

HANDBOOK
OF
Motor **A.J.S.** Cycles

INSTRUCTIONS FOR OWNERS
ON THE CARE AND MAINTENANCE
..... OF A.J.S. MACHINES.

SERIES R.

2.48 h.p., 3.49 h.p., 4.98 h.p., and 9.96 h.p. Models.

1930.

MANUFACTURED THROUGHOUT BY
A. J. STEVENS & CO. (1914) LTD.,
GRAISELEY HOUSE, WOLVERHAMPTON, ENGLAND.

TELEPHONE 1731
(Five Lines).

COPIES :
A.B.C. 5th Edition.
A.B.C. 6th Edition.

TELEGRAMS :
"HORR, Wolverhampton."

Bentley's, Marconi International.

FOREWORD.

THE information given in this booklet has been very carefully compiled in the hope that it will prove of assistance to the rider in keeping his machine in the best possible condition, and aid him in elucidating any little difficulties which may arise from time to time.

The reader's attention is especially drawn to the pages devoted to Driving Instructions and General Care of the Machine, these apply with equal significance to all types of 1930 A.J.S. Models. Particular attention should be given to those parts of the instructions which are emphasised by being printed either in italics or heavy type.

This booklet covers the whole range of the 1930 A.J.S. Models, and as there is much in their constructional details that is common to all types, these will be found grouped under such headings as "Driving Instructions," "Care of the Machine," "Change Speed Gear," "Detachable Wheel," etc. Where, however, differences in design occur, they are dealt with in separate sections.

It has always been our aim to construct A.J.S. Motor Cycles on such simple and straightforward lines that their management, running and upkeep shall present no difficulties, even to the motor cyclist with little or no previous experience.

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 be accompanied in every case by a remittance for 1/- to cover cost and postage.

1930.

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

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DRIVING INSTRUCTIONS, ETC.

For 2.48 h.p., 3.49 h.p., 4.98 h.p., and 9.96 h.p. Motor Cycles.

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ERRATA.

9.96 H.P. CHAIN CASE.—Page 19.

The information given on page 19 only applies to a 9.96 h.p. machine when this is fitted with totally enclosed chain case to special order. The standard chain case encloses the primary drive, but not the rear, this latter being covered over the top half only.

QUICK DETACHABLE WHEEL.—Page 24.

In the second paragraph relating to the removal of wheel complete with sprocket, brakes, &c., this should read:—"Take the chain off the sprocket by means of the spring link, and unscrew and take out the brake drum anchor bolt and nut. The wheel will then fall out of the slots in fork ends." The above remarks apply also for the removal of the rear wheel of models R5, R7, R10 and R12.

BRAKE ANCHORAGE.—Page 24.

The instructions regarding replacement should read as follows:—"When the wheel is replaced see that the brake anchorage bolt and nut are screwed up again tightly."

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

The oil tank will be found situated behind the rear down tube. For further instructions respecting lubrication see "Care of Machine—Engine," page 8.

To Start the Machine.

See that the gate change lever is in the neutral position marked on the gate change quadrant.

Retard the ignition lever about $\frac{1}{4}$ or $\frac{1}{2}$ its travel. This is to prevent back-firing.

Move the lever to the left to retard the ignition and vice versa.

On machines fitted with twist grip control, the ignition lever is mounted on the right handlebar above the air lever, and to advance the ignition this lever is moved to the left, and to the right to retard. Machines fitted with the lever control to the carburettor have the gas and air levers on the right handlebar, the throttle lever being the bottom or lower one. These open inwards, that is to the left when seated on the machine. The magneto lever is on the left handlebar.

If the cables are properly adjusted, the least movement should begin to operate against the springs in the carburettor. If there is any slackness in the cable, the adjusting screw in the top of the carburettor should be raised to remove the back lash.

- (a) Turn on the petrol by pushing the tap to the "on" position, and when the float chamber needle has risen, give it one or two taps with the finger to flood the carburettor.
- (b) Shut the air lever.
- (c) Open the throttle very slightly, that is about $\frac{1}{8}$ in. pull on the wire after you have felt the resistance of the throttle spring.

IVING INSTRUCTIONS, ETC.—Continued.

On machines with twist-grip the right handlebar grip is moved inwards to open, *i.e.*, anti-clockwise when seated on the machine. Twist-grip control pulls the throttle wire like an ordinary lever, but working around the bar instead of on top of it. Open the throttle very slightly by twisting inwards about $\frac{1}{4}$ in. movement of the diameter of the rubber grip after you have felt the resistance of the throttle spring.

When Starting up—Twist Grip.—See that the position of the twist grip is not altered, this may easily take place by the movement of the body when depressing the footstarter pedal.

Footstarter.—Now lift the exhaust lever and turn the engine over, say twice with the footstarter, to get gas into the cylinder. Then give one smart kick downward, and the engine should start. Take the foot off the pedal immediately the engine fires, *but do not allow the footstarter to spring back with a bang.* Bring the foot back with the pedal and to prevent a heavy blow being given to the stop.

Carburettor Adjustment.—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. Alter the engine has warmed up the lever can be left open.

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 cause 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. Raise 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.

To sum up for Starting.—Do not flood the carburettor except when cold or when petrol has been turned off for any length of time.

There is no need to shut the air lever if the engine is hot.

Do not open the throttle more than the slightest amount.

Set the ignition lever a quarter or half retard, and when the engine is started, advance the ignition fully.

Presuming these instructions have been carried out, and you are seated in the saddle, take out the clutch by means of the clutch lever on the left-hand side of the handlebar, 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 foot brake.

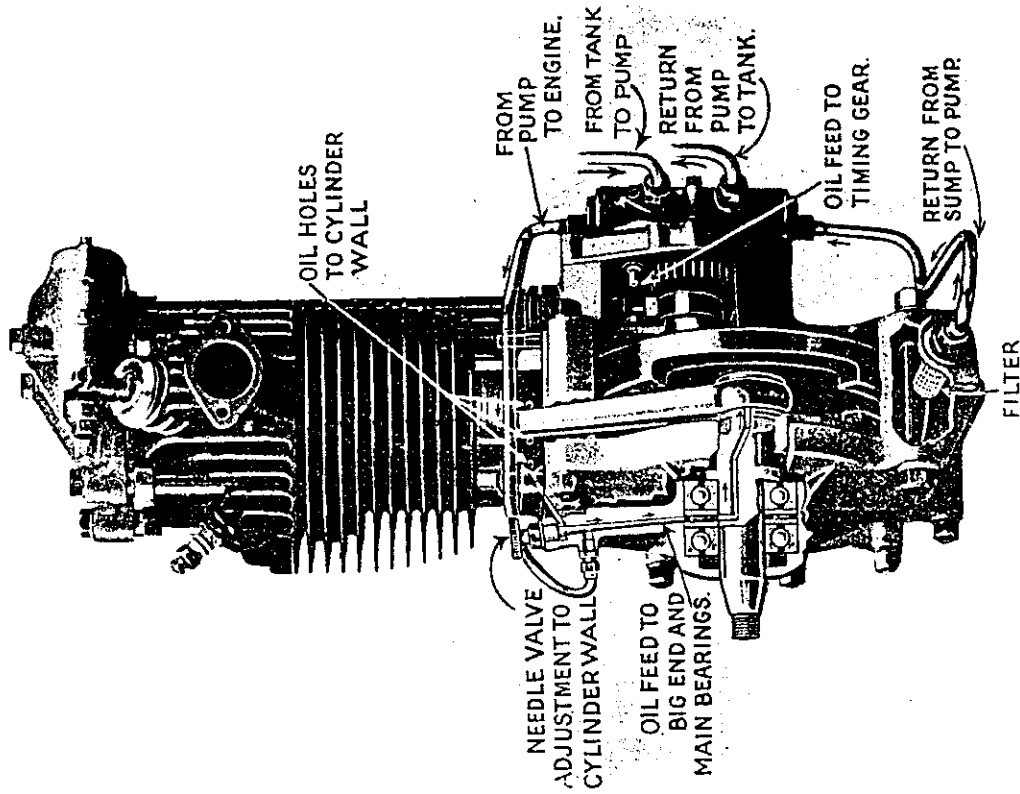


Illustration 1.

DRY SUMP LUBRICATION.

Sectional view of engine, showing circulation of oil.

CARE OF THE MACHINE. ENGINE.

Lubrication, Dry Sump.—Only best quality oils should be used. We use and recommend Wakefield-Castrol "C," other suitable oils are Golden Shell, Mobiloil "B" Summer, Mobiloil "TT" Winter (for side valve engines); Mobiloil "D" Summer, Mobiloil "TT" Winter (for O.H.V. Engines); Pnce's Motormine "C" de Luxe Winter, Motormine "B" de Luxe Summer.

Lubrication of the engine is of the dry sump type. Driven by the half-time shaft is a double-acting pump, of which the feed side forces oil to the main bearings and thence by oil-ways to the big end. Oil is also forced to the timing gear case, lubricating all gears, cams and bearings. All oil pumped to the engine drains to the sump, from whence it is drawn by the other half of the pump and returned to the tank.

For every condition of touring, either fast or slow, the cylinder is correctly lubricated by oil thrown from the big end, but should the machine be used for road or track racing, oil can be fed direct to the piston by unscrewing one to two complete turns of the needle-valve fitted to the left-hand side of the crankcase at base of cylinder. Other than using this needle-valve for racing work, the lubrication system requires no adjustment whatever.

Important.—If the rider complains that his engine is wearing badly and gives poor performance, it is usually found on investigation that the oil tank has not been drained of old oil after many thousand miles of running, or that it is the rider's usual practice to have the oil at a very low level in the tank, with a result that the oil circulating through the engine has practically no lubricating qualities at all, and has become particularly thick, dirty, and impregnated with foreign matter. It is very important therefore, that as far as is reasonably possible the oil tank should be kept full. Also drain tank of dirty oil; clean tank and engine filters and oil pipes at least every 1,000 miles.

The circulation of the oil can be seen by removing the oil tank filler cap just underneath the return pipe from the sump. If, with the engine running oil flows through this pipe, the system is functioning properly. After the engine sump has been drained, it will be found that when the engine is started up again oil will not immediately flow through the return pipe into the tank, on account of the time which must necessarily elapse for the oil to circulate throughout the engine before being pumped back to the tank.

With this patented system of lubrication the rider has the satisfaction of knowing that a continuous flow of clean, cool oil is passing through his engine to suit every condition of road or load, with no trouble to himself, excepting keeping oil in the tank to the level shown thereon. But be sure the tank is never allowed to run dry. The oil pipes from the tank to the pump, and from the pump to the engine are concealed, except for an inch or so where they are connected to the oil tank and pump. Those from the tank to the pump pass underneath the bottom bracket through special oil-ways integral with the bracket, and at their juncture with the pipes are connected by a short length of rubber tubing. Similarly the pipe from the pump to the engine passes through the front engine plates. To disconnect the pipes, simply unscrew the union nuts and pull the pipes out of the rubber connections.

Adjustments and Cleaning.—See that the valve tappets of side valve and overhead valve models are always properly adjusted, .006 in. inlet and .008 in. exhaust is the correct clearance, or about the thickness of a visiting card 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 on side valve models.

To remove the cylinder head for decarbonising, the exhaust pipe must be disconnected from the cylinder. With the exception of the 9.96 h.p. twin cylinder machine, the exhaust pipe is a push-on fit on to the exhaust port outlet. On the twin cylinder models, however, the pipes are held up by union nuts which must be unscrewed. Next remove the petrol pipe and slides from the carburettor, then undo the four holding-down bolts on top of the cylinder head. To detach the head insert a screwdriver or similar tool between the top of the cylinder fin and the head, prising the head carefully off the barrel from both sides. Take great care not to break the radiating fins. Prise upwards not downwards. When quite free, the head can then be lifted off. If it is desired to remove the

ENGINE.—
pinned.

cylinder barrel as well, the four nuts situated at each corner of the base will have to be unscrewed from the studs, but before drawing off the cylinder barrel the engine should be turned over until the piston is at the lowest position of its stroke, and then lift off the barrel carefully, taking care 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.

In the case of the R5 machine the cylinder head and barrel are in one piece, and the former cannot therefore be detached as is the case with all other models. The general instructions for decarbonising, however, will hold good in the case of this particular model. In order to remove the cylinder of the R5 model, the exhaust pipe and steady bolt between the cylinder and front down tube must be removed, also high tension wire to the plug. The carburettor can either be left in place on the cylinder by removing the slides and the petrol pipe from the bottom of the float chamber, or alternatively the carburettor can be detached from the inlet port by removing the two pins that bolt it to the cylinder. Next unscrew the four nuts which hold the cylinder barrel to the crankcase, when the cylinder complete can be lifted off. The decarbonising of the head can be accomplished with the aid of a long screwdriver or similar tool with which to scrape or chip off the carbon.

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. The top of the piston should 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. To remove the gudgeon pin from the piston, take out one of 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.

After replacing the piston, see that both the gudgeon pin retaining springs are in place. 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 the crankcase and base of the cylinder. If the washer between the cylinder head and barrel has been damaged in detaching the head, replace with a new one. Smear the face of the cylinder head with a thin film of oil or vaseline. This will act as an adhesive to which the washer can be fixed, and will retain the washer in its correct position whilst fitting the cylinder head on to the barrel. Place the cylinder head squarely on the barrel and then screw on the four holding-down bolts, afterwards tightening these evenly.

If it is required to remove the valves of side valve machines for inspection, etc., this can be done with the cylinder head still in position. 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 center to be withdrawn.

The valve can then be pushed up and drawn out of the head, via the valve cap aperture. If the valve settings are at all pitted, grind in the valves with fine emery flour mixed with oil into a paste, 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.

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.

ENGINE—Continued.

Removal of Cylinder on O.H.V. Models R 6, R 8 and R 14.—To remove the cylinder for cleaning, first disconnect all such fittings as exhaust pipes, carburettor slides, then proceed to remove the tubes which enclose the push rods by telescoping them one inside the other. To do this the lock nuts at top and bottom of the tubes must be unscrewed. To detach the push rods the special extractor tool should be used; this is not supplied with the kit but can be had, Price 1/—/. Place the end of the tool with the round hole over the rocker adjusting screw (see Illustration 2) and press down until the valve

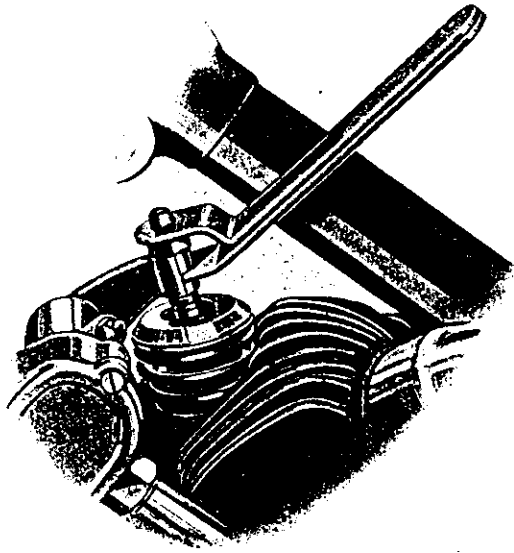


Illustration 2.

PUSH ROD EXTRACTOR.

spring is compressed. Hold down firmly and take hold of the bottom of the push rod which will be seen passing upwards from the crankcase to the rocker. Lift this up from its hollow cup and withdraw. Repeat the operation for the other push rod. To remove the rocker gear for the purpose of decarbonising, the locknuts at top and bottom of the push rod enclosing tubes will of course have to be dealt with as mentioned in the preceding paragraph. Next unscrew the four pins holding down the rocker box. The two pins at the right or push rod side of the rocker box need only be unscrewed until they are free, but those nearest to the valves must be withdrawn entirely. The rocker box can now be drawn off the cylinder head from the right hand side. Next unscrew and remove the four holding down bolts on top of cylinder head. To detach the head insert a screw-driver or similar tool between the top cylinder fin and the head, prising off carefully upwards from both sides.

The rocker gear can be inspected by removing the inspection cover, but this need not be taken off for the purpose of lubricating the upper ball joints of the push rods. In the centre of the inspection cover will be found a Tecalmite nipple, and by means of the grease gun a very little grease can be forced through the nipple, which automatically finds its way to the push rod ball joints. It is important when this is being done that both valves are in the closed position. If the inspection cover is removed, care should be taken to see that the two coil springs, which fit inside the rocker spindles, are not lost. These coil springs press against the inside of the cover, and have their other bearing against the end of the hollow rocker spindle.

ENGINE—Continued.

Should it be desired to remove the valves 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 the illustration. 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 so that the two small split cones can be taken away from the recess in the valve stem, and the valves withdrawn.

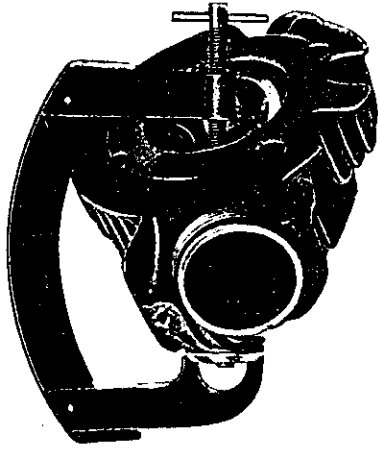


Illustration 3.

VALVE EXTRACTOR.

like tool to extract the valve 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 the illustration. 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 so that the two small split cones can be taken away from the recess in the valve stem, and the valves withdrawn.

Carburettor Fitting.—The carburettors on all the 1930 models, except the Twin Cylinder Machine, are fitted to the cylinder by means of a flange and two bolts, and care should be taken that a perfectly air tight joint is made between these two faces if the carburettor has been taken off. If the washer is damaged do not hesitate to replace it with a new one, as a bad joint will cause air leaks, and consequently erratic running.

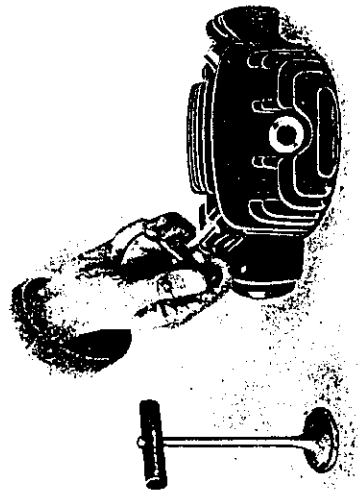


Illustration 4.

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

OVERHEAD CAMSHAFT ENGINE.

Removal of Cylinder on O.H.C. Models R7 and R10.—Remove exhaust pipe, carburettor connections, oil pipe to cam box, etc. Take out sparking plug. Then put piston on top dead centre with valves closed. Take away cap, also split cotter fixing nut on camshaft and remove the nut. Take off the washer; next remove the four pins holding the cam box on to cylinder head, and whilst an assistant holds and steadies the chain-wheel, carefully take away the cam box.

Unscrew the four pins holding cylinder head in position.

Take off cylinder head, then carefully turn engine until piston is on bottom of stroke. Whilst turning the engine, support the chain wheel, either with the fingers or some instrument that will allow the chain wheel to turn freely. The chain wheel must not be allowed to lock in the chaincase whilst the engine is being turned. For decarbonising see general instructions on page 8.

To Re-assemble.—Fit the cylinder into the crankcase and tighten the four holding-down nuts evenly

Next replace the cylinder head and tighten these nuts down.

When fitting the cam box, carefully place the chain-wheel on spigot of camshaft, then turn engine round slowly until hole in the camshaft sleeve is opposite hole in chain-wheel.

Now insert the washer with its special peg, and tighten up nut

Fit split cotter.

Fit exhaust pipe, oil-pipe to cam box, carburettor connection, etc.

Should it be necessary at any time to take away the chains that drive the camshaft and magneto, see that the tooth marked with a dot on the timing pinion is opposite the dot on the larger pinion. Also see that the arrows on the chain-wheels are opposite each other (see Illustration 5).

Valve Clearance, Most Important.—When the engine is cold there must be a clearance of .018 between the end of the exhaust valve stem and the rocker stud, and .016 between the inlet valve and rocker stud. Gauges are supplied with each machine to show this clearance.

On no account must the clearance be less than stated above.

If the gauge should be mislaid, a rough setting may be obtained by turning the engine over until both valves are closed, then loosen the locking nut on rocker stud and screw down the stud until it just touches the end of the valve stem. Now unscrew the stud one half turn which will give approximately .018 clearance. Tighten up the locking nut again afterwards. These clearances may appear to be excessive, but with a camshaft engine such as the A.J.S., these are taken up when the engine gets warm. Conditions are different to those of a push-rod overhead valve or side valve engine.

Warning.—Do not take any metal from cylinder foot or top end of cylinder barrel to raise the compression, or put a thicker washer underneath cylinder barrel to lower the compression. If this is done it will alter the chain centre.

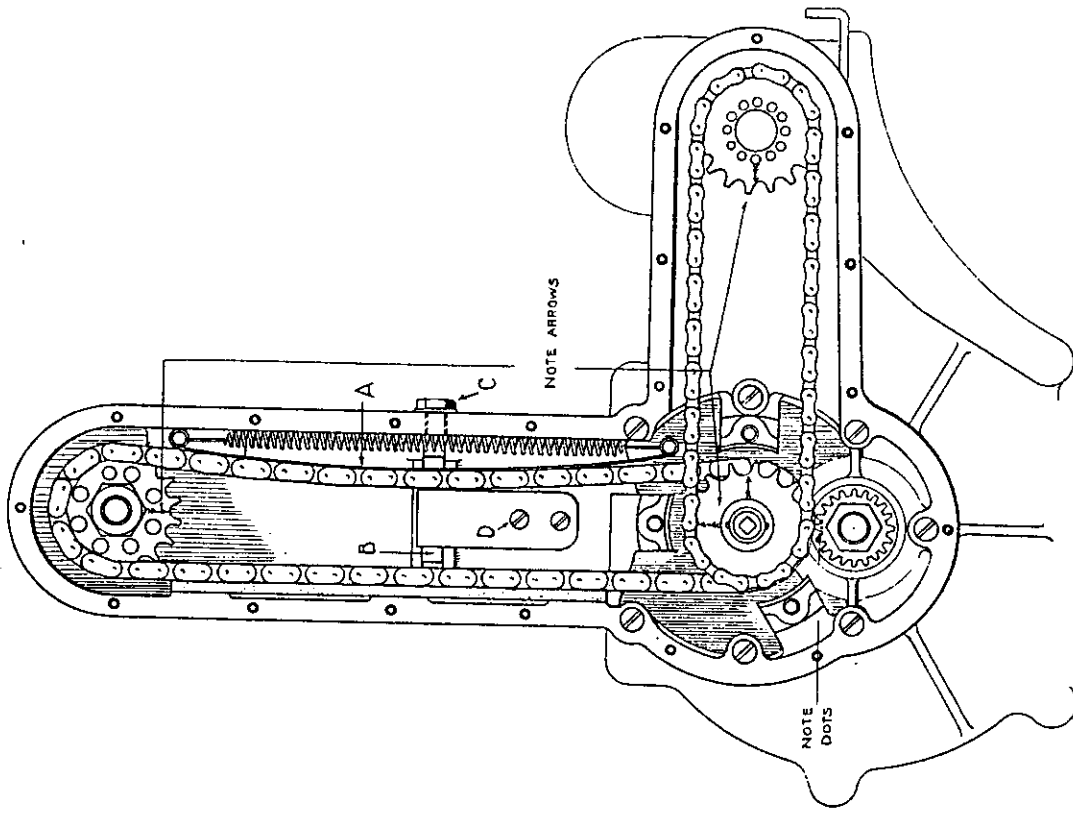


Illustration 5.

A.J.S. CAMSHAFT ENGINE,

Showing Chain Drive, Tensioning Device and Reaction Damper.

MAGNETO. Continued.

shaft, set the piston its correct distance from top of compression stroke (see ignition timing for details of settings of each particular model), making sure it is not on the exhaust stroke. With the piston 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 points. This is the firing point, and with the piston in the position referred to above 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.

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.

Ignition Timing.—The spark is timed to take place $\frac{3}{8}$ in. before the top of compression stroke on Models R2, R9 and R12, $\frac{1}{8}$ in. before top of compression stroke on Models R4, R5 and R8, $\frac{3}{8}$ in. before top of compression stroke on Model R6, and $\frac{1}{4}$ in. before top of compression stroke on Models R7 and R10. In all cases these are with the magneto control in the fully advanced position.

Magdyno.—This instrument, if fitted to a machine, provides ignition for the engine and generates current for the electric lamps, and although the two are retained as separate units they are housed so as to form one instrument. A full description of the working, care and maintenance of the "Magdyno" is contained in the Lucas Book of Running Instructions, a copy of which is sent out with each new A.J.S. machine.

The lubrication is the same as with the ordinary magneto. Usually sufficient grease works through from the gear wheel casing to lubricate all bearings on the driving end. The dynamo commutator end bearing can easily be lubricated by removing the hexagon nut securing end cover and placing a small quantity of grease or a few drops of oil in the bearing housing. The magneto bearing at the contact breaker end should run perfectly without any attention, owing to the manner in which it is protected. Should the gears run completely dry they can be packed with a high melting point grease such as Price's H.M.P. grease.

When Ignition Trouble is Suspected.—Before interfering with the magneto verify that the sparking plug, the cable and connections are correct. If these are in order turn the engine over slowly and watch if the contact breaker arm 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 prise the rocker arm off its bearings and clean the steel pin on which it works with fine emery cloth, and smear a very small quantity of oil on it before replacing. 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.

Magneto Adjustment.—Models R4, R6, R8 and R9.—Examine the driving chain occasionally, and, if slack, it must be tightened. The adjustment of the magneto on these models is different to that of R2, R5 and R12. The foregoing models have inclined engines and the magneto is carried behind the cylinder on a platform which is mounted on the bottom bracket by four pins. This platform is pivoted at its forward end and can be raised in order to take up chain slack. To adjust the chain, the front and rear nuts should be unscrewed and the platform raised from the forward end. When the desired chain tension is arrived at, hold the magneto and platform carefully and retighten the nuts.

Magneto Adjustment.—Models R2, R5 and R12.—On these models the magneto is carried in front of the engine and adjustment is obtained by slacking off the platform adjusting pins and moving the magneto along the platform in a forward direction. When the correct chain tension has been obtained screw the pins up again tightly.

MAGNETO.

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 contact breaker points should be examined after 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 mm. or roughly $\frac{1}{64}$ 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 points only must 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 being exercised.*

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. Fitted 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 will be found an arrow. *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. As a means of verifying the timing, or if the sleeve (1) has been removed from the magneto armature

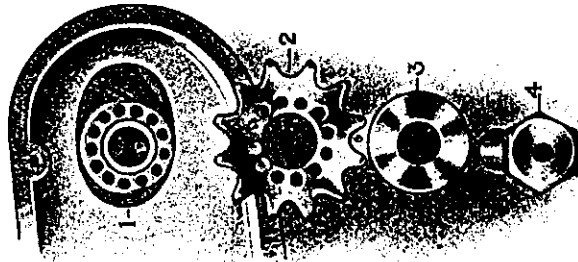


Illustration 6.

VERNIER TIMING ADJUSTMENT.

the timing shifting in the process, as is often the case with other methods. As a means of verifying the timing, or if the sleeve (1) has been removed from the magneto armature

GEAR BOX.

Lubrication.—Gargoyle Mobilgrease is also recommended as being entirely suitable for the A.J.S. gear box. This lubricant can be obtained in 1-lb. tubes, the use of which facilitates filling.

GEAR BOX.

The gearbox fitted to all A.J.S. machines is of the three-speed countershaft type, and beyond carrying out the following instructions should require no attention whatever.

Lubrication.—Wakefield "Castrolase" is specially recommended for the gearbox. If the gearbox has been dismantled, charge with $\frac{1}{2}$ lb. of the "Castrolase" and $\frac{1}{2}$ pint of oil used for the engine. Recharge with $\frac{1}{8}$ pint of oil every 1,000 miles.

It is very important to see that these instructions are carefully observed. No harm is done by an additional charge, but on the other hand a large percentage of gear trouble can be directly attributed to insufficient lubrication, or by using a lubricant which is not suitable.

It is not advisable to use thick grease, as it may prevent the free operation of the kick starter pawl.

The various joints in the gear changing lever mechanism should also be kept oiled regularly to ensure freedom of action.

Do not put oil into the clutch under any circumstances, as this is designed to run dry.

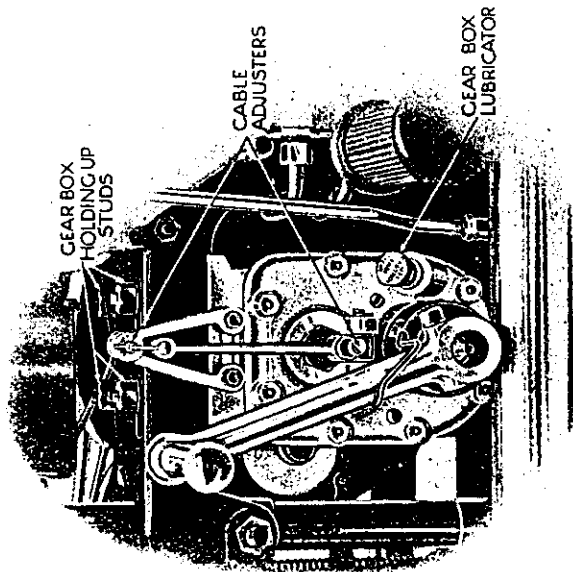


Illustration 9.

THE A.J.S. GEAR BOX.

MAGNETO.—Continued.

It is not necessary to remove the magneto chain cover to Test for correct chain tension, as all models are fitted with an inspection door on the chain cover.

When adjusting, turn the engine very slowly to check for any tight places in the chain. Examine also the nuts securing the chain sprocket to the engine shaft and armature shaft of the magneto respectively. To do these two latter operations, it will of course be necessary to take off the magneto chain cover entirely. After examining and before replacing the cover, oil the chain.

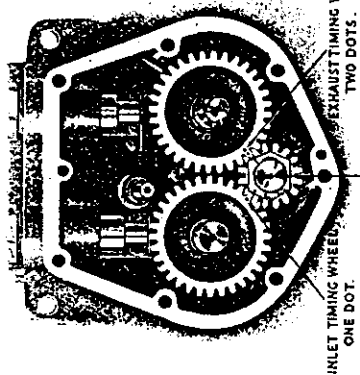


Illustration 7.

ARRANGEMENT OF TIMING GEAR,

Single Cylinder Models, except R7 and R10.

Engine Timing.—Model

R2.—The registering marks for twin cylinder models are as follows:—small timing pinion—single dot and double dot. These marks register with corresponding dots on the back and front exhaust cam wheels, the back exhaust wheel being stamped with one and the front exhaust wheel 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 pinion. There now only remains the double inlet cam wheel which meshes with the front exhaust cam wheel. Upon this 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.

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.

Engine Timing.—Models R3, R4, R5, R6, R8, R9 and R12.—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 7. 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.

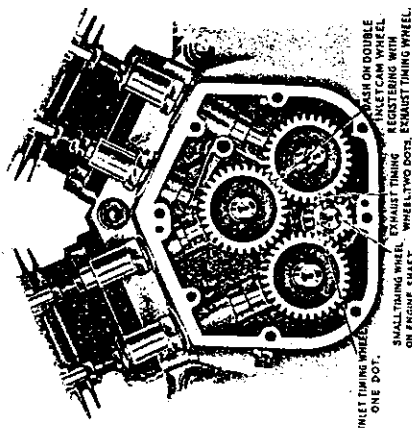


Illustration 8.

ARRANGEMENT OF TIMING GEAR,

9.96 h.p. Twin Cylinder Engine.

CLUTCH.

If the clutch should slip when climbing hills, see that there is a little back lash in the handlebar lever, otherwise the clutch springs cannot exert all their pressure on the plates, also when taking up excessive back lash in the handlebar lever, see that a little play is left to allow the plates to compress when the engine is pulling hard.

The adjustment for the handlebar lever is by means of an adjusting pin on the gearbox clutch operating lever. When all the adjustment on this is exhausted, further adjustment will be found with the milled nut at the end of the clutch cable, which screws into the lug on the gearbox.

There is no adjustment for the tension of the springs of the clutch on any model, the pins should be screwed up dead tight.

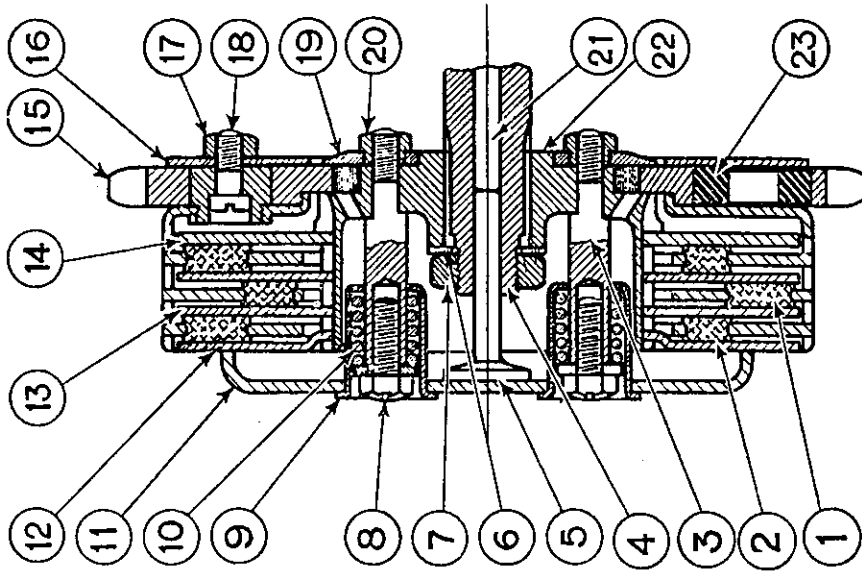


Illustration 10.
CLUTCH PARTS.

- | | | |
|---------------------------------------|------------------------------|------------------------------------|
| 1. Cork Inserts (Small). | 8. Clutch Spring Screw. | 16. Clutch Sprocket Back Plate. |
| 2. Cork Inserts (Large). | 9. Clutch Spring Box. | 17. Nut for Clutch Drive Screw. |
| 3. Clutch Spring Stud. | 10. Clutch Spring. | 18. Clutch Drive and Screw. |
| 4. Main Shaft. | 11. Clutch Spring Box Plate. | 19. Clutch Sprocket Locking Plate. |
| 5. Clutch Trust Pin. | 12. Clutch Outer Plate. | 20. Nut for Clutch Spring Stud. |
| 6. Locking Washer for Main Shaft Nut. | 13. Clutch Centre Plate. | 21. Clutch Rod. |
| 7. Main Shaft Nut. | 14. Clutch Back Plate. | 22. Clutch Centre. |
| | 15. Clutch Sprocket. | 23. Rubbers (solid) for Drive. |

Tension of Kickstarter Return Spring.—If any difficulty is experienced with the return of the footstarter crank after starting up the engine, this would be due to the spring not having sufficient tension. To overcome this difficulty, the kick starter crank should be removed, also the cover for the spring. You will then notice that the end of the spring is fitted into the first of a series of five holes. To get additional tension, the end of the spring should be fitted one or more holes to the right, which should have the desired effect. Under no circumstances whatever should the spring be given an additional complete turn.

TRANSMISSION.

Adjustment of Chains.—To adjust the chain from engine to gear box it is only necessary to slack off the nuts on top of the bracket and slide the box bodily backwards by means of the adjusting bolt.

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 (see adjustment gauge, Illustration 14). 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 $\frac{3}{8}$ in. on the front chain, and about $\frac{1}{4}$ in. on the back chain.

CARE OF CHAINS.

In the case of the 9.96 h.p. machines the chain drive is totally enclosed in weather-proof 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. 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

E OF CHAINS.—Continued.

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 foot-board rod and push through the lug of crankcase, just sufficient to allow the chain case to drop away. The front portion previously alluded to is readily removed by partly slackening 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 crankcase of engine through the chain case.

Lubrication.—Only the rear chain need be lubricated, the front chain being automatically oiled by a pipe from the oil tank. It is a good plan to oil the rear chain every day before starting out, one oiling being sufficient for a day's riding whatever the mileage done.

Long life, less need of adjustment, and complete satisfaction with the transmission is assured if the rider will make a point of oiling his chains 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, since it is usually worn out long before the breaking point is arrived at.

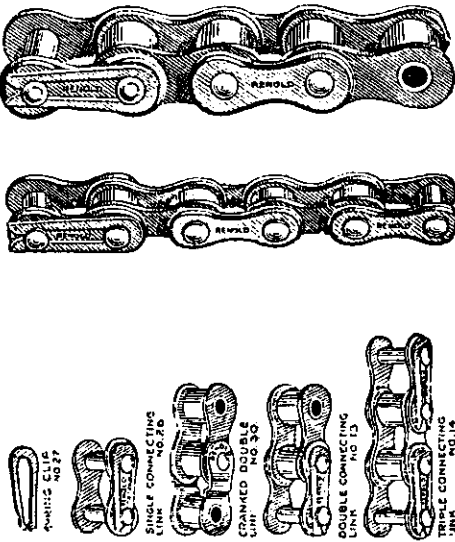


Illustration 11.

CHAIN REPAIR PARTS.

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 12) 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.

Outer links can be removed with this tool 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 rivet 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.

The illustration on page 20 shows all the parts necessary to effect repairs to a chain.

To shorten a chain containing an even number of pitches replace by parts No. 30 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.

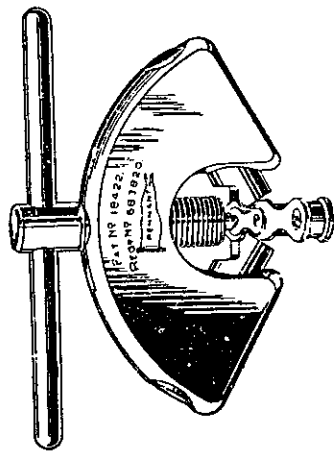


Illustration 12.

CHAIN RIVET EXTRACTOR.

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. Fit this so that the plate and spring clip are on the inside of the chain i.e., next the spokes.

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

STEERING HEAD AND HANDLEBARS.

All the 1930 A.J.S. machines are fitted with adjustable handlebars. If the rider wishes to make any adjustment, slacken off the bolts which pass through the split lugs that connect the handlebars to the forks, and partly rotate the handlebars upwards or downwards until the desired position is attained. Afterwards carefully tighten up the bolts of the split lug.

FRONT HEAD AND HANDLEBARS—Continued.

To adjust for any play in the ball head, slack off the lug around the steering head and adjust by the large hexagon headed nut on top of the steering column, turning to the right to take up slack and vice versa. Afterwards tighten up the bolt of the lug.

Adjustment of Steering Head.—Slacken the nut which bolts the split lug round the ball head, and adjust the large hexagon nut by turning to the right to take up slack and vice versa.

It is advisable in all cases when adjusting the steering head to place a box or some other article under the engine to take the weight off the front wheel, so that the forks may move freely.

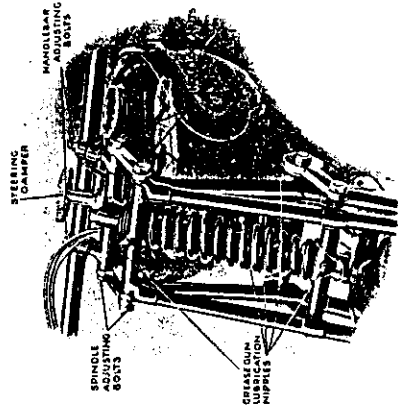


Illustration 13.

FRONT FORKS AND ADJUSTABLE HANDLEBARS, etc.

STEERING DAMPER.

The manipulation of the steering damper will be perfectly obvious. Turning to the right, that is clockwise, has the effect of tightening the steering. The correct tension may be adjusted to suit individual rider's requirements.

SPEEDOMETER.

When a speedometer is fitted, the instrument is let into the tank and held in position by means of two long pins which pass through the tank and are held by nuts from below. The drive is of course taken from the gearbox where provision is made for this.

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 see Illustration 13), 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.

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.

REAR WHEEL ADJUSTMENT GAUGE—Continued.

In the tool kit will be found a flat gauge that can be fitted round the rim (see Illustration 14). 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.

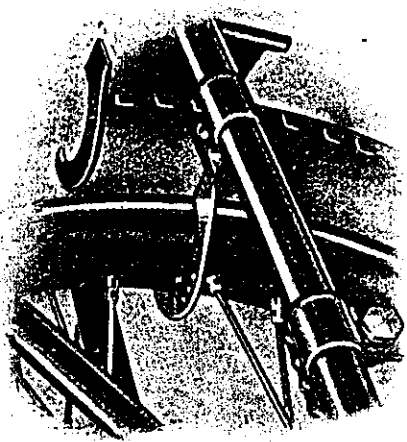


Illustration 14.

REAR WHEEL ADJUSTMENT GAUGE.

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.

It is important that this gauge should be properly on to the rim on both sides; the best method of ensuring this being to see that the hooked end is properly encircling the bead of the rim. Then pull the gauge end into place firmly.

DETACHABLE WHEELS.

With the exception of Models R5 and R12, all A.J.S. Machines are fitted with quick detachable rear wheels, and in the case of Model R2 the front wheel also is quick detachable and interchangeable.

To remove proceed as follows.—Put the machine on the stand and remove the rear mudguard stay on the right-hand side only—This only applies to machines fitted with central stands—then, with the box spanner provided, unscrew the three sleeve nuts which pass through the hub flanges. To prevent the wheel revolving while unscrewing the sleeve nuts, place foot against the tyre at bottom of wheel, or the change speed lever can be placed in gear. 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.

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

L.A.S. WHEELS.—Continued.

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 holds the wheel firmly while the tyre is being manipulated.

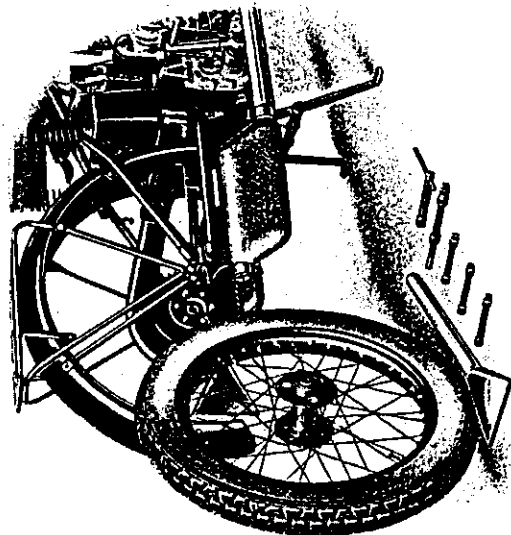


Illustration 15.

THE A.J.S. QUICK DETACHABLE WHEEL.

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, in wheel only is taken out, leaving the chain, sprocket, brake, chaincase, 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 the chain guard, slack off spindle nut and detach brake rod from lever. Take the chain off the sprocket by means of the spring link, and unscrew the brake drum anchor pin which projects into slot of brake anchor plate, sufficient to clear. The wheel will then fall out of slots in fork-ends. The above remarks apply also for the removal of the rear wheel of Models R7, R10 and R12.

When the wheel is replaced, see that the brake anchor pin is screwed into the slot in the fork lugs.

All wheels are disc-adjusting. Don't let the hubs run loosely, but take care that they are not adjusted too tightly.

All hubs before leaving the factory are packed with sufficient grease to last approximately two to three thousand miles, but an occasional charge with the grease gun when going over other parts of the machine is advisable.

IMPORTANT.

INSTRUCTIONS WHICH MUST BE CAREFULLY CARRIED OUT FOR DISMANTLING AND RE-ASSEMBLING TAPER ROLLER BEARING HUBS:—

To dismantle, release the locking nut and screw out the adjusting ring. The dished plate containing felt washer and plain plate will then drop out. Take out spring ring from the opposite side of hub and remove felt washer and holder consisting of two plates and retaining ring, the latter being between the two plates. The spindle can now be pressed or driven out from either end, bringing with it one of the outer races. The other race can then be driven out.

To re-assemble, press in outer race on fixed or plain end of hub, *taking great care that it goes in square.* This race is pressed in about 1/32 in. beyond its actual position, to enable the felt washer and its retaining ring together with the two plates to be put in, and the spring ring to snap into its groove. *Care must be taken to put the plate with the larger hole in last. This is most important.* This outer race can now be forced back until the plates are tight on the spring ring. The spindle can now be inserted, the short end being placed in first. *The long end of the spindle must be on the adjusting side.* The other race can now be pressed in until there is about 1/16 in. end play in the spindle. Insert plain plate and dished plate with felt washer, screw in adjusting ring, and gradually screw down until there is just a fraction of end play in the spindle. This should be .001 of an inch. It is of the utmost importance that the bearings are not adjusted too tight, as this would ruin them in a few miles. Having got this adjustment correct, the locking ring can be put on and tightened up, *again taking care that the adjusting ring does not creep forward and make the bearings too tight.*

Removal of Front Wheel.—Model R2.—As previously mentioned, the front wheel of model R2, being interchangeable with the back, the same system of attachment is provided, that is, three sleeve nuts and a centre pin. These are taken out in precisely the same way as in the case of the rear, when the wheel can be drawn off the driving studs on the brake drum. If the front wheel is to be removed, always place the machine on to its stand, or the machine will roll forward and damage the forks.

Removal of Front Wheel.—Models R4, R5, R6, R8, R9 and R12.—Disconnect the yoke end of the operating rod from the brake drum lever, remove anchor plate bolt which passes through the lug between the fork blades, and after slackening off the spindle nuts on either side, the wheel will then fall out of the slots in fork ends. When the wheel is replaced, see that the brake anchor pin is screwed in tightly and the spindle nuts are tight.

BRAKE ADJUSTMENT.

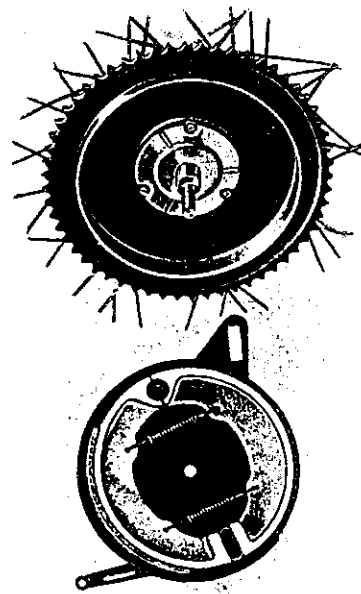


Illustration 16.

INTERNAL EXPANDING REAR BRAKE.

WAKE ADJUSTMENT—Continued.

The brakes of A.J.S. machines require no attention with the exception of occasional adjustment of the control mechanism. In the case of the rear brake this is effected by giving a few turns to the adjusting disc, turning to the right to take up slack and vice versa. The front, on all models except R5 and R12, is carried out in a similar manner by means of finger adjustment on top of the fork girder. In the latter, the adjustment is provided by turning the milled nut above the cable stop at the bottom of the fork.

GENERAL.

Remember you have a bicycle as well as a power plant. Frequently with the grease gun lubricate the links of spring fork and 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. Lubricator nipples are fitted to all important moving parts. 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 sidecar 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 into 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, or better still, carry tools and spare parts in the locker of sidecar where they will not be subjected to such punishment as when packed in the pannier bag 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. It is not necessary to have the front tyre inflated as hard as the back.

Do not test the compression of your engine by standing on the footstarter pedal. Put the machine on the rear stand, place the gear lever in "top" position, and pull the rear wheel over by hand.

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.

1. Never drive faster than you can pull up in the distance you can see.
2. Never attempt to overtake another vehicle on a blind corner.
3. Always keep closely to your right side of the road when taking a blind corner.
4. 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.

SIDECAR HINTS.

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

The sidecar 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

SIDECAR HINTS—Continued.

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 sidecar wheel, and when measured across each end the distance should be equal.

If the machine has a tendency to steer to the right or to the left, other than that caused by the camber of the road, the motor cycle is either not upright or the sidecar is out of alignment.

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

The A.J.S. sidecar 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 sidecar 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 sidecar 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 sidecars, 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 sidecars 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 sidecar which is always giving trouble spoils the whole combination.

HINTS AND TIPS FOR HILL CLIMBS AND SPEED EVENTS.

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 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 different engine sprockets with a chain for each gear, so that an alteration in the gear ratio can be effected with the minimum of trouble. For 3.49 h.p. machines we advise from 18 tooth to 22 tooth and for 4.98 h.p. machines from 16 tooth to 20 tooth.

Lubricating Oil. For racing, the oil we use and recommend is Wakefield Castrol "R," other first-class oils are Shell Super Heavy Oil, Mobilol "D," or Price's Motorine "B" de Luxe.

Fuel. On all models we have found an advantage by using a mixture of first-class Petrol and Benzole in equal proportions. 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.

Sparkling Plugs. A high-class plug is absolutely essential. There are many good plugs on the market, particularly the K.L.C., Type 341. 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.