

B.S.A.

Motor Cycle Instruction Book

1930 Models

3.49 h.p. O.H.V.

4.93 h.p. O.H.V.

4.93 h.p. O.H.V. de Luxe



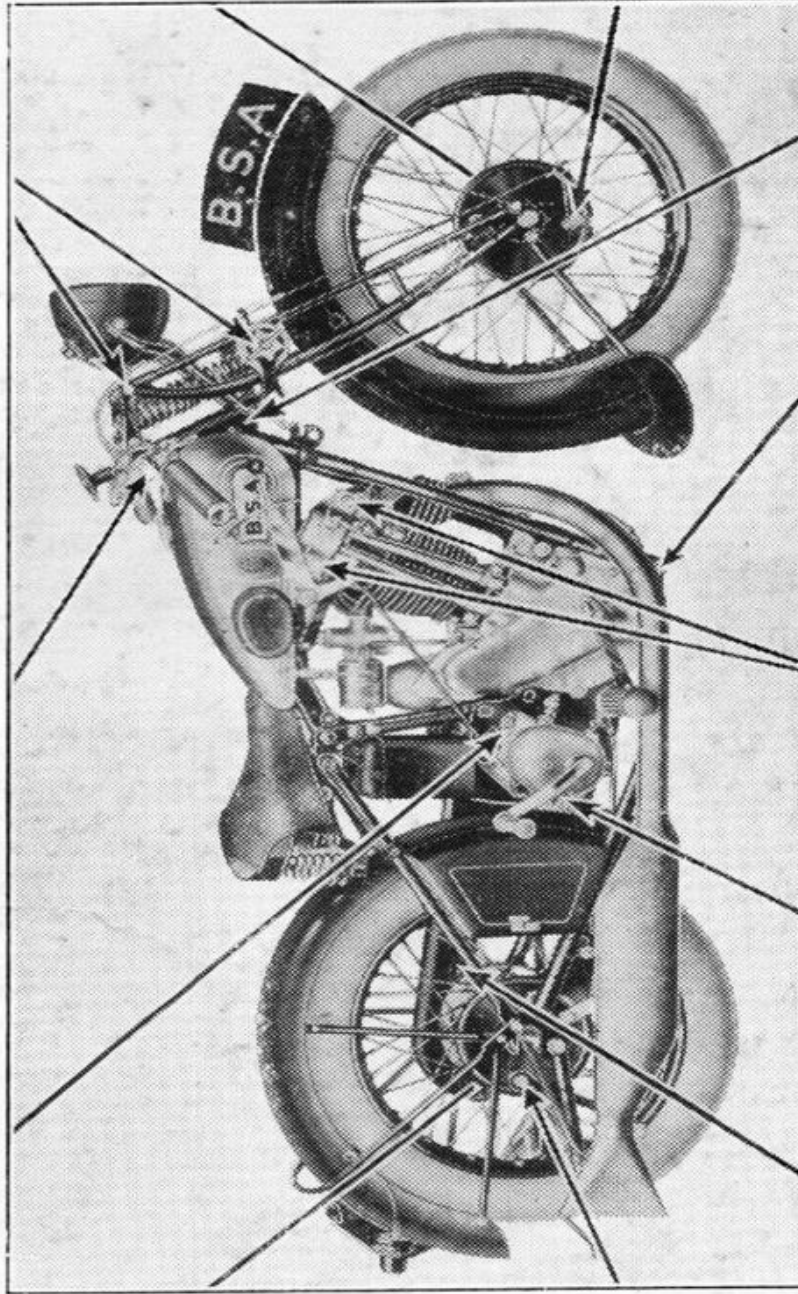
List of B.S.A. Spare Parts Stockists.

Town	Name of Stockist.	Address.	Telephone No.	Telegraphic Address.
Aberdeen	J. Dawson	39, Thistle Street	1272	
"	D. C. Cruickshank	13, Rosemount Viaduct	503	
Aldershot	Phillips Bros.	Birchett Road and Cranmore Lane	300	Phillips, Cycles, Aldershot.
Banbury	Trinder & Osborne	2 and 3, Broad Street	146	Trinder, 146, Banbury.
Barnstaple	Arch. Jones	70, High Street	163	Arch Jones, Barnstaple.
Bedford	The Imperial Cycle Co.	58, St. Loyes	2374	
Belfast	W. J. Chambers	106, Donegall Pass	2263	Fastnote, Belfast.
Berwick-on-Tweed.	Lion Garages Ltd.	Lion Garage	15	
Birkenhead	H. J. Marston	50, Argyle Street	2213	Notsram, Birkenhead.
Birmingham	County Cycle & Motor Co. Ltd.	301, Broad Street	Midland 2670	Comocyco, Birmingham.
" (Aston)	Falcon Cycle & Motor Depot (E. Newell).	54, Lozells Road	Northern 505	
" (Edgbaston)	Cranmore Bros.	5, Upper Hagley Road	Bwd. 1396	Cranmore, Bearwood 1396.
" (Hay Mills)	H. Bird & Sons	1045 Coventry Road	Victoria 651	
" (Rubery)	Owen's Garage	New Road	Rubery 3	Owen, Rubery, Birmingham.
" (Small Heath)	J. J. Woodgate	Small Heath Park Motor and Cycle Depot	Victoria 372	
" (Sparkhill)	A. Watkins	550 & 565, Stratford Rd.	Victoria 946	
Blackpool	J. Hall	143, Church Street	795	
Bournemouth	S. Priestley	35, Seamoor Road	834	Priestley, B'mth.
"	Knott Bros.	214-218, Charminster Rd.	2666	
Bradford	C. Sidney Ltd.	142, Manningham Lane	3116	
Bridgend	J. Lewis	35, Caroline Street	76	
Bridgwater	Anderson & Wall	18, St. Mary Street	116	Service, Bridgwater.
Brighton	Bradshaw's	6, Western Road, Hove	Hove 4124	
Bristol	S. J. Fair	201, Cheltenham Road	2238	
Burnley	Wilde & Co.	181, St. James' Street	1510	
Bury	Arthur Coyle	33, Walmersley Road	714	
Cambridge	King & Harper	6 and 7, Bridge Street	1600	Motors, C'bridge.
Canterbury	G. R. Barrett & Son	30, St. Peter's Street	386	Barrett Motors, Canterbury.
Cardiff	J. Parsons & Co.	2, Albany Rd., Roath Pk.	3422	Pioneer, Cardiff.
Carlisle	W. T. Tiffen	Irishgate Brow	314	Tiffen, Irishgate, Carlisle.
Carmarthen	W. Edwards & Sons	Towy Garage	82	Edwards' Garage, Carmarthen.
Chapel-en-le-Frith.	Lomas Bros.	Newfield Garage	Whaley Bridge 100.	[Tel: Lomas Bros., Chapel-en-le-Frith.
Chatham	H. G. Russell	Fountain Garage, High Street	Chatham 2609.	
Chelmsford	Hadler's Garage	New Street	227	Hadler, Chelmsford.
Cheltenham	Leslie Paynter	Bath Street	2887	Paynter's Garage, Bath St., Cheltenham.
Chester	Davies Bros.	34, Bridge Street	510	
Chesterfield	M. Brooks	Holywell Street	2663	
Colchester	The Motor Cycle and Light Car Depot.	119, High Street	171	Medcalf, Colchester.
Coventry	Coventry Motor Mart Ltd.	London Road	3200	Coventry Motor Mart.
Croydon (West)	Godfreys Ltd.	228-234, London Road	Crydn. 1214	Godfrables, London.
Darlington	Duplex Motor & Cycle Co.	8-12, Grange Road	2071	Duplex, Darlington.
Derby	Campion Cycle Co.	59 & 61, London Road	696	Campion, London Rd., Derby.

GEARBOX
Fill every
500 miles.

CONTROL LEVERS
Oil every
250 miles.

FORK LINKS
Grease every
250 miles.



REAR HUB
Grease every
250 miles.

FRONT HUB
Grease every
250 miles.

REAR BRAKE
CAM
Grease every
1,000 miles.

FRONT BRAKE
CAM
Grease every
1,000 miles.

REAR CHAIN
Remove every
1,000 miles
for lubrication.

CLUTCH OPERATING
LEVER
Oil every
250 miles.

O.H.V. ROCKERS
Grease every
250 miles.

CRANKCASE
AND SUMP
Drain every
1,000 miles.

STEERING HEAD
Grease every
250 miles.

LUBRICATING DIAGRAM FOR B.S.A. 3.49 H.P. O.H.V., 4.93 H.P. O.H.V. and
4.93 H.P. O.H.V. DE LUXE MOTOR CYCLES.

RIDING INSTRUCTIONS FOR THE 1930
B.S.A. 3.49 h.p. O.H.V., 4.93 h.p. O.H.V.,
and 4.93 h.p. O.H.V. DE LUXE
MOTOR CYCLES.

AFTER receiving the motor cycle it is necessary, before taking it out on the road, that you should make yourself familiar with the control and working of the machine.

FILLING UP WITH FUEL AND OIL. Place the machine on the rear stand and fill up the petrol tank, using a large funnel fitted with fine gauze. This will prevent dirt and water entering the tank

Notes on the most suitable fuel to use in your machine will be found under the heading "Compression Ratios and Fuel" (page 12).

To fill the engine sump with oil unscrew the filler plug on the right-hand side at the front and pour in the lubricating oil.

All B.S.A. engines are tested on Castrol "XXL" for summer use and Castrol "XL" for winter use, which grades are recommended.

The following other proprietary brands are also recommended: Mobiloil "D" (summer), "TT" (winter), Golden Shell, Speedwell "Sans-Egal" (summer or winter grade).

Fill also the auxiliary oil tank underneath the saddle if one is fitted to your machine.

OIL FOR GEARBOX. Unscrew the filler plug at the front of the gearbox and also remove the oil level plug screwed into the end-plate of the gearbox on the right.

Now fill the gearbox with B.S.A. Heavy Gear Oil until it reaches the level of the plug hole in the end-plate, working the kickstarter once or twice in order to remove any air bubbles.

Do not forget to replace both the plugs before running.

If you cannot obtain B.S.A. Heavy Gear Oil use Castrol D, Mobiloil C, or Shell Gear Oil. In cold weather the gear oil should be thinned with a little engine oil. Another lubricant that we can recommend for B.S.A. gearboxes is Speedwell Crimsangere Light. This should be mixed with a little B.S.A. engine oil to make it just thin enough to pour into the gearbox.

This charge of oil in the gearbox is sufficient for 500 miles, after which a fresh supply should be given.

For racing or other conditions where high speeds are used, and it is desirable to reduce friction losses as far as possible, B.S.A. or other motorcycle engine oil may be used in the gearbox.

OILING A NEW ENGINE. Before a new machine is run for the first time it is necessary to give the engine a supply of oil. If your machine is fitted with an auxiliary oil tank proceed as follows:—

Remove the sparking plug and then insert a pencil or length of rod through the plug hole and rotate the engine until the piston is felt to be at the top of its stroke. Then push down the pedal on the left-hand side of the machine at the rear. This is connected to the pump plunger on the auxiliary oil tank. If the pedal springs up quickly when you release it keep pushing it down

until it no longer springs up but comes up slowly. When the pedal rises slowly a charge of oil has been given to the engine. Give another four charges in this way, making five in all.

In the case of those machines which are not equipped with the auxiliary oiling system it is necessary to remove the plug at the rear of the cylinder barrel, and also the sparking plug.

Turn the engine until the piston is at top dead centre, as described above. Unscrew the cap from the barrel of the grease gun supplied in the toolkit and fill this with engine oil. Replace cap and inject the oil into the engine through the hole at the rear of the cylinder. Give four or five charges of oil in this way, and then replace the plugs.

It is only necessary to oil in this manner when starting a new engine for the first time or when starting an engine which has not been in use for a considerable period.

ENGINE CONTROLS. There are three main engine controls. These are: carburettor controls, ignition control, and the exhaust valve lifter.

The carburettor controls consist of an air lever and a throttle lever, or twist-grip, on the right handlebar. If both the carburettor controls on your machine are levers the air lever is mounted above the throttle lever. These levers open from left to right. If a twist-grip throttle control is fitted this is opened when turned towards the rider.

The ignition control is mounted on the left handlebar. This may be a lever or a twist-grip. To advance the ignition the lever is moved from left to right, or, in the case of the twist-grip, this is turned towards the rider. (Note that if a Lucas Magdyno lighting set is fitted to your machine the ignition control works in the reverse direction.)

The exhaust valve lifter lever is under the right handlebar.

STARTING THE ENGINE. With the machine still on the stand see that the gear lever on the right-hand side of the tank is in the neutral position marked on the change-speed gate. If the lever is in another position raise the exhaust lifter, revolve the engine by working the kick-starter, and at the same time move the gear lever to the neutral position. **Never attempt to move the gear lever while the engine is stationary.**

Now turn on the petrol by moving the lever of the petrol tap so that it is pointing downwards (The petrol tap is underneath the tank at the rear.) Close the air lever and open the throttle about one-third. Move the ignition control to about one-half full advance.

Raise the exhaust lifter lever and push the kick-starter smartly down with your foot. Just before the kickstarter reaches the bottom of its stroke release the exhaust lifter lever and the engine should start firing. If the engine does not start after two or three trials flood the carburettor by pressing down for a second or two the tickler mounted on the top of the float chamber. This is usually necessary in cold weather. Be careful not to flood the carburettor too much or petrol will pour out of the carburettor and starting will be difficult owing to too much getting into the cylinder.

THE WORKING OF THE CONTROLS. As soon as the engine starts open the air lever about two-thirds and leave it there. For ordinary running this lever may be left alone. Under certain conditions it is necessary to adjust this lever, but this will be explained later.

While the engine is still running observe the effect of opening and closing the throttle lever and of advancing and retarding the spark lever. Note that if the exhaust lifter lever is raised the engine stops firing and that the engine can also be stopped by closing the throttle lever.

A study of the working of these levers will soon enable you to understand the control of the machine, and a little experience will show the best setting of the levers for starting your particular machine.

While carrying out these tests do not allow the engine to run too long or it will overheat, since it is not being cooled by travelling through the air.

STARTING. While the engine is still running push the machine gently off the stand and the latter will spring up into position. Now mount the machine, raise the clutch lever (on the outside of the left handlebar) to its fullest extent and push the gear lever forward into the low-gear position on the change-speed gate. If the lever will not go right into the notch return it to the neutral position and release the clutch lever for a moment. Then try the operation over again. Now engage the clutch by gently and slowly releasing the clutch lever and the machine will start away smoothly and gather speed as the throttle lever is opened. **Be very careful always to raise the clutch lever fully before moving the gear lever from the neutral position.**

Of course when you are used to the machine it is not necessary to put it on the stand to start it. The kickstarter can easily be operated when you are astride the machine.

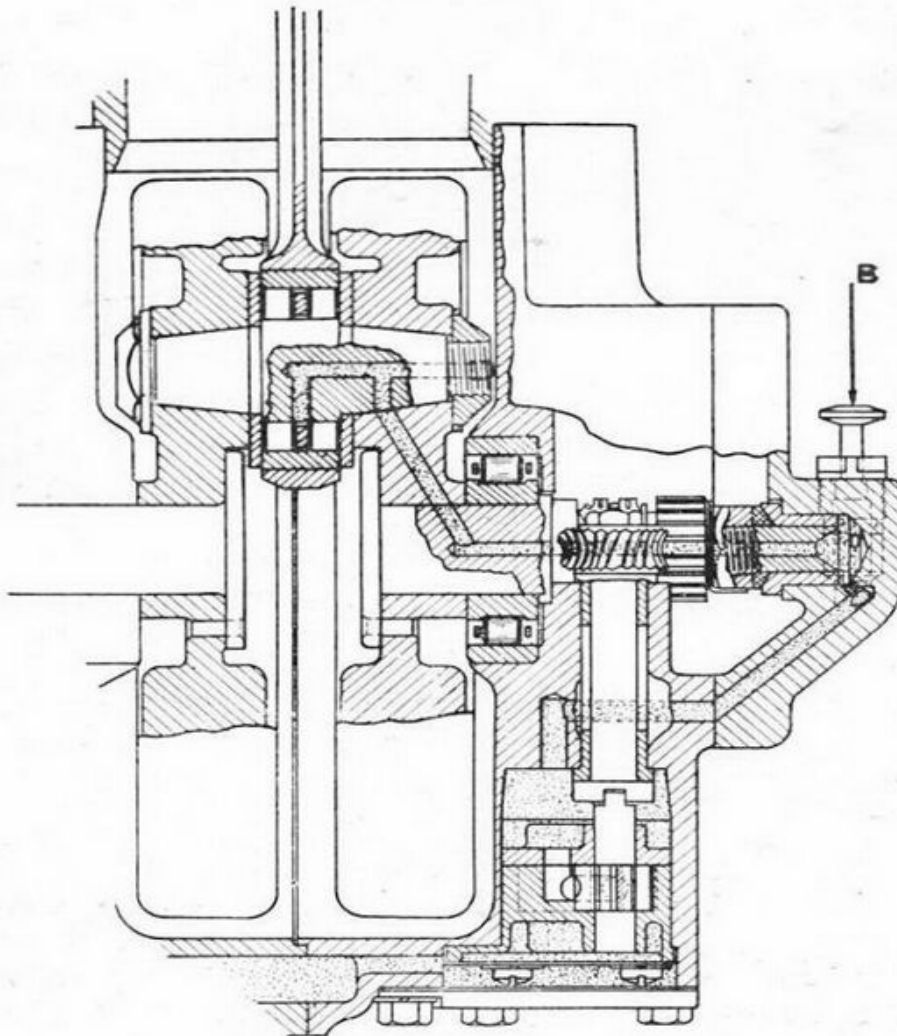
GEAR CHANGING. As soon as the machine is well under way raise the clutch lever and move the gear lever into the middle-gear position, releasing the clutch immediately after. Accelerate to about 20 miles per hour, then change in the same way to top gear.

When reducing speed, whether because the machine is climbing a steep hill or for any other cause, never let the engine labour on top gear. As soon as the engine seems inclined to labour change down into middle gear. This is done merely by easing the clutch and pushing the gear lever forward into the desired position. A similar operation enables the rider to change from middle to low gear if the speed similarly becomes too low for the former. Never be afraid to change to a lower gear if it is thought desirable. The gearbox is on the machine for use, and far more harm is done by letting the engine labour and thump unnecessarily on a high gear than by letting it "rev" a little on a lower gear. If very slow running is desired—as, for instance, when negotiating thick traffic—change into bottom gear and partly disengage the clutch. The B.S.A. clutch is fitted with special friction linings and cannot be damaged by a reasonable amount of slipping when slow running is required.

RIDING HINTS. Do not control the speed of the engine by operating the exhaust valve lifter. The speed should always be controlled by the throttle lever, and the exhaust lifter should only be used when it is desired to stop the engine altogether or for starting purposes. When descending long hills the clutch may be disengaged and the engine stopped altogether, so that the machine coasts down like a bicycle. After coasting down a hill never attempt to start the engine by means of the

clutch if the low gear is engaged or serious damage may result. Keeping the clutch disengaged pull the gear lever into the high-gear position, open throttle slightly, and let clutch in gradually until the engine starts.

LUBRICATING SYSTEM. A very thorough lubrication system is provided on this engine. Cast integral with the crankcase and

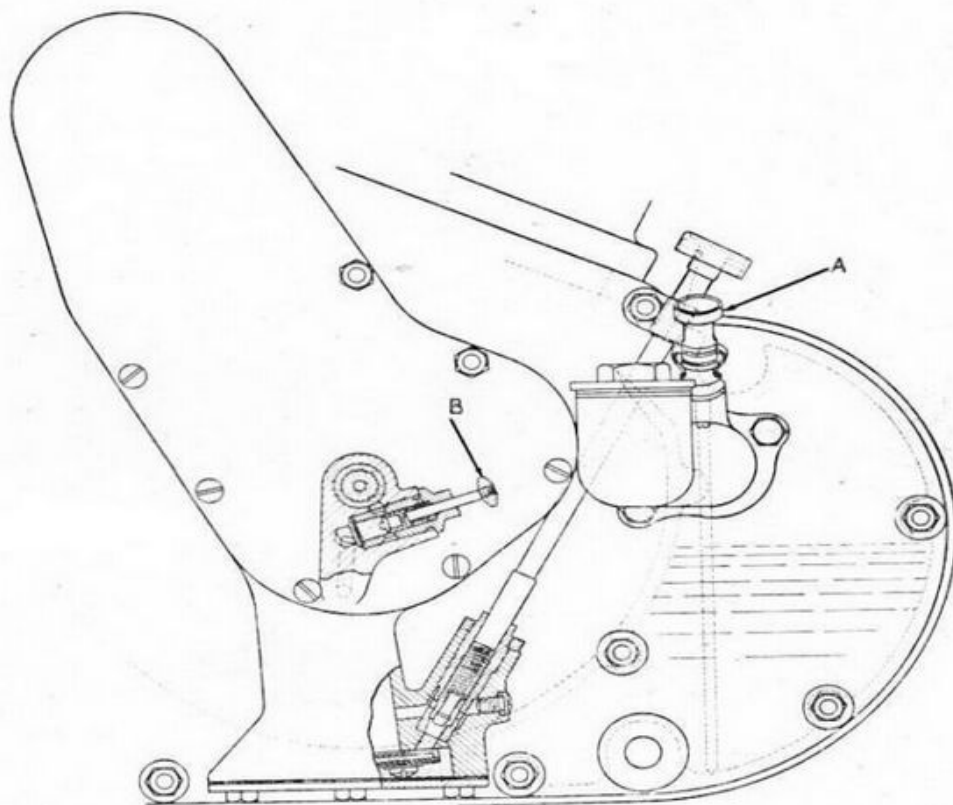


Section showing oil-feed in big-end.

Fig. 1.

surrounding the flywheel chamber at front, underneath, and at the rear is a sump, the capacity of

which is three pints. The gear-type pump, driven by skew-gearing from the timing-side mainshaft, is submerged in an extension of the sump. The pump rotates at one-sixth engine speed and delivers filtered oil to the big-end bearing through passages cut in crankcase, timing-cover, mainshaft, flywheel, and crankpin. The oil enters the annular space between the two rows of rollers and the centre portion of the phosphor-bronze cage.



Lubrication System.

Fig 2.

After lubricating the big-end the oil reaches the other parts of the engine by splash. Any excess of oil is picked up by the flywheel rims from the bottom of the crankcase and is removed by a scraper acting on the flywheels and returned to the sump

The oil supply is controlled by a valve on the intake side of the pump. The valve is provided

with an extension handle passing in front of the timing-case to a point easily accessible to the rider from the saddle. On the delivery side of the pump a tell-tale is fitted. This takes the form of a small spring plunger, which is forced outwards by the passage of oil, mounted on the timing-cover and visible from the saddle. So long, therefore, as oil is being delivered by the pump the tell-tale projects. A portion of the oil flowing past the tell-tale is fed to the cam-wheel bearings through holes in the fixed shafts.

An oil level dipper-gauge of the quick-release type (A, Fig. 2) is fitted at the right-hand side of the sump. This consists of a rod which projects within the sump, reaching to the bottom. The rod is of D-section, and on the flat side pint graduations are marked. To test the oil level in the sump it is only necessary to remove the dipper by pulling it out and examine it. If the oil level on the dipper-gauge is indistinct wipe it clean, reinsert it, and withdraw it again. It will then be very clearly marked.

A convenient filler is mounted at the side of the sump through which oil can be filled up to the correct level, but not above it.

Lubrication is arranged for the engine shaft cush-drive by oil mist passing from the crankcase through a hole in the mainshaft.

A special oiling device for the front chain consists of a small reservoir formed on the inner near-side crankcase wall. Oil accumulates in this and passes through an adjustable valve, accessible to the rider, and thence through a special hollow stud placed so that oil emerging from it drips on to the front chain.

When an auxiliary oil tank, together with pedal operated force-feed pump is fitted to the machine

this provides an additional supply of oil direct to the piston. This is useful for long-distance racing.

INSTRUCTIONS FOR LUBRICATION. For ordinary running the oil pump control valve should be opened (turned to the left) from half to one complete turn. This setting is only arbitrary, and the rider should find out for himself the most economical setting consistent with adequate lubrication. The tell-tale provides the best guide for correct oil-control setting. If it projects about $\frac{1}{4}$ in. the setting is about correct. If it moves out further than this the setting should be reduced. If the tell-tale moves in and out continuously instead of remaining stationary it is a sign that the engine is not receiving sufficient oil due to the control not being far enough open, or to the sump becoming empty. These instructions apply for normal touring speeds.

For racing, where an auxiliary oil tank and pedal-operated force pump are not fitted, it is advisable to open the control about one-and-three-quarters to two turns.

If the machine is equipped with the auxiliary oiling system this need only be used for racing and other high-speed work. Set the mechanical pump control about one-and-a-half turns open and give frequent charges of oil (every two or three miles) by means of the foot-operated pump.

When the engine is new the oil supply should be fairly generous for the first 500 miles. The engine should be given about 25% more oil than the above settings indicate.

Attention should be paid to the following points in connection with the lubricating system :—

Check the oil level in the sump regularly by means of the dipper (A, Fig. 2). When the level

falls to the notch marked "1" the sump should be filled up with a pint of oil. If preferred the sump can be filled up with a quart of oil when the level falls to the mark "2" on the dipper.

It is of the utmost importance, however, not to run more than about 20 miles after the oil level has fallen to the mark "2." If this distance is exceeded engine trouble may occur due to lack of lubrication.

The pump tell-tale (B, Fig. 2) on the side of the timing-cover should also be watched. As this is on the delivery side of the pump it must project if the pump is delivering oil. If it does not project look to your oil supply. If there is plenty of oil in the sump the pump should be withdrawn for examination (see "Mechanical Oil Pump, page 24).

When the engine stops firing the tell-tale should be gradually drawn in under spring pressure. If it remains out this may be due to the presence of grit or dust on the stem, and the latter should be cleaned with a piece of rag. If a very heavy oil is used it may be necessary to push the tell-tale home with the fingers.

For oil recommendations see page 2.

COMPRESSION RATIOS AND FUELS.

The 4.93 h.p. engine is fitted with a low-compression piston (unless the high-compression piston is specified).

This has a ratio of 5.8 to 1, and may be run on a good quality of No. 1 petrol. After carbon deposit has begun to form better running will be obtained by the addition of 25% of benzole.

A shim (supplied in the kit of specially-tuned machines only) is available for placing under the

cylinder base. This reduces the compression ratio from 5.8 to 5.4 in the case of the low-compression piston and from 6.8 to 6.4 in the case of the high-compression piston.

In the case of the 3.49 h.p. engine a high-compression piston with shim is fitted as standard. This gives a ratio of 6.5 to 1. Without the shim the ratio is 7 to 1. A low-compression piston (5.4 to 1 and 5 to 1 with shim) is available if specified.

The high-compression piston is fitted to machines having specially-tuned engines. A suitable fuel for this compression ratio is a mixture of 50% of benzole and 50% of No. 1 petrol. For special work Aviation spirit may be used instead of No. 1 petrol.

For the medium-compression ratio obtained when the shim is used in conjunction with the high-compression piston a mixture of petrol and benzole containing 25% to 50% of the latter is satisfactory.

When the lower compression ratios are used straight petrol is suitable.

DECARBONIZATION PERIODS. Owing to the economical lubricating system the engine will run for long periods without being decarbonized.

The distance that the machine will run satisfactorily without being decarbonized varies with the different compression ratios. The general rule is that higher compression ratios call for more frequent decarbonization. The presence of excessive carbon deposit on the cylinder and piston heads is indicated by the readiness of the engine to "pink" or "knock" when under load. This is most marked when accelerating in top gear from low speeds.

The admixture of additional benzole with the fuel lessens the tendency towards "pinking" when this becomes pronounced and it helps to prolong the decarbonization periods.

When the two lower compression ratios are used decarbonization should not be necessary until 3000 to 4000 miles have been covered.

If the high-compression piston is used with shim the engine should be decarbonized every 2000 miles, while in the case of the high-compression piston without shim decarbonization should be carried out after 1500 miles.

In each case additional benzole should be added to the fuel supply during the latter part of the suggested period of running.

AIR-CLEANER. An air-cleaner is available for all B.S.A. motor cycles. This is of the filter type. Air enters the cylindrical chamber through louvres cut in its sides and passes through a lining of silk before reaching the carburetter. Any dust which is suspended in the air is thus effectively prevented from reaching the engine. The lining is supported and held in position by a coil spring.

A light spring-loaded flap valve is included in the design. The object of this is to prevent the silk catching fire in the event of a blow-back due to weak mixture or to a sticking inlet valve. Any reversal of gas travel between the engine and the air-cleaner causes the valve to close.

The air-cleaner is a valuable addition to the equipment of any engine, and its use is very strongly recommended for dusty road conditions. The exclusion of dust and grit from the cylinder walls and moving parts of an engine results in greatly

reduced wear and longer life. It is found, moreover, that carbon deposit may contain as much as 50% of road dust. The formation of carbon deposit is therefore not so rapid when an air-cleaner is fitted, and greater mileages may be covered before decarbonization becomes necessary.

The advantages of an air-cleaner is specially marked in the case of new engines during the running-in period. The abrasive action of dust on piston and cylinder walls is eliminated, with the result that these parts become bedded down in a most satisfactory manner, and the eventual performance of the engine is thus improved.

The air-cleaner has no effect on engine power at touring speeds, and the reduction in power at high revolutions is so slight as only to warrant its removal when maximum speeds are required.

CARBURETTER When the air-cleaner is fitted the correct jet size is one size smaller than that used without the air-cleaner (three sizes smaller on the 4.93 h.p. engine).
JET SIZES. For economy a size smaller than the one fitted when the machine is sent out may be used, while one size larger may be fitted if maximum power is desired.

CARE OF ENGINE.

RUNNING-IN. The machine should be driven with care during the first 500 miles. On top gear a speed of 40m.p.h. should not be exceeded during this period. On middle and low gears the maximum speeds should not be more than 30m.p.h. and 20m.p.h. respectively. While the engine is being run-in the oil supply should be slightly in excess of normal (*see* "Instructions for Lubrication," page 11) and the air-cleaner, if fitted, should not be removed from the carburetter intake.

If these points are carefully observed by the rider during the running-in period the conditions and performance of the engine will eventually be superior to those of one which has been carelessly treated in the early stages of its life.

(This does not apply to machines fitted with specially-tuned engines, since these have already been well run-in on the bench before being tested for power output).

Both the crankcase and the oil sump should be drained every 1000 miles by removing the two plugs on the driving side of the engine.

COMPRESSION. The engine compression should be tested regularly. This should be such that a definite resistance to movement is encountered when the kickstarter is depressed. If the latter can be pushed down easily without the exhaust lifter being raised it is an indication that the compression is faulty, and the matter should be investigated further.

If the engine compression is faulty this may be due to leakage past the sparking plug washer or past the piston rings and valves. Lack of compression may also be due to a defective cylinder head joint washer.

If the sparking plug is loose smear the washer with oil and tighten. The presence of any defect in the washer itself will then be indicated by bubbles when the kickstarter is depressed. If the washer is faulty fit a new one.

The valve clearance should be carefully checked to see that the valves are properly seated. If

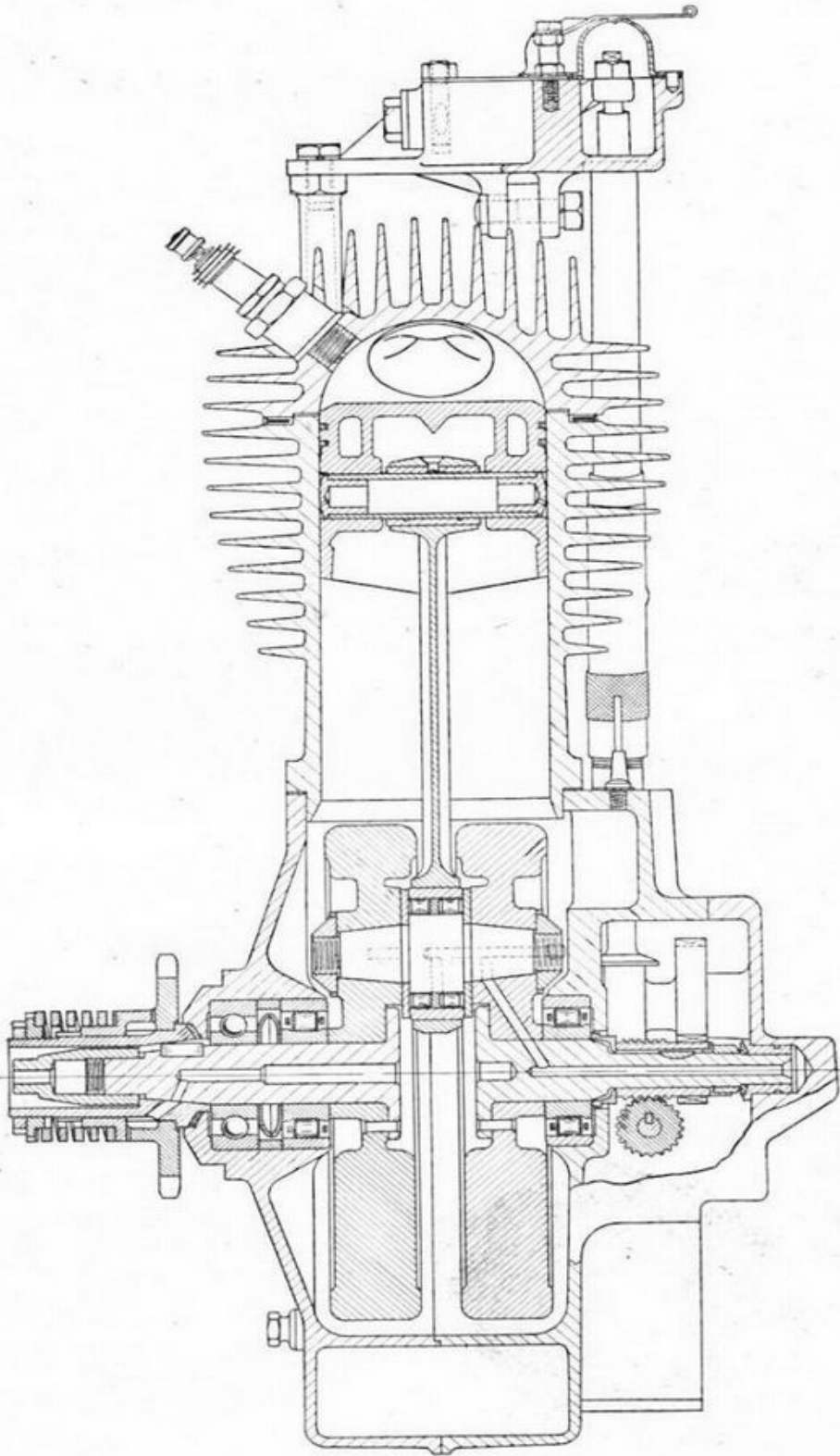


Fig 3.

Cross section of B.S.A. O.H.V. engine

there is no clearance the valves should be removed for examination, when it may be found that the seatings are pitted or the valves are burned. Badly-pitted valves should be reground and valves which are burned should be replaced.

It is extremely important that the valve clearances should be correct, since running without clearance always results in serious damage to the valves.

The most convenient way to test the head joint washer without removing the head is to place the machine on the stand and start up the engine. Hold the back of the hand close to the cylinder in line with the head joint. Any "blow" past the washer will be felt by the hand. Test all round the joint in this way. If the washer is still suspected, even although this test fails to reveal any defect, examination of the washer will show definitely whether or not leakage occurs at this joint. The presence of black patches on the washer will indicate that the joint is defective. The cylinder head nuts should be tightened down periodically to prevent leakage developing at the washer.

The piston rings should also be examined as described under the heading "Piston and Rings". The width of the gap is important. If this is excessive leakage may occur, and new rings should be fitted.

Should leakage still occur even when new rings are fitted, examine the cylinder bore. This may be scored or badly worn, due to under-lubrication. In this case it may be necessary to have the cylinder bore reground and to fit an oversize piston.

Further instructions on the removal and examination and adjustment of parts will be found in the following notes.

VALVE CLEARANCES. To ensure quiet valve-gear operation particular attention should always be paid to the clearance between valve and rocker, especially during the first 500 miles (while the working surfaces are bedding down). This should be tested when the engine is cold and with the piston at about top dead-centre at the end of the compression stroke. Test the valve clearance every 250 miles.

To check the valve clearance proceed as follows : Turn the engine round by the kick-starter until compression is felt. Then raise the exhaust lifter and push the kickstarter down another couple of inches so that the piston is at the top of the compression stroke.

There should now be clearance between the rocker and the valve stem. Owing to the pull of the rocker return springs the rocker end should be clear of the valve stem, and if pressure is exerted on the end of the rocker movement should be felt. The clearance should be accurately checked by a set of feeler gauges. For ordinary running this should be about $3/1000$ in. when the engine is cold. For racing $4/1000$ in. clearance is recommended.

If there is no clearance the valve will never close properly. Starting will be difficult and the face of the valve will become burnt and pitted due to leakage of hot gas at the moment of explosion. If the clearance is excessive the valve gear will be noisy in operation and loss of power and increased wear will result.

In the case of the exhaust valve first make sure that the valve lifter cam inside the rocker-box is clear of the push-rod flange. It should be possible to operate the exhaust lifter lever through a small angle before moving the rocker, thus showing that the correct clearance exists. If not, the control wire should be adjusted until clearance is obtained

To set the valve clearance. Remove the rocker-box cover by releasing the spring clip. Undo the locking-nut *A* (Fig. 4) by means of the tappet spanner, and using the small end of the B.S.A. spanner turn the adjusting screw *B* until the correct clearance is obtained. Still holding screw *B* tighten the locknut *A*. Check the clearance after tightening the locknut to make certain that this has been done correctly.

ADJUSTMENT OF ROCKERS. To adjust the overhead rockers for end-play release locknut *C* and turn the adjusting nut *D* to the right until it just becomes tight. Then slacken it back a quarter to one-third of a turn, when play should just be felt when the rocker is shaken end-ways. Then tighten the locknut.

This will be found to be the most accurate way of adjusting the rockers, since the tightening of the locknut takes up the clearance between the threads on the adjusting nut and rocker spindle.

The hexagon *E* should not be touched during the adjusting process. This must always be screwed up tight, and should only be unscrewed when it is desired to remove the rocker spindle. Before it can be unscrewed the locking stud *F* should be released by undoing the nut which is screwed on to it.

LUBRICATION OF ROCKERS. Grease-gun nipples are fitted to the ends of overhead rocker spindles, and lubrication of these points should be carried out every 250 miles or weekly.

For this purpose a high melting-point graphite-impregnated grease such as Acheson's "Gredag," grade 33, is to be recommended. Speedwell "Crimsangere Heavy" may also be used.

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Force the grease into the bearing by means of the grease gun until a large amount oozes out at the ends of the rocker bearing. In this way adequate lubrication for this highly important bearing will be ensured.

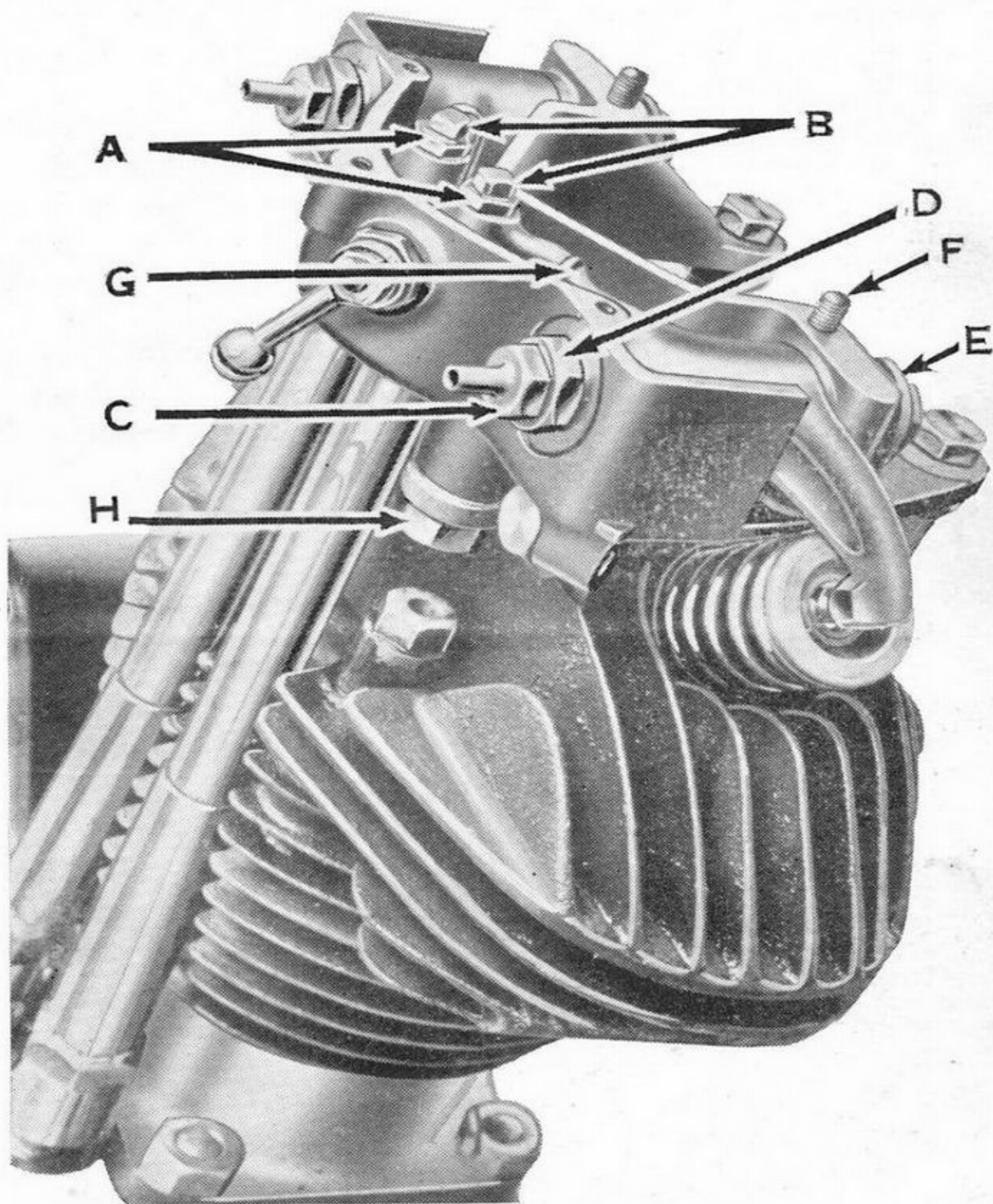


Fig. 4.

PUSH ROD ENDS. The upper push rod ends should be lubricated once a week. To do this remove the rocker box cover and turn the engine until one of the valves is open. It will then be possible to apply oil to the push rod end with an oilcan. This should be done for each of the push rods in turn. Neglect to lubricate these is liable to cause wear and noise.

OIL MIST LUBRICATION. In addition to the system just described the valve gear is lubricated by oil mist from the engine. Oil mist formed by the splashing action of the flywheels is driven by the descending piston through holes into the timing-case, thence through grooves in the tappet guides, and up the push-rod tubes into the rocker-box. The rockers are fitted with felt rings which accumulate the oil and thus provide additional lubrication for the rocker bearings.

An important advantage of this system is that the valve and rocker gear, being enclosed, are protected from the abrasive action of dust and road grit.

The enclosing of the overhead valve gear, coupled with the efficient lubrication provided, also makes for silent operation.

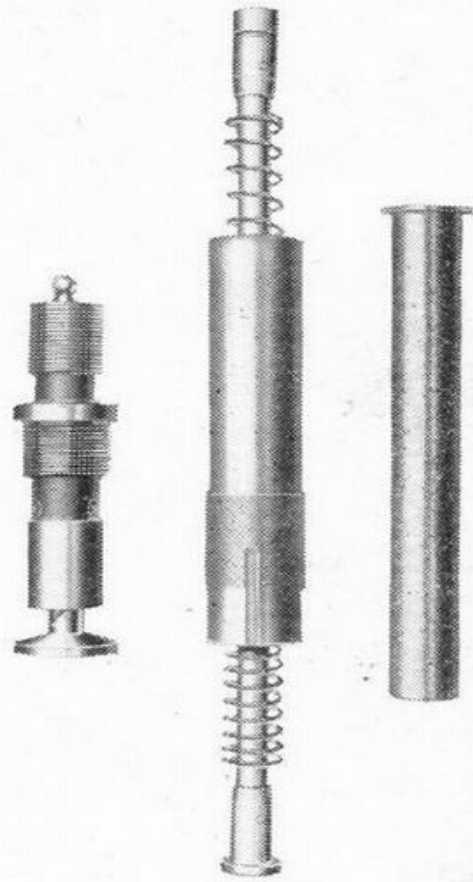
RETURN SPRINGS. Return springs are fitted to the push-rods (4.93 h.p. O.H.V. de luxe, 3.49 h.p. O.H.V., and 4.93 h.p. O.H.V. specially tuned engines) and to the rockers.

The push-rod return springs are held between the flange at the bottom of the push-rod and a collar at the top of the lower half of the push-rod tube (*see* Fig. 5). The latter is screwed on to the tappet guide, and the pressure on the spring is adjusted by screwing the tube up or down. A spring register engaging in a notch in the tube

automatically locks the latter in position.

The rocker return springs are hooked on to the push-rod ends of the rockers, *G*, Fig. 4. At the other end each spring is attached to a screw having an adjusting nut, *H*. These are mounted on bosses underneath the rocker-box on each side of the push-rod tubes. To increase the tension on the rocker return spring turn the nut to the right. This operation necessitates the removal of the rocker box. The nuts are also locked in position by means of registers on their upper faces which engage in slots in the rocker return spring boss caps.

When the machine is delivered both pairs of return springs are adjusted to give medium pressure. This should not be exceeded unless maximum engine revolutions are required for racing purposes, etc. Increased loads on these springs cause greater stresses and consequently more rapid wear on the valve and tappet gear and cams. When high speeds are not required, or if it is desired to maintain the timing gear in an efficient condition for the longest possible period without adjustment, the pressure on the return springs should be eased right back.



Valve Tappet Gear
(see text, page 22).

Fig. 5.

MECHANICAL OIL PUMP. If it should be necessary to remove the oil pump (see "Lubricating System," page 8) this should be done in the following manner: Place a tin or other receptacle under the machine to catch the oil which pours out when the pump is removed. Then unscrew the five nuts and remove the plate underneath the crankcase on the timing side. This will expose four screws which hold the pump in position. These should be removed with a screwdriver. The gauze filter will then come away and the pump can be withdrawn.

To dismantle the pump it is only necessary to remove the four screws in the cover.

When replacing the pump make certain that the driving dog on the end of the spindle engages correctly with the slot in the driving spindle as shown in Fig. 1 (page 8).

VALVE TIMING. The valve timing of the engine should not be tampered with in any way, as the makers' setting is that which has been found to give the best results. Should the timing be disturbed, however, the engine should be revolved until the tooth on the small pinion with a dash mark on it is pointing towards the inlet cam spindle, and the tooth with a dot on it is pointing to the exhaust cam spindle. The inlet cam pinion should then be inserted in such a way that the space marked with a dash is occupied by the marked tooth on the small pinion. The space on exhaust cam pinion marked with a dot should then be engaged with the tooth also marked with a dot on the small pinion.

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Mark front of piston to enable it to be reassembled in the original position. Scrape all carbon off the top of the piston by means of a short screwdriver or old pocket-knife. Finish by polishing the top of the piston lightly with fine emery-paper.

Now examine the piston rings. If they are bright and quite free in their grooves it is better to leave them alone, as they are brittle and there is a considerable risk of breaking them during removal. If the rings are stuck in their grooves prise them out very carefully and clean them. Scrape any carbon from the grooves and from the inside and edges of the rings and then replace, providing they are otherwise in order.

After several thousand miles have been covered the gap between the ends of the rings should be checked with ring in cylinder. The ring may be positioned correctly by first inserting piston and then sliding ring up to piston skirt. If the gap exceeds $15/1000$ in. a new ring should be fitted with a gap of $6/1000$ in. ($4/1000$ in. on the 3.49 h.p. engine). Any ring showing brown patches should be replaced by a new one. After cleaning the piston make sure that the slots in the piston rings are on the opposite sides of the piston to one another and then smear the sides of the piston generously with engine oil to obviate any risk of damage when first running after assembly.

When tuning the engine for speed the piston should be carefully examined and any high spots eased down with a smooth file. The sides of the relieved portions (surrounding each end of the gudgeon-pin) should also be eased slightly as well as the full-diameter portion below the gudgeon-pin at each side. Do not use emery-cloth for easing the piston or particles of emery may become embedded in the piston and cause rapid cylinder wear.

CRANKCASE. While the cylinder is off it is advisable to clean out the crankcase and sump. This is done by unscrewing the drain plugs on the bottom left-hand side of the crankcase and allowing the oil to drain out. The crankcase and sump should then be swilled out first with paraffin and then with half a pint of engine oil, and the plugs replaced. Make sure that the latter are screwed up tight, as loss on the road might result in harm to the engine due to lack of lubricating oil. The cylinder base washer should be intact; if not a new one may be cut from ordinary brown paper.

ASSEMBLING AFTER DECARBONIZATION. Do not disturb the cylinder head joint washer unless this proves on examination to be defective, but make certain that the nuts are tight (see "Compression," page 16).

Replace the piston and gudgeon-pin on the connecting-rod, making sure that the piston is the correct way round. Turn the engine until the crank is slightly past bottom dead-centre. The top piston ring should now be compressed by the fingers while the cylinder barrel, held in the front angle of the frame, is slid on to the piston. The lower ring may now be compressed until it enters the barrel, which may then be slid home and bolted to the crankcase by gradually and alternately tightening down the nuts.

Replace the valves and springs with the aid of the special tool and then refix the cylinder head on the barrel, tightening the nuts gradually to ensure the head being kept square.

Now turn the engine until both tappets are down (i.e., piston at top dead-centre at end of compression stroke). Replace rocker-box and see

that the tops of the vapour tubes spring into their seatings underneath the box.

Check the clearances between valves and rockers and adjust if necessary.

The rocker-box cover, exhaust lifter cable, carburettor, sparking plug, and exhaust pipes may now be fitted.

STARTING AFTER ASSEMBLY. Before starting up the engine give at least three complete charges of lubricating oil by means of the pedal-operated pump. If this is not fitted lubricate the engine through the plug hole in the cylinder as described under "Oiling a New Engine" (page 3). **This is very important and must be kept in mind.**

The engine should then be ready for the road again, but full power cannot be expected until it has had a little running-in to allow valves and piston rings to become properly bedded-in after being disturbed.

CARE OF MACHINE.

CLEANING. The life of a machine is increased, and its appearance and value greatly improved by regular and careful attention to cleaning. Special care should be taken to prevent grit working into the moving parts and causing undue wear and other troubles. Particularly is this the case round the front, rear, and sidecar hubs, carburetter, magneto, valve stems, tappets, brakes, and gear-box.

Never rub dry and caked mud from the frame, mudguards, etc. To do so means that the enamel

will be subjected to the abrasive action of the grit and the polish will soon be destroyed. Thoroughly soak the dirt first, then wash it off and wipe the parts dry. If a hose pipe is available this will be found the most satisfactory way of removing dirt. Direct the stream of water on the portion being cleaned, taking care to avoid playing direct on to the hub bearings, etc. Afterwards brush lightly with a soft brush, finally drying and polishing with a smooth cloth. To remove dirt from the engine soak it well with paraffin, cleanse with a fresh supply, then wipe dry. To remove oil stains from the crankcase use caustic soda solution. An occasional coating of a cylinder paint should be given to prevent rusting of the cylinder, or a solution of lampblack in paraffin to which a small quantity of gold size has been added may be used. This will also be found to assist the radiation of heat.

GREASE GUN A grease gun is supplied with the kit. To charge this, unscrew the nozzle and press the gun into position in a "Tecalemit Easy Filling Tin" if available. Now replace the nozzle. To lubricate, place the nozzle of the gun on to the nipple, and by pushing the body of the gun down several times grease will be forced into the working parts at high pressure. The gun can also be filled by pushing the cork piston to the far end of the gun and inserting grease into the body.

Lubricate the front fork link bearings every 250 miles or weekly by means of the grease gun. Keep pushing the body of the gun down until grease is forced out at the working faces.

SPRING FORK. Keep the top link bolts just tight enough to eliminate side-play, which generally causes a mechanical click when the machine is rocked sideways. To adjust, unscrew the nuts on the left-hand side and screw up the bolts from the right-hand side just sufficiently tight to eliminate all side-play, then lock in position with the nuts, doing one bolt at a time. If too tight the flexibility of the fork will be reduced. It should be noted that the links on the right-hand side have plain holes and those on the left have threaded holes.

SHOCK ABSORBER. This device has been incorporated with the bottom fork link to enable the deflection and rebound of the fork on rough roads to be controlled. It is adjustable to suit the weight of the rider and the nature of the road surface. Quick adjustment is provided, and it is only necessary to tighten or slacken the thumbscrew, as the case may be, to suit individual requirements.

To remove Front Fork Spring and Forks.—Support the crankcase on a box so that the front wheel hangs clear of the ground. Remove the nut from top spring retaining bolt and depress same until it can be removed from anchorage lug, afterwards “unwinding” spring from bottom retaining scroll. Then remove the four bolts from the forks by unscrewing the nuts on the left-hand side and withdrawing from the right. Slide out the four links sideways and the forks will fall clear of the machine.

Frequent attention should also be paid to the steering-head. A grease gun nipple is fitted on the right-hand side of the steering head,

and this should be greased regularly (every 250 miles). If this is not done the head will become stiff and the steering will feel unsteady. To adjust head it is first of all necessary to slacken the steering damper right back. Then unscrew the clip-nut, screw down the adjusting nut by means of a special spanner supplied with tool kit until there is no perceptible shake in head, slack back about a twelfth of a turn, and then screw up clip-nut again tightly.

STEERING DAMPER. A B.S.A. steering damper is fitted to the lower end of the steering stem yoke, and the pressure is adjustable by means of a knob mounted on the top of the steering head.

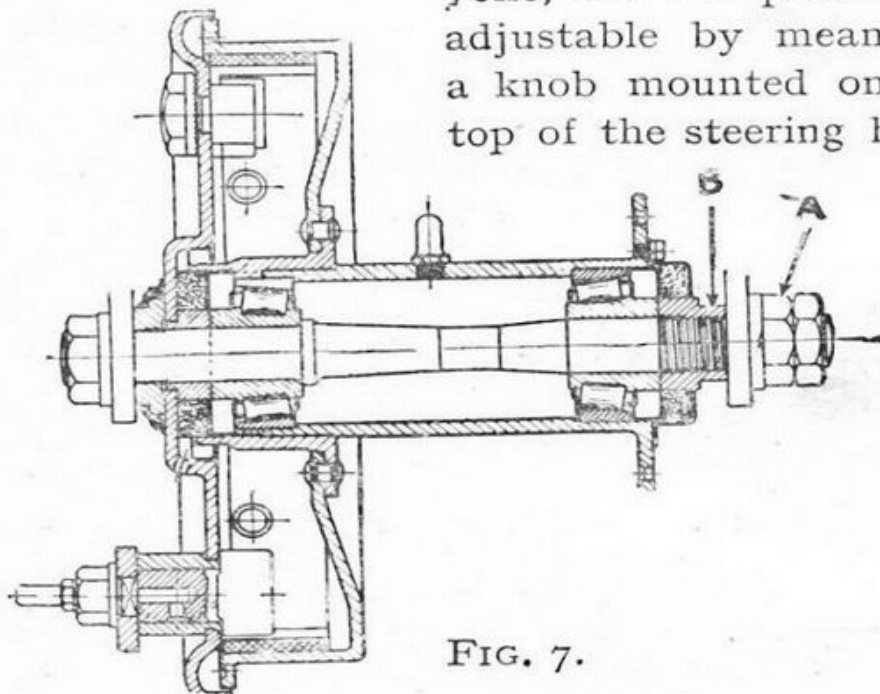


FIG. 7.

The function of a steering damper is twofold. In the case of solo machines it ensures stability at high speeds on rough roads and prevents "speed wobble." When fitted to a sidecar combination a steering damper eliminates the tendency to "handlebar wobble" and reduces steering drag. The steering damper should be adjusted to suit individual requirements.

Beyond occasional cleaning of the friction discs the B.S.A. damper requires no attention.

HUB

ADJUSTMENT. Both front and rear hubs (shown in section in Figs. 7 and 8 respectively) are of the taper roller bearing type. They should be tested frequently for side-play and adjusted if necessary:

To adjust for side-play slacken off the left-hand spindle nut *A* and turn the bearing nut *B* gradually, at the same time rotating the wheel slowly and testing for side-play. When the play is all taken up unscrew the nut *B* about one-third of a turn or until play can just be felt when the wheel is rocked sideways. Upon tightening up the spindle

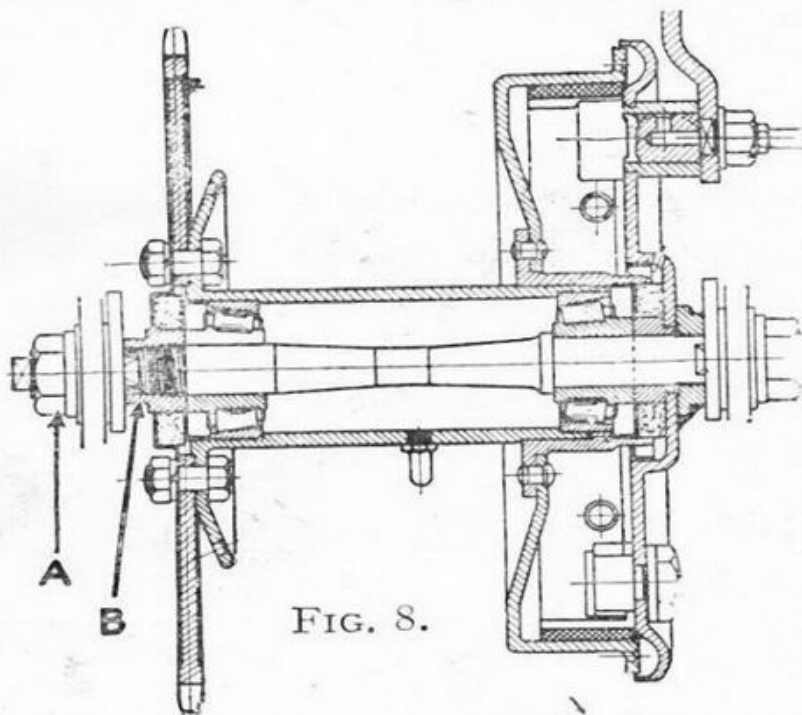


FIG. 8.

nut *A* this play will be taken up and the adjustment will be correct if there is the barest perceptible shake in the bearing as measured at the wheel rim. Do not screw the

bearing nut *B* up too tight when making the preliminary adjustment or the rollers and races may be damaged.

It is essential that the wheel bearings should be free but without excessive play, and this adjustment should be very carefully made and checked.

HUB AND BRAKE LUBRICATION.

It is of the utmost importance that the hubs should be greased every 250 miles, or weekly. If this is not done they are liable to overheat and

wear. Care should be taken, however, to avoid over-lubricating the hubs since any excess of grease may reach the brake linings and impair the efficiency of the brakes. When the machines are sent out the hubs are packed with grease and the regular weekly application of a small quantity will maintain this amount.

The brake cams should be greased every 1,000 miles or monthly. Only a small quantity of grease should be applied, otherwise the linings may be affected.

BRAKE ADJUSTMENT. Quick adjustment is provided for the brakes. To adjust the rear brake it is only necessary to screw the wing-nut fixed to the end of the brake rod backwards or forwards, as the case may be, until the correct setting is obtained.

To adjust the front brake the sleeve mounted on the front fork yoke lug should be screwed in or out. The end of the Bowden cable outer casing fits into this sleeve. The sleeve locknut should be released before adjustment and tightened afterwards.

PETROL TANK. The interior of the petrol tank should be examined periodically and any traces of water removed by means of a piece of blotting paper or otherwise. If drops of water are allowed to accumulate they are liable to damage the tank by causing rust.

DESCRIPTION OF THREE-SPEED GEAR,

with Instructions for Adjustment and Lubrication.

THE B.S.A. Three-speed Gearbox fitted to these models is of the counter-shaft type, with all pinions in constant mesh and external clutch of the dry-plate type. Gear-changing is effected by sliding dog-clutches *A* and *B*, and the method by which the dog-clutches are given

the necessary movement constitutes one of the principal features of the device (see Figs. 9 and 10).

On shaft *C*, which is rotated by means of the pinion and quadrant *D*, which is operated by lever at side of tank, are mounted two operating

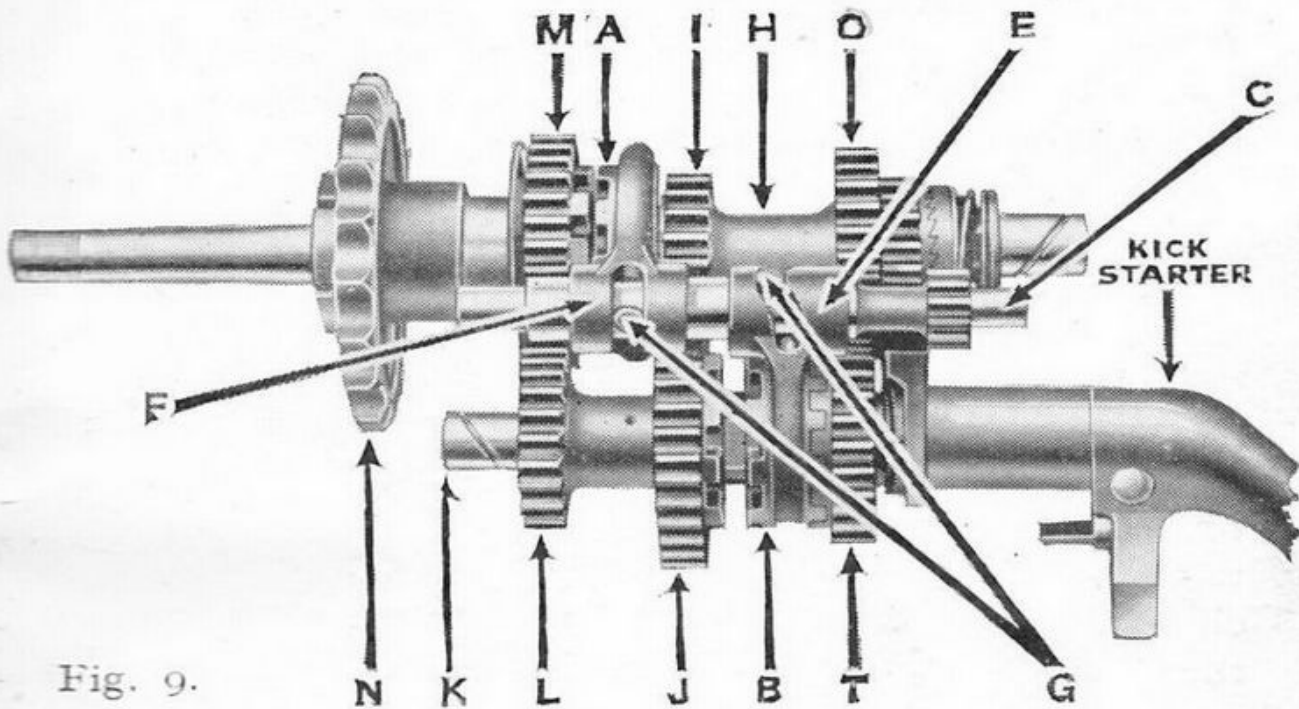


Fig. 9.

forks *E* and *F*, the arms of which engage in the grooves of the dog-clutches *A* and *B*. Helical cam grooves are formed in these forks, which engage pegs *G* fixed in shaft *C*. When shaft *C* is revolved by means of the operating mechanism the pegs *G* cause the forks *E* and *F* to slide along, the cams being cut so as to give the required position to the sliding dog-clutches *A* and *B*. When the low gear is put into operation dog-clutch *B* is moved into engagement with pinion *J*. The drive is transmitted by means of central shaft *H* and pinion *I* to pinion *J*, then through dog-clutch *B* to shaft *K* and pinion *L*, which in turn drives pinion *M*, to which the rear chain sprocket *N* is attached.

The second gear is obtained by rotating shaft *C*, which withdraws dog-clutch *B* from engagement

with pinion *J* into engagement with pinion *T*. The drive is then transmitted from shaft *H* through pinions *O* and *T*, then, as previously, through pinion *L* to pinion *M* and rear chain sprocket.

The high or normal gear is effected by a further rotating of shaft *C*, which withdraws dog-clutch *B* from pinion *T* and engages dog-clutch *A* with pinion *M*, clutch *B* being retained in an inoperative position. Pinion sleeve *M*, with sprocket *N* is thus coupled direct to shaft *H*, pinions *J*, *T*, and *L* revolving idly.

A means of ensuring correct position of all gears is arranged in the gearbox operating mechanism. The quadrant *D* is formed with teeth round part of its circumference only. On the plain portion of the periphery a number of pockets are provided, which engage with a springplunger mounted

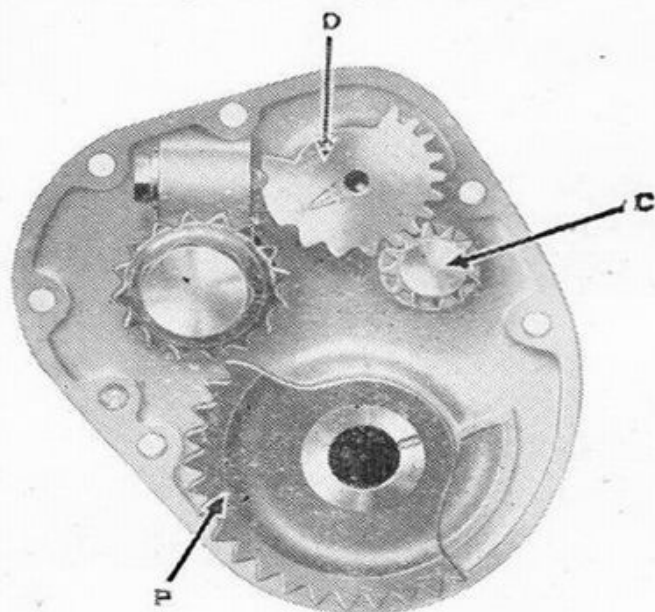


Fig. 10.

on boss of gearbox cover. The position of the gear lever in relation to the gear is thus assured if the control rod is correctly adjusted (see Figs. 10 and 11).

To start engine the operating lever is moved to the neutral position. Each dog clutch is now out of engagement. Movement of the kickstarter crank rotates quadrant *P* mounted on shaft *K*, which in turn engages with ratchet pinion mounted on shaft *H*. In order that its engagement shall be certain, without jamming, the first tooth in quadrant *P* is of special form. All difficulty of engagement is thus obviated. On the road the engine can only be started by means of the kickstarter with the gear in "neutral" position.

LUBRICATION. The oil level in the gearbox should be maintained by frequent injections or at least every 500 miles. Instructions for filling up are given on page 3.

After every 1500 miles' running thoroughly flush the gearbox with paraffin. To do this the machine should be placed on the stand. Start the engine, engage top gear in the usual way, and release clutch. Carefully drain by means of the plug provided and then fill up with oil to the correct level.

Gear Ratios - 4.93 h.p. Models.

TEETH ON SPROCKET				GEAR RATIOS			
$\frac{1}{2}$ " Pitch		$\frac{3}{8}$ " Pitch		High	Middle	Low	
Engine Shaft	Gear-box	Gear-box	Rear Wheel				
18	48	19	42	5.9	8.0	13.9	
19	48	19	42	5.6	7.6	13.2	Comb.
20	48	19	42	5.3	7.2	12.6	
21	48	19	42	5.0	6.9	11.9	
22	48	19	42	4.8	6.6	11.4	Solo.
23	48	19	42	4.6	6.3	10.9	
24	48	19	42	4.4	6.0	10.4	
25	48	19	42	4.2	5.8	10.0	

Gear Ratios - 3.49 h.p. Models.

20	43	15	42	6.0	8.2	14.3	Comb.
21	43	15	42	5.7	7.8	13.5	Solo.
22	43	15	42	5.4	7.4	12.9	
23	43	15	42	5.2	7.1	12.3	
24	43	15	42	5.0	6.8	11.8	
25	43	15	42	4.8	6.5	11.3	

NOTE.—The above figures are for the gearboxes fitted as standard to these models. Special wide and special close ratio gearboxes are available, if specified.

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TRANSMISSION.

CHAINS. It is advisable to remove both chains periodically. Remove chains by detaching spring link. They should then be thoroughly cleansed in petrol or paraffin and dried off. Warm them for some time at about the temperature of boiling water in a mixture of grease and graphite. After they have cooled wipe off the excess lubricant. Under load the lubricant will be gradually squeezed out; the process should therefore be repeated every 1000 miles. Clean the sprockets, and on replacing chain note that the split end of spring fastener is at the rear to direction of travel of chain.

FRONT CHAIN LUBRICATION. The control valve is on the left side of the crankcase. For ordinary work open this (turn to the left) $\frac{1}{8}$ to $\frac{1}{4}$ turn. For high speeds increase the setting slightly. To clear the oilway in case of stoppage remove the knob by screwing it right out, withdraw the grub screw at the side of the lubricator, and insert a piece of wire.

TO ADJUST THE FRONT CHAIN. For front chain adjustment the gearbox is made to swivel on its lower anchoring bolt while the top bolt slides in specially-shaped slots in the cradle plates. The screw adjuster for moving the gearbox is mounted on the right-hand at the front (Fig 11).

To adjust the chain slacken off nuts *L* and release locknut *M*. To tighten the chain turn hexagon head *N* to the left; to make the chain slack turn to the right.

The chain when properly adjusted should have about $\frac{5}{8}$ in. freedom up or down at the centre at the tightest portion of the drive.

Make sure that the nuts *L* are well tightened after moving the gearbox.

If a considerable movement has been made in the position of gearbox it will be necessary to readjust the gear control rod.

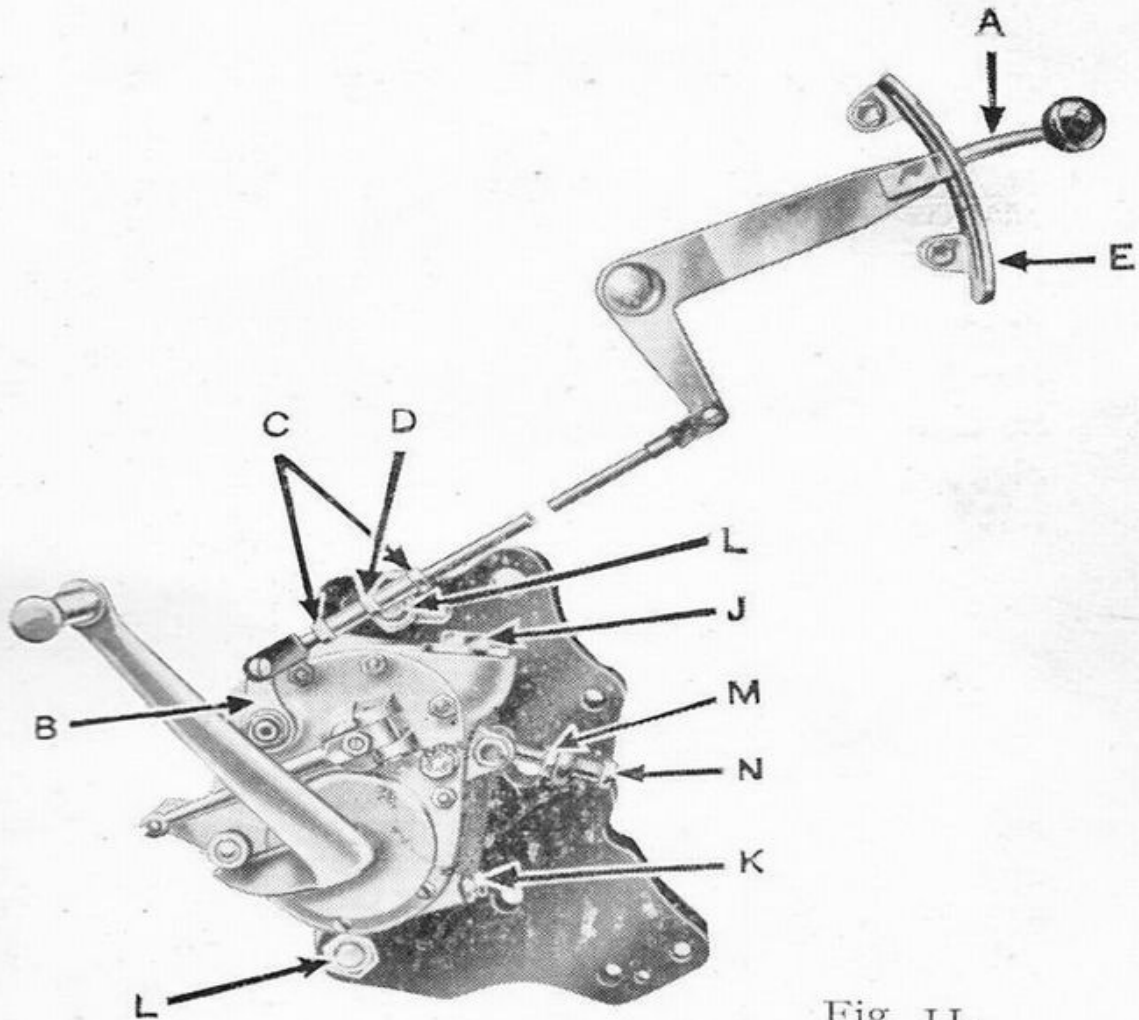


Fig 11.

To effect this the lever *B* should be moved towards front of machine until the spring plunger inside gearbox can be felt to have registered with its recess. The nuts *C* should now be slackened from sleeve *D*, bearing in mind that the lower one has a left-hand thread. Sleeve *D* should now be moved until operating lever *A* is just making contact with the end of its quadrant, as at *E*. Then tighten nuts *C*. Test adjustment by moving lever to middle of neutral position, noting

that the spring plunger can be felt engaging when the lever *A* is opposite the respective positions on quadrant. The clutch can be adjusted by means of either screw *F* or *G*, the latter being of the quickly-adjustable type. The locknuts must first be released and the screws should then be adjusted until a slight clearance is perceptible between screw *F* and rod *H* (Fig. 12).

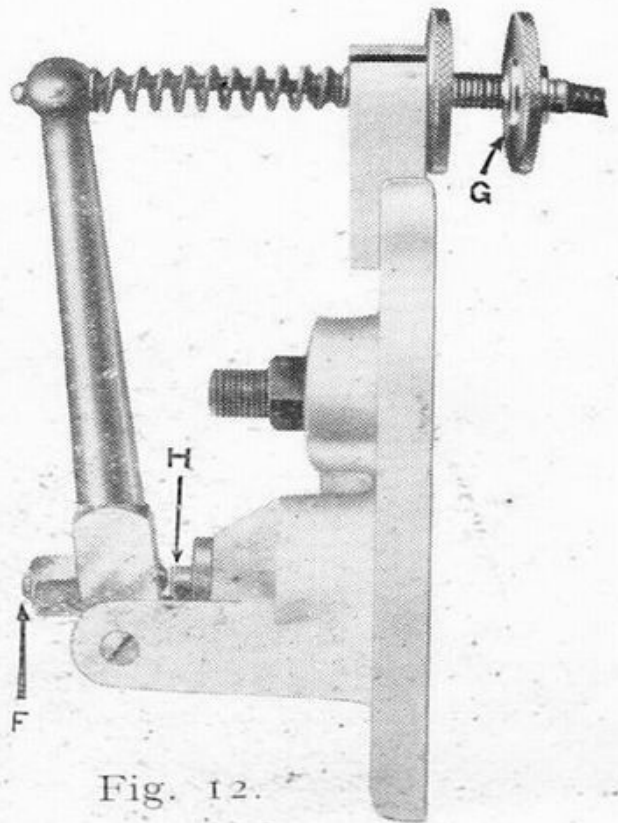


Fig. 12.

TO ADJUST THE REAR CHAIN.

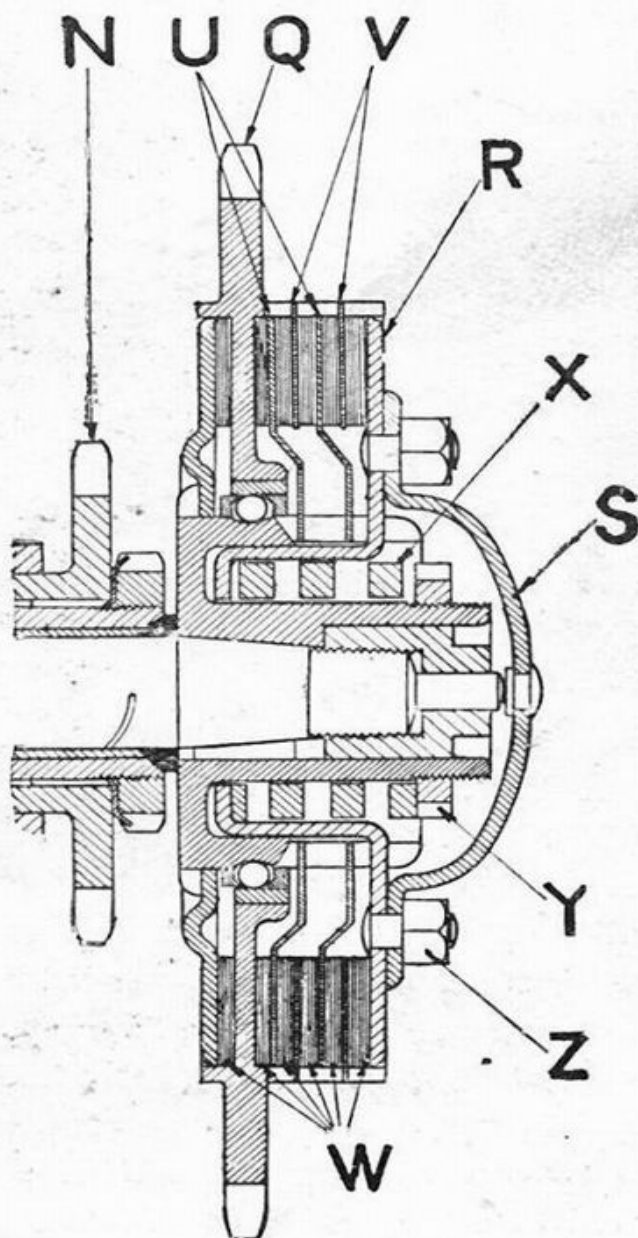
Loosen the nut on the hub spindle on the left side of the machine, then the nut on the right side. Apply an adjustable spanner (handle upwards) to the square end of the hub spindle, then turn towards the rear of the machine until the chain is tight. Slightly turn the reverse way to slacken the chain sufficiently to ensure free running. Hold the spanner firmly in this position, keeping the cams and blocks in close contact, then with the other spanner tighten the left-hand nut, remove the adjustable spanner, and tighten up the right-hand spindle nut. This chain should have a sag of about $\frac{3}{4}$ in. when properly adjusted. It may be found necessary to adjust the rear brake after adjusting this chain (see page 36).

CLUTCH

When chaincase is re-adjusted (3.49h.p. Model). the spring pressure of clutch may be adjusted if the cap on clutch cover plate

is taken off, which is done by removing the nuts *Z*. This will disclose the adjusting nut *Y*. If it is required to increase the spring pressure turn in a clockwise direction with the spanner provided. To make clutch sweeter in action a half-turn or so in the opposite direction will be required. To dismantle clutch the nut *Y* must be removed. The end-plate *R* and spring *X* will now slide off, leaving the plates accessible.

Note the order in which the plates *U*, *V*, and *W* are arranged so that they can be assembled in the same order (see Fig. 13). Thoroughly cleanse by means of a stiff brush and petrol, removing all trace of oil or grease, and when dry reassemble. In assembling clutch the pressure of the spring *A* (Fig. 14) has to be overcome before the nut *B* can be engaged on its thread.



3.49 h.p. Clutch.

Fig. 13.

To enable this to be done a thread has been formed in the nut *C* into which the setscrew sup-

plied in kit may be engaged when the clutch operating rod has been removed. It will be seen that by means of the nut *D* and washer *E* the nut *B* may be forced up to the threaded portion *F* against the pressure of the spring *A*. When in this position if the nuts *C* and *D* are turned together the former nut will engage on its thread. Refit cap and make sure that the nuts *Z* are tight.

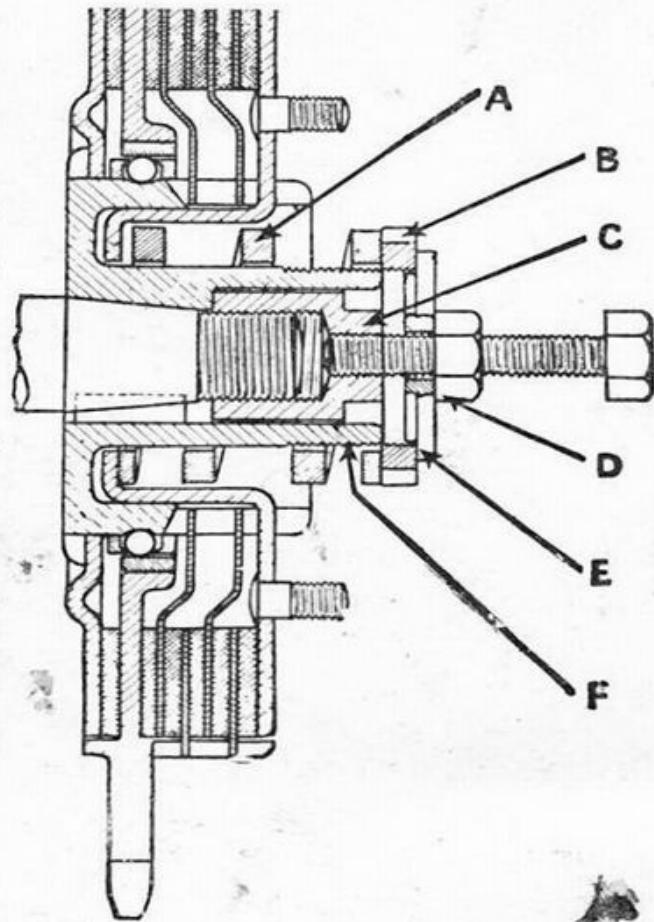


Fig. 14

CLUTCH

When the chaincase is re-
(4.93h.p. Models). moved the spring pressure of clutch may be adjusted if the cap on clutch cover plate is taken off, which is done by removing the nuts *Z* (Fig. 15). This will disclose the adjusting nut *Y*. If it is required to increase the spring pressure turn in a clockwise direction with the spanner provided. To make clutch sweeter in action a half-turn or so in the opposite direction will be required. To dismantle clutch the locknuts *Q* and the nut *Y* must be removed. The end-plate *R* and spring pockets *X* will now slide off, leaving the plates accessible.

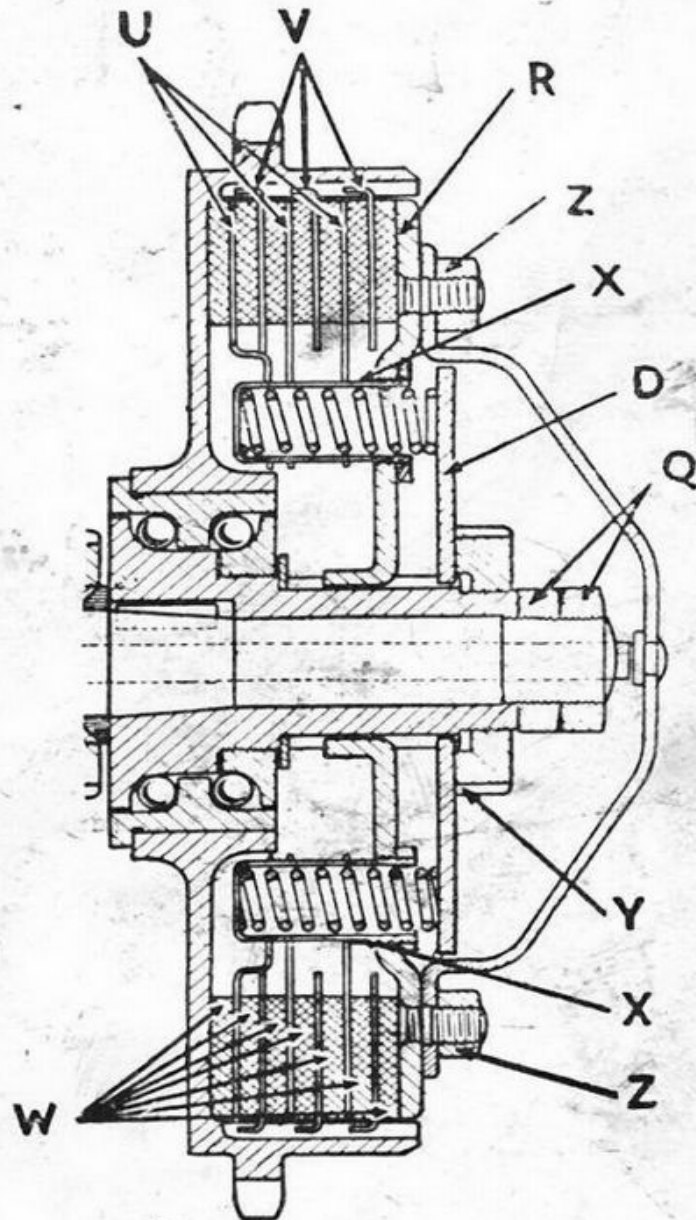
Note the order in which the plates *U*, *V*, and *W* are arranged so that they can be assembled in

the same order (see Fig. 15). Thoroughly cleanse by means of a stiff brush and petrol, removing all trace of oil or grease, and when dry reassemble.

To replace the adjusting-nut it will be necessary to compress the springs *X*. Remove two of the engine timing case cover screws and thread these through the spring thrust-plate *D* and screw into the clutch end-plate until the adjusting-nut can be screwed on to the sleeve. When the end of sleeve just protrudes through the mainshaft the locknuts can be replaced. Refit conical cap and make sure that the nuts *Z* are tight.

Instructions for adjusting clutch control will be found on page 42:

The clutch cable should be greased periodically. This calls for its withdrawal from the outer casing, and the cable should be examined at the ends.



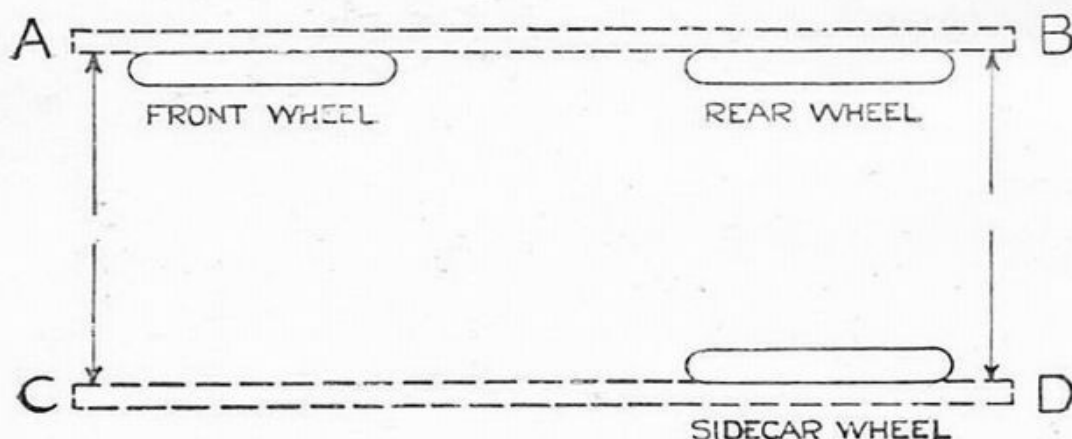
4.93 h.p. Clutch.

Fig. 15.

If any of the ends are frayed difficulty will be experienced in reinserting the cable, and a new one should be fitted.

NOTES ON SIDECAR ALIGNMENT.

THE diagram shows how the alignment of B.S.A. sidecars may be checked. Lay a long wooden straightedge *A—B* against both wheels of the motor cycle and a similar straightedge *C—D* against the sidecar wheel. Make certain that the machine is perfectly upright, then adjust the sidecar until the points *A* and *C* are $\frac{1}{2}$ in. closer together than the points *B* and *D*—i.e., the straightedges should be nearly parallel.



To obtain adjustment the front support tube connection on the sidecar chassis is fitted with a screwed end-lug, washers being fitted between this lug and the tube.

These washers are fitted to the tube when it is sent out and should give correct alignment. Further adjustment, however, can be made if necessary by adding or removing washers.

The front stay is already fixed with two adjusting washers on each side of the spring bracket, and any adjustment must be made by removing washers from one side to the other.

The vertical alignment should also be checked, it being important that the machine should be vertical or leaning slightly outwards. To do this the seat pillar connection should be released at the clip on the axle tubes.

The rear connection is fitted with spherical washer and spring washer to facilitate the vertical alignment of the machine.

All nuts should be locked up tightly after the correct alignment has been obtained, and care should be taken to fit all castellated nuts with split-pins.

The nut securing the rear connection to the chainstay should be slacked back half-a-turn before fitting its split-pin to enable the ball-joint to work.

Grease-gun nipples are fitted to the rear spring and shackle link bolts. These should be lubricated every 250 miles.

TROUBLE AND HOW TO LOCATE IT.

TO meet any emergency likely to arise through trouble on the road it is advisable to carry the following spares: Spare valve, complete with springs, cup, and cotter; sparking plug, spare links and fasteners for chain, chain rivet extractor, and tyre repair outfit, together with the kit of tools supplied with the machine. The points most likely to cause trouble are the petrol supply and the sparking plug

Should the engine develop misfiring or stop firing altogether first ascertain that there is petrol in the tank and that the petrol tap is turned on to carburetter. Depress tickler on float chamber to see that petrol is reaching the jet. If not see the

petrol pipe is clear, detaching the same by unscrewing the union nuts from the petrol tap and underside of the carburettor float chamber. Then examine the jet, which is detached by unscrewing the hexagon-headed jet holder at the base of the carburettor body. If machine still refuses to fire examine the sparking plug to see whether the points are fouled with charred oil; if so cleanse them with brush and petrol or scrape clean with a knife. It may be necessary to dismantle plug to clean out any carbon which is causing internal sparking. Adjust the points if necessary to give a gap of about $18/1000$ in. Having cleaned the plug connect it to high-tension cable, lay plug on top of cylinder, noting that only the metal body of plug makes contact with this. Rotate engine a few times by means of kickstarter. A spark should occur at intervals at the plug points unless the plug is defective. If so fit in a spare plug. Of course if the engine stops and over-oiling is suspected—in this case the exhaust will have previously had a bluish tinge—remove the plug and clean in the first place; then, if engine still refuses to run examine the other points likely to cause trouble.

TUNING FOR SPEED.

IN order that maximum speed may be obtained it is essential that everything should be in perfect adjustment and that all moving parts of engine, gearbox, and machine should be free. The following notes indicate briefly those points to which attention should be paid.

ENGINE. The high-compression piston should be used without the shim. Ease the piston, if necessary, as directed under "Care of Engine."

If the cylinder bore is at all rough lap it out

with metal-polish or jewellers' rouge. The actual piston rings should be used for this, but not the piston which is to be run in the engine.

Examine the head joint washer and replace if there are any signs of leakage.

Check the gap of each piston ring. The top ring should have $8/1000$ in. to $10/1000$ in., the lower ring $6/1000$ in. to $8/1000$ in. The rings should be free in their grooves but without sideplay.

Polish the valve stems and necks and valve ports.

The exhaust valve in a high duty engine is very severely stressed and heated when racing.

It is advisable to change the exhaust valve for a new one after a long race of 200 miles or over.

Adjust the rockers carefully for end-play and set the valve clearances to $.004$ in. when the engine is cold.

Check the alignment of piston, connecting-rod, crankpin, and mainshaft. The gudgeon-pin, when fitted to the small end, should be parallel to the face on which the cylinder rests.

Examine the big-end carefully. This should be free but without more than the slightest amount of up-and-down play. If there is any discoloration in the rollers, or on the roller tracks on crankpin or connecting-rod, new parts should be fitted and subsequently well run-in.

Check the mainshaft and flywheels for truth before and after assembly.

The mainshaft bearings should be free but without play

Polish all bearing surfaces in the timing gear if there are signs of roughness.

Adjust the push-rod and rocker return springs to give full pressure.

GEARBOX. All the bearings should be free. To reduce friction losses B.S.A. or other motor

cycle engine oil may be used instead of gear oil. Be careful to replace the pen-steel washers fitted at each side of the mainshaft ballrace. These will help to prevent the thin oil from reaching the clutch.

TRANSMISSION. Remove both chains and grease them as described on page 40. When re-fitting make certain that they are not tight at any portion of the drive. With the chains in position turn the engine slowly, at the same time testing the sag in the chain until the whole of the latter has passed the point at which it is being tested. In this way any tight portion will be detected. The correct total up-and-down movement for the tightest portion of the drive is $\frac{5}{8}$ in. for the front chain and $\frac{3}{4}$ in. for the rear.

Make certain that the engine, gearbox, and rear wheel sprockets are correctly lined up.

During a high-speed run the front chain oiler should be set to give a copious supply of oil to chain.

MACHINE. Slacken off the steering damper and adjust the head carefully. Then adjust the damper to suit requirements.

Test the frame for alignment by means of a straightedge laid against the wheels.

Remove all grease from the hubs, adjust them carefully, and lubricate with thin cycle oil.

Make certain that the brakes are not binding when in the "off" position.

Inflate the tyres to the correct pressure.

For tyre pressure recommendations see Dunlop booklet supplied with your machine.

B.S.A. CYCLES LTD., Small Heath, Birmingham
(Proprietors: The Birmingham Small Arms Company Limited.)

Directors: Sir Edward Manville, P. Martin (U.S.A.),
Sir Hallelwell Rogers, A. Eadie,
Com. G. Herbert, D.S.O. (Managing).

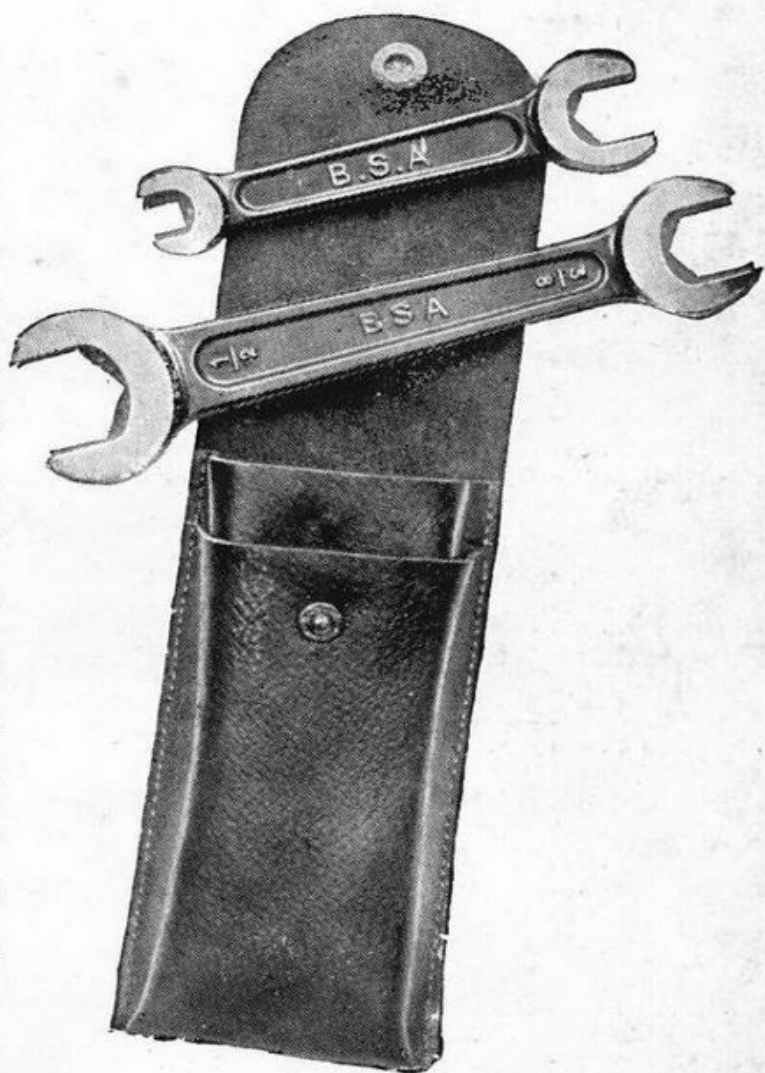
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B.S.A.

Four-way

Set of Spanners

This handy set of B.S.A. Four-way Spanners is invaluable in any tool kit. B.S.A. Spanners are the strongest in the world, being accurately made from steel forgings, with the jaws carefully hardened and tempered and the shanks left soft. They are finished in carbonia black, with polished cheeks, and fit in a strong black leather case with fastener.



Price :

5/- per set.

(Gt. Britain only.)

Large Spanner :

$\frac{5}{16}$ in., $\frac{3}{8}$ in., $\frac{7}{16}$ in., and $\frac{1}{2}$ in.

Small Spanner :

.26 in. square; .44 in., .525 in.,
and .594 in. hexagon.

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List of B.S.A. Spare Parts Stockists—continued.

Town.	Name of Stockist.	Address.	Telephone No.	Telegraphic Address.
Derby	Kay & Scampton	14, Sadler Gate	1131	Kay, Sadler-gate, Derby.
Doncaster	W. E. Clark & Co.	27 & 29, Station Road	176	Cars, Doncaster.
Dorchester	Tilley's	31, South Street	14	Motors, D'chester
Eastbourne	F. Ray & Sons Ltd.	47, Seaside Road	459	Ray's Garage, Eastbourne.
"	Bradshaw's	10, Terminus Road	1292	
East Grinstead	Fosters East Grinstead Ltd.	79, London Road	131	
Edinburgh	Alexander & Co.	113-115, Lothian Road	21176	Motorcycles, Edinburgh.
"	Shepherd Bros.	26, Morrison Street	Central 9153.	
Evesham	Frank Morrall	Ivy Garage, Bengeworth	206	
Exeter	Wessex Garage Co.	60, Longbrook Street	2342	Egbert, Exeter.
Frome	P. Difazio	25, Catherine Street	212	Difazio, Frome.
Gateshead	O. Carmichael & Son	81 & 83, High West St.	15	
Glasgow	Bell Bros.	223, St. George's Road	Douglas 258	Motobike, Glasgow.
"	Alexander & Co.	272-274, Great Western Road.	Douglas 3880	Alexmoto, Glasgow.
"	Hamilton Bros.	Buchanan Street	3900	
"	Rossleigh Ltd.	532, Great Western Rd.	Western 4045	Rossleigh, Glasgow.
Gloucester	Boakes & Harper	1, Worcester Street	1187	Boakes, Gloucester.
Goldthorpe (Yorks.)	A. Wigfield	Furlong Road	24	Wigfield, Goldthorpe.
Gravesend	Barty's Motor Works	Central Garage	33	Bartimoto, Gravesend.
Grimsby	J. Plastow & Son	13, Osborne Street	2638	Plastow, 2638, Grimsby.
Guildford	J. E. Jackson	97, High Street	345	
Halifax	Halifax Motor Exchange	25, Horton Street	1400	Perfection, H'fax.
Hampton-in-Arden.	J. Pearson	Barston	Hampton-in-Arden 30.	
Harrogate	H. Acklam	Strawberry Dale.		
Hastings	F. Ray & Sons Ltd.	29-30, Havelock Road	875	Ray & Sons, Hastings.
Hawick	Milligan & Bell	7, Bridge Street	179	
Hayward's Heath	J. W. Dinnage	Sussex Road	294	
Hereford	A. Kear & Co.	45, Commercial Street	1253	Kear, Hereford.
Hitchin	J. Chalkley & Son	Brand Street	44	Chalkley's, Hitchin.
Horsham	Jackson Bros.	London Road	12	
Huddersfield	Earnshaw	10, Cloth Hall Street	1232	
Hull	A. E. Brown	47½-48, Witham	Central 4162.	
Inverness	Alex. Munro	14, Falcon Square	98	Munro, Iron-monger, Inverness.
Ipswich	Revett's	Barrack Corner Garage	2822	Revett's, Motors, Ipswich.
King's Lynn	The "Sandringham" Cycle Works (Messrs. J. Cox & Sons).	Railway Road	350	Cox, Cycles, Lynn.
Kingston-on-Thames.	H. Taylor & Co. Ltd.	135, London Road	1264	
Kirkcaldy	Wm. Christie	11, Whytescauseway	2611	
Launceston	J. Wooldridge & Son	Western Road	21	Wooldridge, Launceston.
Leeds	J. Armitage & Sons	York Street	23193	
"	Watson, Cairns & Co. Ltd.	Lower Briggate	23379	Watson Cairns, Briggate, Leeds.
Leicester	E. W. Champion & Sons	Welford Place.		
Lincoln	West's (Lincoln) Ltd.	115, High Street	164	West's Garage, Lincoln.
Liverpool	Champion Cycle Co.	70, Renshaw Street	Royal 1589.	

List of B.S.A. Spare Parts Stockists—continued.

Town.	Name of Stockist.	Address.	Telephone No.	Telegraphic Address.
Liverpool	Candle's	24, Old Haymarket	North 1679	Seldnuc, L'pl.
	J. Edwards & Sons	452-462, Rice Lane, Walton	Walton 106.	
London N.W.1	Godfrey's Ltd.	366-368, Euston Road (Spares Dept.).	Museum 1402-3	Godfrabike, London.
E.C.2	J. Grose Ltd.	4, Old Jewry, Cheapside	Central 0166	Jograspur, London.
N7	J. Grose Ltd.	255-257, Holloway Rd.	North 1297.	
S.E.6	F. Parks & Son	5-6, Central Parade, Catford.	Lee Green 2011	Mocycparis, Catgreen, London.
S.E.18	Clare & Co.	125, Woolwich High St.	Woolwich 174.	
W.C.1	Referee Cycle Co. Ltd.	332, High Holborn	Central 472	Scorcher, Holborn, London.
W.12	Turner's Stores	180/2, Railway Approach, Shepherd's Bush	Ham 2436.	
E.7	Lovett's Ltd.	418, Romford Road, Forest Gate.	Grangewood 1234	Egaraco, London.
S.W.11	Owen Bros.	19, Battersea Rise, Clapham Common	Battersea 1299	
(Twickenham)	C. A. Blay	192, Heath Road	Popesgrove 2103	
(West Croydon)	Godfrey's Ltd.	228-234, London Road	Croydon 1214	Godfrabike, London.
Lowestoft	Taylor Bros.	75, London Road	510	
Luton	Moss & Thompstone	Park Street	1792	
Maidstone	Anstey & Son	30-34, Stone Street	432	Anstey 432, Maidstone.
Manchester	W. H. Jones	415, Bury New Road, Higher Broughton	Hr. Br'ton 978	
	Colmore Depot	209, Deansgate	Central 4046	Coldep, Manchester.
	Tom Davies	229, Deansgate	Central 536.	
	Stretford Garage	1073, Chester Road, Stretford	Trafford Park 519.	
Middlesbrough	Pallister, Yare & Cobb	134, Marton Road	773	Payacob, Middlesbrough.
Nottingham	Wilde & Co.	95-97, Manchester Road	524	
Newcastle-on-Tyne	Kirsop, Murray & Co. Ltd.	12, Hood Street	1566	
	Dene Motor Co.	Haymarket	Central 2336	Ened, New- castle-on-Tyne.
Newmarket	H. W. Kelty & Son	High Street	43	
Newport (Mon.)	V. T. Waite	79, Commercial Street	2716	Wamobike Newport (Mon.).
Northampton	P. C. Spokes	1, Henry Stree	1160	
Norton (Malton, Yorks.)	Bower's Motor Exchange	Church Street	Malton 176	Bowe, Malton.
Norwich	H. Chapman	42, Duke Street	921	Chapman, Duke Street Norwich.
Nottingham	E. W. Campion & Sons	Station Street	2961	
Oxford	Laytons of Oxford'	New Road	3381	Integrity, Oxford
Perth	M. Shaw & Sons	22, Mill Street, and 137-143, High Street.	483	Shaw's Garage, Perth.
Peterborough	Barrows Bros.	57, Westgate	154	
Peterhead	J. Campbell & Sons	34½-38, St. Peter Street	172	Campbell, Peterhead.
Plymouth	A. E. Snell (Mrs.)	97, Old Town Street	1706	Tyres, Plymouth.
Portsmouth	Suitalls	258, Commercial Road	6153	Suitalls, [Commercial, Portsmouth,
Pruton	Loxham's Garages Ltd.	Charnley Street, Fishergate.	1288	Loxham's Pruton.

List of B.S.A. Spare Parts Stockists—continued.

Town.	Name of Stockist.	Address.	Telephone No.	Telegraphic Address.
Bulborough (Sussex).	Gray & Rowsell ..	Burygate	Bury 4 (Sussex).
Reading ..	Fortescue Bros. Ltd. ..	1 and 2, West Street ..	1143	
Redhill ..	The Redhill Motor and Cycle Works ..	50, Brighton Road ..	77	
Rhyl ..	Nelson's ..	39, Queen Street ..	130	Nelson's Garage, Rhyl.
Rotherham ..	Walter Wrang ..	27, Effingham Street ..	479	
Salisbury ..	H. Kellaway & Sons ..	South Street Garage ..	102	
Salisbury ..	W. Rowland & Sons ..	85-106, Castle Street ..	170	Motors, S'bury.
Sheffield ..	Walter Wrang ..	Wellington Street ..	26098	Wrang, Sheffield 26098.
Sherborne ..	The Sherborne Garage ..	South Street ..	85	Dyer, Sherborne.
Sheffield ..	Thomson's Garage ..	Esplanade, Lerwick ..		Thomson's Garage, Lerwick.
Sligo ..	J. C. Pickering ..	49, Mardon Road, and Smithfield Road ..	2730	
Southampton ..	B. B. Tebbutt ..	54, Commercial Road ..	4863	Tebbutt, Southampton 4863.
Southport ..	H. F. Brockbank ..	58, Lord Street ..	5054	
Southsea ..	Percy Kiln Ltd. ..	Elm Grove ..	4793	Portsmouth-Percy Kiln, Southsea.
Stockton-on-Tees ..	Sten Jones ..	Bridge Road ..	179	
Stoke-on-Trent ..	J. & N. Bisset ..	Howard Place, Shelton ..		
Stratford-on-Avon ..	A. Bolland & Co. ..	Guild Street ..	14	Bolland, Stratford-on-Avon.
Sunderland ..	Dunn & Jamson ..	100-106, Hylton Road ..	651	Motors, S'land.
Sutton-in-Ashfield ..	W. Henstock ..	29-43, Forest Street ..	90	Henstock, Sutton-in-Ashfield.
Swadlincote ..	S. H. Wroughton ..	High Street Garage ..	114	Wroughton's Garage, Sw'cote.
Swindon ..	J. Easter & Sons ..	8-10, King Street ..		
Tanlow ..	H. E. West ..	Bath Road ..		
Taunton ..	W. P. Edwards ..	58, East Street ..	233	Edwards, Taunton.
Thetford ..	W. & G. Lambert Ltd. ..	Cycle and Motor Works ..	17	Lambert's, Thetford.
Tonbridge ..	Chas. Baker & Co. ..	150, High Street ..	105	Monservice, Tonbridge.
Tunbridge Wells ..	G. E. Tunbridge ..	2, Vale Road ..	416	Tunbridge Motors, Tunbridge Wells.
Warsop ..	E. Poynton ..	Central Garage, Market Place ..	21	
Watford ..	Lloyd, Cooper & Co. ..	61, Queen's Road ..	600	
Wednesfield ..	Wednesfield Motor and Cycle Garage ..	Wolverhampton Road ..		Wolverhampton 2072.
Wellingborough ..	H. V. Briggs & Co. Ltd. ..	High Street ..	163	Briggs, Motors, Wellingborough.
Westcliffe-on-Sea ..	J. Costin & Son ..	237, London Road ..		Southend 1095.
Weymouth ..	Tilley's ..	The Esplanade ..	72	Motors, Weym'th.
Winchester ..	Winchester Cycle and Motor Co. ..	Jewry Street ..	728	
Windsor ..	S. A. Surplice ..	37 and 39, Sheet Street ..	200	
Workington ..	J. Wilkinson ..	43, Washington Street ..	166	Wilkinson's Garage, Workington.
Worthing ..	F. Wheathead ..	56, Broadwater St. West ..	1234	
Yarm-on-Tees ..	T. B. Dobson & Sons ..	High Street ..		Eaglescliffe 118.
Yeovil ..	The Yeovil Motor Mart ..	Hendford ..	267	Motor Mart, Yeovil.
York ..	C. S. Russell ..	Lawrence Street ..	744	Russell, Lawrence St., York.