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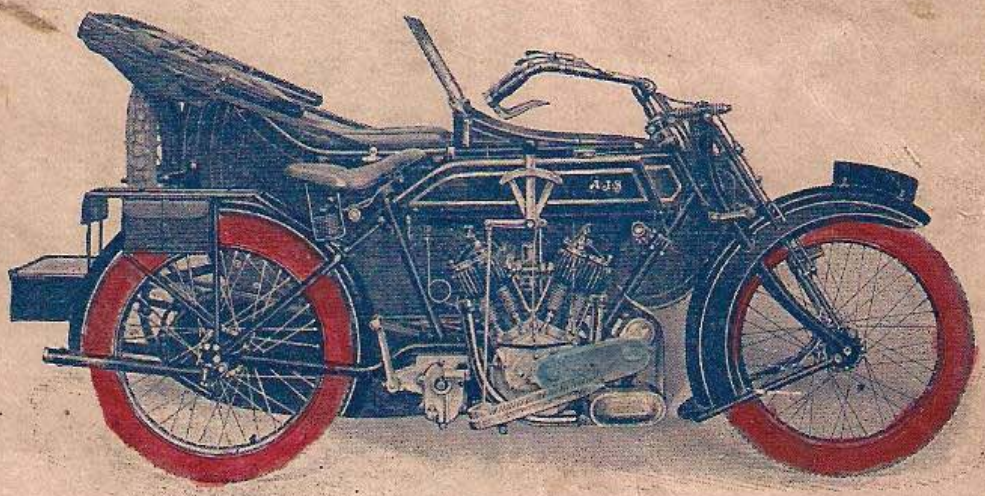
A·J·S Motor Cycles



6 h.p. 3-SPEED A.J.S. PASSENGER COMBINATION.
MODEL D.

1919 & 1920

HOW TO MANAGE THEM

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

HILDRETH & CHAMBERS, WOLVERHAMPTON.

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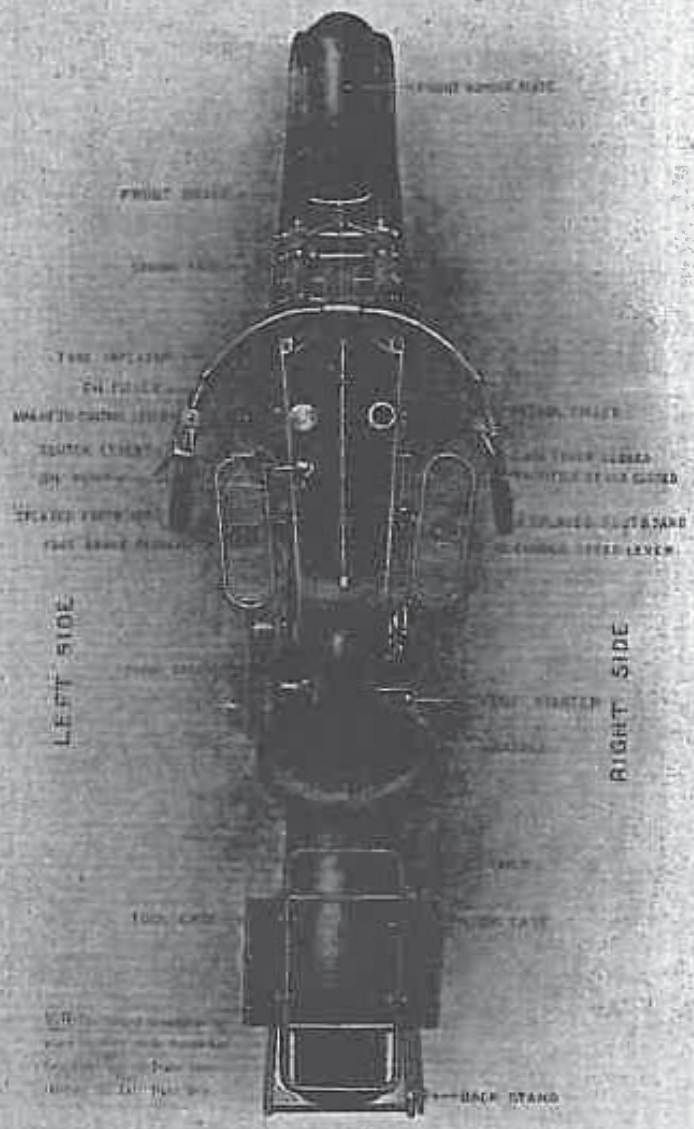
PLAN A·J·S VIEW.



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A·J·S

MOTOR CYCLES.

FOREWORD.

WE have pleasure in providing the riders of A.J.S. Machines with a comprehensive Instruction Book, dealing with our 1919 Motor Cycle and Sidecar.

The Booklet has been very carefully compiled, and we trust that the information contained in the following pages will be of assistance to the rider in tackling little adjustments, or elucidating any troubles which may from time to time take place.

Many adjustments and little troubles can, however, be avoided if the new rider will carefully read—and remember what he has read—that portion of this Booklet devoted to Driving Instructions, and general care of the machine, and particularly take note of those instructions which are emphasised by being printed in italics.

RE SUPPLY OF THIS PUBLICATION.

A copy of this Booklet is supplied free with every new A.J.S. Motor Cycle. Applications for extra copies must in every case be accompanied by a remittance of 4d. to cover cost.

A. J. STEVENS & CO. (1914) Ltd.

June, 1919.

Contents.

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Index to Illustrations.

Driving Instructions, &c.

For 6 h.p. Three-speed A.J.S. Motor Cycle

AFTER receiving the machine, thoroughly examine it and get conversant with its details. Before taking it on the road fill up with petrol and oil.

Only oil suitable for air cooled engines must be used.

Turn on the petrol tap by turning the tap lever downwards in line with the petrol pipe, and "flood" the carburetter by pressing the knob on top of float chamber. Turn on the oil tap, found below the elbow outside tank, by turning the lever in a line with the pipe (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 particulars of lubrication see "Engine Lubrication" on Page 10

Inject a small quantity of petrol into the cylinders through the compression taps by means of priming pipes under the tank. It will greatly facilitate the entry of the petrol into the cylinders if the exhaust valve lifter is raised. After the petrol has been injected see that the compression taps are closed again.

Unless the engine is difficult to turn when cold with the kick-starter, it is seldom necessary to inject petrol into cylinders.

Now mount the machine and carry out the following operations:—

1. See that the gear lever is in the "Neutral" position marked on gate change quadrant (Illustration B).
2. Nearly close the air lever (the shorter one) of carburetter control and open throttle lever (the longer one) about one-third. The levers open to the left (inwards) and close to the right (outwards). The carburetter is the "A.M.A.C." For full details and hints on adjustments, etc., see page 21.
3. Lift the exhaust valve by means of the lever under the right handle bar grip.
4. Engage the kick-starter with the right foot (using the instep of the boot) and press smartly backwards and downwards, at almost the same time release the valve lifter and the engine should then start. Take the foot off the kick-starter pedal immediately the engine fires, but *do not allow the kick-starter to spring back with a "bang" after starting the engine. Bring the foot back with the pedal, and so prevent a heavy blow being given to the stop.* After once mastering these details the engine can be started with the back wheel on the ground.

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 foothrake.

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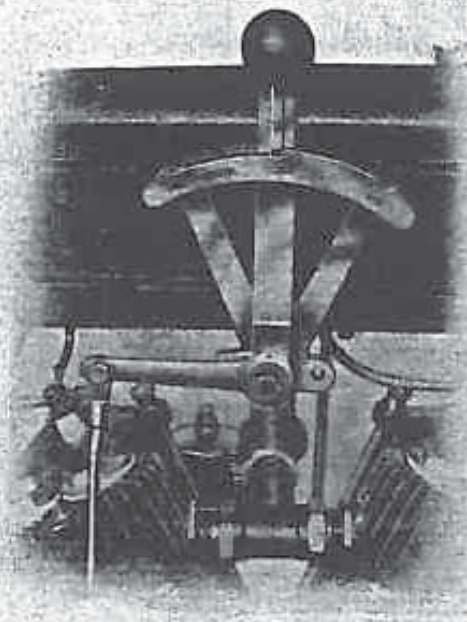
The change speed lever is operated as follows:—To engage the low gear from neutral, press the lever lightly to the *right* and pull backwards (see "Important warning" below. To move to second gear, again press lightly to the *right* and move the lever forward into second gear position. To engage high 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 B.

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

Always drive with the air lever of carburetter 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 throttle is closed somewhat before doing so. After the gear changing, and immediately the clutch is engaged, gently open the throttle, and so take up the higher gear sweetly and comfortably without any signs of jerk. *Always disengage the clutch when changing gear*, this makes gear changing easier for the reason it takes off driving strain, and allows the gears to pass in and out of engagement.

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 inserts, 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.

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, common with all petrol driven vehicles, however well balanced an engine may be, but the drive can be made just as sweet and as comfortable as one may wish, by easing the clutch a little, by means of the clutch lever on the handle bar. 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 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.

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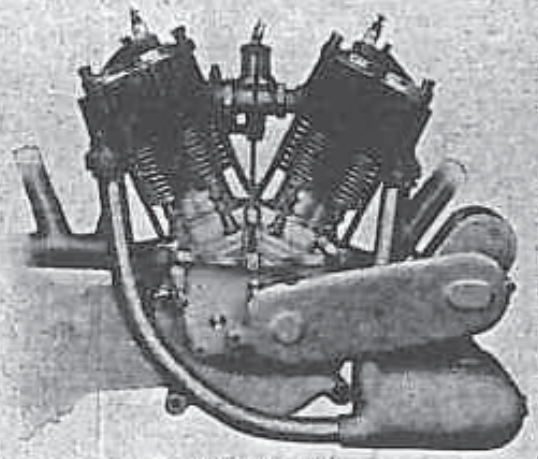
Engine.



A.J.S 6 h.p. Engine.
ILLUSTRATION C.

Lubrication.—The most important point in connection with the engine is lubrication. Give about one pumpful every 4 miles, and rather more if fast riding is indulged in.

The type we employ gives a direct feed to the engine, oil being delivered as the plunger rod ascends on the up stroke. To give a charge of oil to the engine, depress the plunger to its full extent. This will fill the barrel with oil, and the plunger being spring loaded it will automatically ascend, and in so doing force the oil into the engine, the plunger rising during the process until it is in position for the next charge to be delivered.

To cut off the oil supply at any moment, such as when the machine is left standing, the tap should be turned off, that is, it should be at right angles to the pipe. As a further precautionary measure the lubricator 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 shewn by oil unduly working out of the valve tappets, and smoke issuing from the silencer. Over oiling will sometimes cause the exhaust valves to stick or move sluggishly in their guides. The symptoms are mostly apparent when the engine is cold. Misfiring occurs, also explosions in silencer and difficulty of starting. The remedy is to take out the valves and clean the stems and guides with petrol.

Adjustments and Cleaning—See that the valve tappets are always properly adjusted. The thickness of a visiting card is about the correct clearance between the tappet top and valve stem when the valve is on its seat. Check the clearance when the engine is hot, not when cold. Use two spanners to unlock the adjusting nuts. The inlet valve tappet of front cylinder is free to revolve. This can be held stationary by inserting a small tommy-bar in the hole drilled in the tappet stem, after the lock nut has been slacked off.

The cylinders of the A.J.S. engine are fitted with detachable heads, but this has not been done to facilitate cleaning. It is a matter of design only for efficiency, so when the cylinders require cleaning treat the cylinder and head as one, the same as with a solid cylinder. This will obviate the risk of a leaky joint between the head and the cylinder barrel. Should it be absolutely necessary to remove the heads, however, first take off the complete cylinder and tap off the head from the inside, using the wood end of a hammer handle for the purpose. When replacing the head see that the face of the washer and the face of the head are quite clean, or a leaky joint will be the result. If the washer is damaged, replace with a new one. To remove the cylinders for cleaning first disconnect all such fitments as induction pipe, exhaust pipes, and plug terminals, etc. Next unscrew the bridge piece holding down nuts and take off the bridges. This now leaves the cylinders free for removal. In doing this the engine should be turned over until the pistons are at their lowest position, and draw off the cylinders carefully, taking care that when the pistons are free not to let them fall sharply against the connecting rod, as this may crack or break the skirt of the piston, which is

easily done. Having removed the cylinders, wrap a clean cloth or rag round underneath the pistons to prevent any foreign matter or dirt getting into the crank case. If the combustion head is badly carboni-ed this must be cleaned. The generally accepted method being to scrape the chamber free of the burnt charges, which can be done with an old screwdriver or similar tool. The top of the pistons 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. Having got rid of all deposit from both the heads and pistons, wash all particles off with paraffin. Before replacing the cylinders after cleaning, carefully oil the pistons, and see that the joints of the piston rings are on opposite sides of the piston. Take care when replacing the cylinders on to the crankcase to see that the packing washer is inserted between the top of crankcase and the base of cylinder. When everything is in position, fit up the inlet pipe and connections before bolting the cylinders down, as this will enable the cylinders to twist into proper position to make perfect joints at each end of the inlet pipe. This is a very important matter. The exhaust pipes can be fitted after the cylinders are bolted down permanently. If one cylinder only is to be taken off it is only necessary to disconnect its exhaust pipe and one side of the inlet pipe.

If it is required to remove the valves at any time for inspection, grinding in, etc., there is no need to touch the cylinders. All that has to be done is to unscrew and take out the valve cap, then place the hooked end of the special valve extractor, which is provided in every tool kit, on the top of the valve, using the valve cap spanner which fits at the bottom of the hook, for the necessary leverage to lift the valve spring to allow the cotter to be withdrawn.

The valve collar can then be pulled off and the valve drawn out of the head via the valve cap aperture. 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. The valves should, generally speaking, be ground in about every 1,500 miles.

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 fresh oil is pumped into engine again, after, draining out the old oil.

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 pedestry brush and a pan of paraffin.

A.J.S. Magneto Adjustment.
ILLUSTRATION D.

Magneto Adjustment—Examine the driving chain of the magneto occasionally, and, if slack, tighten it by moving the platform to which the magneto is attached in a forward direction. Slacking off the two nuts on the contact breaker side of the magneto platform allows this. The magneto platform rests on two extensions of the front engine plates. These plates have slots which, when the before-mentioned nuts are slacked off, permit the platform to be moved forward to tighten the chain. When the correct tension has been obtained, screw the nuts 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

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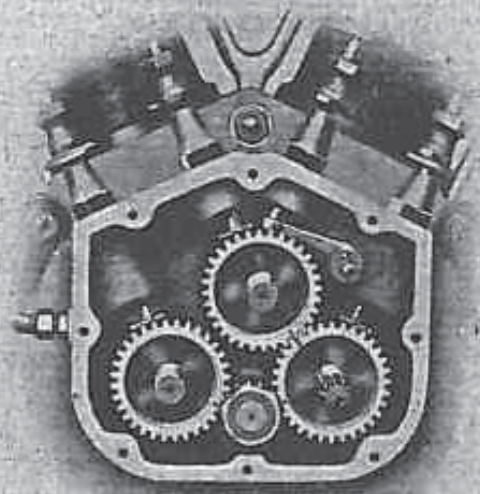
Engine Timing—Except in case of necessity we do not advise tampering with the valve timing arrangement. However, if the engine has been completely dismantled for any reason, we make it a practice to so mark the timing pinions that replacement is a matter of perfect ease if the following instructions are carried out. To facilitate correct setting and meshing of the pinions these are marked with a dot and dash system of identification as shown in Illustration E. On the small timing pinion will be found a single dot and a double dot. These marks register with corresponding dots on the back and front exhaust cam wheels, the back exhaust wheel being stamped with one dot, and the front exhaust with two. The teeth of the back exhaust wheel must be meshed with those of the small pinion so that the single dot registers with the single dot on the small pinion, and the two dots on the front exhaust must register with the two dots on the small wheel. There now only remains the double inlet cam wheel which meshes with the front exhaust cam wheel. Upon this double inlet wheel a dash or stroke is marked, which must be placed opposite the corresponding dash which will be found upon the front exhaust cam wheel. The correct setting of the valve timing is then arrived at.



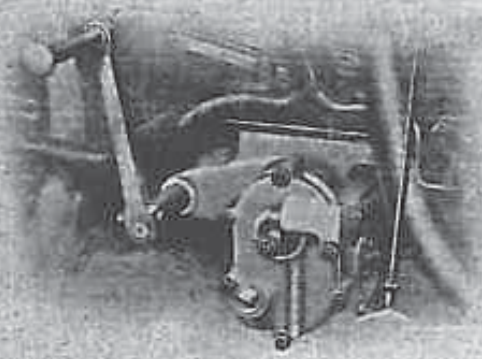
Arrangement of Timing Gear 6 h.p. A.J.S.

ILLUSTRATION E.

The spark is timed to take place 2·5 mm. or 1-in. before the top of the compression stroke, with the magneto control lever in the fully advanced position. The segment of contact-breaker marked No. 1 fixes the rear cylinder (see paragraph on "Magneto Timing.")

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 F.

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.

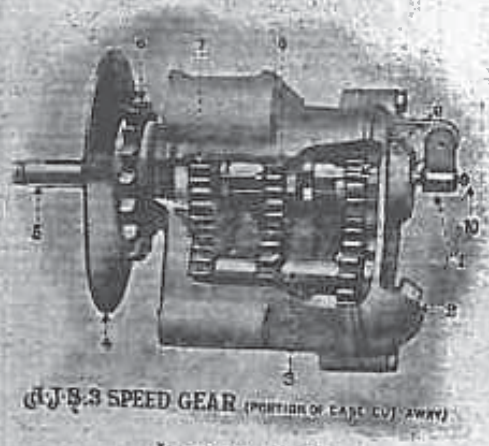
To dismantle the box the following procedure must be carried out:—

First unscrew the set pin which holds clutch operating lever on to the hexagon ended arm of bell crank. The clutch lever can then be knocked off the arm, and of the way or removed the bell crank, which is now free, can be swung over out 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. Bell Crank Lever 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 G.

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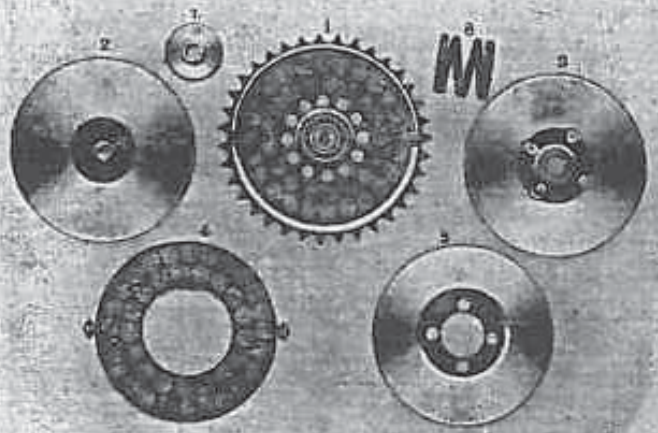


A·J·S 6 HP. CLUTCH PARTS.

ILLUSTRATION H.

1. Clutch Sprocket fitted with Cork Inserts.
2. Sliding Plate (note key in centre which passes through main Gear Box Shaft).
3. Fixed Plate.
4. Plate fitted with cork inserts (driven by No. 1).
5. Dished Plate (driven by No. 3).
6. Ball Bearing on which No. 1 revolves when clutch is disengaged.
7. Clutch Spring Adjusting Nut.
8. Clutch Spring.

The Clutch parts are assembled in the following order—No. 3, 4, 5, 1, 2, 8 and 7.

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. 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.

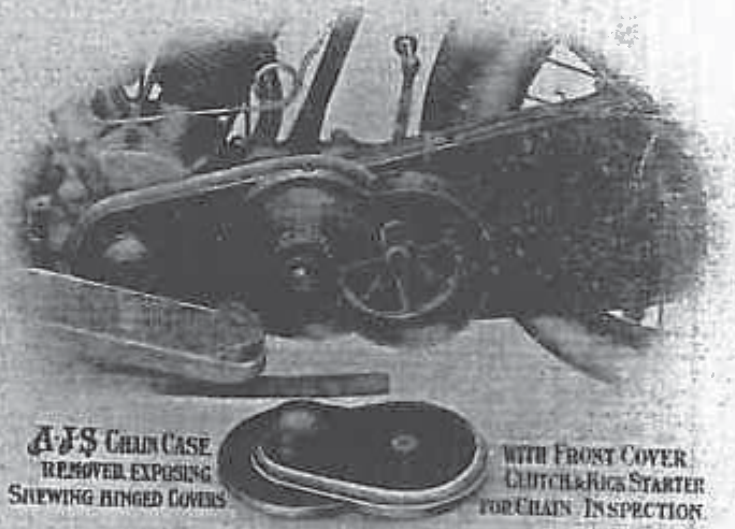
Do not put Oil into the Clutch under any circumstances.

To take up excessive backlash in Bowden lever on handle bar adjust by means of the Bell crank adjusting screw No. 10 (Illustration G). 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 H) should foul the end of slot in shaft it would prevent the clutch engaging.

To dismantle the clutch, take off the front cover of chain case by slacking off the pins round the edge of same (the cover can then be removed) see Illustration I.

Unscrew the clutch spring adjusting nut No. 7 (Illustration H) and remove the spring No. 8. Take out the cotter pin of kick-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 L 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 shewn in Fig. 2 (Illustration H) 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.



A·J·S CHAIN CASE WITH FRONT COVER REMOVED EXPOSING CLUTCH & KICK STARTER SHEWING HINGED COVERS FOR CHAIN INSPECTION.

ILLUSTRATION I.

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. The cause of "drag" is usually that plate No. 5 (Illustration H) has too much lateral movement, and "follows up" the plates in front of it, when the clutch is disengaged. If the clutch plates Nos. 1 and 2 are removed, it will be found that plate No. 5 is driven by four pegs on the fixed plate No. 3. On two of the pegs, between the two plates, are small coil springs, whose function is to separate the plates when the clutch is disengaged. The driving pegs are fitted with screws which act as stops, and determine the lateral movement of plate No. 5. If these screws should be loose the plate would have too much lateral movement and cause "drag," but if found tight, the only remedy is to remove them and file away slightly the top of the driving pegs until the plates separate only just enough to free the cork inset plate No. 4. This may appear to be somewhat complicated, but it will be found quite simple on examining the parts mentioned. It is, however, a very rare thing for the clutch to "drag," and can only happen by excessive clutch wear.

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 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.

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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 pressing on the back driving chain.

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.

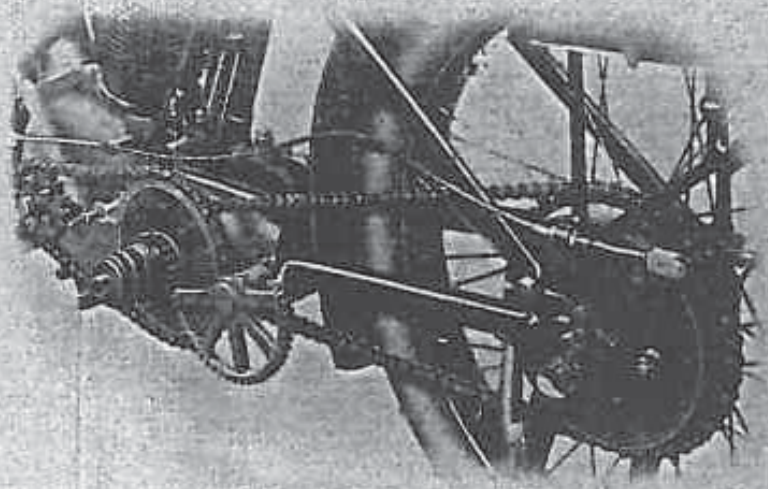


ILLUSTRATION J.

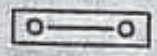
Screw the spindle nuts up tightly again after the chain is properly adjusted. It may be found that moving the wheel back has caused the brake to be "on." This is easily rectified by means of the brake cable adjustment at the bottom of carrier stays on left-hand side.

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. The chains can immediately be inspected and tested by means of the inspection doors fitted to both back and front parts of the chain case. If desired the whole of the top portion of the case can be readily taken off, whilst the lower half is correspondingly easily removed.

Lubrication—A good plan is 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 valves, 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 daily, to say nothing of the knowledge that they are regularly having a supply of fresh clean oil. A front chain should last from 7,000 to 10,000 miles, and the back chain 10,000 to 15,000 miles.



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.

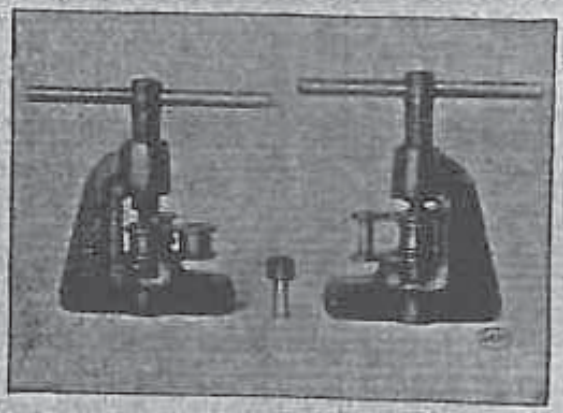


ILLUSTRATION K.

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

The method of using the tool is fairly obvious from the illustration. On the left it is shown removing a rivet—forcing the rivet head out of the upper side plate—by turning the screw. Both rivets in the link have to be forced out, taking care to place the chain that the underside plate can fall away between the jaws of the tool. Replacing a rivet is carried out by the use of the spring pin shown in the centre of the illustration. This fits between the jaws of the tool and has a recess or hole in the head to take the head of the rivet when forced into the hole in the lower side-plate by the screw. It must then be riveted over with a light hammer.

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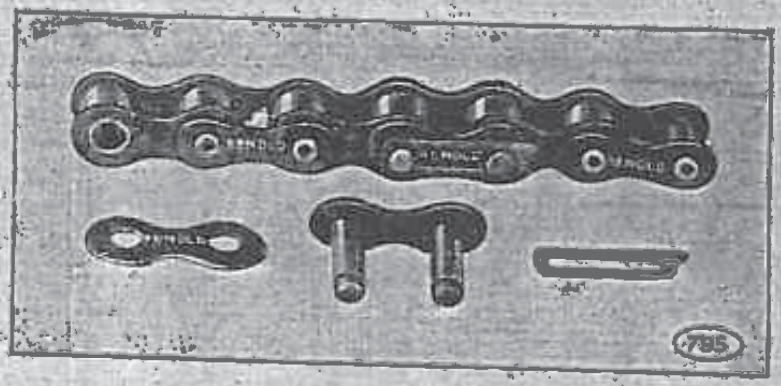


Chain Repair Parts.

ILLUSTRATION L.

Four parts are necessary to effect all repairs to a chain:

1. Spring clip joint (shown complete and in parts—Illustration L) for quick road repairs, and generally as a joining up link.

2. Outer links for more leisurely and permanent repairs.

3. Inner links complete with rollers and bushes.

4. Cranked, or half links, for shortening or lengthening a chain by one link only.

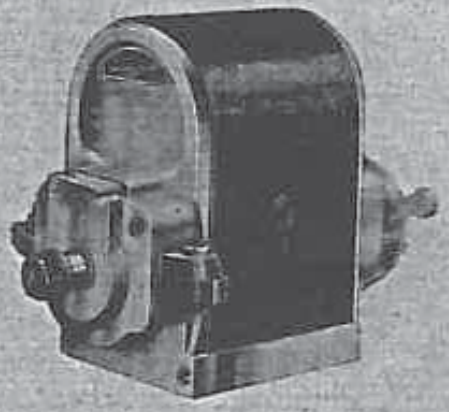
In the case of a broken roller, do not fit a new roller alone but replace with a whole inner link complete.

When the chain is joined up with a spring link it is very important that the spring is fastened with the open end towards the opposite direction in which the chain travels.

Chain Case.

The top, bottom, and back portion of the chain case can be detached independently, also a part of the front can be removed to expose the clutch and kick-starter (Illustration K). The rear part of the case is divided both horizontally and vertically. To remove the rear part unfasten the set pin which bolts together the top and bottom halves of the horizontal division, also unscrew similar pins holding the vertical division. Next take out the two small bolts which will be found to pass through slots cut in the rear part of the chain case. These bolts screw into the anchor plate and must be removed entirely to allow the rear of the case to come away. Having done this the case end can now be withdrawn. To remove the whole of the lower half of the chain case carry out the same operations as detailed above, but in addition take off the nut on the end of the left hand rear footboard rod and push the rod through the lug of crank case, just sufficient to allow the chain case to drop away. The front portion previously alluded to is readily removed by partly slacking off the small screws round its outer edge. Also, after these portions have been removed, the top half is quickly detached by simply taking off the nut on the end of the distance bolt which projects from the crank case of engine through the chain case.

Magneto.



Thomson-Bennett Magneto

ILLUSTRATION M.

The magneto requires only the least possible amount of lubrication. It is fitted with ball bearings, and a few drops of oil at each of the places provided once or twice a month when in regular use is all that is required.

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 1/40 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*

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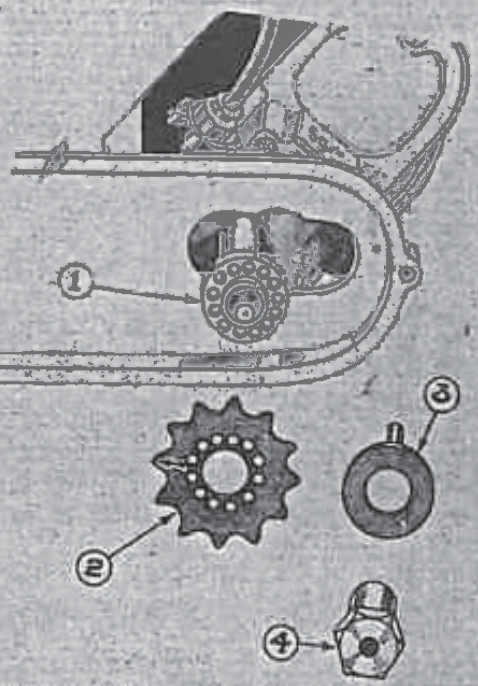
each other before anything else is done. The first thing then in timing up is to set these two arrows so that they face exactly towards each other. To do this turn engine over until the arrow on the driving shaft is pointing directly towards the arrow on the magneto sprocket. This latter should be held 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. The magneto must be timed on No. 1 cylinder, that is the one that fires first. This is the back cylinder of the two. The magneto terminals are numbered on the body of the instrument, and care must be taken to see that the high tension wires are correctly connected to the cylinders corresponding with these numbers. Having done this, revolve the engine until the piston of No. 1 cylinder is within ¾-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 rises on the inclined plane of the steel segment marked No. 1 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.

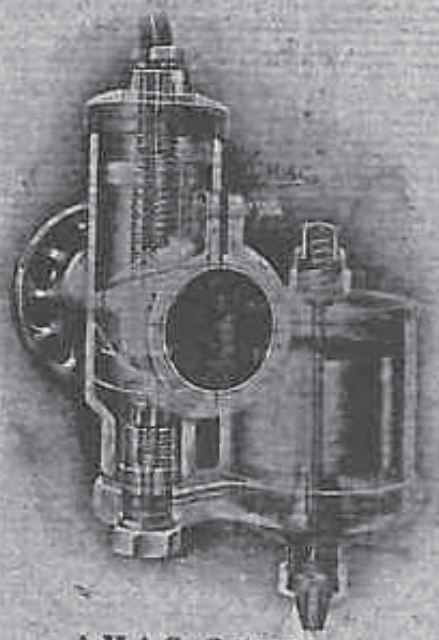
ILLUSTRATION N.

It will prevent misfiring, and make starting easier, if the slip ring is cleaned occasionally. This is done by taking out a 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 fibre 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 screws* 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.

Carburetter A.M.A.C.



A.M.A.C. Carburetter

ILLUSTRATION O.

The instrument which we fit provides, in our opinion, the best all-round solution of the problem of carburation for the average rider, as it is extremely simple to handle and provides a measure of automaticity which particularly appeals to all except those riders who revel in constant lever manipulation. Its construction, however, at the same time allows of a large range of adjustments at the hands of the expert, the choice of jets being so proportioned that while the best results can be achieved by a skilful use of the air lever in conjunction with the throttle, use of the latter alone with the air fully open will yield results equal to those of many two-lever instruments demanding the intelligent use of both levers. The cable control adjustment of air and throttle slides is effected at the top of throttle chamber. The jet can be removed without disturbing the carburetter.

Slow Running—Either a too rich or too poor mixture will cause misfiring at slow speeds. If the mixture is too rich, black smoke will issue from silencer. If too poor "popping back" will take place in carburetter.

The following will prevent slow running:

Too large a jet or carburetter flooding. Unequal wear of inlet valve guides. Bad petrol supply. Dirt or water in petrol. Low level of petrol in float chamber caused by the machine leaning (in the case of an incorrectly fitted side car). Weak exhaust valve springs. Faulty plugs or points of plugs too far apart. Slight leakage of high tension current to frame via high tension cable. Weak magneto. Dirty and badly worn contact breaker points, or too great a gap between the points when broken. If the engine refuses to run slowly, always first check the petrol in float chamber. Try lowering the level by lowering the sleeve of needle valve, under which the split cotter fits. The needle must be removed to do this. If this makes matters worse, raise the petrol level by reversing the process.

Setting and Driving—The jet should not be so large that the engine will take full air with the throttle full open. The air slide acts as a variable choke tube, and the air passage (when both slides are full open) is greater than the inlet pipe.

The air lever should open from 2·3 in. to 3/4 in. when going full out. If more the jet is too large, if less the jet is too small.

It will be found that for all ordinary variations in speed it is not necessary to alter the position of the air lever, owing to the throttle acting as a variable choke tube to a certain extent. On a steep hill the air lever should be closed somewhat, and also for very slow running, although it will be found that the machine will run with the throttle nearly closed and the air full open owing to the

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supplementary action of the slides. This is not an indication that the jet is too large or that not enough air can be given, but is a natural consequence of its semi-automatic action. When the carburetter is properly set the air lever should have three positions:—

For high speeds and hard driving—HALF CLOSED.

Slow Speeds in traffic—NEARLY CLOSED.

Ordinary Speeds—FULL OPEN.

Easy Starting—To start the engine easily do not open the throttle more than half way. The following can prevent easy starting:—

Badly worn inlet valve guides. Petrol pipe stopped up with dirt, &c. Air lock in petrol pipe or tank. Mixture too poor owing to too small a jet. Throttle too far open. Carburetter not vertical. Faulty ignition. Ignition retarded (see "Slow Running").

If the engine is very difficult to turn over when cold, inject petrol through the compression taps.

Adjustment of Slides—Put the control levers in closed position, then screw the adjusters on top of throttle barrel in or out until all slack is just taken up. When doing this, hold the cable to prevent it twisting with the adjuster. All sharp bends must be avoided or the inner cable will work stiffly.

It is extremely important that the inlet pipe joints be absolutely air-tight to get satisfactory slow running.

Flooding—This can be caused by any of the following reasons:—

Dirt on needle valve seating. Gauze in filter preventing proper working of needle valve. Bent needle valve. Split pin not being fixed under collar on needle valve. Punctured float. Carburetter not vertical. Needle valve too long and fouling the underside of float-cap.

In most cases flooding is caused (especially on new machines) by dirt on the needle valve seating. This can be cured by twisting needle valve with the fingers while pulling upwards.

Do not leave the machine standing for long periods without turning off the petrol.

Petrol Consumption—To get the best results study carefully the hints given under the heading "Setting and Driving."

Other causes of heavy petrol consumption not due to carburation are:—

Allowing the engine to run for long periods when the machine is standing. Unnecessarily using the free engine clutch, and driving on the low gears without a cause. Driving with ignition retarded. Inlet valve or springs too weak causing "blow back." Air gauze stopped-up with dust or mud (this will cause misfiring). Exhaust valve too small. Choked silencer.

Important Note—After a new machine has been run about 200 or 300 miles, and the engine thoroughly "run in," a smaller jet can usually be fitted to advantage, especially regarding petrol consumption.

Try a No. 28, 27, or even No. 26 jet before being satisfied that the best results are being obtained, consistent with satisfactory running.

Between the air intake and the body of carburetter is fitted a disc of gauze which prevents dust or foreign matter getting to the engine. Periodically clean this gauze. If the gauze is choked with dust, etc., no air can get to the carburetter, and erratic running takes place, the cause of which is difficult to trace.

Back Detachable Wheel Removed.

ILLUSTRATION P.

Rear Wheel—To remove the back 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 avioded 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 (see Illustration Q). Now replace the distance piece and the centre pin and proceed to refit tube and cover. Fitting the centre pin first, holds 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 case (see "Chain Case"), slack off spindle nuts 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.

Care should be taken to prevent the ends of chain falling back into chain case while removing the wheel. The upper portion of chain should be folded back over the top of chain case and hooked on to the pin provided. The lower portion of chain will hang down below the bottom half of case.

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.

Centre-Pin of Rear wheel withdrawn to allow Inner Tube to be completely taken out and replaced without detaching the wheel.

ILLUSTRATION Q.

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.

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Showing Front Wheel detached and its interchangeability with Rear Wheel.

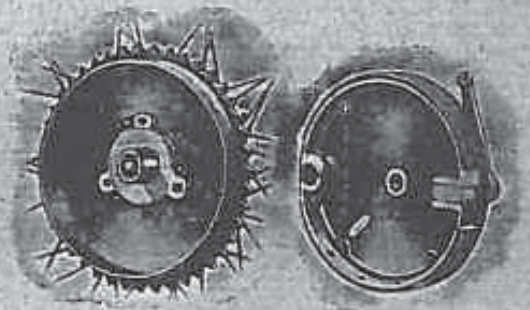
ILLUSTRATION R.

Front Wheel—The front wheel is interchangeable with the back, and to remove this first jack up the wheel on the front stand. Slacken the nuts of brake blocks and swing them clear of the rim to allow tyre to pass. Next take out the centre pin, which will allow wheel to fall out of fork ends. It will be found that a dust cap is fitted on the left hand hub flange, which must be pulled off when it is desired to use the front wheel for a driving wheel and refitted to the wheel which is to replace it. This hub cap entirely protects the driving face of the hub from dust and grit.

The adjustment of the hub bearings is perfectly obvious. Both 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.

This brake requires no attention with the exception of occasional adjustment by means of the adjustable stop fitted to the stay of carrier.



AJS INTERNAL EXPANDING BRAKE

ILLUSTRATION S.

Rear Stand.

The operation of the rear stand requires very little explanation.

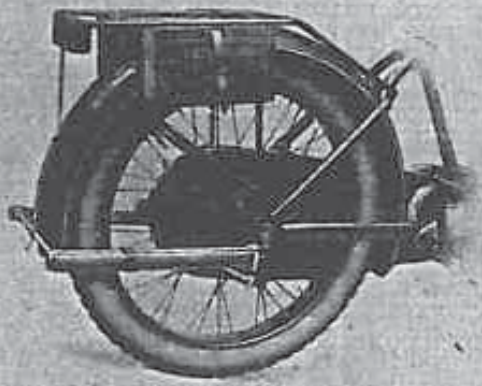


ILLUSTRATION 1.

Illustration 1 shows the stand in the normal position. Illustration 2 depicts the stand let down and the rider about to pull lever over backwards, which instantly commences to raise the machine on to the stand. Illustration 3 shows the final stage of the movement, the levering action being fully completed and back wheel raised clear of the ground. To bring lever into action release clip which holds it to the stand tube, and swing it over towards the engine. Now push down the stand in the ordinary way on to the ground and pull lever upwards towards rear of machine. When the operation is completed *always fold the lever down again* and clip it to stand. To lower the machine simply reverse these operations.

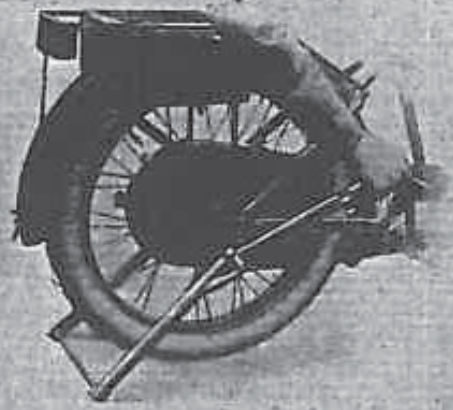


ILLUSTRATION 2.

ILLUSTRATION 3.

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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. If a side-car is fitted, don't forget to lubricate the spring shackles, etc., if squeaks are to be avoided. If the leaves of the springs creak or squeak, separate them by inserting the end of a screwdriver, and force oil between with the oil gun.

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 carburetter, 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, **or better still, carry tools and** spare parts in the locker of side-car where they **will not be subjected to such** punishment as when packed in the pannier bags on carrier. 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.

If the machine is used **at all as a solo mount**, 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 sub-**stantial 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, and a spare cover and tube in case of serious tyre trouble, if a spare detachable wheel is not carried.

The 6 h.p. A.J.S. is designed to carry two persons, and luggage, anywhere, and do it easily, but if you have a freak hill in your district, do not try to climb it with all your friends heaped up in the **side car and on the carrier. It is not fair to** the machine, your pocket, or the makers.

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.

Side Car Hints.

It is highly important that the side car **be in perfect alignment with the** cycle or all-round satisfaction cannot be obtained.

The side car wheel should be dead parallel with the wheel of cycle and also perfectly vertical. The cycle also should be quite upright, and not leaning either outward or inward. Two straight pieces of wood, about 7 or 8 feet long should be used to test the alignment. One piece should be placed alongside both wheels of cycle, and the other against the side **car** wheel, and when measured across each end the distance should be equal.

If, although the alignment is correct, the machine has a tendency to steer to the left, the cycle should be adjusted to lean a little to the right. If the steering tends to the right, slightly lean the machine to the left (towards the side car).

Always drive the machine sitting **in an** upright position, and do not fall into the unsightly habit of leaning the body permanently towards the side **car.** It is not only unnecessary but it puts a great strain **on** the side **car** attachments.

After the machine has **been in use** a little time it sometimes happens that the side car fittings will take a permanent "set," causing the cycle to lean slightly towards the side car. This is easily remedied **by** means of the telescopic torque rod, between the seat pillar and the side car axle.

When turning a corner sharply to the left, lean the body to the **left**, when turning to the right lean the body to the right. It is not sufficient, however, to simply lean the body, the rider should throw the weight of his body in the direction he leans.

Always endeavour, however, to turn a corner at a reasonable speed, especially when turning to the left, as centrifugal force puts a great lateral strain on the machine and tends to lift the side car wheel from the ground. When turning to the right the lateral strain is thrown in the opposite direction and has a crushing effect on the side car axle via the torque rod. When taking a corner to the right at high speeds this strain is terrific and is a fruitful cause of side car axles breaking.

The A.J.S. side car axle is made specially strong for this reason, but the rider will be well advised if he takes corners at a reasonable and safe speed.

When turning to the left while climbing a very steep hill at a moderate speed it is not so necessary to lean in that direction, as the natural side-drag of the side car tends to turn the machine to the left. When turning to the right under the same conditions the driver and passenger should lean well to the right.

When climbing a very steep hill the passenger should get in a position that will put as much weight as possible on the back wheel of cycle. It will prevent the wheel slipping, and will counteract the tendency of the side car to drag. When descending very steep hills it will help the steering also if the passenger will put as much weight on the driving wheel as possible. This paragraph only refers to "freak" hills.

With the exception of the instances mentioned above, there is no necessity for the passenger to be continually leaning to the left or to the right, especially if ordinary corners are taken at a reasonable and safe speed. It is not an uncommon sight to see a passenger continually leaning in one direction or the other, even when turning a very slight curve in the road, with the mistaken idea that it helps the steering. It is not only unnecessary but it makes a toil of what should be a pleasure.

The old saying "the race is not always to the swift," is **very** true, when applied to motoring. The careful driver who keeps up a consistent reasonable speed is usually much more certain of reaching his destination, not only in good time, but in comfort and safety.

As a last word on side cars, we would earnestly advise our friends to order the complete combination (if this has not already been done) and not fit **one** of the ultra cheap side cars with which the market is flooded (some of the expensive ones are very badly designed!). They not only give continual trouble but in **some** cases are positively dangerous. However reliable the motor cycle **may** be, **a side** car which is always giving trouble spoils the whole combination.