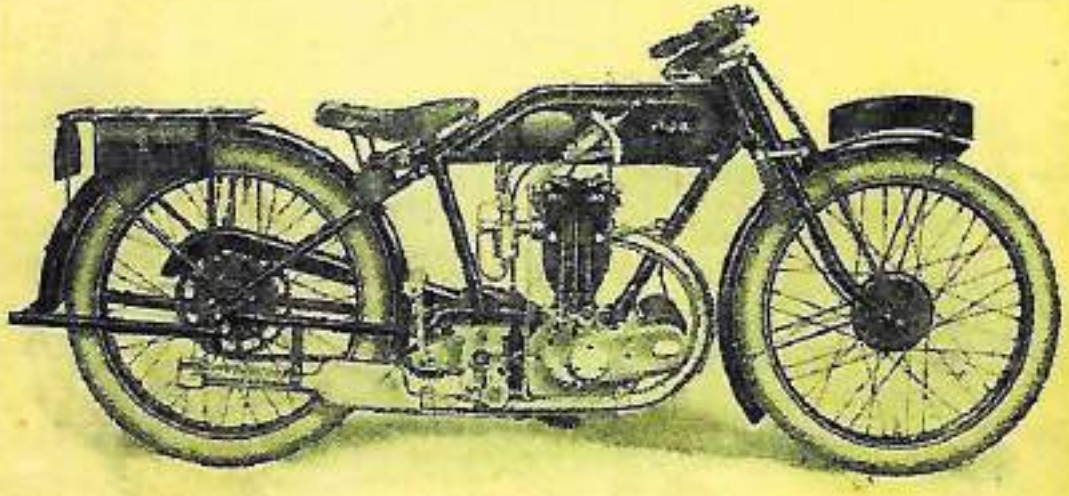
TELEGRAMS: "HOPIT, WOLVERHAMPTON."
TELEPHONE: 1731 (FIVE LINES).

A·J·S

Motor Cycles



3·49 h.p. 3-Speed A.J.S.
Solo Machine, O.H.V. Model G6.

1926.

HOW TO MANAGE THEM.

A. J. STEVENS & CO. (1914) Ltd.,
GRAISELEY HOUSE, WOLVERHAMPTON.

HILDRETH & CHAMBERS, WOLVERHAMPTON. 3/26

MOTOR A·J·S CYCLES

Some Outstanding Performances in Speed Events Gained by the 3·49 h.p. O.H.V. Model.

JUNIOR T.T. RACE, June 15th.
3.49 h.p. A.J.S. 3rd and 4th places.

SIDECAR T.T. RACE, June 19th.
3.49 h.p. A.J.S. machines 1st and 2nd in the 350 c.c. class, and 4th and 5th in the 600 c.c. class, gaining Special Award. Only 6 sidecars actually completed the course out of 18 starters, two of which were the 350 c.c. A.J.S. Combinations.

BELFAST & DISTRICT M.C.C. SPEED TRIALS, at Magilligan, May 9th.
The flying mile covered in 40 seconds at a speed of 90 m.p.h. by a 3.49 h.p. A.J.S.

AFRICA.

SOUTH AFRICAN T.T. RACE, Jan. 10th.
3.49 h.p. A.J.S. machines 1st, 2nd, 3rd, 4th and 5th.

SOUTH AFRICAN GRASS TRACK CHAMPIONSHIP.
In the 350 c.c. 5-Lap Race a 3.49 h.p. A.J.S. gained 1st Place.

SOUTH AFRICAN HOFFMAN CUP TRIAL, April 19th.
A.J.S. machines gained 1st, 2nd, 3rd, 4th and 6th places.

AUSTRALIA.

FOUR AUSTRALIAN RECORDS, Feb. 4th.
350 c.c. and 600 c.c. classes—One mile flying start at 92.3 m.p.h., one mile flying start (two ways) at 86.1 m.p.h.

GRASS TRACK CHAMPIONSHIP, January 24th. In the 400 c.c. class A.J.S. gained 1st place for the 3rd successive year, also 3rd place. In the 600 c.c. Sidecar Race 2nd position was gained by a 3.49 h.p. A.J.S. and Sidecar.

STATE CHAMPIONSHIP, January 26th.
1st in the 350 c.c. class in Record Time.

SOUTH AUSTRALIAN CHAMPIONSHIP.
1st and 2nd in the 350 c.c. class and 2nd in the 600 c.c. class by 3.49 h.p. A.J.S. machines.

NEW ZEALAND.

LIGHTWEIGHT CHAMPIONSHIP, January 31st.
1st and 2nd in the 350 c.c. class.

FRANCE.

FRENCH GRAND PRIX, July 18th.
350 c.c. class A.J.S. machines 1st, 2nd and 4th.

BELGIUM.

GRAND PRIX DE HARIANT, May 10th.
2nd in the 350 c.c. class.

OSTEND BEACH RACE.
Chater-Lea Cup and Fastest Time of the Day in the 350 c.c. class.

SWITZERLAND.

ENDURANCE GRAND PRIX.
3.49 h.p. A.J.S. 1st in controlled Hill Climb, 1st in Speed Test, and 1st in Endurance Test, Gained Highest Award—Large Gold Medal. Also a 3.49 h.p. A.J.S. and Sidecar made Best Performance of any 350 c.c. Outfit, and Fastest Time in Controlled Hill Climb and Speed Event.

ITALY.

ITALIAN CHAMPIONSHIP.
350 c.c. class won by 3.49 h.p. A.J.S. Also thirty-nine Firsts in other important Speed events during the year.

GERMANY.

GUSTAV BRAUNBREC CUP RACE.
In the 350 c.c. class a 3.49 h.p. A.J.S. was 1st, winning the Gustav Braunbrec Cup.

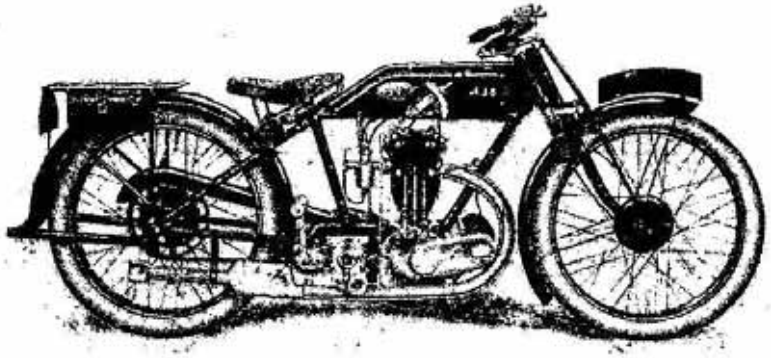
PFORZHEIM HILL CLIMB, May 3rd.
An A.J.S. was 1st in the 350 c.c. class.

SOLITUDE RACES.
A 3.49 h.p. A.J.S. 1st in the 350 c.c. class.

Manufactured throughout by A. J. STEVENS & CO. (1914) LTD., WOLVERHAMPTON.

TELEGRAMS: "HOPIT, WOLVERHAMPTON."
TELEPHONE: 1731 (FIVE LINES).

A·J·S Motor Cycles



3·49 h.p. 3-Speed A.J.S.

Solo Machine, O.H.V. Model G6.

1926.

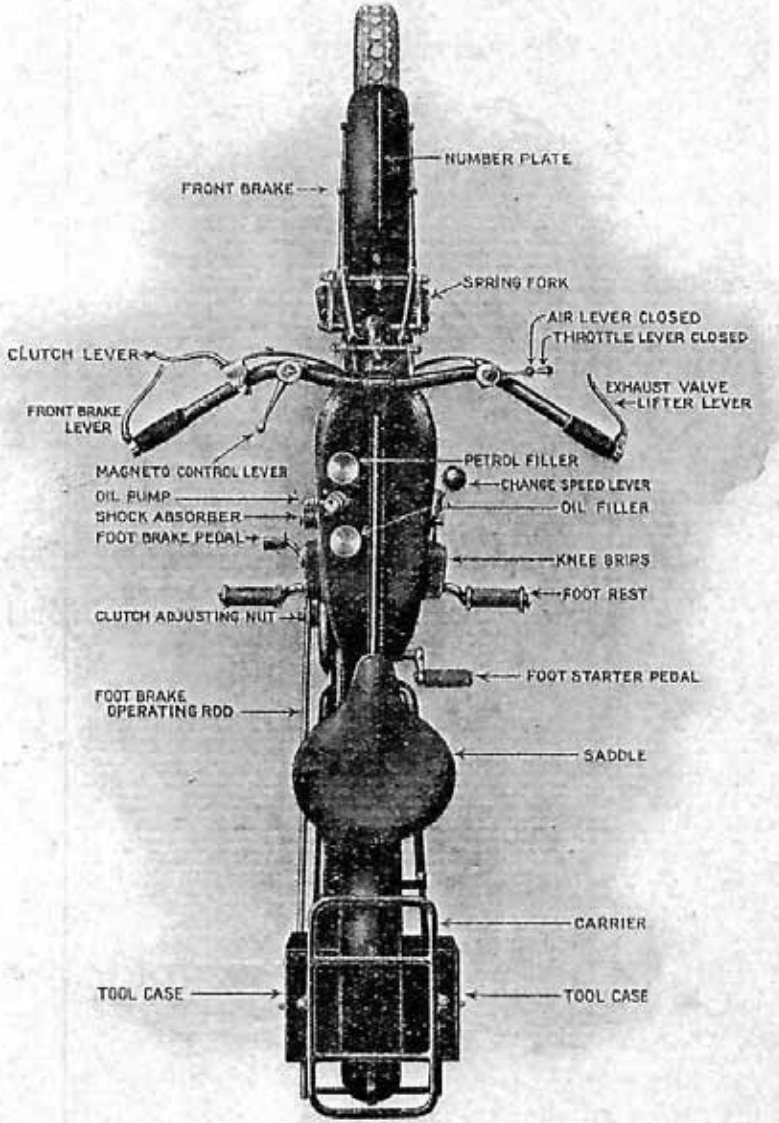
HOW TO MANAGE THEM.

A. J. STEVENS & CO. (1914) Ltd.,
GRAISELEY HOUSE, WOLVERHAMPTON.

HILDRETH & CHAMBERS, WOLVERHAMPTON.

PLAN A·J·S VIEW.

A.J.S. 3·49 H.P. O.H.V. MODEL G 6.



General.

Remember you have a bicycle as well as a power plant. Frequently oil the links of spring fork. Periodically put oil in the hubs or fill with vaseline. Oil occasionally any little moving parts about the machine, such as brake shackles, Bowden levers, joints of control rods, change speed lever, gear box clutch lever, etc. An oil gun is a most useful accessory. A charge of oil can be drawn out of the oil tank and used for lubricating every part of the machine.

Keep the machine clean. If mud, etc., is allowed to accumulate, it will work into bearings, especially the hubs, and cause undue wear. Do not wash the machine down with a hose-pipe. By so doing it is easy to get water in the petrol tank or carburettor, and cause trouble. Remove mud by means of a sponge and a bucket of water.

Pack tools tightly in the tool case with cleaning cloths, and so prevent them rattling about. Treat spare parts the same. The pannier bags can be used for carrying spare tubes if they are carefully and tightly packed, but it means certain destruction if they are not.

Keep the back tyre fully inflated, but not board hard, and see that security bolts are tight. It is not necessary to have the front tyre inflated as hard as the back.

Do not fit all-steel studded tyres. They are positively dangerous on granite sets or tramlines, especially if wet.

It is not necessary to carry a load of spare parts with the machine. The only parts that may be required under ordinary conditions are :—

One spare valve complete with spring, washer and cotter, a good substantial tyre repair outfit, one each spring link and half link for chains, two good sparking plugs an inside plaster for tyre in case of a bad cut or burst, and a good supply of observant common-sense.

For very long journeys or an extended tour it is wise to carry (in addition to the above) a spare front chain complete with spring link.

Any further information required we shall only be too happy to give if communicated with direct, but it will save unnecessary correspondence if our patrons will ascertain first, that the information is not already given in this booklet.

"Safety First" Hints.

Never drive faster than you can pull up in the distance you can see.

Never attempt to overtake another vehicle on a blind corner.

Always keep closely to your right side of the road when taking a blind corner.

If the machine will not comfortably climb a hill on high gear it is no disgrace to change down, and besides it is faster to do so.

Contents.

Index to Illustrations.

Driving Instructions, etc.

For 3·49 h.p. Three-speed Overhead Valve A.J.S. Motor Cycle.

AFTER receiving the machine, thoroughly examine it and get conversant with its details. Fill up with petrol and oil.

Only oil suitable for air cooled engines must be used. The oil we use and recommend is Wakefield's "Castrol C."

Turn on the petrol by pushing the knob of the petrol tap where marked "on. The oil tap will be found below the elbow outside the tank, and is similar in operation to the petrol tap. This tap can be left in the "on" position while riding, and need only be turned off when the machine is left standing for a long period. For further instructions regarding lubrication see "Engine Lubrication" on Page 10.

To start the machine carry out the following operations:—

Place the gear lever in the "Neutral" position marked on the gate change quadrant (Illustration A).

First retard the ignition lever about ¼ or ⅓ its travel. This is to prevent back-firing.

See that petrol is in the float chamber of the carburettor by observing that the needle protrudes through the lid, then tap the needle gently once, to raise the petrol level slightly. Unless the engine is very cold and hard to turn because of the congealed oil, it is unnecessary to heavily flood the carburettor. If the engine is warm, there is no necessity to flood at all.

For easy-starting the throttle setting is important. To find the correct setting first shut the twist-grip (in the case of the lever control, the throttle lever) right back, then open by a movement of ¼ in. of the circumference of the rubber twist-grip. If the cables are properly adjusted, this should open the throttle *not more* than ¼ of an inch, which is the correct opening for easy starting. In the case of lever control, the throttle lever should be moved sufficiently to open the throttle the same amount.

The throttle cable should be adjusted by the screw on the top of the carburettor (nearer the cylinder), so that when the twist-grip, or lever, is shut back, a slight opening movement should begin to lift the throttle.

If the engine is cold close the air lever.

If the engine is warm, then it is usually unnecessary to close the air lever.

Now lift the exhaust lifter, and turn the engine over, say twice, with the footstarter, to get gas into the cylinder. Then give one smart kick downwards, dropping the exhaust lifter at the correct moment; the engine should then start.

If the engine has been started with the air closed, it will be found that the mixture is very rich, so steadily open the air lever until the engine runs smoothly. For dead slow running the air lever should be rather more than half open. In traffic the air lever should be set approximately three-quarters open, and for touring wide open, closing slightly only for hill climbing and running through towns.

The correct position of the air lever, of course, varies with atmospheric conditions, the quality of petrol, etc., but in a short time the rider should be able to get the correct setting of the air lever from the behaviour of the engine on the road. If the air lever is set properly, the carburettor should be practically automatic throughout its touring range.

If the engine does not start easily after the first attempt, the rider is usually inclined to heavily flood the carburettor, and so causes the mixture to be so rich that starting is impossible. If it is thought the mixture is too rich, open the throttle and air lever fully, lift the exhaust valve lifter, and turn the engine over a few times with the footstarter. This will get rid of the excessive petrol in the engine. Then proceed to start the engine again as described in the first part of these instructions.

The Binks two-jet carburettor, with the throttle very slightly opened, gives a fierce suction on the pilot jet (this is purposely allowed for, so that a slightly rich mixture is obtained for starting and for dead-slow running), so it will be seen that it is easily possible to get the mixture too rich by unduly flooding the carburettor.

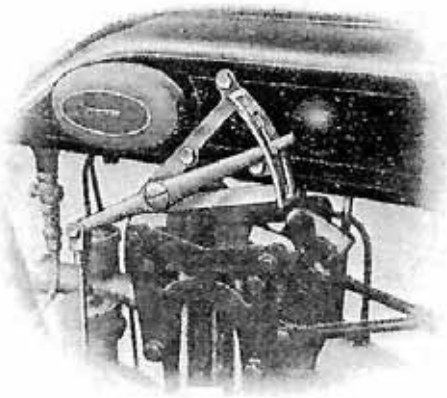
To sum up, start with the smallest possible throttle opening; don't overflood the carburettor; set ignition lever ¼ to ⅓ retard, and, when engine has started, set ignition in advanced position.

Presuming these instructions have been carried out take out the clutch by means of the clutch lever on the left hand side of handle bar—place the gear lever in the low position, speed up the engine by opening the throttle a little, and gently release the clutch lever. The machine will then move forward on the low gear. When the machine has attained a fair speed on this gear, again pull out the clutch and move the gear lever into second gear position, immediately re-engaging the clutch.

Repeat this operation to engage high gear. When running on high gear the machine must be controlled by means of the throttle lever and brakes. To stop, close the throttle, and when the machine is almost at a standstill, take out the clutch and apply the footbrake.

The change speed lever is operated as follows:—To engage the low gear from neutral, press the lever lightly to the *right* and pull backwards (see "important warning" below). To move to second gear, again press lightly to *right* and move the lever forward into second gear position. To engage high gear from second, press the lever to the *left* and move it forward into the high position. How to operate the gear lever will be obvious if a careful examination is made of its construction. The gear lever has a positive stop for each gear, whether changing up or down, and is automatically locked in each position when released by the hand.

Important Warning.—*If the change speed lever does not move quite easily into position, do not attempt to force it. Move the machine slightly backwards or forwards, or turn the back wheel, while keeping a little pressure on the lever. This will bring the "dog clutches" in the gear box into proper position for engagement, and the gears will engage without using unnecessary force. Under no circumstances must this lever be forced into position, or the working parts will be strained and damage done.*



THE A.J.S. PATENT CHANGE SPEED LEVER.

Illustration A.

This warning only applies when the machine is stationary, not when being ridden.

Always drive with the air lever of carburettor open as far as possible consistent with the engine firing properly. It is not always necessary to stop the engine when the machine is brought to a standstill, but it can be left quietly running until ready to start away again. This can be done by taking out the clutch momentarily, and slipping the gear lever into the neutral position, afterwards releasing the clutch again. The engine will now be running free. Do not "race" the engine while standing, throttle it down just sufficient to keep it firing until ready to start away again. In the case of a short stop, as when obstructed by traffic, the clutch only need be taken out, but always remember to engage low gear when starting again.

Although it is not absolutely necessary to do so, it will be found a much nicer method of changing gear if the following instructions are carried out:—When changing from a low to a higher gear, slightly slow the engine down by closing the throttle a little immediately before changing. When changing down let the engine accelerate slightly with the clutch out before engaging the lower gear. A little practice will soon make the rider proficient.

The most common cause of damage to gears is changing to a low gear whilst the machine is travelling fast. Many riders make a practice of approaching a corner at a high speed, and to bring the machine to a safe pace to negotiate it, they forcibly engage lower gear. If it is desired to turn a corner on a lower gear, the machine should be brought down to a safe pace by means of the throttle and brakes before changing to the lower gear. Changing from a high gear to a low one when travelling fast, for the purpose of braking the machine, is abuse which no orthodox gear-box will put up with for long.

Always change gear quickly and firmly, but without using unnecessary force.

When climbing a steep hill which necessitates changing down to a lower gear, always change while the machine has reasonable "way" on it. Do not let the machine come almost to a standstill before changing.

If the machine will not climb a hill on top gear, do not force it to do so by slipping the clutch but change to a lower gear. If the clutch is allowed to slip for a lengthy period under such a heavy driving load it will—owing to the intense heat generated by friction—burn out the cork insets, in fact would destroy, by heat, any material of which a clutch may be composed. There is really no excuse for the rider who destroys his clutch by this practice. It is not only ***bad*** *driving, but it is trying to make the clutch do the work of the gear box which is utterly impossible.*

Do not run the machine unnecessarily on low gear. This gear is only provided for ease of starting, and climbing exceptionally steep hills, or when negotiating thick traffic demanding a very slow rate of progress. Using the low gear unnecessarily simply means extra wear and tear, high petrol consumption, and shortens the life of the engine, and transmission.

Never race the engine with the machine stationary. Racing the engine will teach you nothing, and may cause serious damage to the piston, big end, and connecting rod. More load is put on these parts when the engine is running at very high speeds with a small throttle opening than at the same speed at full throttle *with the engine under load.*

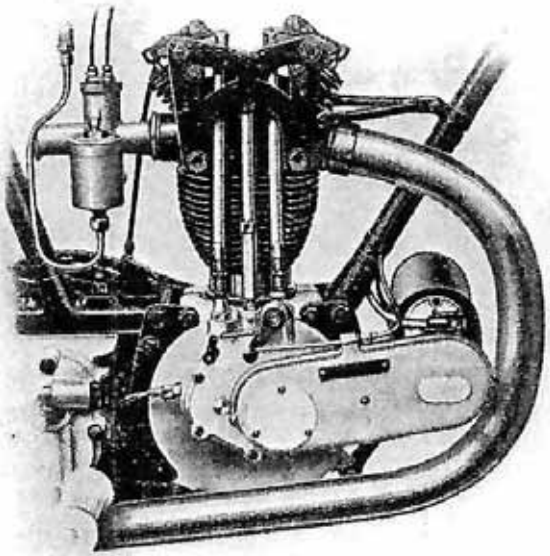
When climbing an exceptionally steep hill it is sometimes an advantage to slightly retard the spark, but under normal conditions the spark lever should be kept in the "advanced" position. If the engine has any tendency to "kick back" when starting it with the foot starter, slightly retard the ignition. The lever on the left handle bar is moved inwards to advance and outwards to retard.

When running at very low speeds on top gear a slight harshness in the drive may be felt, which is common to all petrol driven machines, however well balanced an engine may be. More especially is this so in the case of a single cylinder engine. To counteract this we fit a shock absorber on the engine shaft, which damps out as far as possible any snatch at slow speeds. The driver has also a further means of eliminating this slight harshness by judicious use of the ordinary clutch. By easing the hand clutch a little, by means of the lever on the handlebar, the drive can be made just as sweet and as comfortable as one may wish. A slight pressure of the hand on this lever allows the clutch to slip slightly under the impulses of the engine, and so the clutch is instantly converted into a perfect shock absorber at the will of the rider. The foregoing hints also refer to "picking up" again after slowing down for a corner, or any other occasion when the machine is to be accellerated suddenly from a slow to a higher speed. It must be quite understood, however, that the clutch is not disengaged so much that it slips to the extent that the engine can "race." Only just so much pressure should be exerted on the lever to allow the clutch to absorb the impulses of the engine. We earnestly commend this paragraph to those riders who are anxious to get the best results and long life from the engine, gears, and chains, to say nothing of the added comfort and satisfaction.

Do not control the speed of the machine with the free engine clutch, excepting in very congested traffic as previously mentioned. Always drive "on the throttle." The object of the clutch is ***not*** to control the speed, the throttle in conjunction with the gear box and the brakes should be used for this purpose.

After a short run it will be found that the control of the machine is quite simple, and the disposition of the levers, operating the footbrake and the clutch, give the rider absolute mastery over his mount. On low gear the machine can be driven at a perfect crawl, and on high gear it is capable of attaining a speed to satisfy even the fastest of riders.

Care of the Machine.—Engine.



A.J.S. 3·49 H.P. ENGINE.—Illustration B.

Lubrication.—The most important point in connection with the engine is lubrication. Give about one pumpful every 10 miles, and rather more if fast riding is indulged in.

During the first one hundred miles, when engine should be quietly run in, the rider should take out the sparking plug occasionally, and see if it is unduly wet with oil. If the plug is not dead dry cut down the supply of oil by turning the pointer on the face of the mechanical pump to the left, moving the end of the pointer about $\frac{1}{16}$ in. at a time, until the engine gets a definite supply of oil without oiling up the plug. If the machine is lubricated by means of a hand pump only, and over-lubrication causes the plug to get oiled up, the remedy is obvious — give less oil.

To cut off the oil supply at any moment, such as when the machine is left standing, the tap under the hand pump should be turned off. As a further precautionary measure the hand pump can be put out of action by pressing down the plunger to its full extent, and fixing it in this position by means of the small catch provided.

Riders and riding conditions vary, so it is absolutely necessary to leave the question of lubrication to each individual's judgment to a certain extent.

The engine working harshly, and a falling off of power, are the usual symptoms of under lubrication. Over lubrication is shown by oil unduly working out of the valve tappets, smoke issuing from the silencer, and also loss of power. Over oiling will sometimes cause the exhaust valve to stick or move sluggishly in its guide. The symptoms are mostly apparent when the engine is cold. Misfiring occurs, also explosions in silencer and difficulty of starting.

Lubrication of Rockers.—Grease Gun Lubrication is provided for the overhead valve rockers. These should be lubricated with the Grease Gun, and "Tecalemit" lubricant every four to five hundred miles, or say twice a week if the machine is in daily use. The lubricant oozing from the ends of rocker is a sign that the rocker bearing is properly lubricated.

Valve Adjustment.—See that the clearance between the valve stem and overhead rocker stud is properly adjusted. This should be from ·010 to ·015. The thickness of a visiting card is about the correct clearance. Check the clearance when the engine is hot, not when cold.

The adjustment is by means of the nuts found on the heads of the tappets. Resting upon these, by means of a ball and socket, are the long push rods. Two nuts will be found on each tappet, the top one being the adjusting nut and the lower the locking nut. To take up clearance the lower nut should be unscrewed a turn or two, which then allows the top nut to be raised on its thread until the correct clearance is obtained. When this has been done the lock nut must be screwed up again tightly. Use two spanners for this operation.

Cleaning.—To remove the cylinder for cleaning first disconnect all such fitments as exhaust pipe, inlet pipe, carburettor, etc. Proceed to remove the tappet tubes, and to do this the special Extractor Tool must be used. This will be found in the tool kit (see illustration D, page 12). One end of this tool forms the spanner fitting the exhaust pipe nut and hub bearing lock ring. The other end of the tool is arranged to fit underneath the rocker (see illustration D) in such a way that when the spanner end is pressed down it compresses the valve spring. It will be seen from the illustration that the forked end of the tool is inserted underneath the rocker spindle, between this and the distance tube immediately below. Press down

firmly on the spanner end of the tool and take hold of the bottom of the tappet tube, which will be seen passes upwards from the crank case to one of the rockers. Lift up this tappet tube from its hollow cup and withdraw. Repeat the operation for the other rocker, and you can then proceed to take off the cylinder head. Disconnect the cylinder steady bolt found anchored to the front down tube. Unscrew the turnbuckles, which tighten the holding-down bridge, until the holding-down bolts can be removed and the bridge-piece is quite free on both sides. Take care to unfasten the turnbuckles evenly, a turn at a time. To detach the head, insert a screwdriver, or similar tool, between the top cylinder fin and head, prising the head carefully off the barrel on both sides. Take great care not to break the radiating fins.

Prise upwards, not downwards. When quite free the head can be lifted off and the U-strap afterwards removed.

When the head is removed it is an easy matter to draw off the cylinder barrel. When doing this the engine should be turned over until the piston is at the lowest position of its stroke, and then take off the barrel carefully, taking care that when the piston is free not to let it fall sharply against the connecting rod, as this may bruise or distort the skirt of the piston.

Having removed the cylinder, wrap a clean cloth or rag round underneath the piston to prevent any foreign matter or dirt getting into the crankcase. If the combustion head is badly carbonised this must be cleaned. The generally accepted method being to scrape the chamber free of the carbon deposit, which can be done with an old screw-driver or similar tool. The top of the piston should also be scraped free of all deposit, using an old blunt knife or chisel, and while carrying out this operation see that no side strain is thrown on the piston. If the rings are quite free in their grooves they need not be removed, but if they are obviously choked up with burnt oil loosen them very carefully, take them off the piston and clean the grooves thoroughly. Take the piston off the connecting rod, to do this. First remove the gudgeon pin from the piston, take out the retaining springs, one of which will be found on either side of the gudgeon pin. These fit into recessed rings in the piston bosses and to withdraw must be squeezed together with the special small pliers provided. Afterwards the gudgeon pin can be pushed out from the driving side. In doing this operation it is advisable to get someone to hold the piston while the gudgeon pin is being tapped out. Having got rid of all deposit from both the head and piston, wash all particles off with paraffin. Before replacing the cylinder after cleaning, carefully oil the piston, and see that the joints of the piston rings are on opposite sides of the piston. Take care when replacing the cylinder on to the crankcase to see that the packing washer is inserted between the top of crankcase and the base of cylinder. If the washer between the cylinder head and barrel has been damaged in detaching the head, replace with a new one, and similarly in the case of the cylinder foot washer. Should it be necessary to remove the valves when the head is detached, the special valve extractor, which is provided in every tool kit, should be used (see illustration C, page 12). This is a clamp-like tool to extract the valves from the cylinder head when the latter has been taken from the engine. For portability the tool is made to fold up. Unfold this and place the end opposite the screw over the valve spring, as shown in illustration C. Screw up until it presses inside the hollow of the valve head. Hold the cylinder head firmly, keep screwing, and it will be found that the spring is compressed; then the two small split cones can be taken away from the recess in the valve stem and the valve withdrawn.

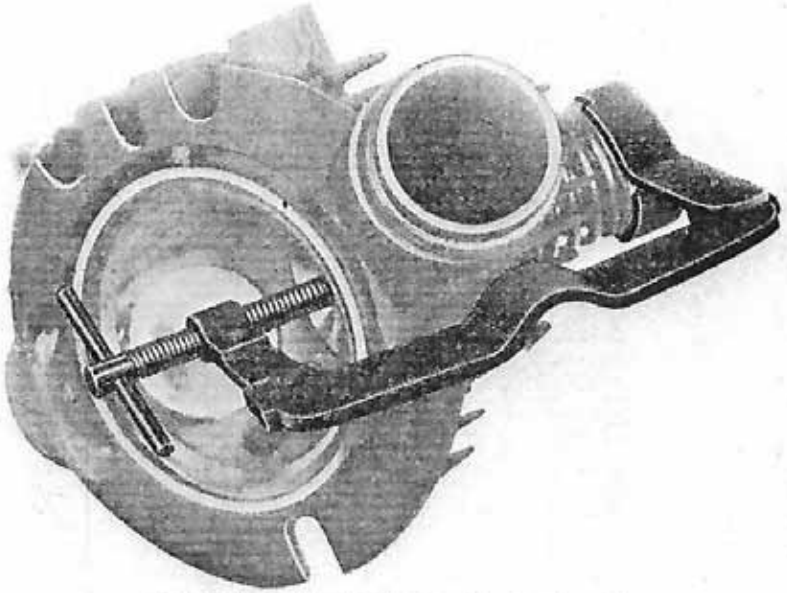
The valve can then be drawn out of the head. If the valve seatings are at all pitted, grind in the valves with fine emery flour, taking care that all emery is cleared out of the valve chamber after the operation. Generally speaking, the valves should be ground in about every 1,500 miles.

When replacing the cylinder head on to the barrel, remember that the head must be tightened down before the "steady" is again attached to the down tube. When the cylinder has been finally tightened down, then the length of stay of the steady can be adjusted so that the pin passes through the clip on down tube and eye of the stay without force.

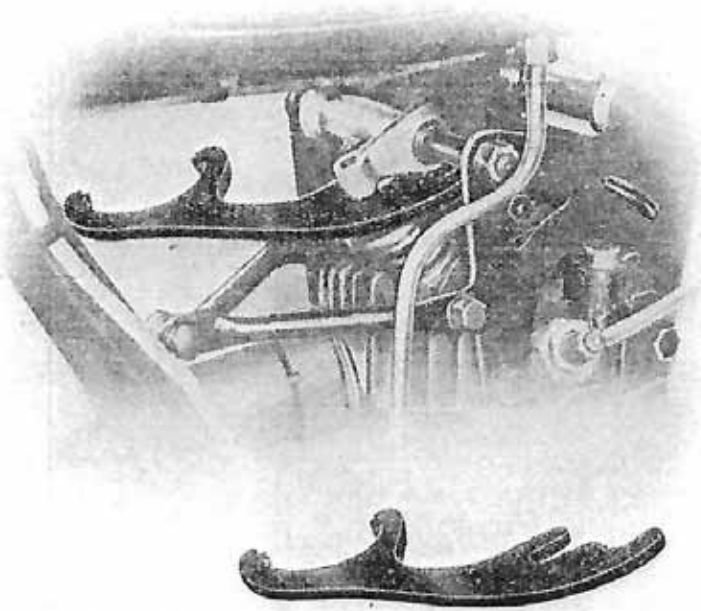
Another important point to remember is that the exhaust valve lifter must not be set to lift the valve more than $\frac{1}{8}$-in. when in operation. If the valve lifter lifts the valve say $\frac{1}{4}$-in., the inlet and exhaust valves foul each other.

Examine periodically the bolts which hold the engine in frame, and tighten any nuts that may have worked loose. Keep the engine clean externally, which can be done quickly and easily with a painter's brush and a pan of paraffin.

Drain old waste oil out of the crankcase of engine about every 1,500 miles. For this purpose a drain plug is fitted on chain case side of crankcase. See that four to five pumpfuls of fresh oil are pumped into the engine again, after draining out the old oil.

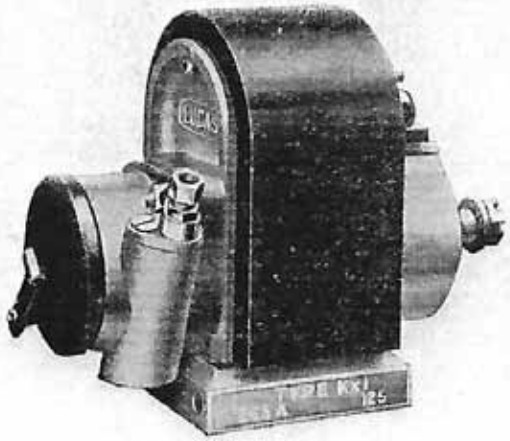


VALVE EXTRACTOR—Illustration C.



TAPPET TUBE EXTRACTOR—Illustration D.

Magneto.



LUCAS MAGNETO.

TYPE K X I.

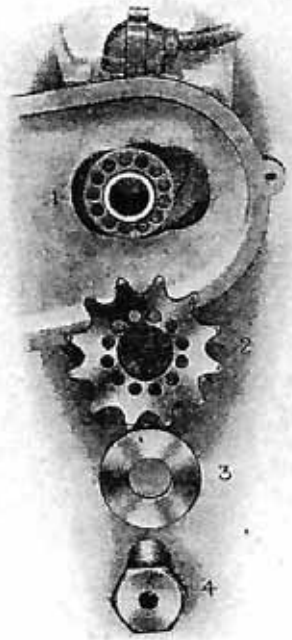
Illustration E.

Lubrication—The instrument is provided with ball bearings throughout, which are packed with grease before leaving the manufacturers. Fresh lubricant should not be required under normal circumstances until the machine has run from 10 to 12 thousand miles.

Adjustment—The platinum contacts should be examined after about 1,000 miles, and if the break should be more than the thickness of a visiting card they should be adjusted. The proper distance of the gap is 0·5 m/m or roughly 1-64 in. full. Too great a gap will advance the timing. A special small spanner is provided with each machine, and the gauge of this is the correct distance for the break of the points. This adjustment, owing to the arrangement of the contact breaker, can be carried out without removing the contact breaker from the magneto. If it is necessary to take the contact breaker out, unscrew the long taper fixing screw, and pull the contact breaker off. The points only need attention at very long intervals, and we warn users against unnecessarily interfering with the setting. *The platinum points must only be dressed with a dead smooth file* if the surface has become at all pitted, and then *the least possible amount taken off*. The greatest care must be exercised, as platinum is a very expensive metal.

Timing—If the magneto has been removed from the machine it will be necessary to see that it is timed correctly after it is refitted. The engine magneto driving sprocket is secured to its shaft by means of castellations, which render wrong replacement impossible. The sprocket on the armature shaft of the magneto is supplied with a vernier timing adjustment, which allows a very accurate and certain method of fixing the drive after the correct setting has been arrived at. The setting of this vernier adjustment may at first sound a trifle complicated, but in reality it is perfectly simple. Keyed to the armature shaft of the magneto is a sleeve (1), which has thirteen holes ranged in a circle. Fitting over a collar on this sleeve is the chain sprocket (2), which has twelve holes similarly arranged. Now on the sprocket on engine driving shaft and on the magneto shaft an arrow will be found. *These must point to each other* before anything else is done. The first thing then in timing up is to set these two arrows so that they face exactly towards each other. To do this turn engine over until the arrow on the driving sprocket is pointing directly towards the arrow on the magneto sprocket. This latter should be held free in the fingers and moved a tooth backwards or forwards in the chain until the correct setting is arrived at. When this is so, place the magneto sprocket on to the sleeve, and turn the armature shaft of magneto until a mark found punched over one of the twelve holes on the sprocket exactly registers with a similar mark on the outside of the collar of the sleeve. It will now be found that the marked holes in sleeve and sprocket respectively exactly coincide, so that all that has to be done is to

push the peg washer (3) into these holes, which effectively prevents the sprocket from moving from its correct setting and tightly screw up the sleeve lock nut (4), which can be done without fear of the timing shifting in the process, as is often the case with other methods. Set the piston ⅜-in. from top of compression stroke—make sure it is not on the exhaust stroke. With the engine in this position take off the sleeve lock nut on magneto sprocket and remove the peg washer. This will leave the armature free from the engine drive, but still connected via the chain to the engine. See that the sprockets have their arrows facing as previously mentioned. Move the ignition control lever to the limit of its motion of advance. Remove the cover of contact breaker and slowly turn the armature till the fibre block of the make and break lever arises on the inclined plane of the steel segment just sufficient to separate the platinum points. This is the firing point, and in this position the markings previously referred to on the sleeve and sprocket should register if correctly fitted up. If so, the drive should be fixed up as before detailed. It is, however, always advisable to check the timing after tightening up.

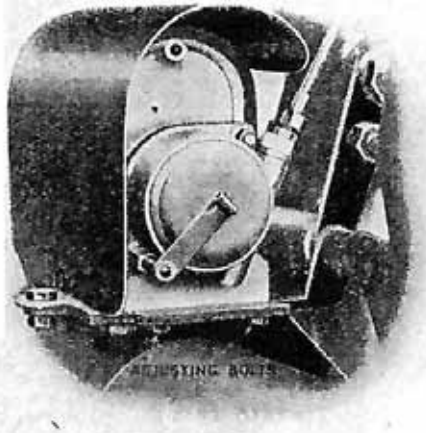


MAGNETO TIMING—VERNIER ADJUSTMENT.
Illustration F.

It will prevent misfiring, and make starting easier, if the slip ring is cleaned occasionally. This is done by taking out the high tension terminal and while the magneto is being revolved by slowly turning the engine round, insert a lead pencil the end of which is covered with a clean rag moistened with petrol. The pencil should be pressed on the revolving slip ring.

When Ignition Trouble is suspected—Before interfering with the magneto verify that the sparking plug, the cable, and the connections are correct. If these are in order, turn the engine slowly by hand and watch if the contact breaker lever works properly. This is bedded in a fire insulating bush, and in moist weather there is an occasional danger of the material swelling. If this happens, ease it out very slightly. This is a most common fault with all magnetos, and should be watched particularly by motor cyclists in winter. Do not take the magneto to pieces needlessly. It is easily possible to damage it.

Most Important—If it is necessary to take out the armature first see that the *carbon collectors and safety gap screw* are removed, or the collector ring will be broken during removal. Keep all parts clean and free from oil, particularly the *contact breaker*. Oil or dirt between the points will give instant trouble.

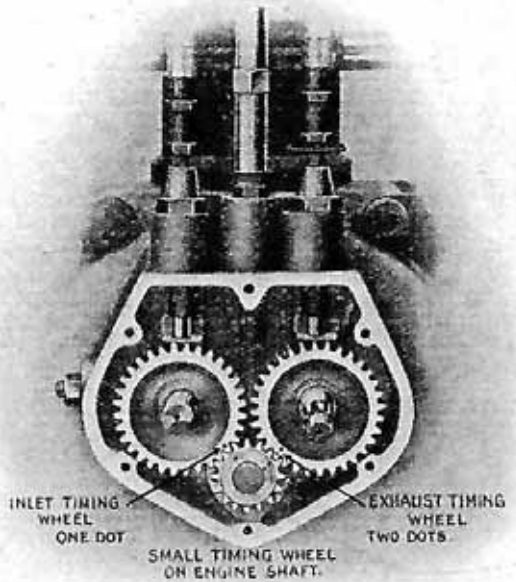


3·49 H.P. A.J.S. MAGNETO ADJUSTMENT.
Illustration G.

Magneto Adjustment.—Examine the driving chain occasionally, and, if slack, tighten it by moving the magneto along the platform in a forward direction. Slacking off the four pins underneath the platform allows this. When the correct tension has been obtained, screw the pins up again tightly. Examine also the nuts securing the chain sprockets to the engine shaft and armature shaft of magneto respectively. After examination, before replacing the cover, oil the chain.

Engine Timing.—Except in case of necessity we do not advise tampering with the valve timing arrangement. However, if the engine has been completely dismantled for any reason, we make it a practice to so mark the timing pinions that replacement is a matter of perfect ease if the following instructions are carried out. To facilitate correct setting and meshing of the pinions these are marked with a dot system of identification as shown in Illustration H. On the small timing pinion will be found a single dot and a double dot. These dots correspond to similar marks on the inlet and exhaust valve timing pinions. To set the inlet valve place the single dot found stamped thereon, in register with the single dot on the small pinion, and similarly in the case of the exhaust wheel which has two dots stamped on it.

Magneto Timing. The spark is timed to take place 16 m.m. or ⅜-in before the top of the compression stroke, with the magneto control lever in the fully advanced position.



ARRANGEMENT OF TIMING GEAR
3·49 H.P. A.J.S.
Illustration H.

With the exception of carrying out the above instructions, do not tinker with the engine, nor fancy you can do better than the makers by tampering with the valve timing gear.

Gear Box.

A.J S. Gear Box in Position.

Illustration I.

Lubrication.—The gear box needs no attention whatever with the exception of replenishing with oil every 500 to 800 miles. Oil as used for the engine is suitable, but a very thick oil is the most suitable. It will facilitate the entry of oil into the box if the back wheel is slowly revolved (with gear in neutral position) while pouring in the oil.

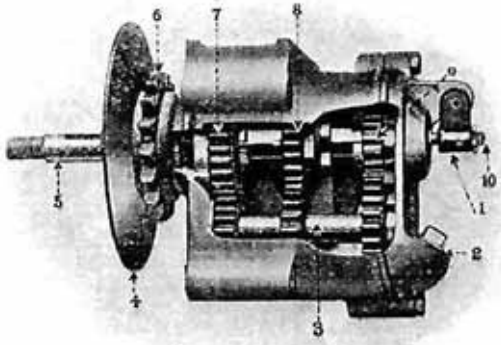
To dismantle the box the following procedure must be carried out:—

First unscrew the set pin which holds the long lever on to the hexagon ended arm of the operating shaft. The clutch lever can then be knocked off the arm, and the operating shaft, which is now free, can be swung over out of the way or removed entirely by pulling it out of its housing. The short push rod can then be taken out, and the thrust lock nut unscrewed from the end of the main shaft. This has a left-hand thread, and the punch provided in the tool kit should be employed to unfasten it, using the large spanner as a hammer. Behind this will be seen the thrust washer. To take this out push the main shaft back a little, so as to allow the washer to be withdrawn. This washer fits on to a Dowel peg, and care should be taken when replacing to ascertain that this is correctly in place. Now take out all bolts round the cover of the box and pull the cover off. The low gear dog wheel and lay shaft can then be taken out, also the sliding sleeve. The main shaft, complete with clutch, etc., can be drawn out from the opposite side of the box. To reassemble simply reverse these operations.

N.B.—Be sure the Thrust Lock Nut is tight after replacing.

Do not forget to put fresh oil in the box after dismantling.

1. Clutch Operating Shaft for disengaging Clutch.
2. Oil Filler
3. Lay Shaft or Secondary Shaft.
4. Fixed Clutch Plate
5. Main or Primary Shaft.
6. Sprocket for transmitting power to Road Wheel.
7. High Gear Dog Wheel.
8. Sliding Sleeve.
9. Low Gear Dog Wheel.
10. Bell Crank Adjusting Screw



A.J.S. 3 SPEED GEAR (portion of case cut away).

Illustration J.

Clutch.

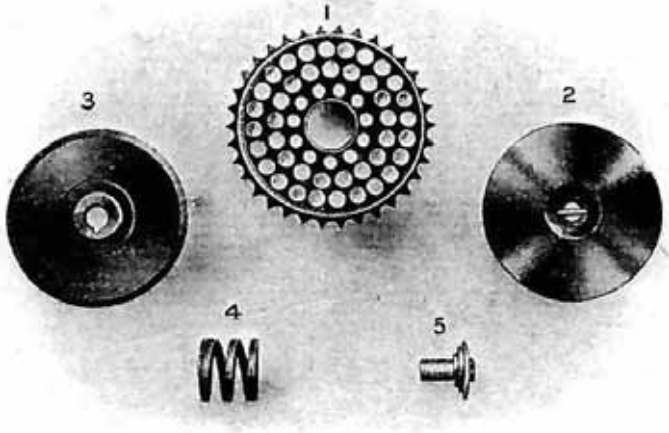


Illustration K.

1. Clutch Sprocket fitted with Cork Insets.
2. Sliding Plate (note key in centre which passes through main Gear Box Shaft).
3. Fixed Plate.
4. Clutch Spring.
5. Clutch Spring Adjusting Nut.

The Clutch parts are assembled in the following order—3, 1, 2, 4 and 5.

Adjustment.—If the clutch should slip when climbing steep hills, tighten up the clutch spring a little by means of the adjusting nut on end of the clutch shaft, and adjust the Bowden cable until there is a little play in the lever. Do not tighten up the spring more than necessary to obtain a perfect grip, or unnecessary strain will be put upon the Bowden control, &c., when the clutch is disengaged.

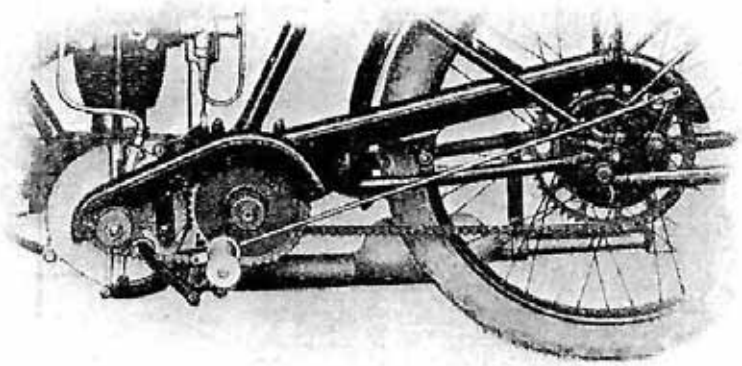
Do not put Oil into the Clutch under any circumstances.

To take up excessive backlash in Bowden lever on handle bar adjust by means of the operating shaft adjusting screw No. 10 (Illustration J). A further adjustment is also provided by a stop formed by an extension of the rear engine plate (left-hand side) through which the Bowden cable passes. However, *always allow a little backlash in the lever, or the clutch spring cannot exert all its pressure on the plates.* If the clutch slips without any external reason, take it apart and ascertain if any portion of its mechanism is fouling another, and so keeping the plates apart. If the key in boss of clutch plate No. 2 (Illustration K) should foul the end of slot in shaft it would prevent the clutch engaging.

To dismantle the clutch, take off the front portion of the chain cover.

Unscrew the clutch spring adjusting nut No. 5 (Illustration K) and remove the spring No. 4. Take out the cotter pin of foot-starter crank and remove crank. This will allow the starting quadrant with its spindle to be drawn out until it can pass the stop on chain stay. The quadrant can then be swung clear of the clutch and allow the plates to be drawn off the clutch shaft. Before replacing, wipe the clutch plates clean, and smear a thin film of oil on the portion of shaft on which the front clutch plate slides. Also before replacing, examine the lock nut which holds the fixed plate in position. If loose see that it is carefully tightened up again.

It is, of course, necessary to take the chain off the clutch sprocket before this can be removed (see Illustration N for particulars of chain joint). It will be found that a flat key passes through a slot in the end of the clutch shaft, and fits in the boss of front or sliding plate. Great care must be taken to see that this key is in its proper position or the clutch cannot be disengaged. This key is clearly shown in Fig. 2 (Illustration K) across the centre of the plate. To fit this key when re-assembling the clutch, turn the shaft till the slot is perfectly horizontal. Then put key in slot with each end projecting equally on each side of the shaft. The sliding plate should then be slipped on shaft with its keyway in a corresponding horizontal position.



TRANSMISSION SYSTEM, SHOWING THE POSITION OF THE REAR BRAKE PEDAL AND OPERATION.

Illustration L.

If to disengage the clutch becomes difficult smear a little oil on that portion of shaft on which the outer plate slides.

If the clutch should "drag," even when fully disengaged, it will make gear changing very difficult, especially when changing down, for the reason that the drive is never properly taken off the gears, thus making it difficult to move the gear lever. This difficulty can be temporarily overcome by suddenly closing the throttle before changing down, immediately opening the throttle again after the change is made. The closing of the throttle takes the drive off the gears, and so allows easy disengagement.

To those riders who prefer a light adjustment of the clutch, the following hint will be useful. A clutch that is lightly adjusted will sometimes slip for a time after changing gear, but the slip will cease if the throttle is momentarily closed when the slip takes place. This is explained by the fact that for the moment the drive is taken off the clutch and allows the plates to settle down to their work.

Transmission.

Adjustment of Chains.—To adjust the chain from engine to gear box it is only necessary to slack off the two nuts on top of bracket and slide the box bodily backwards by means of the adjusting bolt, situated at rear of bottom bracket. (See Illustration I, page 16).

It is important that the nuts are screwed tightly again after adjustment.

Back Chain.—Slack off the nuts on each side of back hub spindle, and move the wheel backwards by means of the adjusting screws in fork-ends. Care must be taken to adjust each side equally or the wheel will be out of alignment. Screw the spindle nuts up tightly again after the chain is properly adjusted. It may be found that moving the wheel back has caused the brake to be "on." This is easily rectified by means of the brake adjustment.

If the chain is too slack it is apt to "whip," which intensifies the wear and tends to break the rollers, especially in the case of the front chain. If on the other hand it is too tight, a crushing effect is produced on the rollers, and the whole chain is strained unduly.

The chains should be adjusted, and kept adjusted, so that they can be pressed down in the centre with the finger from ½ in. on the front chain, and about ¾ in. on the back chain.

Care of Chains.

Lubrication.—As the chains of the 3·49 A.J.S. are only partly enclosed it is a good plan to make a point of oiling the chains every day before starting out. One oiling will suffice for a day's riding whatever mileage is done. An oil gun is the best means of oiling the chains. With this instrument draw a charge of oil from the oil compartment of tank, and insert spout of oiler into the chain case oil plug hole, which will be found on top of front of chain case above the front chain. Lift the exhaust valve and while pressing down plunger of oil gun, slowly turn the engine round with the foot starter, taking care that the oil from the oil gun is falling on the chain. This ensures the whole chain being well lubricated. Treat the back chain in the same way by slowly revolving the back wheel.

Long life, less need of adjustment, and complete satisfaction with the transmission is assured if the rider will make a point of oiling his chain frequently, to say nothing of the knowledge that they are regularly having a supply of fresh *clean* oil.

Chain Repairs.

A Chain hardly ever breaks, if properly adjusted (we have never yet heard of a chain breaking with our system of transmission), since it is usually worn out long before the breaking point is arrived at.

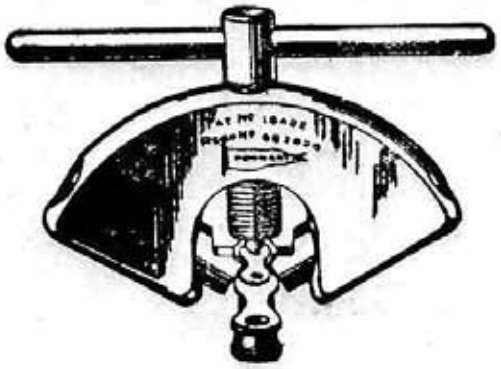


Illustration M.

If lubrication or adjustment is neglected, broken rollers may occasionally be found. The chain can, however, be easily repaired with the Pennant Chain Rivet Extractor (Illustration M) and a few spare parts. This tool provides a simple means of removing the rivets, which cannot be filed down, as they are casehardened. It can also be used for putting in a new outer link.

This tool provides a simple means of removing outer links by pushing the rivet heads through the plate.

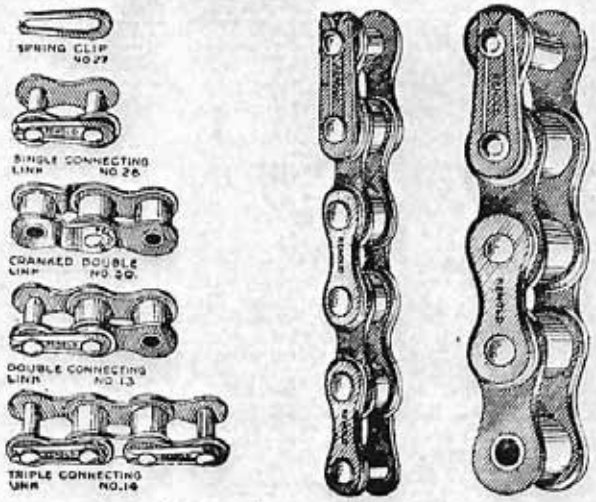
The illustration shows clearly the method used in the removal of the outer link by means of this tool.

Chain Rivet Extractor.

To Remove complete Links.—Screw down the punch on to the head of each rivet in turn through the top plate. Both rivets should be pushed out from the same side of the chain.

To Remove Broken Links.—Insert chain roller between the jaws and screw down the punch in order to press the head of the rivet through the top plate. Remove chain from extractor, and link will fall out.

Note. Before attempting to extract a rivet, compress the ends of the jaws to obtain a grip on the chain roller.



CHAIN REPAIR PARTS.
Illustration N

The above illustration contains all the parts necessary to effect repairs to a chain:

To shorten a chain containing an even number of pitches replace by parts No. 39 and 26.

To shorten a chain containing an odd number of pitches replace by parts No. 13.

To repair a chain with a broken roller or faulty inside link, replace by parts No. 14.

For joining up any length of chain where extremities are inside links, use part No. 26.

When a chain is joined up with a spring clip, it is most important that the clip is correctly fitted over the cover plate. The open end should always face in the opposite direction to which the chain travels.

Chain Guard.

Remove the two bolts found on the forward end of the guard, then the rear bolt on chain stay clip and the anchorage to carrier stay. The rear portion of the guard can be removed independently of the front by means of the carrier stay anchorage previously referred to.

It will be found unnecessary, however, to remove brake rod.

Steering Head.

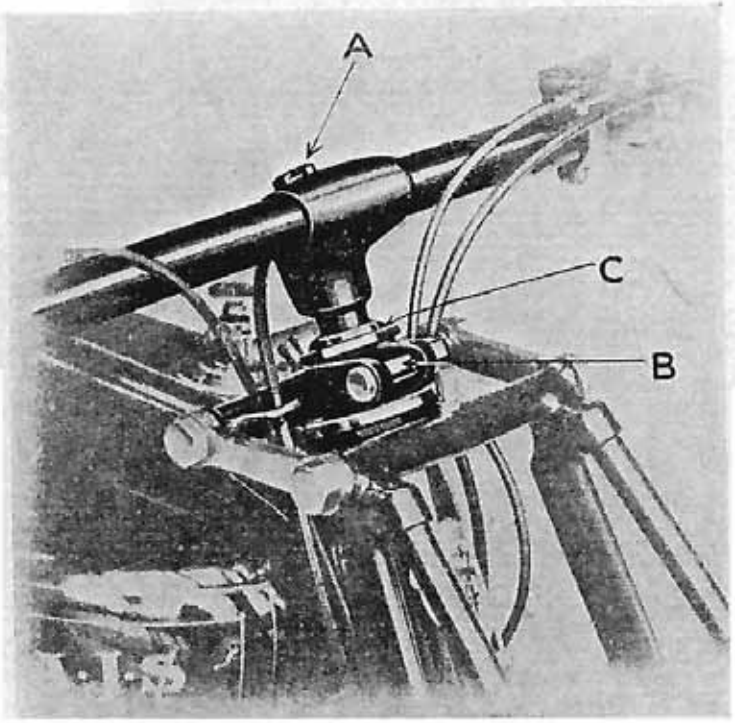


Illustration O.

1. Unscrew Bolt A four turns and give it a sharp tap with hammer.
2. Slacken Nut B.
3. Adjust steering head by Nut C.
4. Lock up Nut B and Bolt A.

Spring Fork Adjustment.

To take up any play which may have developed in the side links, unscrew the spindle lock nuts on the right-hand side of the forks (looking at the machine from the front), and turn the spindles by means of the heads on the left-hand side until all slackness is taken up. Afterwards tighten up lock nuts.

Rear Wheel Adjustment Gauge.

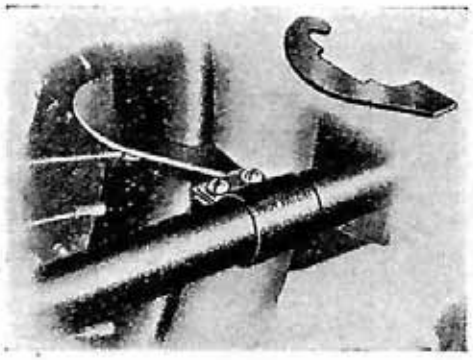
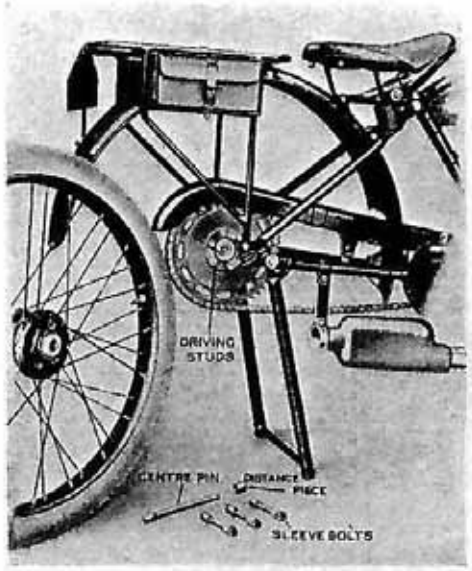


Illustration P.

Rear Wheel Adjustment Gauge.– On the right-hand side of the bottom chain stay will be found a piece of sheet metal, held in position by a clip which passes round the tube.

In the tool kit will be found a flat gauge that can be fitted round the rim (see illustration). When replacing the rear wheel after removal, or after making adjustment to chain, place the gauge on the rim with the extension to the right, and set the wheel so that the edge of the gauge just touches the plate that is held by the clip on the chain stay. This ensures the wheel being correctly aligned and must be done before finally tightening up the spindle nuts. Do not attempt to unscrew the clip from the chain stay, as the position of the plate is set correctly before the machine leaves the factory.

Detachable Wheels.



A.J.S. Quick Detachable Wheel.
Illustration Q

Rear Wheel—To remove the rear wheel proceed as follows: Put the machine on the stand and with the box spanner provided *first* unscrew the three sleeve nuts which pass through the hub flanges. To prevent the wheel revolving while unscrewing the sleeve nuts, place the foot against the tyre at bottom of wheel. The three sleeve nuts extend right through the wheel and near hub flange, and screw on to the three threaded studs on the driving sprocket. There are also three plain studs on the sprocket which act as dummy drivers. These fit into the three remaining holes in the hub flange. After the sleeve nuts have been unscrewed *then* unscrew the centre pin and draw it completely out, together with distance piece. The space now left by the distance piece will allow the wheel to be drawn off the driving studs in sprocket. The whole operation should not take more than 30 to 40 seconds.

To replace the wheel, push it squarely on to the driving studs and *next* (with the distance piece in position) screw up the centre pin moderately tight. The three sleeve nuts can now be screwed up *tightly*, afterwards giving a final turn to the centre pin. It is very important to point out that when the centre pin is removed, the wheel is hanging on one fork only, so any rough treatment must be carefully avoided or there is great danger of straining or breaking the fork end. *Under no circumstances must the centre pin be removed until the machine is jacked up on the stand, and the centre pin must always be in position before the machine is taken off the stand again.* If for any reason the wheel should be difficult to pull off the driving studs, screw in the centre pin a few turns (without the distance piece), this will steady the wheel while drawing it off the driving studs.

If the rider wishes to fit a new tube without removing the wheel entire, he must first take off the one side of the tyre and remove the tube in the ordinary way. Next take out the centre pin and distance piece only, leaving the sleeve nuts intact. This will be found to give sufficient space between the hub and the fork end to allow the tube to be passed through and drawn completely out. Now replace the distance piece and the centre pin and proceed to refit tube and cover. Fitting the centre pin first, hold the wheel firmly while the tyre is being manipulated.

Periodically test the centre pin and sleeve nuts with the spanner, and keep them tight. If the sleeve nuts are loose a dull hammering will be felt when driving at slow speeds. If this is noticed, tighten the sleeve nuts at once. When the back wheel is removed, the *wheel only* is taken out, leaving the chain, sprocket, brake, chain case, etc., remaining in their original position. If desired the wheel complete with sprocket, brake, etc., can be taken out, which is quite a simple operation. Remove the back portion of chain guard, slack off spindle nut and detach brake cable by removing the pin in shackle. Take the chain off the sprocket by means of the spring link, and unscrew the anchor pin which projects into slot of brake anchor plate, sufficient to clear. The wheel will then fall out of slots in fork-ends.

DETACHABLE WHEELS.—continued.

When replacing the chain it will facilitate the fitting of spring link if the ends of the chain are encircling an equal portion of the sprocket. This also applies to removing the spring link.

When the wheel is replaced, see that the brake anchor pin is screwed into the slot in anchor plate and the spindle nuts are tight.

Removing Front Wheel—Disconnect cable yoke end from brake operating lever, remove anchor plate bolt from fork end, and after slackening off spindle nuts the wheel will then fall out of slots in fork ends.

The adjustment of the hub bearings is perfectly obvious. Both wheels are disc-adjusting. Don't let the hubs run loosely, but take care that they are not adjusted too tightly.

This is a common cause of broken balls and cracked ball races. When properly adjusted, the weight of tyre valve should revolve the wheel, if placed above the centre of wheel. At the same time the wheel should have no shake.

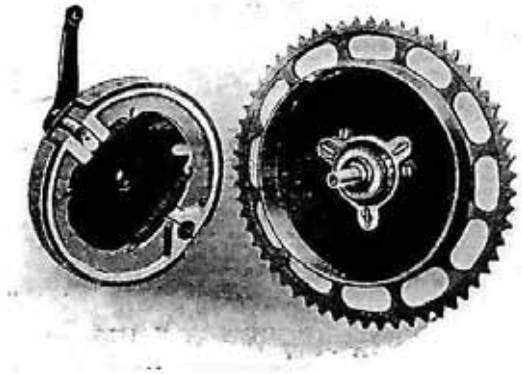
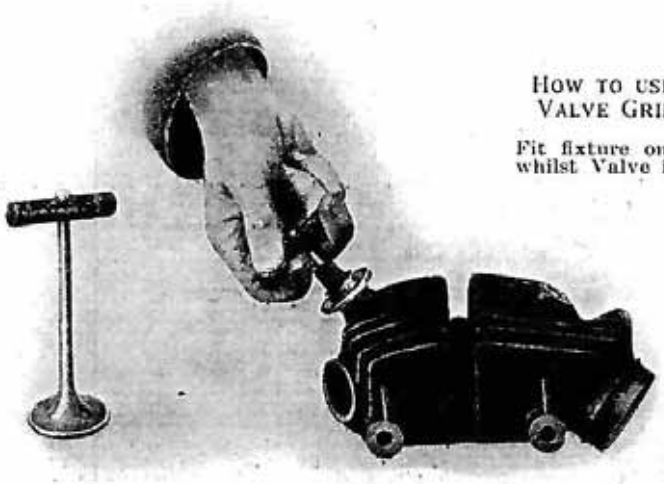


Illustration R.

This brake requires no attention except occasional adjustment at the rear end of operating rod.

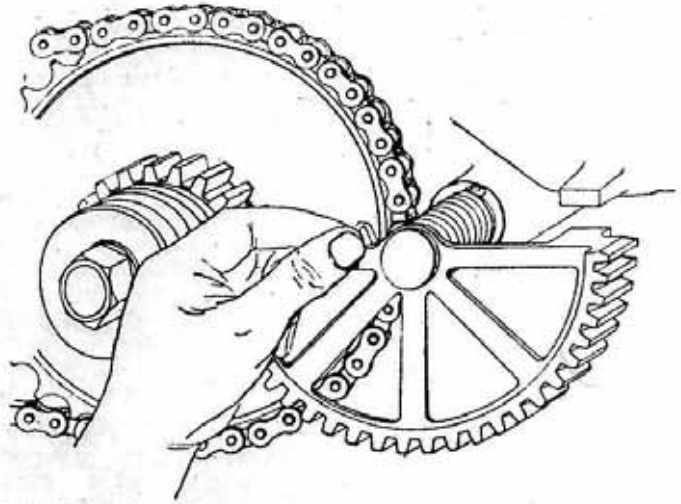


HOW TO USE THE A.J.S. VALVE GRINDING TOOL.

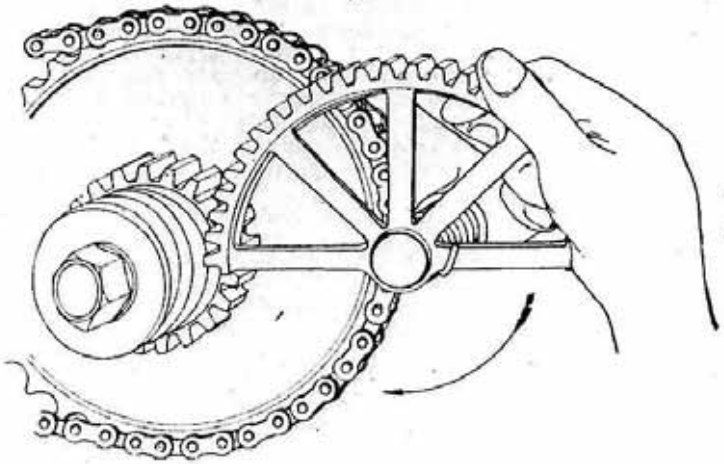
Fit fixture on end of Stem whilst Valve is in the Head.

Illustration S.

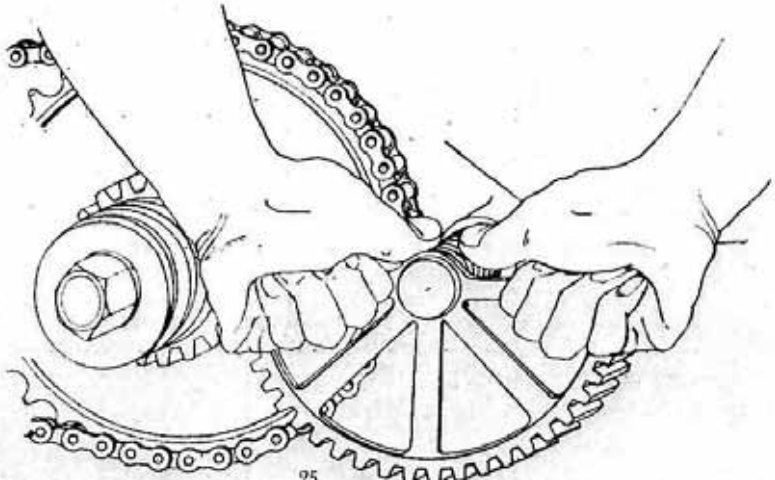
Method of Replacing Footstarter Spring.



1. Hook free end of Spring overTopSpoke of Footstarter Quadrant.



2. Turn Quadrant a complete Revolution in Direction of Arrow.



3. Push Quadrant into position, at the same time pressing with both thumbs the outer coils of the Spring down and over Footstarter Shaft Tube.

Hints and Tips for Hill Climbs and Speed Events.

As Hill Climbs and Short Speed Events are sometimes won or lost by fifths of seconds, a great deal depends upon the skill of the rider in the "get-away," especially when the event is from a standing start. The man who gets quickest into his stride after the word "go" is usually the winner. Start on second gear, and do not attempt to change into a higher gear until the engine has attained its highest speed. Steer a straight course, and let the body offer as little wind resistance as possible. See that the engine is properly lubricated before the start, as it is a waste of time to attempt to lubricate the engine in the middle of a speed burst. This, of course, only applies to short distance events. In speed events on the level the standard gear ratios would be the most suitable, but should there be a slight gradient or a stiff head wind, a slightly lower gear can sometimes be an advantage.

As regards Hill Climbs, it is very difficult to give any definite information regarding gear ratios, as everything depends upon the steepness of the hill, but a 19 tooth sprocket on the engine shaft will suit the average hill, but if the hill be fairly steep, an 18 tooth sprocket on the engine shaft would perhaps be faster, and as a rule in a hill climb, it is better to gear too low than too high. Deciding on a suitable gear for any particular hill can only come from experience. Where the rider is continually competing in hill climb events, it is a great advantage to have engine sprockets of 18, 19, and 20 tooth, with a chain for each gear, so that an alteration in the gear ratio can be effected with the minimum of trouble.

Lubricating Oil. For racing, the oil we use and recommend is Wakefield's "Castrol R," and for ordinary touring, Wakefield's "Castrol C." It is very necessary that the engine is properly lubricated, but a lot of power can be lost by over-lubrication, and we venture to say that quite as many hill climbs and speed events are lost through over-lubrication as under-lubrication.

Fuel. In the case of the "G 6" models, we have found an advantage by using a mixture of first-class petrol and Benzole in equal proportions, and possibly some little advantage would be derived from this mixture on the other models. There are now several mixtures of motor spirit on the market, some containing alcohol, but we are not in a position to give any advice on these fuels—it is all a matter for individual experiment.

Sparking Plugs. A high-class plug is absolutely essential. There are many good plugs on the market, particularly the "K.L.G." Type H.S.3. A cheap unsuitable plug usually causes pre-ignition, giving symptoms of the engine apparently seizing up. The engine suddenly falling off in power, as though a piston seizure is taking place, is usually caused by an unsuitable plug.

Carburettor. To get maximum power fit a jet large enough to give a correct mixture with the throttle and air levers wide open. The jet large enough to give best results with full throttle and full air would probably cause erratic running at slow speeds, but in speed events and hill climbs one is more concerned with high speeds than slow speeds.