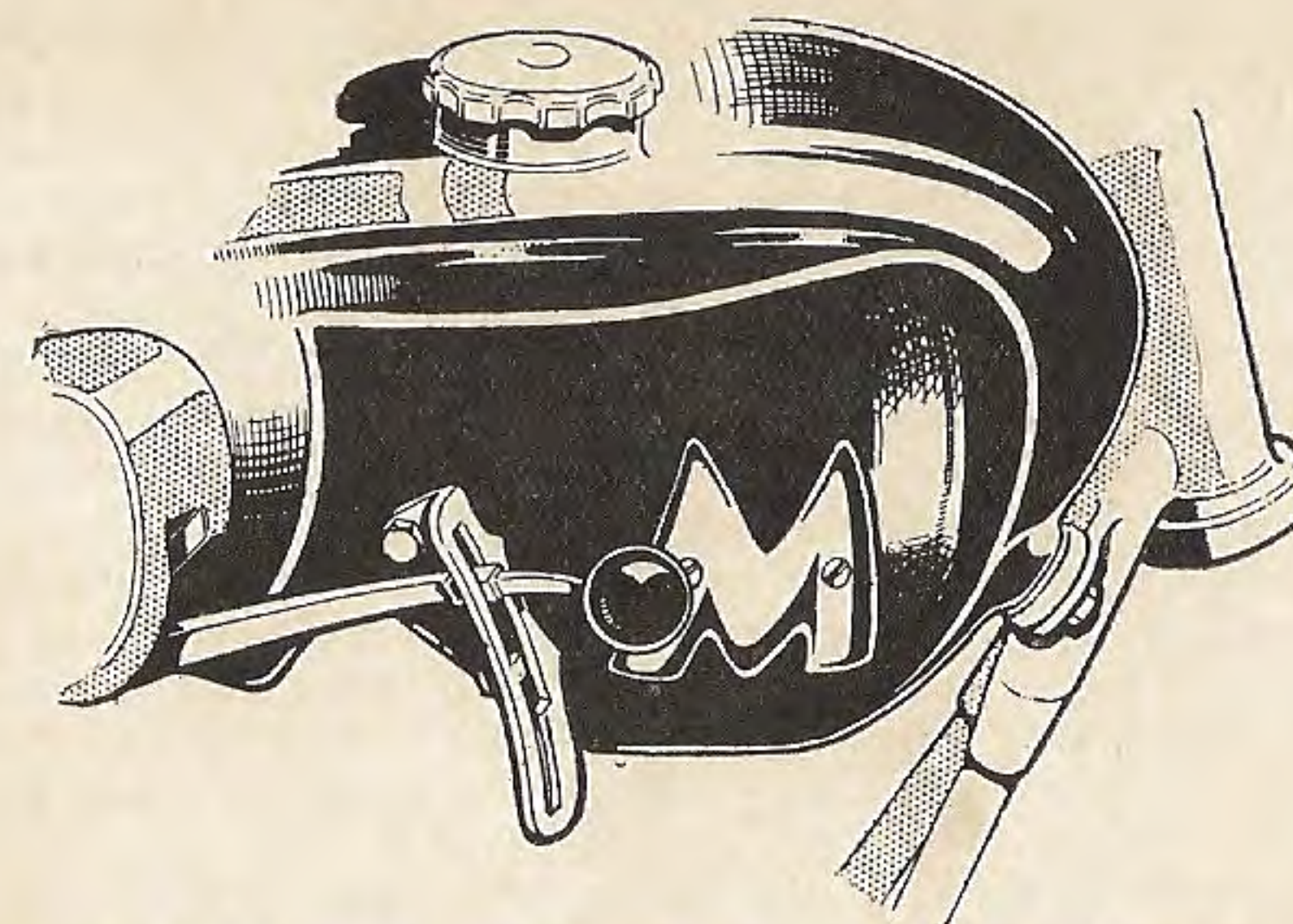


FIG. 79. THE NEW SADDLE TANK WITH EMBOSSED CHROMIUM "M"
This tank is specified on all 1933 machines except the "Silver Arrow" and "Silver Hawk"

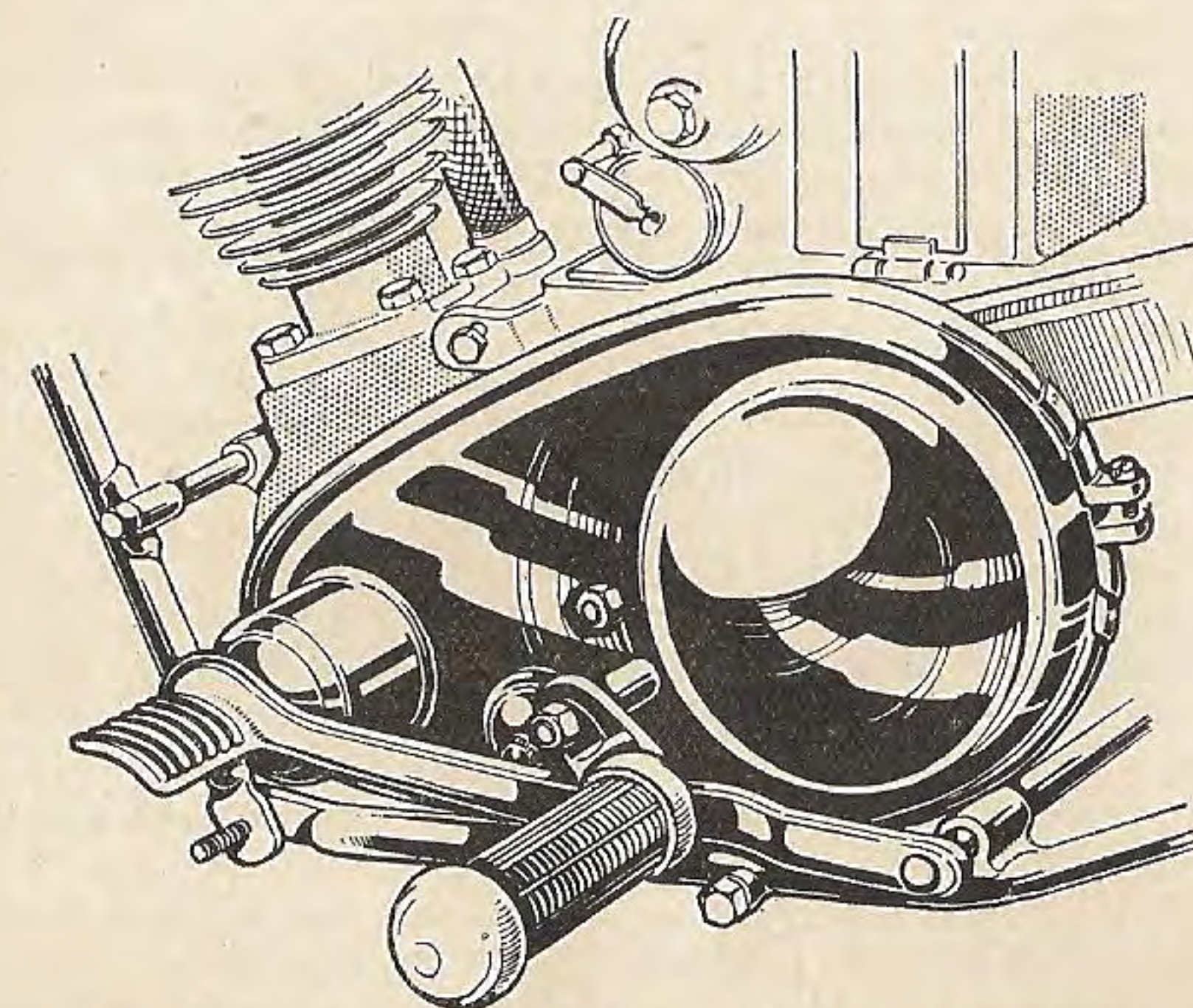


FIG. 80. OIL-BATH CHAIN CASE FITTED TO 1933 SINGLES
Clamp details are shown in Fig. 80A. Model 33/D7 has a chain guard only and has not the 12 in. rear brake pedal fitted, as shown above, to the other D/5 class models

except on the "D" class models). Insulation from road shocks and vibration is provided by rubber buffers (Fig. 79), and larger knee-grips are fitted.

Chromium-edged Mudguards. All the 1933 "D" class models except the "250" side-valve have chromium-plated edges on the mudguards, which, besides giving an air of refinement to the machines, tends to prevent deterioration of the enamel. These edges are formed of brass mouldings rolled over the edges of the mudguards and riveted in place.

Oil-bath Primary Chain Cases. Black enamelled oil-bath primary chain cases of very neat design (see Fig. 80) are fitted to all 1933 single-cylinder models except model 33/D7. The lower chain run is entirely submerged in oil and the chain therefore operates under ideal conditions with a consequently great increase in its life and silent running. An inspection cap on the side of the chain case serves as an oil level indicator and enables the chain tension to be ascertained. The chain case is designed so that it can be readily taken apart. The two halves, which are steel pressings, are held together by a moulded rubber band with a metal clamp extending round the chain-case and tightened up by a nut and bolt conveniently placed at the rear (Fig. 80A).

Burman Gearboxes and Clutches. Pivot-mounted three-speed Burman gearboxes were introduced in 1932 for models D/5, D/6, D/3. This type of gearbox is retained this year for model 33/D5, but Burman four-speed gearboxes are now fitted to model 33/D2, and models 33/D6, 33/D3, 33/D80.

The three-speed Burman gearbox (type "WP") has a two-plate clutch and the four-speed model (type "HP") a three-plate clutch. Both gearboxes are of very similar design and have constant-mesh gears of oil-toughened nickel-chrome steel (not case-hardened), the necessary gear changes being obtained by means of dog clutches and locked by a patent rack and pawl mechanism (see Fig. 90) actuated by a bell-crank lever. The kick-starter is not mounted on the layshaft, but on a separate shaft, thus allowing a good second gear ratio to be obtained for starting purposes. The drive is taken through the mainshaft. The clutches are of the multiple-spring type with alternate cork-inserted and plain steel plates, the outer clutch spring plate having a recessed adjusting screw against which the floating plunger in the hollow mainshaft bears. Unlike the Sturmey-Archer clutches, the springs are adjustable for tension and a shock-absorber is fitted in such a way that the drive is transmitted from the clutch sprocket to the clutch through rubber buffers which give a radial movement of approximately $\frac{3}{16}$ in. As may be seen in Fig. 90, to allow for expansion of the buffers dished recesses are provided.

Referring to Fig. 90, the action of the four-speed gearbox will be seen to be very simple. The mainshaft is splined for its whole length and the layshaft for only two short distances. Pinions 6, 7, 10, 11, are moved simultaneously by the striker 19 and pinions 9, 12 are keyed to their shafts. To obtain neutral the four sliding pinions are moved into the position shown, where both layshaft pinions are free of the layshaft splines. To obtain first gear the sliding pinions are moved to the extreme right so that the dogwheels 7, 8 are coupled and the drive is transmitted from the mainshaft to the gearbox sprocket 4 through pinions 8,

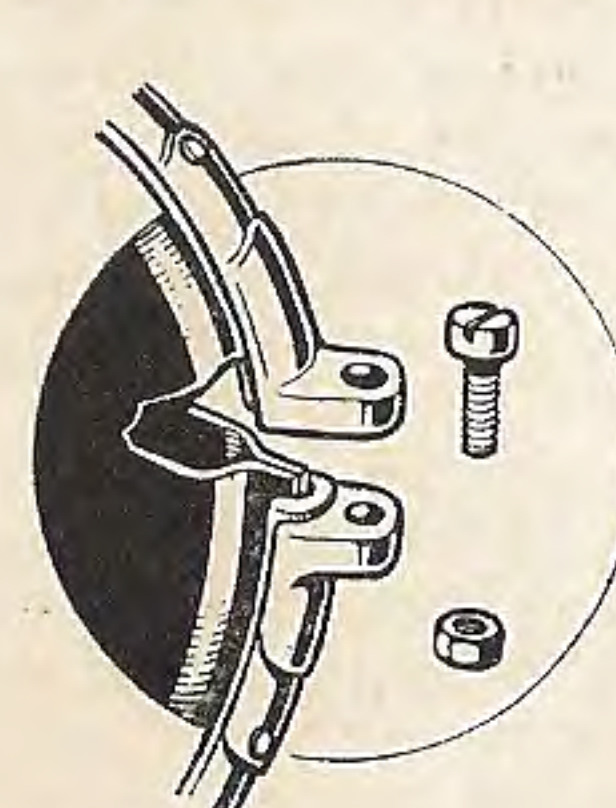
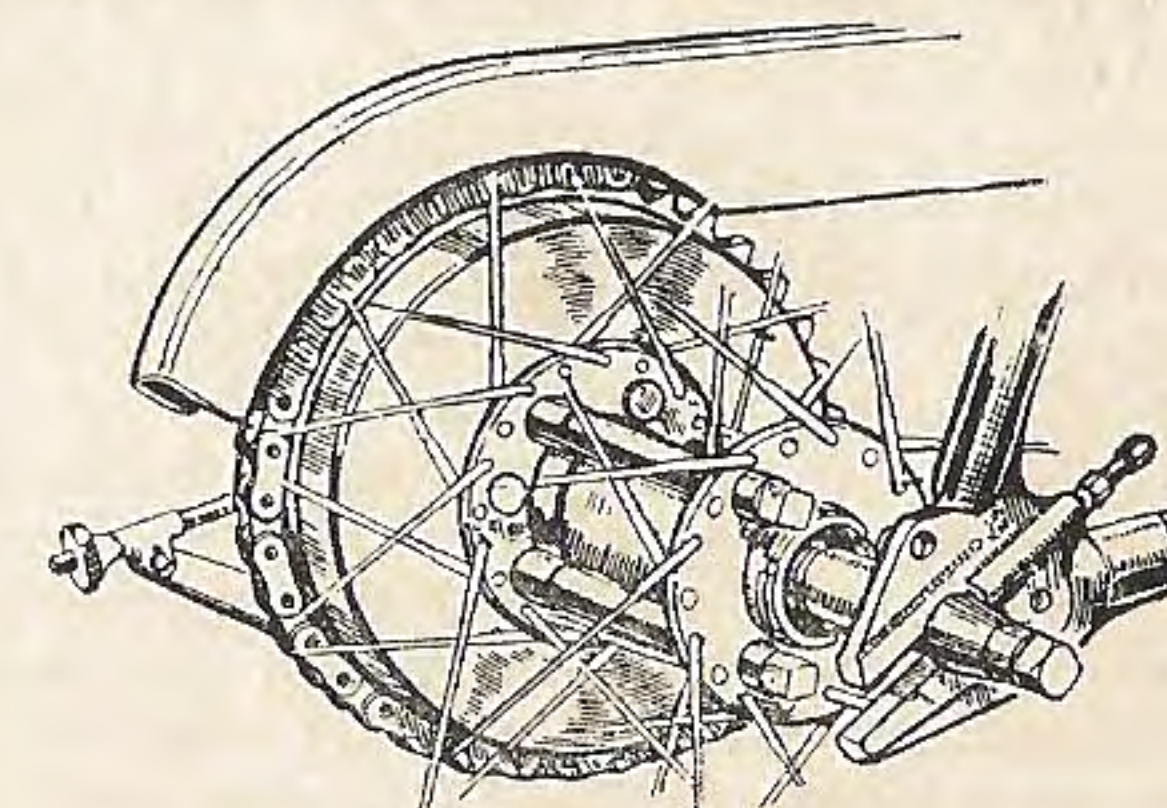


FIG. 80A. PRIMARY CHAIN CASE CLAMP



(From "The Motor Cycle")

FIG. 81. QUICKLY-DETACHABLE REAR WHEEL

12, 9, 5. To obtain second gear the sliding pinions are moved $\frac{1}{4}$ in. to the left of the neutral position, when pinion 11 engages the layshaft splines and the drive is transmitted through pinions 7, 11, 9, 5. To obtain third gear the sliding pinions are moved $\frac{3}{4}$ in. to the left of neutral when pinion 10 engages the layshaft splines and the drive is taken through pinions 6, 10, 9, 5. Fourth gear is obtained by moving the sliding pinions to the extreme left until the dogwheels 5, 6 are coupled, thereby locking the gearbox sprocket sleeve 5A to the mainshaft and giving direct drive.

Optional Foot Gear Control. Positive-stop foot control may be had as an alternative to the hand control on all 1933 models with Burman gearboxes. 1932 Burman gearbox models may also be converted to foot control for a small extra charge. The 1933 Burman foot control ("T.T." type) comprises a short toe-operated lever with its fulcrum on an extension of the gearbox inner selector lever spindle. Also pivoted on the spindle is the casing of the foot control containing a double edged pawl engaging teeth cut on a sector keyed to the spindle, together with two springs which return the gear lever to the same position after

every gear change. On the back of the casing are two bosses which bear against stops on the spindle bush and limit the lever movement. Foot control, rather similar to the Burman, may be specified also on model 33/CS.

Oversize Tyres. 26 in. $\times$ 3.25 in. "Firestone" cord tyres are fitted to all models except model 33/D7. Oversize tyres measuring 27 in. $\times$ 4 in. are available for all except the "D" class models.

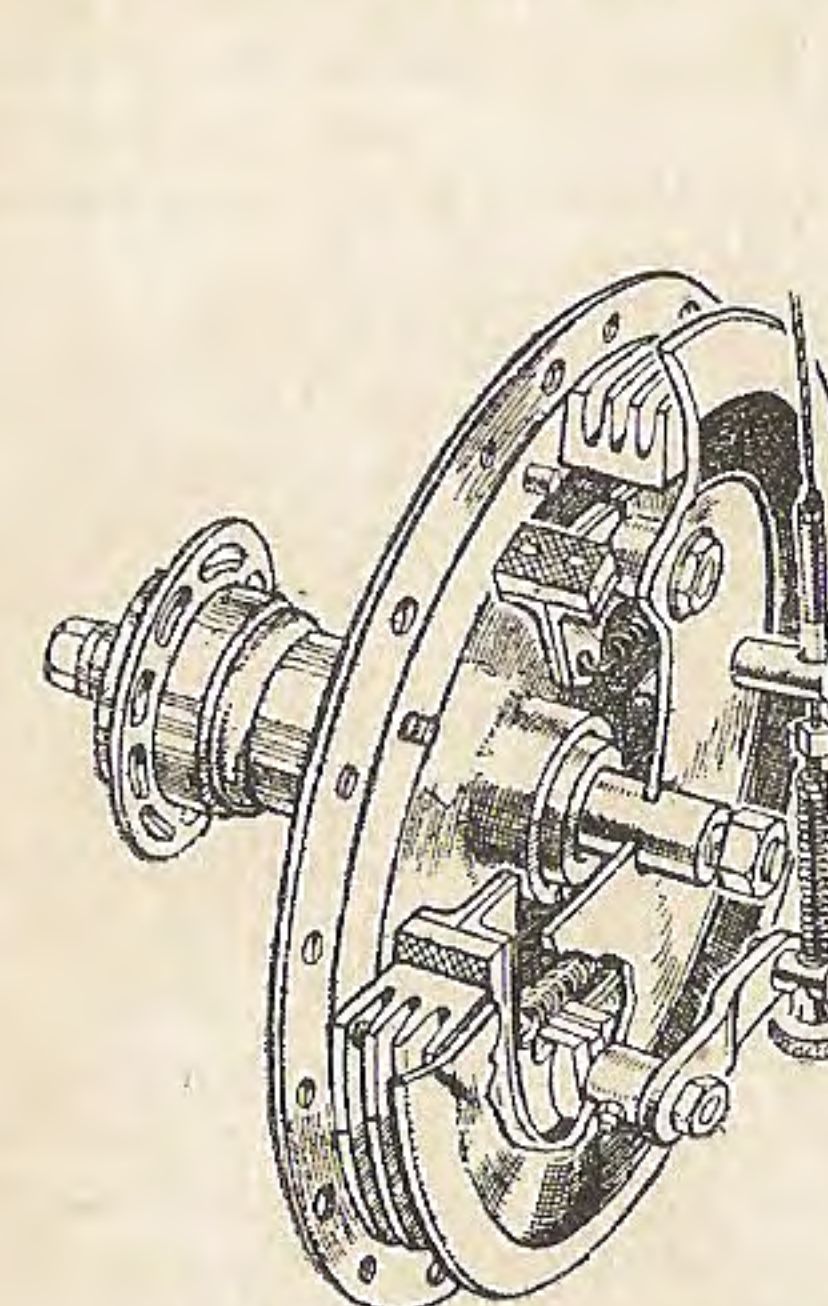
Quickly-detachable Rear Wheels. Models 33/C, 33/CS have bolt-fitting quickly-detachable rear wheels. The method of securing the hub is shown in Fig. 81. To remove the rear wheel it is only necessary to undo the three tubular bolts and take out the centre spindle, when the wheel can be lifted clear of the three dummy studs and withdrawn.

Redesigned Brakes. All the "D" class models except 33/D7 have been fitted with entirely new brakes. Fig. 82 shows a partly sectioned front brake, but the rear is similar. A large flange is formed integral with the hub, and to this flange is secured by eight screws the 6½ in. diameter brake drum proper which has some unusual features. It is made of centrifugally cast chromium-iron alloy, an ideal braking surface because of its high co-efficient of friction, and has four deep ribs which serve the dual purpose of stiffening the brake drum and providing efficient cooling when descending long and steep hills. The brake anchor plate which houses the shoes has had its diameter increased so as to form a cover plate which entirely excludes mud and water. The rim of the cover plate is chromium-plated and this greatly enhances the appearance of the "D" class models. A brake pedal 12 in. long (see Fig. 80) operates the rear brake which is not inter-connected with the front one.

Transmission Shock-absorber. 1932-3 single-cylinder models have a face-cam shock-absorber fitted on the engine shaft to eliminate transmission snatch. As may be seen in Fig. 83, the magneto drive and engine sprockets are mounted on a splined sleeve which fits over the end of the mainshaft, and on this sleeve, able to slide axially, is a similarly splined face-cam member with its cams held by a powerful compression spring close to face-cams situated in a ring attached to the engine sprocket. The magneto sprocket (which, incidentally, is fitted as shown only in the case of model 33/D7) is, of course, integral with the splined sleeve, but the engine sprocket is free to rotate on it in so far as the compression spring will allow of relative movement between the face-cams. Thus, on opening the throttle suddenly some "slip" occurs, so smoothing out the transmission.

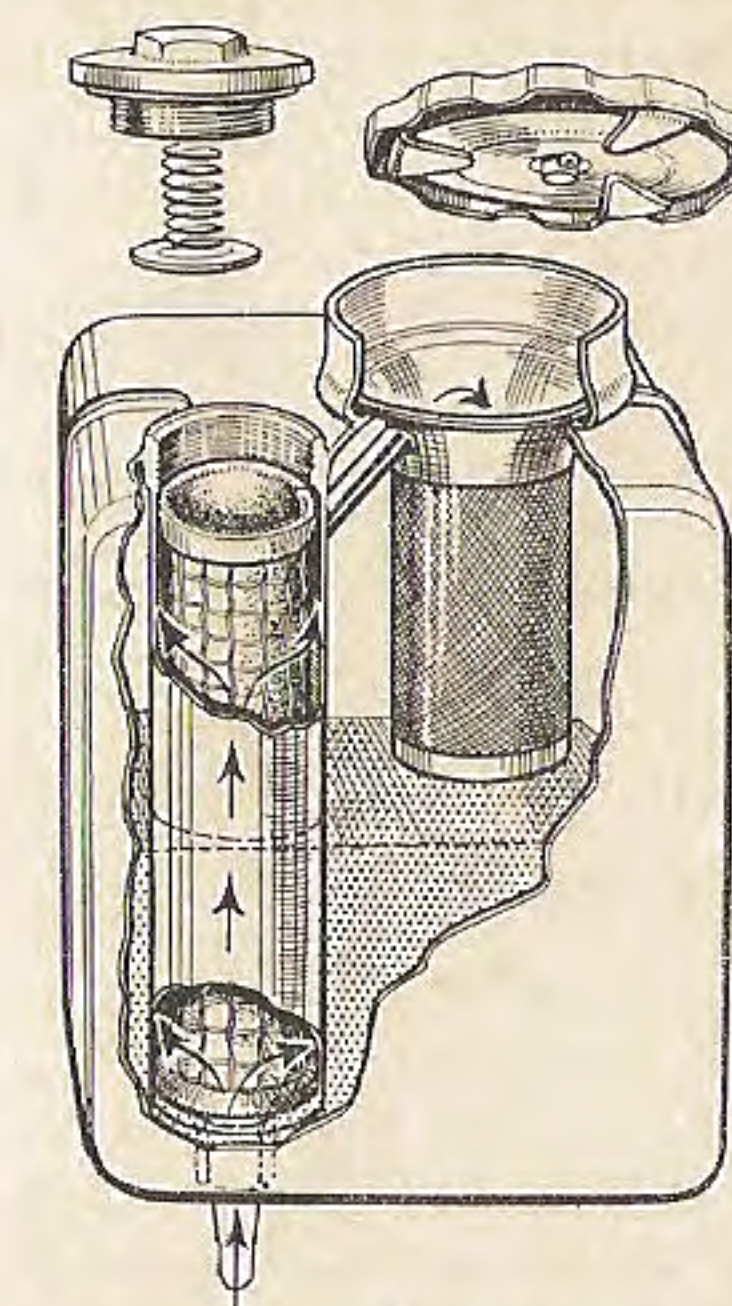
Fabric Oil Filters. The efficiency and reliability of the Matchless dry-sump lubrication system has been still further improved by the fitting to all 1932-3 oil tanks of a special detachable

fabric filter (Fig. 84) through which all oil must pass before being returned to the tank. The filter, which is a felt cartridge about 7 in. long and 1 in. in diameter, has a capacity about ten



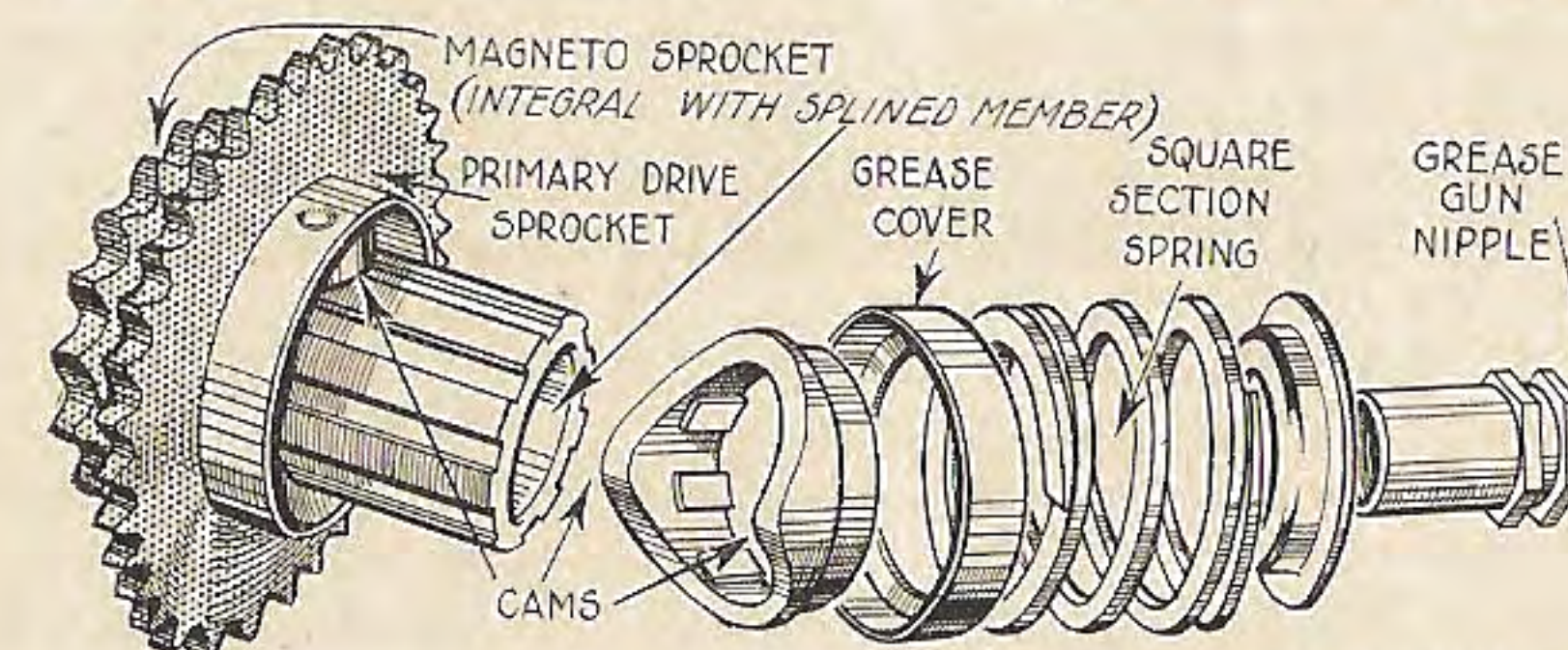
(From "The Motor Cycle")

FIG. 82. THE NEW MATCHLESS BRAKE WITH RIBBED DRUM



(From "The Motor Cycle")

FIG. 84. SHOWING FABRIC FILTER FITTED TO THE OIL TANKS



(From "The Motor Cycle")

FIG. 83. COMPONENT PARTS OF THE FACE-CAM TYPE TRANSMISSION SHOCK-ABSORBER FITTED TO THE ENGINE SHAFT

times as great as the amount of oil actually filtered and is guaranteed to remove all impurities from the oil.

Matchless Engine Modifications. Models introduced 1931-2 and since retained and redesigned for 1933 have had in most instances the cylinder-head and cylinder finning made more massive, and

all the small capacity "D" class engines except model 33/D7 have the ignition unit driven off the inlet camshaft and have a cast-aluminium chain-case for the drive. All overhead-valve engines which last year had valve-rocker return springs now have valve return springs enclosed in the push-rod covers. In place of the two-ring aluminium alloy piston with split skirt (Fig. 30A) used prior to 1932, a special type of three-ring piston known as the "Invar-strut" piston is fitted to all early 1933 engines except 33/D80, 33/D7, 33/D2, 33/D3, 33/D6, the "Silver Arrow" and "Silver Hawk." The piston, illustrated in Fig. 86, is self-compensating for varying temperatures and engines fitted with it can be driven hard for prolonged periods without risk of "drying-up." Small working clearances are used with the "Invar-strut" piston, and this entirely eliminates piston "slap." Later versions of the above engines have a self-compensating three-ring piston of Italian design having "Invar-struts." Big-end bearings, except on models 33/D7, 33/D2, 33/A2, 33/B, have been modified by the substitution of caged roller bearings for the shouldered crankpin bearing.

New Silencers. All 1932-3 models except the multi-cylinder models have an improved shape of silencer with integral fishtail. Internally the silencer is the same as that shown in Fig. 6. A high-level competition exhaust pipe with tubular silencer (Fig. 88) may be specified as an alternative to the standard exhaust system on all O.H.V. models, and also on model 33/D5 as an extra.

MODEL 33/D7

This remarkably low priced (£34) side-valve "250," introduced this year to take advantage of the 30s. *per annum* tax, for machines of under 250 c.c. capacity, has exactly the same specification as the 1931 model D described and illustrated on page 48, except for the following—

The 2·46 h.p. Side-valve Engine. As on the 1932-3 347 c.c. engine, the cylinder and cylinder-head are cast integral, with finned aluminium valve caps provided on the latter, but to obtain a decrease in capacity of 101 c.c. the bore and stroke have been altered to 62·5 mm. × 80 mm. The compression ratio has been raised to 4·9 to 1, giving a maximum speed of just over 50 m.p.h. The only other important engine alteration is the incorporation on the engine shaft of a face-cam shock-absorber. A decompressor for easy starting is retained.

Carburettor. This is a two-lever semi-automatic type 74/014 Amal with flange fixing direct to the cylinder and twist-grip throttle control. A size 70 main jet is used, together with a 4/4 throttle valve and needle position 3. Fuel consumption with this setting should work out at 100-120 m.p.g.

Lubrication. The dry-sump lubrication system remains unaltered but for the inclusion of a fabric filter in the oil tank.

Miscellaneous Items. Included in the specification are a 2 gal. saddle tank of new design, "clean" handlebars of graceful semi-sports pattern with integral fittings, a new silencer and "Firestone" cord tyres.

MODEL 33/D5

Something like a sensation was caused in the motor-cycle world, and history was made in the autumn of 1931 when Messrs.

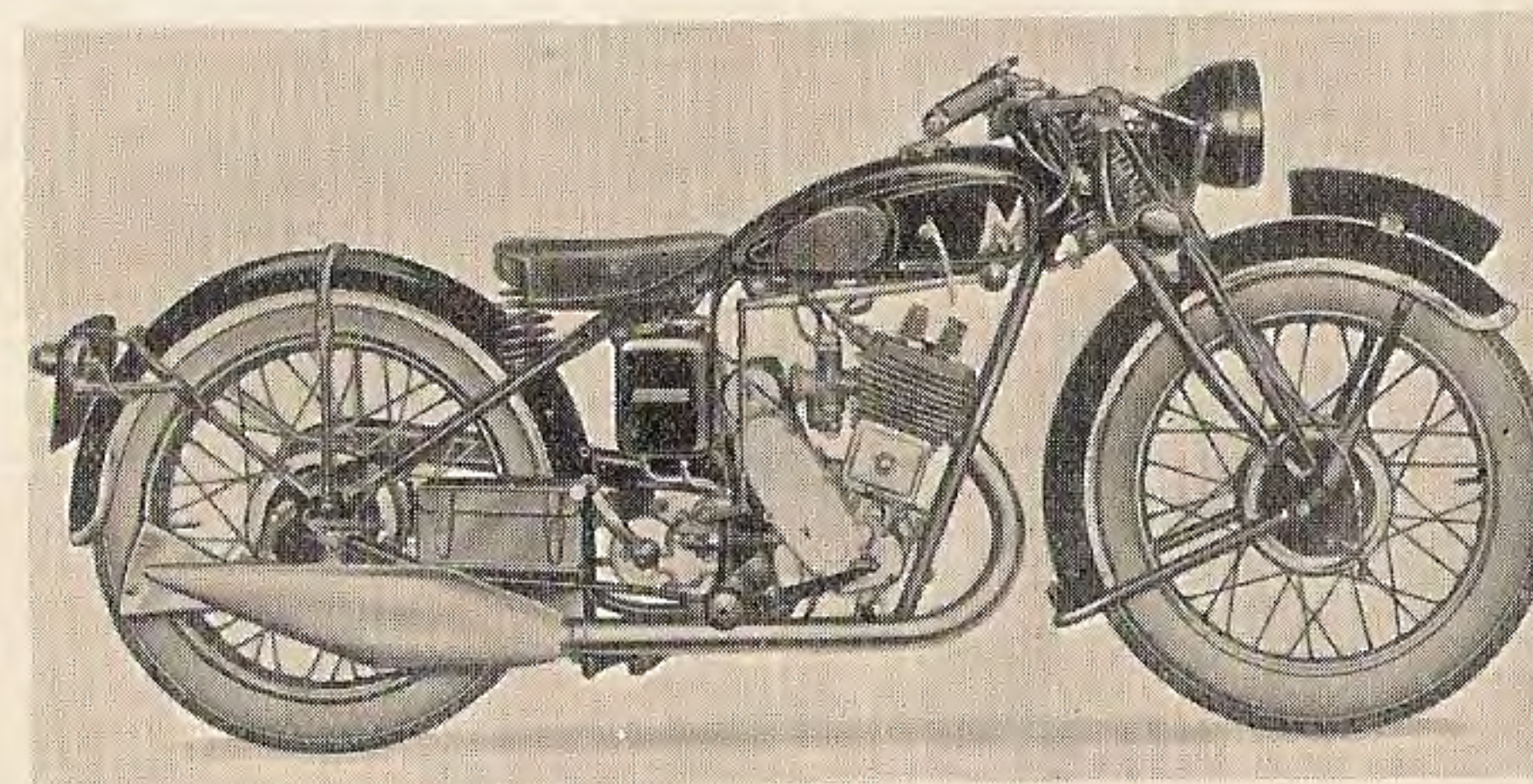


FIG. 85. MODEL 33/D5 ("LIGHT 500")

Colliers placed on the market an amazingly cheap 500 c.c. motor-cycle (model D/5) complete with electric lighting and full equipment, weighing under 224 lb. This "Light 500" is retained for 1933 and its power/weight ratio, in spite of numerous improvements, has still been maintained at a level sufficient to give wonderful acceleration and a full throttle speed of about 65 m.p.h. Model 33/D5, which costs £38 10s., has the following specification—

The 4·98 h.p. Side-valve Engine. The power-unit, which has a bore and stroke of 82·5 mm. × 93 mm., is of straightforward Matchless design and very similar to the 5·86 h.p. engine described on page 43, though like model 33/D7 it has no detachable head and there are several other important differences. For instance, a caged double-row roller bearing is used for the big-end of the connecting-rod which now has fitted to the $\frac{7}{8}$ in. diameter gudgeon-pin a self-compensating "Invar-strut" piston (Fig. 86) with three narrow rings at the crown. The piston reciprocates in a heavily finned cylinder having the latest design of semi-turbulent combustion chamber with a compression ratio of 4·4 to 1. As may be seen in Fig. 85, the position of the sparking plug is

somewhat unusual; it is situated in a cool position over the inlet port behind the valve cap, which, like the exhaust valve cap, has an aluminium "fircone" to assist cooling. The exhaust gases make their exit *via* a large diameter and heavily plated pipe and standard silencer with integral fishtail.

The valves operate in cast-iron guides and are protected and lubricated by the valve chest, which, as on all Matchless engines, is cast integral with the cylinder and has a detachable cover. There are no variations from standard Matchless practice in regard to either the two-cam timing gear or the dry-sump lubrication system. A decompressor is fitted, and the engine has a disc-type crankcase breather.

Carburettor. A two-lever, semi-automatic, pilot jet Amal type 76/004 is used (almost identical to the instrument illustrated on page 77). Twist-grip throttle control is standard and the recommended setting is: main jet size 180; throttle valve 6/5; needle position 3. With this setting 80-90 m.p.g. should be obtained solo, and 60-65 m.p.g. with sidecar.

Ignition. A Lucas magneto (unless "Magdyno" lighting is specified) is placed behind the engine and driven off the inlet camshaft at half engine speed by a chain enclosed in an aluminium chain case cast integral with the timing case cover. The plug fitted is a Lodge T.S.3 (1933 O.H.V. models have a Lodge H.1).

Frame and Forks. The frame, which is built of Aero quality butted steel tube, is a duplex cradle type of almost identical design to that used on the "C" class models (Fig. 32). It has, however, a $3\frac{1}{2}$ in. shorter wheel-base. The spring forks with finger adjustment to the shock-absorbers are of the same type fitted since 1930 and have fork stops.

Gearbox and Clutch. A three-speed, type "WP," Burman gearbox having constant-mesh gears is pivot-mounted similarly to the Sturmey-Archer gearbox in a rear extension of the engine plates, and is operated by a tank-mounted gear lever (with first gear position forward) or positive-stop foot control (12s. 6d. extra). The gearbox has an internal speedometer drive and the following standard solo gear ratios are provided—

First, 13.2 to 1; second, 8.1 to 1; third, 5.1 to 1. Sidecar gear ratios are: first, 15.0 to 1; second, 9.2 to 1; third, 5.8 to 1.

The clutch is a three-plate multiple spring type Burman with cork inserts and shock-absorber.

Transmission. Coventry "Ultimate" chains are used throughout, and the dimensions front and rear are $\frac{7}{16}$ in. $\times$.265 in. and $\frac{1}{2}$ in. $\times$.305 in., respectively. The front chain runs in an oil-bath chain case (Fig. 80). Besides the clutch shock-absorber, a face-cam shock-absorber is fitted on the engine shaft. The rear chain has an efficient guard.

Brakes. Both brakes are of an entirely new design (Fig. 82) with detachable cast chromidium-iron alloy brake drums of $6\frac{1}{2}$ in. diameter provided with cooling fins and chromium-rimmed cover plates to exclude mud and water. No inter-connecting gear is used. The rear brake is operated by a 12 in. brake pedal on the off side, and the front one by a handlebar lever on the same side. Finger adjustment is provided for each brake.

Wheels and Tyres. The wheels which are built up of heavy gauge butted spokes have Timken roller bearing hubs and are fitted with 26 in. $\times$ 3.25 in. "Firestone" cord tyres.

Tanks. The fuel tank, which is a redesigned bulbous saddle type, with embossed chromium "M" (Fig. 79), has a capacity of 2 gal., sufficient for about 170 miles. The rectangular oil tank mounted over the gearbox and provided with a fabric filter (Fig. 84) holds 3 pints. Oil consumption works out at 1,300-1,500 m.p.g.

Miscellaneous Equipment. "Clean" semi-sports handlebars, adjustable for position, a Lycett "Aero" spring seat, large knee-grips and adjustable footrests ensure a comfortable riding position. Large domed mudguards with chromium-plated edges protect the rider from all dirt. The rear mudguard is detachable for tyre repairs. Included in the equipment are a steering damper, a spring-up central stand, tubular front stand, pump inflator, two large pannier tool-bags between the chain stays, and a very complete set of tools.

MODEL 33/D2

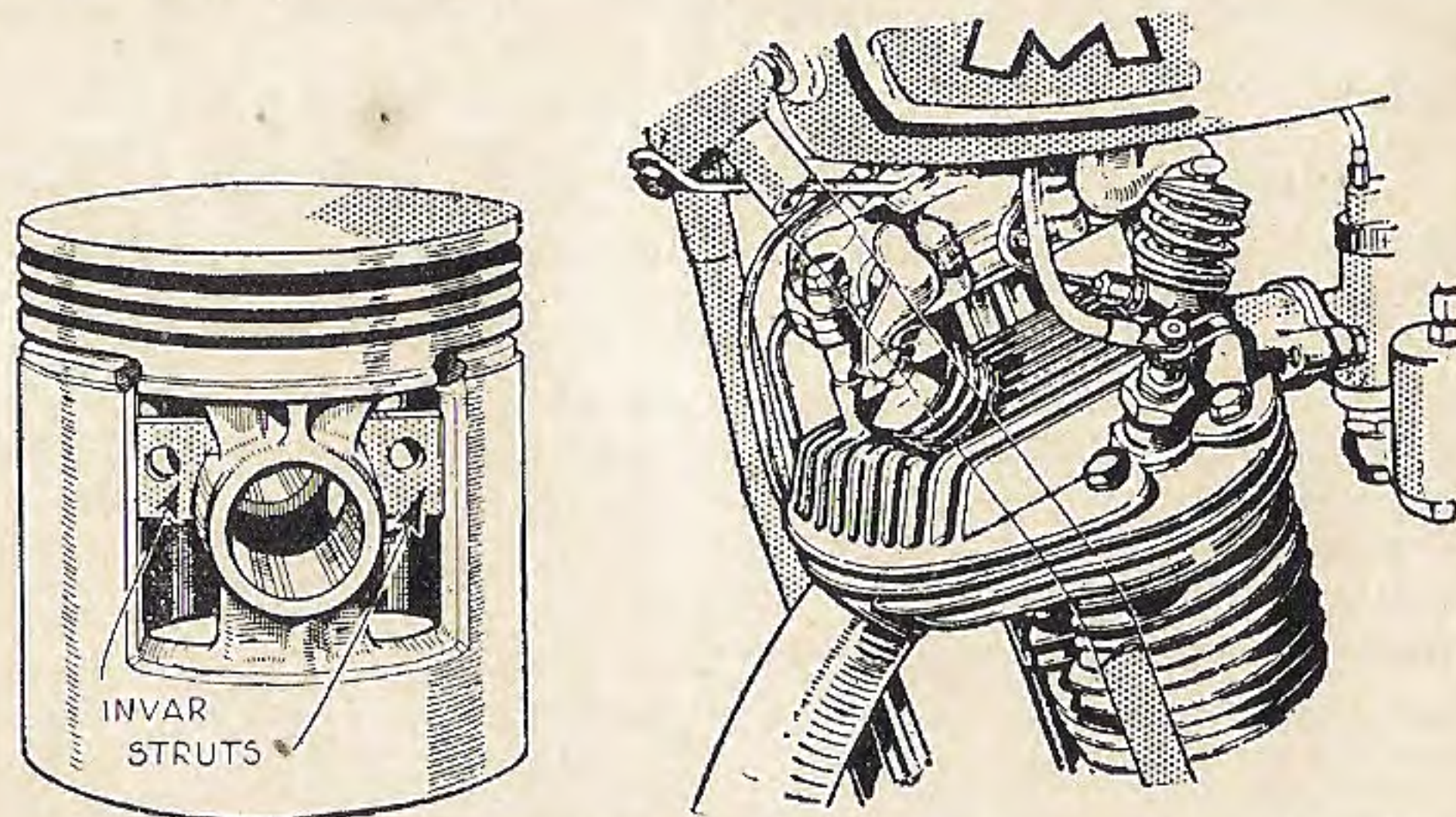
This rakish looking overhead-valve "250" is like the side-valve "250" eligible for the 30s. *per annum* tax and costs only £40 10s. It is, of course, much faster and on full throttle will attain a speed of 65 m.p.h. without difficulty. Model D/2, although a new model introduced this year, is really an improved version of the 1931-2 model D/S with its general specification developed on the lines of the "Light 500" already described. Its specification is, in fact, identical to that of model 33/D5 except in regard to the engine and gearbox. The rear brake pedal is also situated on the opposite side.

The 2.46 h.p. O.H.V. Two-port Engine. The bore and stroke are the same as on the 246 c.c. side-valve, namely 62.5 mm. $\times$ 80 mm., and the general design of the engine differs only a very little from the 1931-2 D/S engine (see page 53). The same type of crankcase, flywheel assembly and lubrication system are used, but the timing case cover is extended as on all present engines except 33/D7 to form a chain case for the magneto or "Magdyno" drive which is taken from the inlet camshaft. An "Invar-strut" piston is not used, however, in the case of this

small capacity power unit. The cylinder finning has been considerably improved and the compression ratio raised to 6.5 to 1. The exhaust system may be of the type shown in Fig. 88 or 89.

Carburettor. This is a type 75/014 Amal semi-automatic, pilot jet instrument and has twist-grip throttle control. Recommended setting is: main jet, size 110; throttle valve, 5/4; needle position, 2. Fuel consumption is 100–120 m.p.g.

Gearbox and Clutch. The gearbox is a pivot-mounted, four-speed, type "HP" Burman, having constant-mesh gears and



FIGS. 86 AND 87. SHOWING (LEFT) THE "INVAR-STRUT" PISTON AND (RIGHT) 1933 CYLINDER-HEAD AND OVERHEAD VALVE GEAR

The O.H.V. engine shown is a model 33/D6. Note pipe to inlet valve guide

hand or foot control at option. The standard gear ratios are: first, 16.6 to 1; second, 10.0 to 1; third, 7.8 to 1; fourth, 6.1 to 1. The clutch is a multi-spring, three-plate type similar to the two-plate type with cork inserts and shock-absorber.

MODELS 33/D3, 33/D6

These two 70 m.p.h. models, which should appeal strongly to riders who prefer the 350 c.c. class of overhead-valve machines, were originally introduced in 1932 and since then have had their specifications much improved, and it is now exactly the same as that of model 33/D2 except that a higher power engine is installed and a different set of four-speed gear ratios is employed. Models 33/D3, 33/D6 are identical except that the latter has a single-port engine. Their prices are £41 10s. and £40 10s., respectively.

The 3.47 h.p. O.H.V. Engine. This is a larger edition of the 2.46 h.p. engine with a bore and stroke of 69 mm. × 93 mm.,

respectively, the only important difference other than engine capacity being in regard to the big-end bearing which is of the caged roller type, and the compression ratio, which is 5.6 to 1.

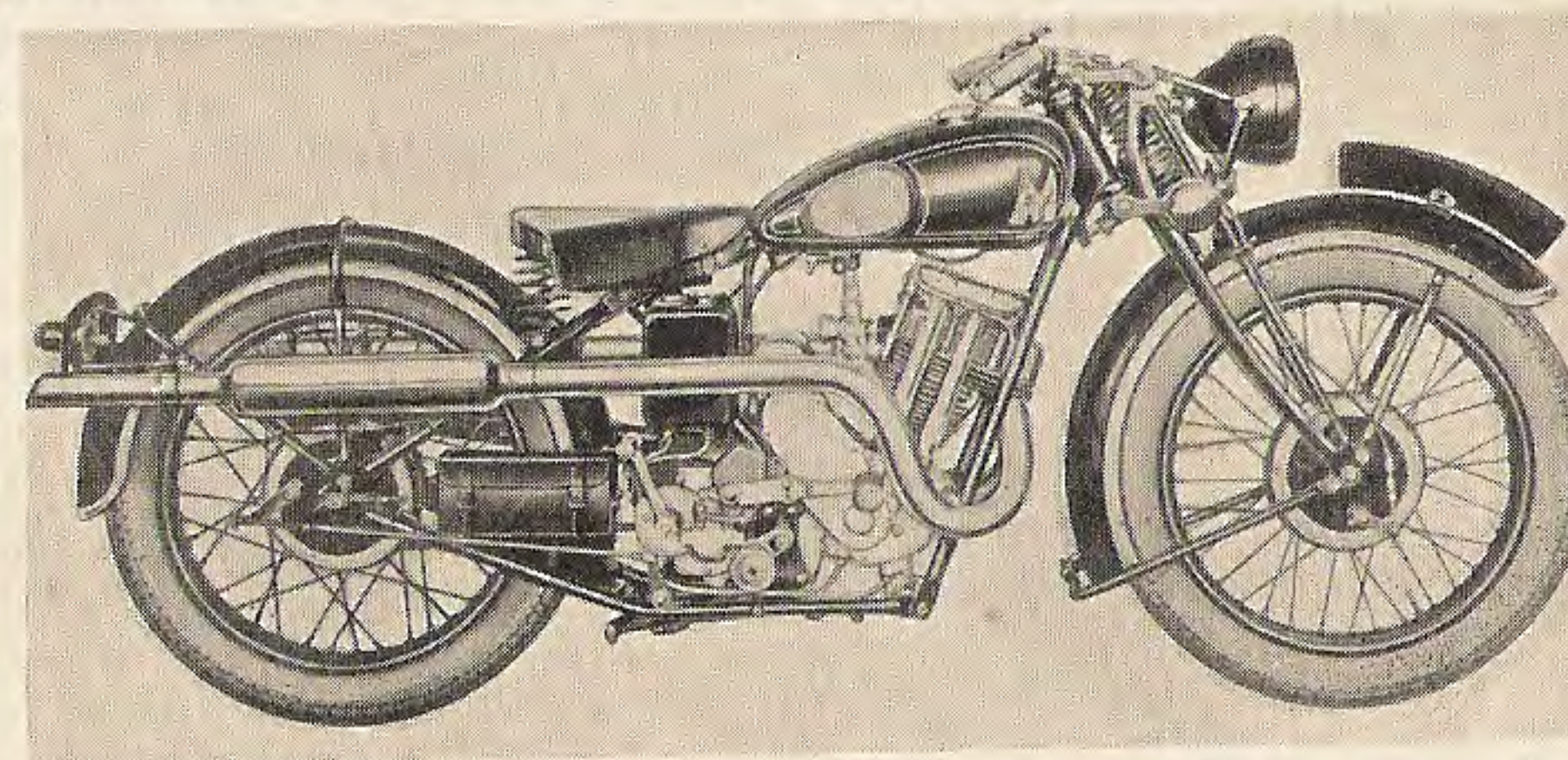


FIG. 88. MODEL 33/D2 (WITH COMPETITION EXHAUST)

Model 33/D3 has a two-port detachable cylinder-head with hemispherical combustion chamber and two exhaust pipes, while model 33/D6 has a single port head. Like model 33/D2, the

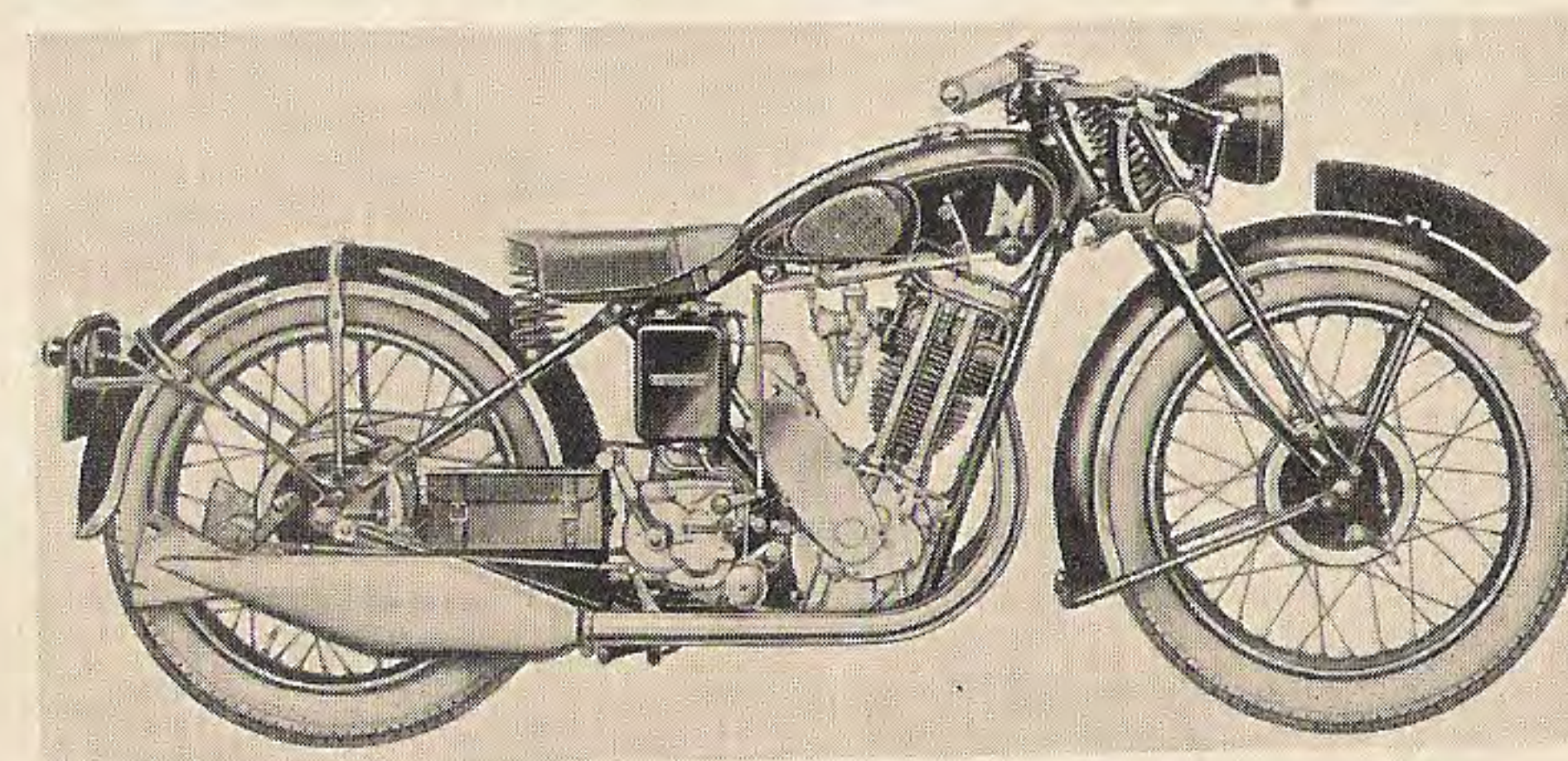


FIG. 89. MODEL 33/D3 (TWO-PORT)

engine now has dry-sump lubrication with automatically lubricated inlet valve guide, enclosed and lubricated roller bearing overhead rockers, enclosed push-rods, a two-cam timing gear running in oil-bath, aluminium piston, inlet camshaft-driven "Magdyno," and a decompressor.

Carburettor. The carburettor is the same type as fitted to the

2.46 h.p. O.H.V. engine and has the same setting except that needle position 3 is advised.

Gear Ratios. The pivot-mounted, four-speed type "HP" Burman gearbox has the following ratios: first, 16.6 to 1; second, 8.9 to 1; third, 7.7 to 1; fourth, 6.0 to 1.

MAINTENANCE NOTES (1932-3)

Use of Foot Gear Control. With the very considerable leverage obtained on this type of control, care must be exercised when changing gear to avoid damaging the gear selectors or control mechanism. When changing gear, disengage the clutch and move the gear pedal simultaneously with a steady toe or heel and toe movement (1932 models) until the desired gear change down or up is obtained. Do not remove the foot from the pedal after the end of the travel has been reached until the clutch has been re-engaged.

Tyre Pressures. The correct inflation pressures for the front and rear tyres of all 1933 solo models except the Big Twins are 15-16 lb. per sq. in. and 20-22 lb. per sq. in. respectively. For the Big Twins, 16-18 and 22-24 lb. per sq. in. are recommended, front and rear. Where a sidecar is attached, 22-24 and 24-26 lb. per sq. in. are recommended for the rear tyre in the case of the single and multi-cylinder models, respectively. Sidecar tyres should be pumped to 15-16 lb. per sq. in., except on the multis where 16-18 lb. per sq. in. is desirable.

Tappet Clearances. All 1932-33 side-valve engines except the "Silver Arrow" should have their tappets kept adjusted so that with the engine warm there is a clearance of .004 in. for the inlet valve and .006 in. for the exhaust valve. On the new 2.46 h.p. and 3.47 h.p. O.H.V. engines the tappets should be adjusted so that with a cold engine there is just no clearance between the valve rocker ends and the hardened caps on the ends of the valve stems. It should be possible, however, to revolve these caps with the fingers. See that the decompressor is in the "off" position when making an adjustment.

Ignition Timings. The correct ignition timing for the 1933 2.46 h.p. S.V. Model D/7 engine is for the contact-breaker points to commence to open with the piston $\frac{1}{16}$ in. before top-dead-centre and the ignition lever fully retarded. The setting for the 1932 4.98 h.p. S.V. and the 3.47 h.p. O.H.V. engines is $\frac{1}{16}$ in. before T.D.C. on full retard, and for the same 1933 engines $\frac{1}{16}$ in. after T.D.C.

Cleaning Fabric Filter. About once every 500 miles not only should the filter below the filler cap of the oil tank be removed and thoroughly cleaned in petrol, but the hexagon-headed cap

on top of the tank should be unscrewed and the fabric filter taken out and similarly cleaned.

Lubricating Transmission Shock-absorber (33/D7). To obtain smoothness of transmission the face-cam shock-absorber on the engine shaft of model 33/D7 must be kept lubricated. Every 300 miles, or more frequently if harshness of transmission develops, inject through the grease-gun nipple provided a charge of Wakefield's "Castrolase." On other models lubrication is automatic.

Lubrication of Primary Chains. On all 1933 singles except model 33/D7 the primary chain is enclosed in an oil-bath and therefore requires no attention other than occasional adjustment and replenishment of the case with engine oil.

Lubricating Burman Gearbox. All Burman gearboxes are sent out by the manufacturers charged with sufficient grease for at least 1,000 miles' running without attention. It is advisable every 1,000 miles to inject through the aperture uncovered by the removal of the grease cap on top of the gearbox 2-3 ounces of Wakefield's "Castrolase Medium," but the gearbox should not be completely filled, two-thirds full being the correct level. About every 5,000-7,000 miles remove and re-pack with grease the clutch sprocket roller bearing and also the mainshaft plunger.

Burman Clutch Adjustment. If clutch slip occurs, first suspect the clutch cable adjustment and if necessary adjust until there is the requisite $\frac{1}{32}$ in. clearance between the clutch rod (16, Fig. 90) and the ball in the actuating lever (17). If the cable adjuster is already screwed right home, the necessary clearance can be obtained by unscrewing the adjuster screw (15A) a trifle. Should clutch slip persist, it is probable that the spring adjuster nuts (15B) require tightening up and each of these should be given half a turn, when a retrial should be made. If necessary, repeat, but be careful to tighten all the nuts uniformly. The correct adjustment is normally seven complete turns from right home.

Should the clutch become difficult to free in spite of the cable not having stretched, wear may have occurred on the clutch rod, in which case the adjusting screw (15A, Fig. 90) should be slightly tightened up. The trouble may, however, be due to the clutch springs being over-tightened. A tendency for the clutch spring adjusting nuts to become unscrewed means that the springs have become fastened by means of mud or rust to the nuts, and the remedy is to clean the springs and nuts and also to polish the ends of the springs and grease them. If relative movement develops between the clutch sprocket and case, it indicates that the rubber buffers (3A) are worn and require renewal. A tendency for both the clutch sprocket and case to "rock" from side to side indicates that the roller race inside the clutch sprocket needs a new set of rollers. Only $\frac{1}{64}$ in. end play is permissible. Excess play

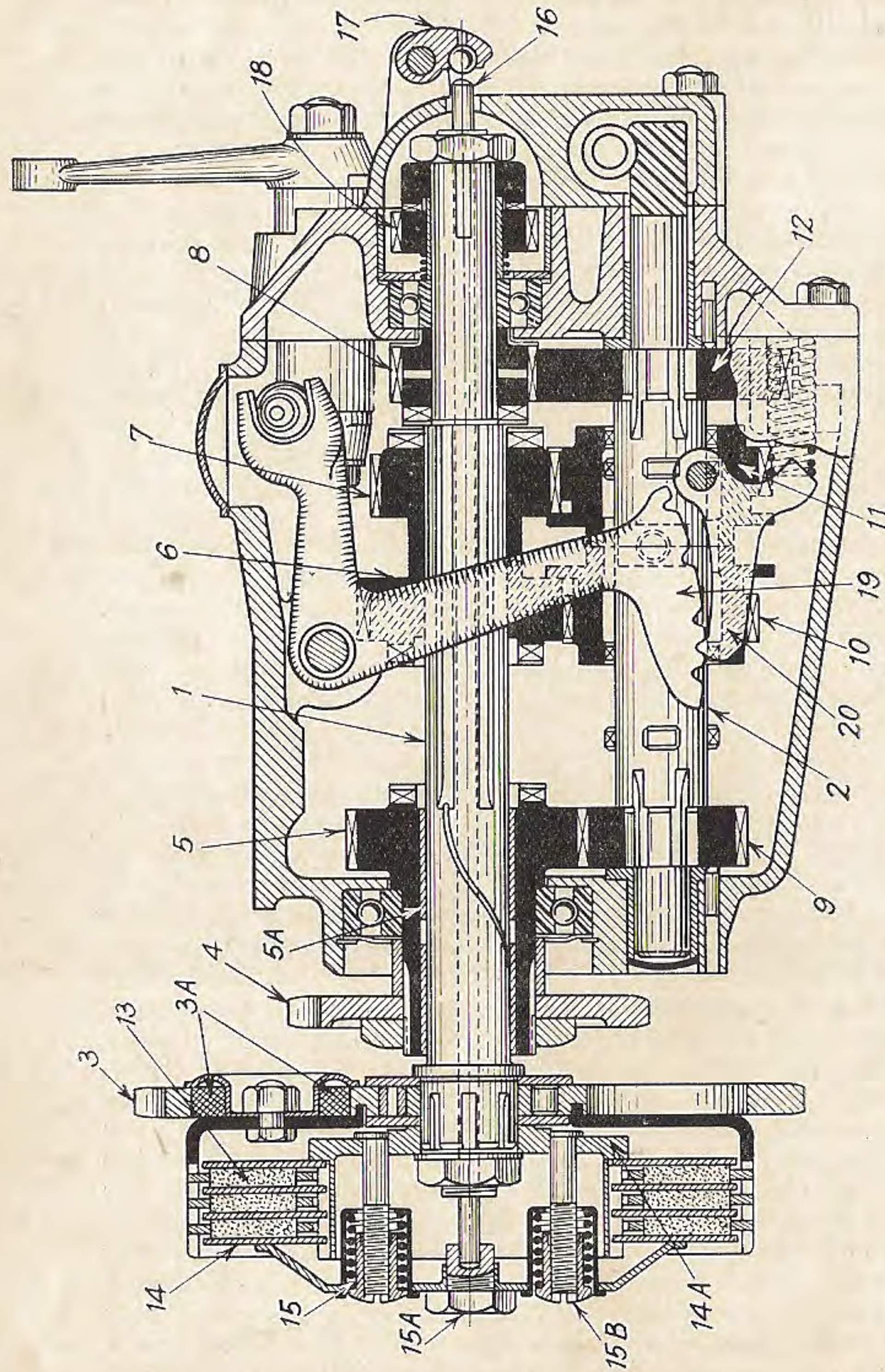


FIG. 90. SECTIONAL VIEW OF BURMAN 4-SPEED GEARBOX AND CLUTCH

The key to numbered parts not given below will be found on page 84.

- 3A. Clutch shock-absorber.
- 6. Mainshaft sliding dogwheel (3rd gear).
- 7. Mainshaft sliding dogwheel (2nd gear).
- 8. Mainshaft dogwheel (1st gear).

- 10. Layshaft sliding pinion (3rd gear).
- 11. Layshaft sliding pinion (2nd gear).
- 12. Layshaft-driven pinion (keyed).
- 15A. Adjuster screw and lock-nut.

- 15B. Spring adjusting nut.
- 18. Mainshaft-driven k.s. pinion.
- 19. Striking fork with rack.
- 20. Spring-operated pawl.

may cause the tongues on the clutch plates to wear grooves in the clutch case.

Removing Quickly-detachable Rear Wheel. Prior to rear wheel removal on all models the mudguard should be detached. To remove the wheel on a model 33/C or 33/CS it is only necessary to unscrew the three tubular fixing bolts and remove the centre spindle when the wheel can be lifted clear of the studs. To avoid damage to these studs, however, it is advisable not to undo the spindle before removing the nuts and also to support the wheel while removing the spindle.

Adjusting Primary Chain. On all 1933 single-cylinder models, except model 33/D7, to test for $\frac{3}{8}$ in. up-and-down movement it is only necessary to remove the inspection cap. The pivot-mounted gearbox may then be swung bodily upon its lower fixing bolt the necessary amount after slackening the off side nut of the upper fixing bolt (unless the machine has foot control, when the near side nut should be slackened). Afterwards check the adjustment of the gear control.

Burman Gear Control Adjustment. After tilting the gearbox rearwards to take up primary chain stretch it is usually found, except on 1933 models with foot control, that some readjustment of the gear control is necessary. Incorrect adjustment causes rattle of the gear lever in its quadrant in second gear position and perhaps a tendency for the gear lever to jump out of gear and cause serious damage. To remedy matters, the length of the vertical rod should be adjusted until the gear lever is centrally positioned in the wide central gear quadrant notch. Should one complete turn of the coarse threaded connection give excessive lengthening, make the final adjustment by means of the finely threaded connection.

In the case of 1932 models with the Burman gearbox, the length of the short rod attached to the small lever on the foot change should be similarly adjusted so that the lever occupies a central position giving an equal amount of free movement backwards and forwards independently of the pedal.

Decarbonizing Hints. The decarbonizing instructions given on pages 124-134 are applicable to the 1932-33 models, but some additional hints are here given in regard to the new models.

To remove the cylinder in order to decarbonize model 33/D7, D5, 33/D5, which have no detachable heads, proceed as described on page 127 for model D. Remove the exhaust pipe and silencer, but leave the carburettor in position if desired after withdrawing the slides and disconnecting the petrol pipe.

Take off the plug, valve chest cover, and aluminium valve caps, when the cylinder may be slid off after the three retaining

nuts have been unscrewed and the piston has been placed near bottom-dead-centre.

To remove the detachable cylinder-head prior to decarbonizing models D/3, D/6, 33/D3, 33/D6, 33/D2, owing to the closeness of the fuel tank to the rocker-box the fuel tank should be raised at its forward end immediately before removing the latter. This can be effected by undoing the two front tank fixing bolts. Proceed as described on pages 125-126, but here again the carburettor need not be removed if the slides are withdrawn. No tie bar now connects the rocker-box with the front down tube. On reassembling the 1932-3 engines do not forget to space the

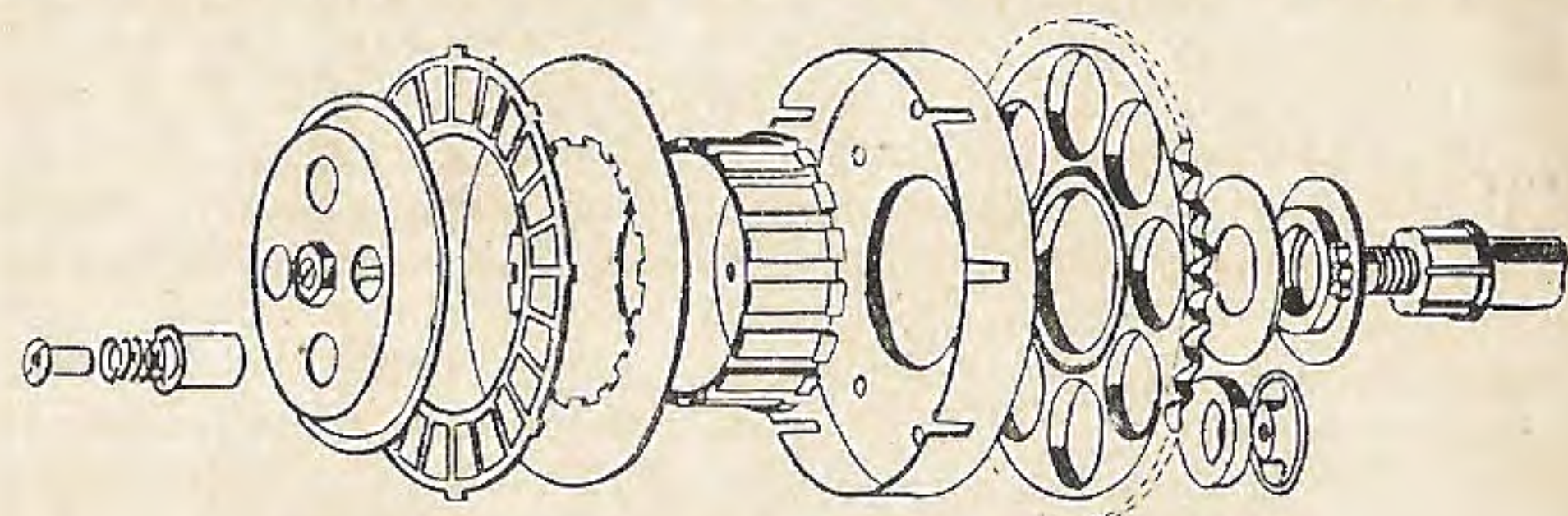


FIG. 91. SHOWING BURMAN CLUTCH ASSEMBLY

Only one friction and one driven plate are shown in the above sketch illustrating the relative positions of the various parts.

ring slots on the "three-ring" piston at 120 degrees to each other.

Retiming Ignition. It should be noted that on models D/5, D/6, D/3, 33/D7, the magneto or "Maglita" sprocket is provided with five keyways which in conjunction with the twelve sprocket teeth enables the ignition timing to be set with great accuracy. When dealing with the sprocket on a "Maglita" armature, on no account omit to grip the sprocket firmly by means of the two flats provided while tightening or loosening the fixing nut which has a locking washer held in place by a spring ring encircling the nut. To remove the ring, use a sharp instrument such as the blade of a penknife.

To Adjust Magneto Chain. The magneto chain on the Big Twins should be adjusted as described on page 112. All other 1932-33 models, except the spring-frame models, which have a shaft drive, have the magneto, "Magdyno," or "Maglita" fixed to a hinged platform which can be tilted as described in the case of models C, C/S on page 113 (third paragraph). The crankcase bolt upon which the platform pivots, and also the crankcase bolt upon which the adjuster screw is mounted, must first be slackened.

Dismantling Burman Clutch. To remove the clutch plates,

unscrew the spring adjusting nuts (15B, Fig. 90) and remove the springs, spring cups, and take off the spring plate, when the other plates may be withdrawn. If desired, the complete clutch assembly may be removed after taking off the spring plate by unscrewing the nut holding the clutch body on the castellated mainshaft.

Valve Timing. The correct valve timing for all the new single-cylinder models referred to in this Supplement is the same as for

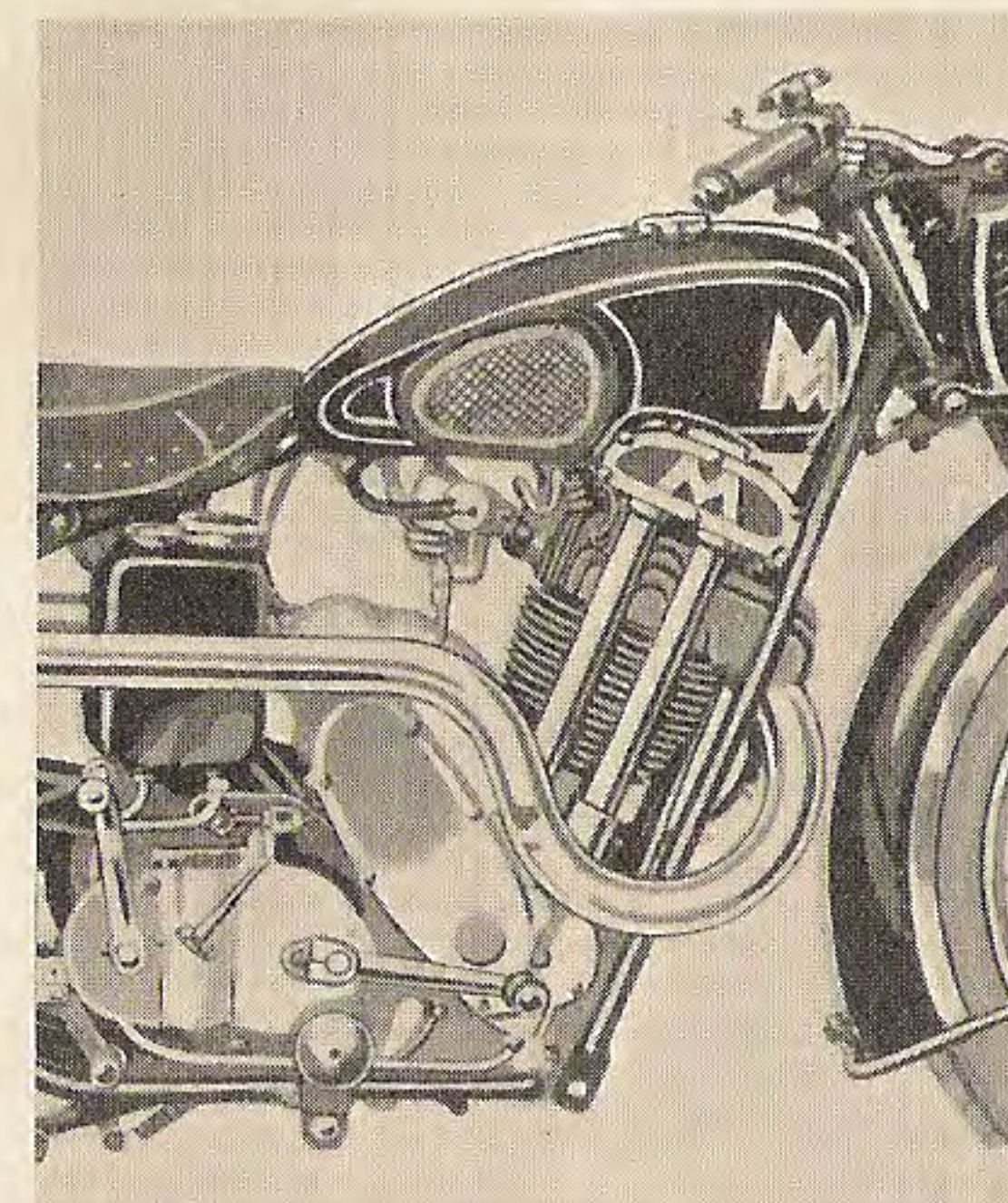


FIG. 92. POWER UNIT OF MODEL 33/D80

models D, D/S (see table on page 142) and should be checked with .014 valve clearances.

MODEL 33/D80

On passing this Supplement for Press, the author finds that a new Sports "500," known as model 33/D80, has just been included in the 1933 Matchless range. The price of this very interesting machine is £43 15s. Owing to its exceptionally high power/weight ratio, model 33/D80 (which weighs only 300 lb.) possesses unusually good acceleration and general liveliness, and on full throttle will attain a speed of no less than 80 m.p.h.

The specification of model 33/D80 is similar to that of the other new O.H.V. "D" class models, but the engine (Fig. 92), which has a bore and stroke of 82.5 mm. × 93 mm. (498 c.c.) and a

compression ratio of 6.2 to 1, has a somewhat different type of high efficiency two-port cylinder-head and other special features. Flange fixed direct to the inlet port is a down-draught Amal sports carburettor with horizontal mixing chamber. The rocker-box is of semi-circular form with duralumin rockers and an end plate with embossed "M," giving access to the rockers. In order to make the overhead valve gear readily accessible, the 2 gal. fuel tank is cut away on the off side to conform to the contour of the rocker-box. A Birmal Lo-ex three-ring, split skirt aluminium alloy, anti-slap piston is fitted, and the $\frac{7}{8}$ in. diameter gudgeon-pin works in a duralumin bush. A caged double-row roller bearing of extra large dimensions is used for the big-end, and the crankcase is ribbed on the driving side. The four-speed, pivot-mounted Burman gearbox, which has a multi-spring, shock absorber clutch, is fitted with foot control and has the following standard ratios: 12.9, 7.3, 6.23, 4.86 to 1.

ERRATA. On page 24 (caption to Fig. 17) the words "Brake Anchor Plate" should read "Brake Drum." On page 30 (19 lines from bottom) the words "in which the rocket fits" should, of course, read "in which the rocker fits." On page 20 (19 lines from bottom) "Mobiloil O" should read "Mobiloil D."

1936 SUPPLEMENT

TO THE BOOK OF THE MATCHLESS

A TENDENCY towards greater standardization is noticeable in the 1936 range, which comprises a dozen models suitable for all temperaments and purses. Of last year's models the Big Twins and two side-valve singles (Models F7, D5) are retained with little alteration and constitute the 1936 "Tourist" range. All other 1935 models have been dropped and are replaced by a "Clubman" range of eight speedy and smart-looking O.H.V. singles with vertical engines. Only a brief description of the 1936 models is possible, as the primary object of this Supplement is to bring THE BOOK OF THE MATCHLESS up to date for Matchless owners.

THE "TOURIST" RANGE (S.V.)

The four "Tourist" models are Models 36/F7, 36/D5, 36/X4 and 36/X4 *de luxe* priced at (with electric lighting) £35 14s., £51, £69 15s., £73 10s. respectively.

The 250 C.C. Model 36/F7. This machine, which is the cheapest in the Matchless range, is, except for the smaller engine capacity, new silencer and coil ignition, very similar to Model 33/D7 (described on page 48). The bore and stroke are 62.5 mm. × 80 mm. and the well-proved D.S. lubrication system is retained. A detachable cylinder head is not provided. The specification includes a four-speed Burman gearbox, oil bath chain case, duplex cradle frame, spring-up centre prop stand, 25 in. × 3 in. tyres, 2 gal. fuel tank, etc.

The 500 C.C. Model 36/D5. Model 36/D5 closely resembles Model 36/F7, but the engine, which has a bore and stroke of 82.5 mm. × 93 mm., has a car type detachable head with semi-turbulent combustion chamber, a "Lo-ex" piston and Lucas "Magdyno" ignition. The oil tank is of improved shape, and the petrol tank holds 3 gal. A heavyweight four-speed Burman gearbox is provided and 26 in. × 3.25 in. tyres are fitted.

The 990 C.C. Model 36/X4. This "go-anywhere" family machine or fast solo remains substantially as hitherto (see page 34), but has been cleaned up and generally improved in detail. The engine, which has a bore and stroke of 85.5 mm. × 85.5 mm., now has forked type connecting rods instead of the side-by-side arrangement, and the big-end bearing has three rows of rollers. A Burman four-speed gearbox and tubular silencers are now fitted.

The 990 C.C. Model 36/X4 De Luxe. The specification of the *de luxe* Big Twin is identical to that of the standard Model 36/X4, with the exception that an instrument panel is mounted above the handlebars and chromium edged mudguards and an air filter are included.

THE "CLUBMAN" RANGE (O.H.V.)

The eight "Clubman" models are Models 36/G2, 36/G2M, 36/G3, 36/G3C, 36/G80, 36/G80C, 36/G90, 36/G90C, and their listed prices (lighting included) are £39 10s., £42 10s., £52 10s., £57 10s., £55, £60, £60, £65 respectively.

The 250 C.C. Model 36/G2. The general layout of this "two-fifty" and all other "Clubman" models is in accordance with orthodox Matchless design, but the O.H.V. two-port engine is of a new type. The bore and stroke are 62.5 mm. × 80 mm. and a "Lo-ex" piston is fitted. Features of a most compact and efficient engine include a heavily finned single-port cylinder, a down-draught carburettor, twin-camshaft timing gear, flat base tappets, an oval rocker-box with valve clearance adjustment at the tops of the push-rods, a new design of exhaust valve lifter. The D.S. lubrication system (see Fig. 94) is the same as on earlier engines, and Miller coil ignition is used. The specification includes a four-speed Burman gearbox, an oil-bath chain case, duplex cradle frame, spring-up centre prop stand, 3 gal. petrol tank, and 26 in. × 3.25 in. tyres.

The 250 C.C. Model 36/G2M. The only essential difference between this and the model just described is that magneto instead of coil ignition is specified. The magneto is driven by a chain enclosed in a chain case cast integral with the timing cover.

The 250 C.C. Model 36/G3. This machine, illustrated in Fig. 93, has a somewhat sturdier engine with a bore and stroke of 69 mm. × 93 mm., hairpin valve springs, magneto ignition. A heavyweight four-speed Burman gearbox is provided and the fuel tankage is 3 gal. Finned chromidium brake drums are incorporated.

The 350 C.C. Model 36/G3C. Except for the provision of a specially tuned engine with polished ports and combustion chamber, and the specifying of features adapted to competition and trials riding, this "Clubman Special" is similar to Model 36/G3.

The 500 C.C. Model 36/G80. This standard "five-hundred" has a similar general specification to the "three-fifties," but is powered with an improved version of the "Sports 500" engine. The bore and stroke are 82.5 mm. × 93 mm., the piston is a "Lo-ex," and the engine main shaft is carried on two journal ball bearings on the driving side and a flood-lubricated bronze bearing on the timing side. A two-port cylinder head is used

and the valve springs are of the hairpin type. The gearbox is a four-speed Burman.

The 500 C.C. Model 36/G80C. Similar to Model 36/G80 except that trials equipment is specified and the engine is specially tuned and has a polished combustion chamber and ports.

The 500 C.C. Model 36/G90. The "Super Clubman" is similar to the standard Model 36/G80, with the exception that a higher

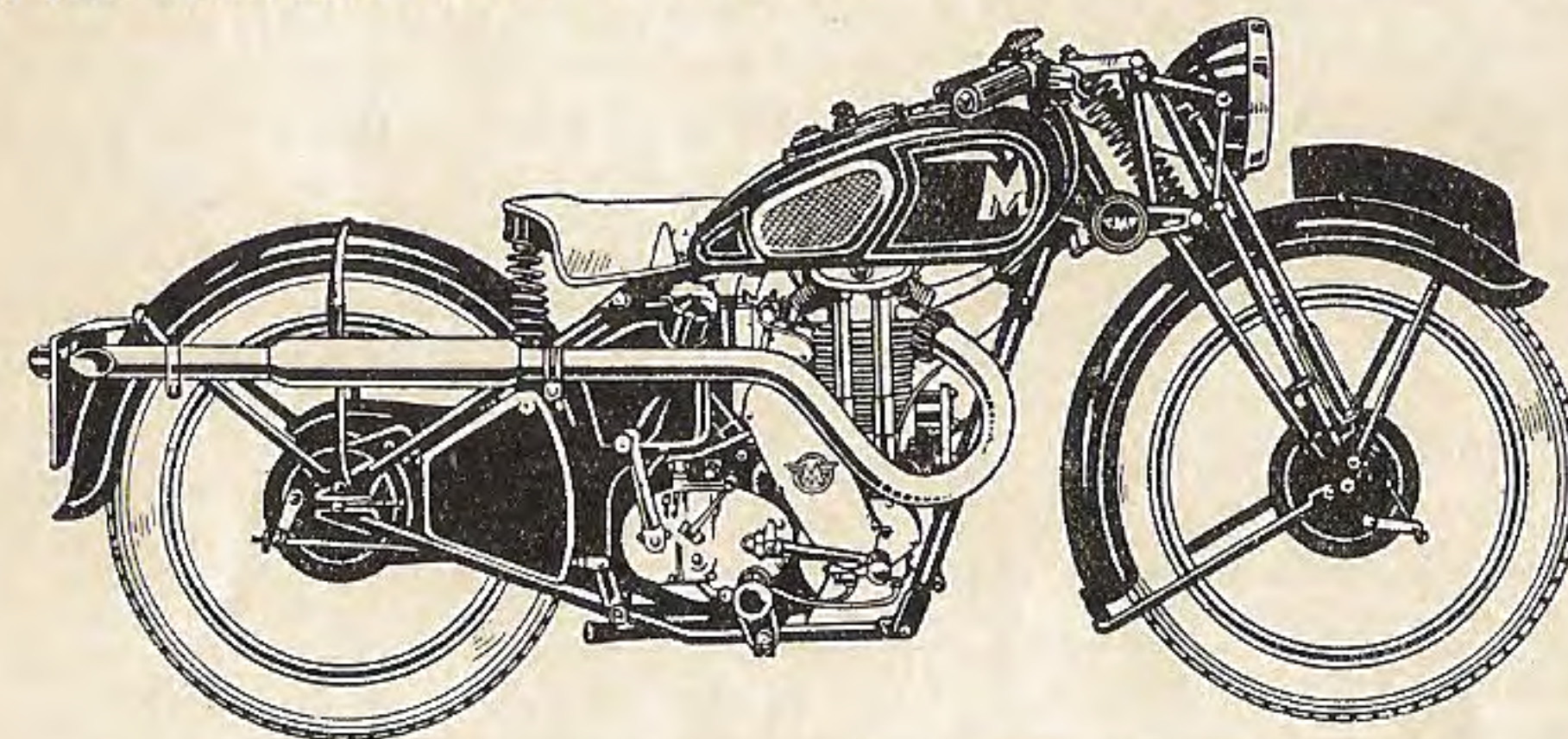


FIG. 93. TYPICAL OF THE NEW "CLUBMAN RANGE"
(MODEL 36/G3)

A fast "three-fifty" with high-efficiency single-port sports engine

compression ratio, a tuned and polished engine are included, together with a 14 mm. plug.

The 500 C.C. Model 36/G90C. Equivalent to Model 36/G90 with trials equipment.

CORRECT LUBRICATION

The Matchless dry sump lubrication system as hitherto incorporates a double-acting oil pump (see page 73) which draws oil from the tank and forces it through the timing side main shaft to the main bearings and big-end, auxiliary oil feeds also being taken to the cylinder walls and timing gear.

Use These Engine Oils. For all 1936 Matchless engines the makers advise the use during the summer of Patent Castrol "XXL," Mobiloil "D," or "Aeroshell." For winter running the last two are quite suitable, but if Patent Castrol is preferred, Grade "XL" should be used. For racing, Patent Castrol "R" is best, but this should never be mixed with other oils. With regard to gearbox lubrication, use the winter grade of engine oil for Sturmey-Archer gearboxes and one of the following greases for Burman gearboxes.

Suitable Greases. For Burman gearboxes, secondary chains

and general grease-gun lubrication, Castrolase Medium, Mobil-grease No. 2, and Shell Motor Grease Soft are eminently satisfactory.

Correct Engine Lubrication. This is assured provided you (1) use the right oil; (2) maintain the level above the half-full mark (do not fill above 1 in. below the return pipe with the engine cold); (3) check oil circulation at the return pipe orifice (at the indicator where an instrument panel is fitted); (4) keep the filters clean.

Clean Filters Every 1000 Miles. Every 1000 miles remove the filter below the filler cap and the fabric filter also, and thoroughly clean both with petrol. About once every 5000 miles (or once every season) drain and clean the tank and replenish with fresh oil. The draining can be arranged when the oil is at the lowest recommended level.

Grease Overhead Rockers Every 500 Miles. It is desirable to apply the grease-gun to the nipples for the O.H. rockers about once every 500 miles. Use a good heat resisting grease (see page 119).

"Magdyno" Lubrication. After a big mileage (say 20,000 miles) return the instrument to the makers and have the bearings repacked with grease. Apply a spot of oil (no more) to the heel of the contact-breaker rocker arm occasionally so as to minimize wear.

Dynamo Lubrication (Coil Ignition Models). Every 500 miles insert a drop of oil through the lubricator on the driving end of the Miller dynamo, and every 1000 miles press a little grease into the hole on the end of the commutator.

Dynamo Lubrication (Magneto Models). Deal with as for the Lucas "Magdyno."

Burman Gearbox Lubrication. About every 1000 miles inject one to two ounces of grease (see previous page) through the nipple on the gearbox top adjacent to the inspection cap, which is slotted at one end to permit of its being rotated on slackening the two fixing nuts. Do not fill completely; it is intended to run *two-thirds* full. Grease can alternatively be injected direct through the inspection orifice with a canister, and in the case of Model 36/D5 it is advisable to remove the extended sleeve nut on the right-hand end of the top gearbox fixing bolt, to permit of the application of the spout of the collapsible grease container. Also inject a little grease through the nipples on the gearbox end so as to lubricate the speedometer drive (where fitted), gear change mechanism and kick-starter spindle.

Sturmey-Archer Gearbox Lubrication. Keep the gearbox about *one-third to one-half full* by regular replenishment with engine oil (see page iii). All 1935-6 models have Burman gearboxes.

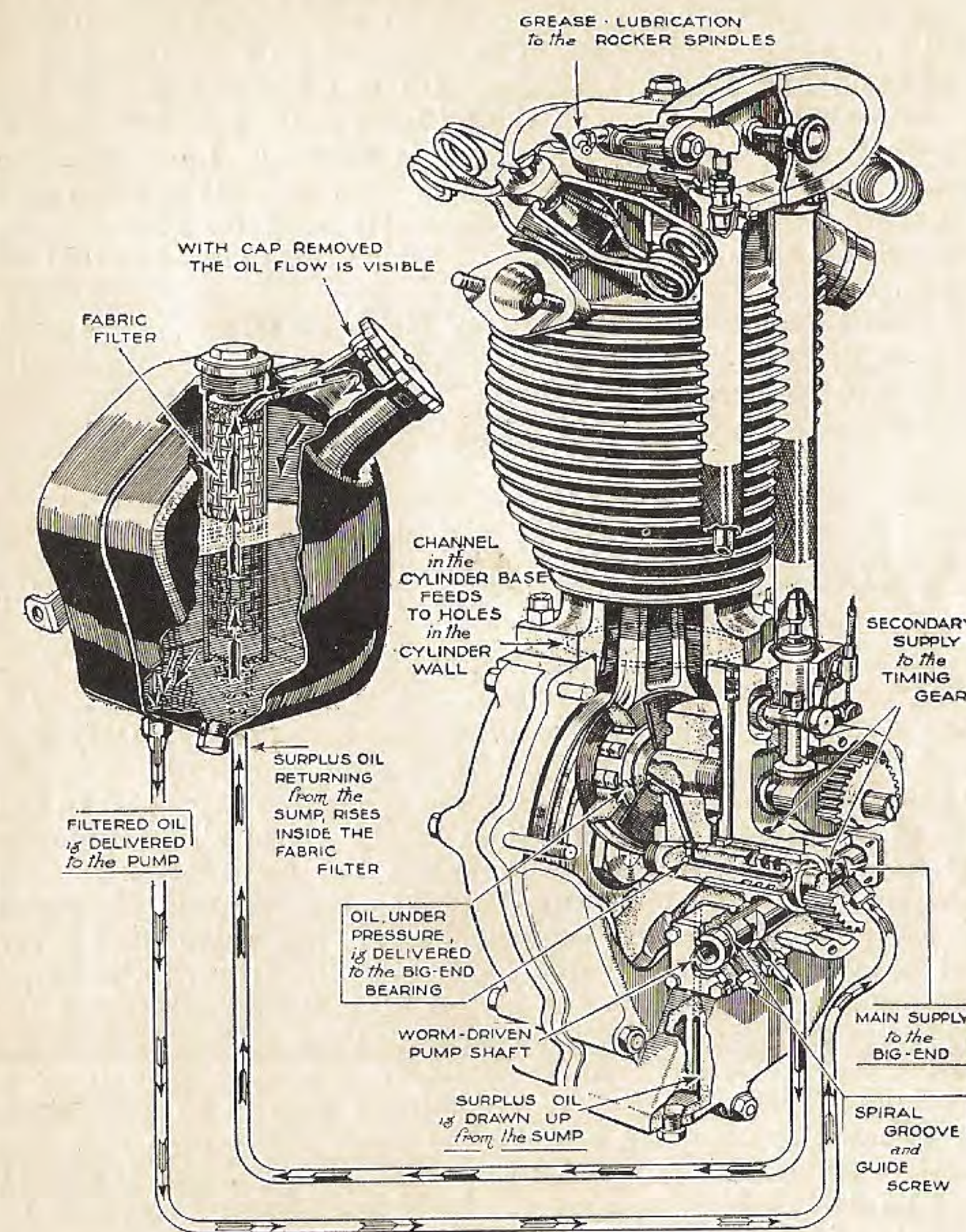


FIG. 94. HOW THE "CLUBMAN" ENGINE IS LUBRICATED

Details of the "Clubman" engine are shown very clearly in the above illustration. Note the improved oil tank with fabric filter and the new design of exhaust valve lifter. But for these the 34-5/F engine is similar. On 1936 500 c.c. "Clubman" engines the rocker-box is of somewhat different shape, and on the 250 c.c. models hairpin valve springs are not provided. Always keep the pump guide screw done up tightly.

Inspect Level of Oil in Chain Case Weekly. The inspection cap orifice prevents over filling. Top up with engine oil as required. Deal with the secondary chain as described on page 122.

Dynamo and Magneto Chains. On coil ignition models the dynamo chain is enclosed in the oil-bath chain case and thus it follows that if the primary chain is correctly lubricated the dynamo chain is also. On magneto ignition models the chain case is packed with grease during assembly and no attention is required for about 5000 miles, after which fresh grease should be added.

Bowden Controls, Forks, Steering Head, Hubs, etc. Deal with these as described on pages 121-123, using one of the previously mentioned greases.

HOW TO DECARBONIZE

The general instructions for decarbonizing and grinding-in the valves given on pages 124-134 are applicable to 1936 models, but changes in design render certain dismantling procedure somewhat different. The following hints bring the original matter completely up to date.

Dismantling Side-valve Engines. As detachable heads are provided on all 1936 engines except Model 36/F7, undertaking a "top overhaul" is a matter of extreme simplicity. Only the sparking plug and cylinder head fixing bolts have to be removed to enable the head to be lifted off and the piston exposed. In the case of Model 36/F7, which has no detachable head, first remove the exhaust pipe and silencer. Then the carburettor mixing chamber should be unscrewed and the throttle and air slides withdrawn. Next remove the petrol pipe, plug, valve chest cover and aluminium fibrecone valve caps. Finally remove the three cylinder fixing nuts, put the piston near B.D.C. and draw off the entire cylinder as described on page 127.

Dismantling Overhead-valve Engines. When decarbonizing a "Clubman" engine, the first preliminary step is to disconnect the exhaust system and remove the plug, petrol pipe and carburettor slides. As the petrol tank obstructs matters, it should next be dealt with. Remove the three tank fixing bolts and, in the case of the 500 C.C. "Clubman" engines, drain the tank and remove the "U" pipe connecting the two halves. The tank may then be readily slid backwards until its stern rests on the saddle nose. A wooden block should be inserted beneath the front of the tank so as to keep it elevated sufficiently to enable spanners to be applied to the rocker-box fixing bolts and cylinder head stay fixing. On 250 c.c. models the tank need not be touched.

Slacken the cylinder head stay fixing bolt at the frame, remove the nut at the rocker-box end and push the stay clear. Now

telescope the push-rod covers until they "stay put," as described on page 126. Remove the rocker-box fixing bolts and gently slide the rocker-box complete with push-rods and covers over towards the timing side. To remove the cylinder head, it is now only necessary to extract the four elongated retaining bolts. Be careful not to damage the hardened valve stem end caps or the soft copper gasket. Cylinder removal is perfectly simple.

To Decarbonize. Follow the instructions given on pages 128-130. The reference to Model D on page 129 applies, of course, to Model 36/F7.

Reassembly (S.V.). The instructions given on page 132 are applicable to 1936 "Tourist" engines.

Reassembly (O.H.V.). Reassemble the cylinder and piston as described on page 132 for the side-valve engines. Then refit the cylinder head, being careful to observe absolute cleanliness of the contacting joint surfaces. Tighten the head bolts firmly and evenly. When replacing the "Clubman" rocker-box assembly, it is wise to remove the inspection cover so as to verify that the upper ends of the push-rods are correctly located, and also to revolve the engine until the tappets are fully down. When refitting the petrol tank it is best to secure the rear part first. Finally check up the valve clearances as described in a later paragraph.

RUNNING ADJUSTMENTS

Are Tyre Pressures Correct? Test frequently with the gauge (not with a kick) and if the pressures do not correspond closely with those given below, rectify so as to ensure comfortable and economical riding (see page 116). For Model 36/F7 the best solo pressures for the 25 in. $\times$ 3 in. tyres are 14-15 lb. and 20-22 lb. per sq. in. for front and rear tyres respectively. In the case of Model 36/D5 with 26 in. $\times$ 3.25 in. tyres inflate to 14-15 lb. and 16-18 lb. per sq. in. front and rear respectively. Add an extra 2 lb. per sq. in. to the rear pressure only for pillion riding. With Models 36/X4, 36/X4 *de luxe*, having 26 in. $\times$ 3.25 in. tyres and fitted with a single passenger sidecar, the front pressure should be 15-16 lb., the rear pressure 20-22 lb., and the sidecar tyre pressure 16-17 lb. per sq. in.

In the case of the 250 c.c. "Clubman" models (36/G2, 36/G2M) front and rear solo pressures should be 14-15 lb. and 18-20 lb. per sq. in. respectively. On the 350 c.c. and 500 c.c. "Clubman" models use the same front pressure, but add 2 lb. to the rear one.

1934-5 Model 4F. Owners. On this machine, which has for practical purposes an inclined "Clubman" engine (and for which the instructions in this Supplement apply), take care not to leave the machine standing with the petrol tap turned on. If you

do this you incur a decided risk of neat petrol dripping into the cylinder through the downswept inlet port and diluting the oil, perhaps causing an engine seizure or even a fire!

Suitable Plugs to Fit. For the "Tourist" models a Lodge TS3 or a K.L.G. 777 gives good results. For the "Clubman" models fit a Lodge H1 or K.L.G. KS5.

To Adjust Valve Clearances (S.V.). Remove the valve chest cover and with the spanner in the tool roll, hold each tappet and with another slacken the lock-nut which secures the adjustable tappet head. Then screw the head up or down until the correct valve clearance is obtained with each valve fully closed and the engine *warm* (not hot). For the Big Twins, clearances of .004 in. and .006 in. are recommended for the inlet and exhaust valves respectively. In the case of Model 36/D5 give a clearance of .006 in. for both the inlet and exhaust valves, and on Model 36/F7 give clearances of .012 in. for both valves.

To Adjust Valve Clearances (O.H.V.). As may be observed in Fig. 94, the "Clubman" engines have valve clearance adjustment at the tops of the push-rods and, in order to get at the adjustment, the rocker-box cover must be removed. Then rotate the engine until the valve needing adjustment is open and, after unscrewing the lock-nut, screw up or unscrew the adjustable push-rod end until the correct clearance is obtained, afterwards retightening the lock-nut. Check again afterwards in case this retightening has upset the adjustment. On the "Clubman" engines the correct clearance between the rocker ends and valves, when the valves are fully closed and the engine *cold*, is the nearest approach to *nil* possible. It should be possible with the fingers to revolve the hardened valve stem end caps without there being any perceptible up-and-down movement present.

Exhaust Valve Lifter Adjustment. Note the remarks on page 106. Details of the exhaust valve lifter mechanism on the "Clubman" engine are clearly shown in Fig. 94.

Inspect Contact Breaker Occasionally. Keep the contacts clean and free from oil and the "break" of the correct magnitude. On "Magdyno" and magneto ignition models the gap between the contacts when wide open should be .012 in. Instructions on cleaning and adjusting will be found on pages 107, 135. On machines fitted with coil ignition the contact-breaker is housed in the timing case cover and is driven by the exhaust camshaft. It is of quite different design from the usual contact-breaker. About every 1000 miles the bakelite cover should be removed, the contacts examined and, if necessary, cleaned and adjusted. But do not interfere unless the gap varies considerably from the correct one, as indicated by a feeler gauge. The proper gap is .018 in. to .02 in. If the contacts are blackened, clean up with a

piece of *very fine* emery cloth; if pitted, true up with a fine carborundum stone. To adjust the contacts, slacken the lock-nut and rotate the fixed contact screw as required and then retighten the lock-nut.

To Retime Ignition. On Lucas "Magdyno" and magneto models proceed as described on pages 137-138, noting that in the case of the Big Twins No. 1 cam is that *farthest* from the rear cylinder (an error occurs on page 138), and that in the case of the magneto ignition models the sprocket on the exhaust camshaft (a taper fit) is loosened, the contact-breaker being rotated with the fingers until the "break" occurs with the piston in the correct position before T.D.C. In this position retighten the camshaft sprocket. The ignition timing for the Big Twins is $\frac{3}{16}$ in. before T.D.C. on full advance. In the case of Model 36/D5 the correct timing is $\frac{1}{8}$ in. before T.D.C. on full advance. The timing for Model 36/G2M is $\frac{1}{4}$ in. before T.D.C. on full advance, and for Models 36/G3, 36/G3C, $\frac{7}{16}$ in. before T.D.C. on full advance. On the 500 c.c. O.H.V. Models 36/G80, 36/G80C, 36/G90, 36/G90C give an advance of $\frac{9}{32}$ in. to $\frac{5}{16}$ in. before T.D.C. on full advance.

To retime on 1934-6 coil ignition models, remove the bakelite contact-breaker cap and slacken the cam fixing screw. Then insert a small punch in one of the slots and gently tap with a *light* hammer until the cam is free on its taper. Set the piston at the correct position before T.D.C. and then turn by hand the cam *anti-clockwise* until the contacts begin to "break." In this position retighten the lock-nut and you are "all set." The correct ignition settings for Models 36/F7 and 36/G2 are T.D.C. on full retard and $\frac{1}{4}$ in. before T.D.C. on full advance respectively.

"Magdyno" Chain Adjustment. Maintain about $\frac{1}{4}$ in. whip at the upper chain run. To adjust on the Big Twins, after removing the chain case cover slacken off both the long headed bolts, passing through the rear engine plate below the "Magdyno." Then tilt the forward end of the "Magdyno" platform until the correct tension is obtained, finally retightening the securing nuts bolts.

To adjust the "Magdyno" chain on Model 36/D5, remove the chain cover, slacken the crankcase bolt on which the platform pivots and also the lower crankcase bolt upon which the adjuster screw is mounted and turn the latter until the "Magdyno" is tilted to give the correct chain tension.

Magneto Chain Adjustment. As with the "Magdyno" chain, maintain about $\frac{1}{4}$ in. whip. To adjust after removing the chain cover, slack off slightly the two crankcase bolts which secure the magneto platform and insert a lever or screwdriver under the front edge and tilt the magneto backwards until correct chain tension is obtained, finally tightening the two fixing bolts.

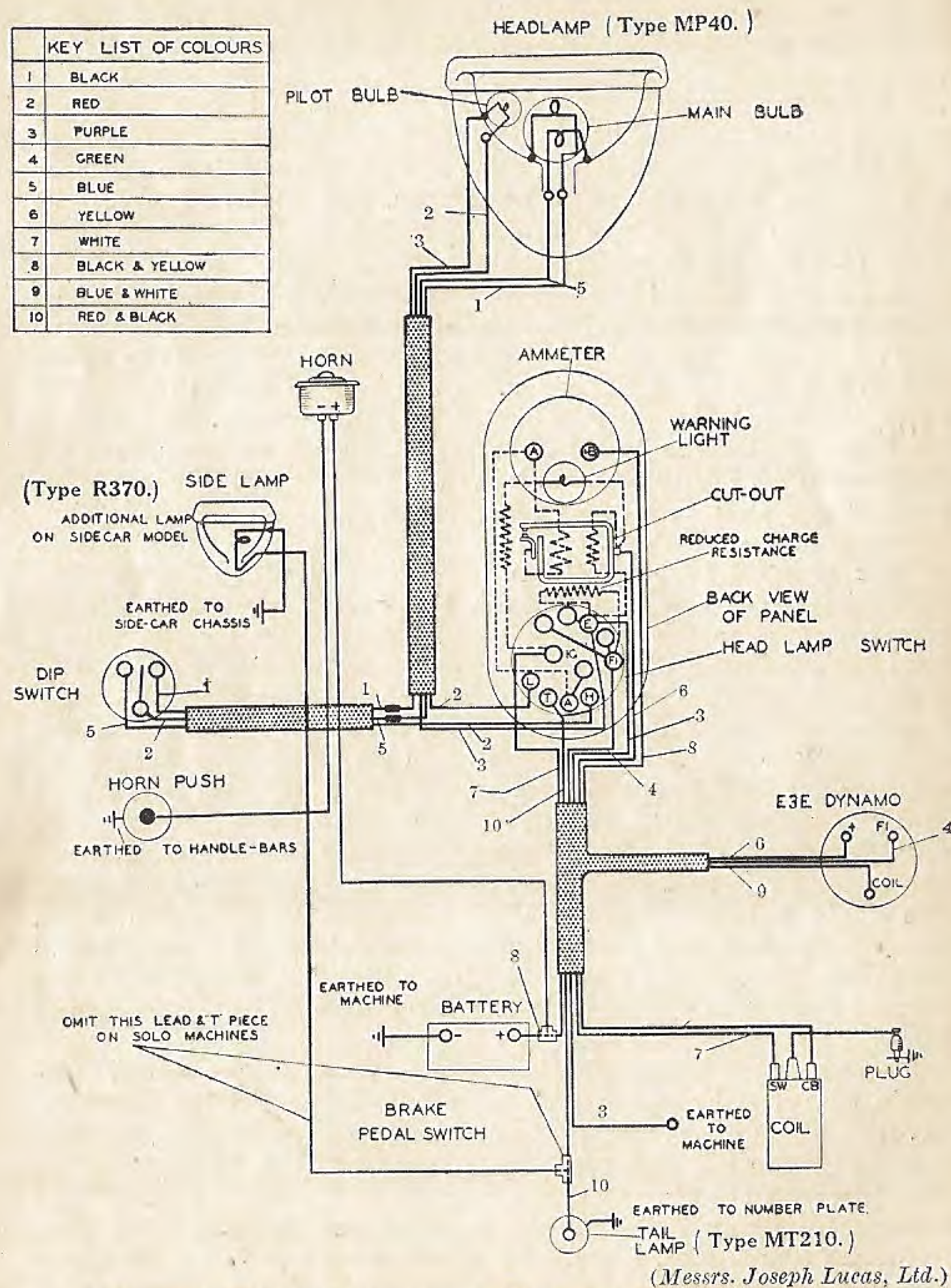


FIG. 95. WIRING DIAGRAM FOR MODELS WITH LUCAS DYNAMO LIGHTING AND COIL IGNITION EQUIPMENT

Model 36/G2 has Miller equipment. The above W.D. also applies to magneto models with separate dynamo; in this case the ignition circuit is omitted.

Dynamo Chain Adjustment. To retension the dynamo chain it is necessary to rotate the dynamo in its cradle mounting until there is a whip in the centre of the top run of $\frac{1}{4}$ in. to $\frac{3}{8}$ in. To adjust the chain tension, first slacken the dynamo clamp bolt and then twist the unit bodily in its mounting *clockwise* to tighten. Note that it is possible to check the tension of both the dynamo and primary chains by passing the fingers through the oil-bath inspection cap orifice which can be released by unscrewing the knurled edge screw.

To Adjust the Primary Chain. It is possible to swing the gearbox bodily on its lower fixing pivot bolt, and to retension the chain proceed as follows—

First slack off the off-side nut on the top gearbox fixing bolt. Then slack off the nut on the adjuster bolt nearest the engine and turn the nut farthest from the engine *clockwise* until there is about $\frac{3}{8}$ in. to $\frac{1}{2}$ in. whip in the chain run as checked through the inspection cap orifice on the chain case cover. After retensioning the chain, tighten the nut on the adjuster nearest the engine, and also the top gearbox fixing bolt nut. Always adjust the primary before the secondary chain, and after making an adjustment on models with hand gear control, check and, if necessary, adjust the control as described below.

To Adjust Secondary Chain. If the chain has more whip than $\frac{1}{2}$ in. to $\frac{3}{4}$ in., retension it by drawing the rear wheel backwards in the slotted fork ends as described on page 111, being careful not to spoil the wheel alignment (see page 141). To check wheel alignment a taut piece of string or a wooden batten may be employed.

To Adjust Gear Control. After adjusting the primary chain by tilting the gearbox, an adjustment of the gear control is usually called for, except in the case of models with foot control, where the gear change lever is mounted direct on the gearbox. To adjust the hand gear control, proceed as described on page xvii of the 1933 Supplement, positioning the gear lever centrally in the *third gear* quadrant notch. Internal indexing on the Burman four-speed gearbox makes it simple to *feel* when the third gears are fully engaged.

Clutch Adjustment. If the clutch on a 1933-4 model with Sturmey-Archer gearbox refuses work, see that there is some free movement in the actuating lever to which the lower end of the cable is attached, and if necessary slacken the cable by means of the adjuster on the gearbox end plate. With the Burman clutch used on all 1935 and 1936 models, make any necessary adjustment as described on page xv of the 1933 Supplement.

To Dismantle Clutch. In the case of the Burman clutch proceed as described on page xviii of the 1933 Supplement after detaching

the outer half of the oil-bath chain case (see below). To dismantle an S.A. clutch (1933-4 models), unscrew the six screws holding the clutch springs and remove these, together with their boxes. Then lift off the spring box plate and withdraw the other plates. After reassembly, tighten up the screws fully, or some "drag" may occur.

Removing Oil-bath Chain Case Cover. To do this it is only necessary to remove the footrest arm and distance pieces, brake rod, yoke end pin and brake pedal, and then the securing pin in the aluminium band around the chain cover, when the outer half of the chain case can be detached. Replacement is simple, but be careful not to damage the rubber seal.

Steering Head Adjustment. Follow the instructions on page 114; be careful not to over tighten the bearings, or the steering will be stiff.

Front Fork Spindle Adjustment. This should be made exactly as described on page 114.

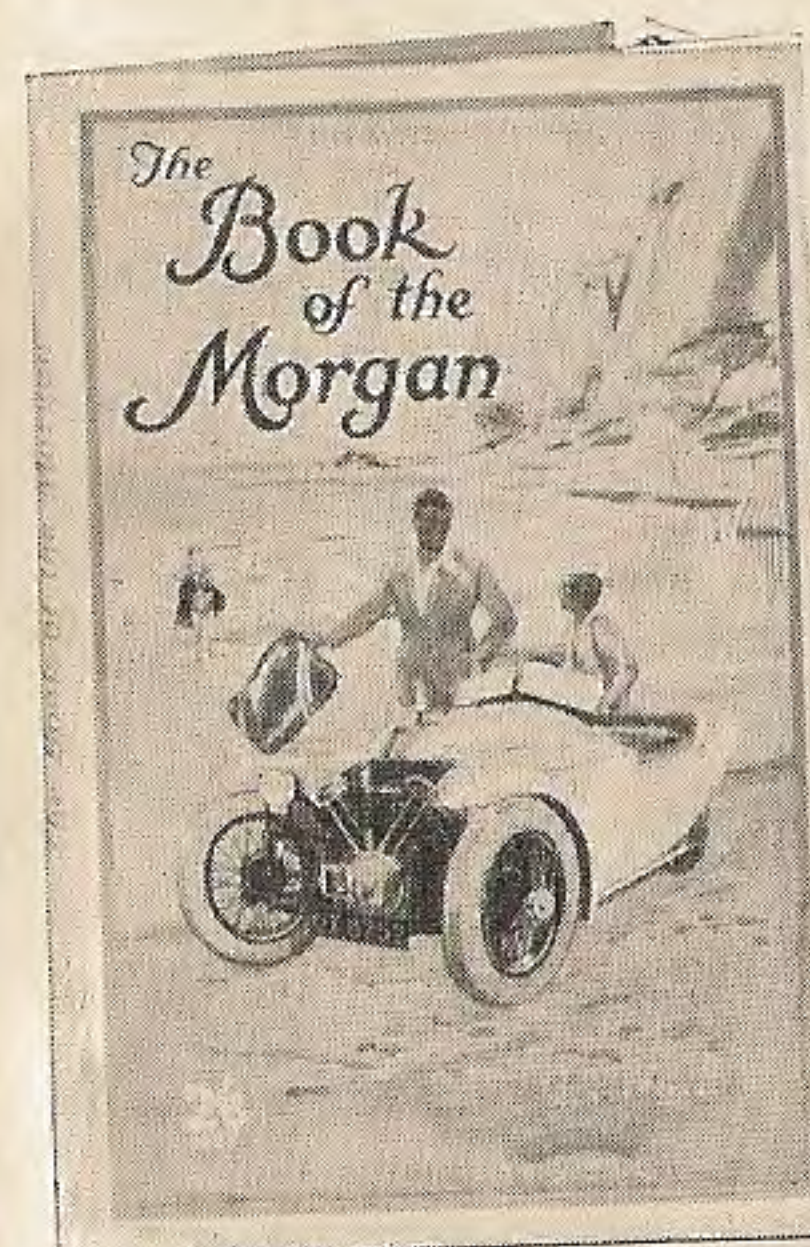
To Adjust Wheel Bearings. Deal with the roller bearings used for all hubs except those of Models 36/G2, 36/G2M as described on page 115. In the case of the two models mentioned, it is unnecessary to adjust with a slight "shake," as with roller bearings. To adjust, first slack off the near side axle nut and also the thin lock-nut on the inner side of the fork end, and then with the special spanner provided in the tool kit turn the cone *clockwise* until all "shake" disappears, after which slacken off slightly and retighten the lock-nut and axle nut firmly.

Rebushing Engine. This work is best entrusted to the makers, but should you by any chance decide to separate the crankcase halves be absolutely sure that you *first* withdraw the oil pump plunger. Failure to do this may cause serious damage.

Engine Timing. Do not experiment with valve timing, as this is a waste of time. The camwheels and engine pinion are clearly marked to ensure correct replacement.

To Remove the Camwheel. (Big Twins.) Before detaching the timing case cover place a receptacle below the crankcase to catch the oil as it runs out (on this engine the gears run submerged in oil). After removing the timing case cover revolve the engine until the marks on the camwheel and engine pinion coincide. Then raise the front inlet valve with a screwdriver or lever, when the camwheel may readily be withdrawn. When refitting the camwheel, if help is not available, keep the front inlet valve raised by packing or with a valve spring compressor. By holding all four camwheel levers up with the fingers it is now possible to insert the camwheel. See that the timing marks coincide.

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