

THE

Velocette

OVERHEAD
CAMSHAFT
MODELS 1925-1931

INSTRUCTION BOOK.

PRICE 6d NETT.

VELOCE LIMITED
HALL GREEN WORKS
BIRMINGHAM 11.

FOR SPARE PARTS PRICES—See Separate List.

INTRODUCTION.

In compiling this Instruction Book we have been to considerable trouble to make it as clear and comprehensive, and thus as useful as possible. We hope therefore that Velocette owners will make full use of it.

The Velocette differs in many ways from other machines and therefore requires a little special knowledge of its construction and adjustment.

Those who are already familiar with earlier Velocette models will find that on this model several alterations have been made in the construction of the machine, and in certain cases adjustments have been provided for in a different manner.

A careful study of the instructions will therefore be found to be well worth while.

VELOCE LIMITED.

LUBRICATION.

The importance of efficient lubrication cannot be over-estimated. The use of cheap oils is false economy and we strongly recommend the employment of those oils which we have found from our own experience to be the most suitable for our machines.

The identifying letters used by most oil firms denoting the different grades in which that oil is supplied are imitated so that it is essential when ordering oil to specify the brand as well as the grade. As an additional precaution it is advisable to buy from the branded cabinets or from sealed Packages. See where your oil is drawn from, and note that it is clean and is measured in a clean container.

For correct lubrication we strongly recommend the following high quality oils.

ENGINE.

Patent Castrol XXL, Aeroshell, Mobiloil D.

GEARBOX.

Patent Castrol XXL, Aeroshell, Mobiloil D.

GREASE NIPPLES.

Castrol Heavy, Shell Retinax, Mobilgrease No. 2.

DRIVING INSTRUCTIONS

AND

GENERAL INFORMATION.

TO START UP. Fill up with Petrol and Oil. For Standard K.S.S., and K.T.T., Models 50% Benzol and 50% Petrol. The Oil Tank is below the Saddle. Fill this up to within 2 in. of the top of the Filler Cap. Do not remove the gauze as this ensures that no foreign matter enters with the Oil.

In case of a new machine or one that has been emptied of Oil for transport purposes, it is advisable to pour a small quantity of Oil into the Bevel Gear Casing through the Screwed Plug, K99, see illustration P. 21. Remove the Oil Filler Plug in the Gearbox, and fill up with Engine Oil until the Oil is level with the Filling orifice when the machine is standing level.

Turn on Petrol and Oil taps. The "On" position of the oil tap is with the large screwdriver slot vertical. Depress "tickler" of carburetter until Petrol pressure is just felt, do not flood.

Place Gear Lever in neutral. Place ignition Lever mid-way between advanced and retard. Leave Air Lever closed, open Throttle Lever very slightly (too large an opening cuts out of action the Pilot Jet and makes starting difficult). When engine is warm start it with Air Lever fully open and Throttle Lever opened very slightly, about $\frac{1}{16}$ " lift on the Throttle Slide.

Lift the Exhaust Lever with the Valve on the left-hand side of the Handlebar. Smartly depress the Kick-starter to the full extent of its travel, at the same time release the Exhaust Lever so as to allow the Valve to close immediately preceding the moment of firing.

In very cold weather, it is a good practice as a preliminary, to raise the Exhaust Lifter, and give a few kicks on the starter with the Throttle half open, Air Lever closed, and then return the Levers to their respective positions, as mentioned above for actual start. This helps to free the piston.

To start away with the Engine running, withdraw the Clutch Lever which is placed on the left-hand side of the Handlebar, place the Gear Lever into low position (right back), or if a foot gear change is fitted the foot lever should be depressed to engage bottom gear, very gently release the Clutch, and at the same time slightly open the throttle when the machine will take up the load gradually, and move away smoothly. Speed the Machine up by opening the Throttle.

To change into second gear, partly close the Throttle, declutch, and move the gear lever smartly into second position, or with foot gear change the lever should be pulled up smartly. To change into top repeat. Let the Clutch in, and open the Throttle at the same time.

When running, the Air Lever should be fully or nearly fully opened. Do not constantly slip your Clutch, it is better to change into a lower gear. Full use should be made of the gearbox to prevent the engine labouring.

TO STOP. Close the Throttle, withdraw the Clutch, and apply the Brakes, and when the Machine has come to a standstill, put the Gear Lever into neutral.

a very small space exists all round the outer flange thus ensuring that the bronze bearing is clamped up between the two aluminium parts. See that all screws are tightened up equally. A little liquid packing is useful such as gold size when applied to the surfaces.

Leaks from bevel gear bushes :—

Look to the packing washer under flange. Never use a washer thicker than the original or it will alter the meshing of the bevel gears.

Gland Nuts of vertical shaft cover :—

Make sure that they are not too tight on their threads or that they are not tight up against the end of thread. If so, add more packing asbestos string or similar material. Six or seven turns around the vertical shaft cover of $\frac{1}{8}$ " string is sufficient. See that the wire jump ring is in position, in its notch at the bottom of the tube, or the tube will slip down. Very serious oil leaks from most joints will occur if the oil tank vent pipe is allowed to become stopped up. This causes a pressure on the oil in the tank and causes oil to be pressure-fed to the oil pump. The oil should reach the pump by gravity only.

Cylinder Head Joint :—

This is a ground joint, and the joint proper is made on the narrow edge, there should be a suspicion of clearance all around the broad face to enable the bolts to pull head down to the narrow edge. The correct clearance can be obtained by grinding the narrow edge with fine grinding powder and the broad face at the same time with coarse. The coarse gives the slight extra clearance required.

Care is necessary when tightening up the bolts to ensure an equal pressure on all and each one should be tightened a little at a time when nearly home.

DECARBONISING. First remove the Carburetter, Exhaust Pipe, Sparking Plug, and Oil Return and Drain Pipes from the Rockerbox and the Exhaust Valve Lifter Cable. Drain out the Oil from the Bevel Gear casings and Vertical Shaft cover by removing the Plug at the base of the Timing Gearbox. Loosen the two Gland Nuts K52, slip the lower Gland Nut up the Tubular Cover K50, and spring the small Jump Ring out of the groove to enable the part K50 to be pushed down into the bottom Bevel Gear Bush. This will expose the Coupling Joint K35.

Now turn the engine round until points on the Contact Breaker are just breaking, and at the same time the lower portion of the top joint in the vertical shaft is facing exactly in line with the Crankshaft. The piston should now be at the top of its stroke. Should this position not be arrived at at once, revolve the engine a number of times when it will be found that the relative position of the piston and joint will be constantly changing until the desired positions are attained. Now mark the teeth of the large bevel wheel K18 and pinion K19 through the inspection plug hole K99 so that they can be readily replaced when reassembling. An indelible pencil is useful for this purpose. Next loosen right out the four bolts holding the Rocker Box casing which can now be withdrawn together with the bolts. If there is difficulty in getting the Rocker Box past the Valve Springs, it can be easily overcome by turning the Valve Spring until a space in the Coils comes opposite the small projecting lugs on the Rockerbox. Now remove the four Cylinder Head Bolts, when the Head can be lifted off. If you do not possess a tool for removing the Valve Washers and Cotters, it is advisable to obtain a Terry o.h.v. spring remover. The 250 c.c. size is the most suitable for single port Engines. We supply and recommend this tool Part No. KA163 a 500c.c. type Part No. KA163/3 is necessary for double port engines.

To grind valves, use very fine emery powder mixed with oil or paraffin. Only a very small quantity should be used. The Valves must be revolved backwards and forwards and frequently lifted up and dropped down again in a different place each time to ensure a smooth seating. To revolve the

Valve a small tool is necessary. We supply a grinding tool Part No. KA164 at 1/2 post free.

Should the valves be very badly pitted, we can reface them for a small charge. After refacing, it is advisable to grind them into the seating of the Cylinder Head as previously explained

To replace the Valves and Valve cotters without proper Tools is not easy. A piece of wood can be inserted inside the head to hold the valve in position, and a vice used to compress the Valve Springs and Washers while the small split Collars are inserted. This is much easier done by using a special tool which can be obtained from us.

To take off the Cylinder the four nuts at the base will have to be removed. To detach piston from the connecting rod it is first necessary to remove the circlip from the boss of the piston. This is a small spring steel ring and is removed by taking a sharp pointed instrument and prising the ring out of its groove. A small slot is provided in the one piston boss to facilitate this operation. The gudgeon pin can then be pushed out from the opposite side of the piston. Before proceeding to remove circlip it is advisable to cover the opening in the top of the crankcase with a rag to prevent the circlip dropping into the crankcase.

To remove Piston Rings :—

Insert 3 or 4 thin metal strips between the rings and piston, slide the rings over the Piston, taking care the rings are not opened too much as they are made of cast iron and are liable to break. Special care should be taken with the Wellworthy slotted scraper ring as, owing to its construction it is very easily broken.

Reassembling :—

Refit the piston complete with rings and insert the circlip. Great care should be taken to ascertain the circlip is pushed right home in its groove in the piston boss. In the case of K.T.T., models it will be noticed that the piston is recessed on the crown at one side to miss the valve. It is important that this recess corresponds with the exhaust valve, therefore the piston should be fitted so that the recess is at the front of the piston. The Cylinder barrel should now be fitted. Great care should be taken to prevent breaking or straining the piston rings when inserting the piston in the barrel. When in position on the four crankcase studs, tighten up the cylinder base nuts evenly, each one a little at a time so as to pull the barrel down to the crankcase evenly.

After placing the Cylinder Head in position, tighten up the screws evenly, each one a little at a time, make sure that the joint is perfectly clean.

Fitting the Rocker Box on the Engine :—

When revolving the Crankshaft it will be noted that at each revolution the slot in the Vertical Shaft is constantly changing its position in relation to the crankshaft. The reason for this that the Bevel Gears have 22 and 23 teeth, so that by constantly revolving, the original position, before the Engine was taken to pieces, will eventually be arrived at. It is important to watch this, otherwise the timing may be wrong. After cleaning all the parts, revolve the engine until the piston is at top dead centre while at the same time the slot of the bottom Vertical Shaft Bevel Gear is exactly in line with the 2 studs that hold the Bevel Gear Bush (part No. K46 or K46-2). It may be necessary to revolve the flywheels several times before this slot comes into its correct position in relation to the piston. The Vertical Shaft with its couplings and cover can then be placed in position. It is now necessary to rotate the camshaft in the cambox until the chisel mark on the end of the camshaft (seen through the inspection plug K99) is exactly in line with the chisel marks on the bevel

gear casing of the cambox and at the same time the slot in the top vertical shaft bevel gear is exactly in line with the 2 bevel gear bush studs, or in other words exactly at right angles to the crankshaft of the engine. The cambox can now be bolted in position. The four Screws holding the cambox should now be tightened up equally. The Vertical Shaft Cover should be pushed up into the top Bevel Gear Bush to enable the small Spring Jump Ring to be put into its groove, after which it should be pushed down until the Ring just lies on the bottom Bevel Gear Bush.

The Gland Nuts may now be tightened up.

The timing can now be checked by noting the time of closing and opening of the Valves. In the case of Standard K, K.N., and K.N.S., machines fitted with the 23 cam (K17). The Exhaust Valve should close when the Piston is $\frac{5}{16}$ " over the top of its stroke. The Inlet Valve should open when the Piston is $\frac{3}{8}$ " before the top of its stroke. NOTE. The No. 23 cam is now obsolete and No. 24 is supplied as replacement. In the case of K.S.S., and K.T.T., machines a 24 cam (K17/2) is fitted and the correct timing should give:- Exhaust valve closed $\frac{1}{8}$ " after top of stroke. Inlet valve opening $\frac{3}{8}$ " before top of stroke. To set valve timing accurately see Valve Timing with No. 24 Cam on page 12. It can also be checked by noting the marks on the teeth of the large bevel wheel and pinion. The marks must come together when the piston is at the top of its stroke and the points of the magneto somewhere near breaking position. If there are no marks on the teeth the line on the Camshaft must be in alignment with those on the front of the bevel gearbox. They should be looked at through the plug hole K99. It is essential that the tappet clearances be set at .012" on both valves for (see below for running clearances) checking the valve timing, i.e. Standard K, K.N., and K.S.S., engines. Measurements taken when engine is cold. In engines where the cam has received a considerable amount of wear the easiest way to check the valve timing is to see that the overlap is shared. That is, the Inlet Valve must open approximately the same distance before top dead centre of the piston as the Exhaust Valve closes after top dead centre.

ADJUSTING THE TAPPETS. It is first necessary to mention that the tappets and sleeves are locked in position by the effect of the tapered tappet stem expanding the split adjusting sleeve in the threads of the rocker. Before the tappet can be adjusted it is necessary to slacken the small lock nut and force the tappet down off its taper seating in the sleeve. If the tappet is tight on its seating the easiest method of removing it is as follows: Insert a screwdriver between the rocker and valve spring collar to give clearance between the tappet and valve stem. By tapping smartly with a small hammer on the top of the tappet stem, it will drop down from its taper seating. The sleeve can now be turned either way by means of the small spanner provided in the tool kit. In making this adjustment, it is necessary to allow for the effect of tightening up the lock nut, which draws in the Tappet, and expands the adjusting sleeve. The clearance for the tappet should be inlet .010", for the exhaust .015". When using machine for racing, increase clearances to ex .020" in .012".

After the Engine has been run, it is as well to again tighten up the Tappet Locking Nuts as these are apt to slacken due to the effect of running the engine which tends to drive the tappet further into the sleeve.

TIMING MAGNETO. Loosen sprocket on the Engine, Part No. K.75 by slackening off the nut, and then give a smart blow on the end of the spindle using the ends of two spanners to support the sprocket while the blow is given. This detaches the sprocket from the end of the taper shaft. Now turn the Engine round until the piston is just $\frac{1}{32}$ " before the top on the up stroke with both the valves shut, this is the firing position. Now set the Contact Breaker fully retard, turn

the magneto round until the points are just breaking. With the armature spindle held in this position, tighten up the nut to lock the sprocket K.75. For correct magneto timing for K.T.T., machines with different fuels refer to page 11. Check the timing to see that everything is correct.

ADJUSTING MAGNETO CHAIN. Loosen holding nuts and insert a thin piece of packing either paper or thin metal between the base Plate of Magneto and Platform. Adjust this when the engine is warm, the heat expands the crankcase and tightens the chain so that it must be slightly loose when cold.

CARBURETTER. The correct size jet for the Amal carburetter is 140. The tapered needle should be in the second notch from the top although the position may vary on certain engines. Raising the needle tends to richen the mixture at high speeds while lowering the needle weakens the mixture. Slow running is controlled by the Pilot jet adjusting screw which is to be found screwed into the mixing chamber on the right hand side of the machine. As the type of carburetters has been altered considerably during the last 2 or 3 years we advise you to communicate with the makers concerned if further information is required. For further information re jet sizes, etc., for different fuels for racing purposes refer to pages 11 and 13.

DISMANTLING THE GEARBOX. Note—It is advisable not to remove gearbox from frame until the former is dismantled as difficulty may be experienced in holding it.

First remove kick-starter crank by unscrewing nut on kick-starter crank cotter and tapping out same. Then turn kick-starter pedal round twice clockwise (this unwinds spring) and withdraw kick-starter crank. Then withdraw clock spring cover taking care that spring remains in cover, otherwise difficulty may be experienced in rewinding the clock spring.

Should it be necessary to rewind spring, place same on peg in end cover then place crank on kick starter shaft and fully wind by turning crank until spring is fully wound. Tie wire round spring. It may then be re-inserted in box and wire withdrawn.

Remove the brass cap B3 covering the end of the Gear shaft, remove the nut B50 on the end of the gear shaft BK5-3 with a box spanner. Loosen the screws holding the cover plate. The cover plate can then be taken off. It is well to place a tin to catch the oil which will run out unless it has been previously drained off. Remove the driving chain, and withdraw the shaft. The middle gear, the layshaft and the low gear are then all free to be removed for inspection. Provided that the wheels are not badly worn, there should be very little requiring attention. The kickstarter should be examined, and if there is a tendency for this part to slip, it can be remedied by fitting larger size rollers. We have various size rollers rising by .005" from .375 to .400. Too large a roller will not allow the kickstarter to free itself, but always use the largest roller possible. See that the springs and pegs which push the rollers into action are in good order.

The latest type of kickstarter is actuated by 2 rollers, which we find gives satisfaction in every way. Owners of machines fitted with the single roller type of kickstarter mechanism can obtain the 2 roller type (which is interchangeable) for a nominal figure.

Reassembling :—

First place the middle gear in the sliding fork B26. The groove in the middle gear for the striking fork should be nearest the end cover of the gearbox., then thread the driving shaft through it. Now place the kickstarter shaft B11-3 with the rollers B13 spring peg and the kickstarter

cam into the layshaft. This can now be placed into position in the gearbox, taking care that the kickstarter cam comes in the correct position with the peg at the back of the gearbox. The tongue of the cam should bear against the kick starter stop pin below the kickshart shart bearing, and the slot in the K.S. shaft for the crank cotter should be at the top of shaft.

The low gear wheel can now be placed into position, and then the cover replaced, and the screws tightened up. Next the lock nut on the end of the gear shaft should be tightened up with a box spanner after which the small brass cap should be replaced. Kickstarter spring and cover can now be replaced taking care to keep spring in cover, sliding the end of the spring over the peg on the end cover. Turn shaft round (clockwise) till slot is at the top. Crank can then be slid into position and revolved twice in anti-clockwise direction when cotter can then be replaced. Should it be necessary to change the gear ratio from the standard ratio to the T.T. ratio, all that is necessary is a new layshaft and low gear wheel.

These ratios are more suitable for long distance road racing. It is easily done without removing the gearbox from the frame, or dismantling the clutch. When the gearbox has been completely assembled do not fail to fill it with lubricating oil as described in paragraph 1.

ADJUSTING THE CLUTCH.

The Clutch cable seldom requires adjusting, and if the clutch tends to slip, first screw out the clutch spring carrier KC4 behind the small gear box sprocket in an anti-clockwise direction. If the correct adjustment has been lost, slack off the cable completely and then screw in the spring carrier clockwise until the clutch can just be felt to slip when pressing down the Kick-starter. Now re-adjust the cable until there is no free movement in the outer casing. Do not force the adjustment. Finally screw out the spring carrier until there is not less than a quarter of an inch free movement in the cable at the handlebar end.

DISMANTLING AND REASSEMBLING CLUTCH.

First remove chain cover and the small gearbox sprocket from end of mainshaft. Remove the sleeve gear nut No. C5-25 by turning anti-clockwise with the peg spanner in tool kit. Remove the driving chain by unfastening the spring link. The Clutch will now pull off the sleeve gear in one unit. The clutch itself is easily taken apart by lifting off the various plates.

Remove the 3 small thrust pins from back plate otherwise they may drop out and be lost.

The fabric inserts should stand up above the steel rings $\frac{1}{8}$ of an inch and will wear until flat with the steel. The plates should be washed clean with petrol and dried. Put a little grease between the balls in the Ball Race.

The Ball Race should be tight in the chain wheel and an easy fit on the centre bearing of the back plate.

To re-assemble the clutch, first place the back plate KC1-25 with the flat side down, next place the steel ring with inserts on the back plate in its working position, now the dished friction plate with the depressed portion engaging the notches in the back plate. The chain wheel now slides on and engages the plate at the back with the notches in the chain wheel. Another dished plate is now placed into position on the chain wheel with the projecting side up, then the ring with the inserts is engaged with the notches in the chain wheel. Last of all the outer plate KC2-25. This one is rather difficult to place into position as the notches must be engaged with the projection on the dished plate below. It is now necessary to replace the 3 thrust pins, and they should be held in position in the back plate by a little grease.

To make the refitting of the Sleeve Gear nut easier it is desirable to

engage top gear. This will prevent the Sleeve Gear being pushed into the gearbox through the Sleeve Gear bearing and will enable the nut to be engaged on the threads of the Sleeve Gear quite easily with only finger pressure.

When all is assembled correctly the whole should be held together and placed on to the sleeve gear in the gearbox and the springs placed in their holes in the adjusting ring KC4. The two sleeve gear lock nut washers should be cleaned and smeared with oil and then placed in position on the sleeve gear lock nut C5-25. They take the slip as the nut is screwed up and prevent the clutch springs from doubling over. The nut C5-25 must now be put on and locked up very tightly. It is best to finish tightening this up with the chain on the clutch correctly adjusted as this will prevent the shaft turning whilst tightening up.

It is advisable to send your Clutch Plate to us to have new inserts fitted. They are fixed under a powerful press. The charge for this is 9/- plus cost of inserts and postage.

ADJUSTING THE GEAR CONTROL. The Gear Control Rod is adjusted by loosening the nut on the lower joint and screwing the rod into or out of the joint. Within the Gearbox of the latest type is a plunger and spring which locates the gear in its correct position. The rod should be adjusted so that the gear lever comes snugly into its respective notches in the gate. (For adjustment to Footgearchange see special section under this heading page 14).

ADJUSTING FRONT WHEEL BEARINGS. The front wheel bearings on our machines are of the cup and cone type. The adjusting cone is secured by a lock nut and is on the near side of the machine (opposite side to front brake). To adjust, the near side spindle nut should be slacked off. Then slack off the cone lock nut and carry out the necessary adjustment of cone. Tighten up lock nut securely against cone and then tighten spindle nut. When correctly adjusted the slightest amount of play should be perceptible on the rim of the wheel.

ADJUSTING FRONT BRAKE. A thumb screw at the end of the connecting rod is used for this purpose. When the limit of adjustment has been reached, thin packing pieces can be inserted beneath the steel slippers on the Brake Shoes. These can be cut out of a piece of ordinary tin plate.

ADJUSTING REAR WHEEL AND TIMKEN ROLLER BEARING. This can only be done properly when the wheel is in the machine. If the adjustment is lost, it is best to slacken left hand thread adjusting nut KS9 on the opposite side to brake. Turn clockwise after loosening the spindle nut on the same side. See that spindle nut on brake side is tight to hold wheel in position. Now adjust by means of the left hand adjusting nut and leave a perceptible shake in wheel, then tighten up the outer spindle nut.

Should the wheel refuse to slacken off, a smart blow on the adjusting end of the spindle will usually free the cone on the spindle. It is advisable, while doing this, to press the wheel in the opposite direction that is, push on the rim of the wheel on the brake side.

ADJUSTING THE ENGINE CHAIN. Slightly loosen the Gearbox Clamping Nuts. If machine is fitted with aluminium front Chain Cover it will be necessary to loosen the Nut which holds the Chain Cover at the back of the Gearbox. Now move the Gearbox along by means of the Adjusting screw below the Bracket supporting the Gearbox. Always finish the adjustment by tightening the adjusting nut, so that it tends to push the Gearbox towards the Engine. This will prevent the Gearbox slipping and possibly tightening the chain when the machine is in use. To do this, turn the nut anti-clockwise. This is best done after the Clamping Nuts have been tightened up.

ADJUSTING THE REAR CHAIN. Loosen slightly the two rear spindle nuts and the brake anchor pin S36-23AC. Now turn the adjusting screws so that each side is moved an equal distance. Tighten up the spindle nut, then the wheel should be central between the stays. The chain should have about $\frac{1}{2}$ " up and down play midway between the sprockets.

To test the alignment of the back wheel, stretch a string tightly alongside the front wheel. Turn the front wheel till the string touches both edges and adjust the back wheel with the adjusting screws until it touches the string also on both edges.

NOTES.

For use with a sidecar it is advisable to fit top links to the forks measuring 3" from centre to centre of spindle. This improves the steering and makes the machine and sidecar run very steady. For prolonged sidecar use we recommend a 145 lb. spring $8\frac{1}{2}$ " long. It is also best to use a 19T sprocket on the gear box.

Do not reduce the tappet clearance below that given.

INSTRUCTIONS FOR KTT. MODEL.

This machine has been developed through years of racing, the design and materials have thus been perfected. We therefore offer the suggestions and information given below. We may at once say that the speeds attained in record breaking were not obtained without a lot of careful preparation by the riders concerned, but there is nothing to prevent anyone with one of these machines doing the same if he has the ability.

Amongst the most important things to settle is the fuel to be used. Our standard fuels are Discol R.D.1., next Discol P.M.S.2, then Petrol aviation grade mixed with 50 % of good quality Benzol. For each of these different compressions are required. Should the Discol be unobtainable some alcohol fuel may be used. It is, therefore best to use the highest compression we can supply. There are different grades of alcohol so no definite particulars can be given, but a small amount of Benzol mixed with alcohol gives good results. It is, therefore, best to start off with a high compression and experiment with various mixtures until good results are obtained. It is then possible to obtain fuel at a reasonable cost.

It is of course necessary to reset the carburetter for different fuels. *For Settings see Pages 11 and 13.*

The next point closely connected with the carburetter is the Plugs to be used. These require careful selection. Plugs are graded according to their heat resisting qualities at one end of the scale and their oil resisting qualities at the other. For starting up, a plug with the best non-oiling characteristics is best, but unfortunately, it soon gets hot, causing pre-ignition, which soon burns up the Piston and Exhaust Valve. It is, therefore, necessary to be very careful. Plugs which stand a lot of heat are generally very expensive and being non-detachable are not easily cleaned. Therefore it is best to experiment with a Plug of the detachable type, such as KLG.396, which is the best of the detachable type in heat resistance.

When running the engine it is always advisable to investigate the cause of any slowing up. The Plug is often the cause, and if it is allowed to run on these conditions, it will damage the engine, whereas, if investigation is made, the cause can be ascertained by the appearance of the Plug. Should the Plug look dry and greivish it is a sure sign that it has been too hot. If the electrodes show signs of heat, it is more than likely to be the cause. The Plug should then be changed for one that will stand more heat.

The next point is to test the tappet clearance. The exhaust tappet should have .018 to .020 and the Inlet Valve .010 to .012 respectively. Tappet clearance should be set with a cold engine.

For racing we recommend that the two Rocker pins be wired to obviate the risk of them slacking back. It is necessary to drill a hole of about 3/64" through the hexagon heads of the pins and pass a piece of wire of about 1/16" through two heads. A piece of cycle spoke is very suitable for this purpose. In the event of the piston being removed for any purpose, always replace it the same way that it was removed. The recess in Discol Pistons is to provide clearance for the exhaust valve and must always be to the front.

The Magneto timing should be checked very closely and is somewhat dependent on the compression and fuel, and to some extent the tune of the engine. Too much advance must be avoided, it will quickly over-heat the engine and shows signs when riding similar to an unsuitable Plug. We recommend points just breaking with Magneto fully advanced 38 degrees before top centre for petrol benzol and 42 degrees for alcohol fuels.

For Valve Timing Instructions see pages 12 and 13.

For track riding it is always best to arrange the riding position so that the smallest area possible is presented to the wind. This is most important. Even loose clothing is capable of knocking off a mile or two an hour. In order to get this position the saddle and foot rests are usually placed near to the centre of the back wheel, and the handlebars arranged so that the body lies along the tank. The handlebars should not be too wide as this also offers considerable resistance.

For sprints the weight, etc. should be reduced as far as possible. If the machine is required chiefly for such events, it should be ordered with a suitable tank. For track work we find that dispensing with the weight of the front brake, makes the machine easier to hold when speeds in the neighbourhood of 100 m.p.h. are reached. It is also better for sprints since weight hinders acceleration.

Apart from attention to all other parts of the machine such as chains, wheel bearings, clutch, etc., there is only the question of gear ratios to be settled. This is always best settled by trial and error. Calculations based on engine revs are only approximate. Often miles per hour are gained by careful selection. Note should be made of the wind—a following wind though only slight will enable a higher gear to be used. The same applies to a slight gradient. The condition of the surface makes some difference to the best ratio. In short races from a standing start it is generally best to gear slightly on the low side. This also applies to road racing where acceleration counts for a lot.

Before any event always run the machine gently for some time in order to get the engine, also the oil in the tank, thoroughly warmed up. For sprint events fill the oil tank only just over the line on the tank.

Timing Instructions, Pages 12 and 13

Gear Ratios, Page 13.

Carburettor Settings, Pages 11 and 13.

Lubrication, Page 12.

Racing Plugs, Page 12.

CARBURETTER SETTINGS.

Amal Type 6/011. (1" Choke.)

	Main Jet.	Needle Jet.	Valve	Needle Position.	Pilot Jet.
Petrol and Petrol Benzole	140	standard	4	2	standard
Discol R.D.I. and alcohol P.M.S.2	260 220	113	3	3	35c.c*.

Range of main Jets for Discol and Alcohol fuels: 200, 220, 240, 260, 300, 325, 350.

*To alter size of Pilot Jet it is necessary to change the whole Jet Block

LUBRICATION

The lubrication is in all engines correctly set to give the correct circulation of oil when the engine is operating under full load on the test bench before leaving the Works.

By removing the oil filler cap when the engine is running slowly the return flow of oil from the engine can be checked and should be almost continuous *when all is warm*.

It can almost be said that too much oil cannot be given for racing, remembering at the same time that an excessive amount will cause trouble with oiled plugs.

In this connection take care that you are using a plug suited to the conditions. (*See notes re plugs*). Should it be necessary to increase or decrease the flow of oil through the engine, this is done by altering the adjusting screw K.69. Turning clockwise increases the flow but do not alter the screw more than a quarter of a turn at a time.

Under no circumstances must the flow be cut down till there is less than an intermittent flow returning to the tank.

The flow of oil through the rocker box can be checked by detaching the pipe from same to the tank and noting that oil is returning. This flow is only small and does not exceed $\frac{1}{4}$ pint in ten minutes when the engine is running slowly.

K.L.G. RACING PLUGS.

Non-detachable types.

K.L.G. 348. Stands great heat but very little oil. Should not be necessary except for Brooklands.

K.L.G. 341. This Plug is recommended but only for sustained "full out" use. Will stand more oil than 348 but oils easily unless engine is well warmed up.

K.L.G. 464. Stands less heat but more oil than 341. } Recommended for
K.L.G. 356. Stands less heat but more oil than 464. } Road Races such as
the T.T.

Detachable Types.

K.L.G. 396. Highest heat resistance of the detachable types but less than any of the above. Recommended for short road circuits or grass track events.

K.L.G. 583. Recommended for touring with KTT engine, also for warming up engine previous to fitting any of the above.

VALVE TIMING—No. 24. Cam—as used in K.T.T. engines up to KTT270.

The valve timing is best carried out by fixing a disc to the sprocket side of the crankshaft, marked out in degrees; a pointer should be fixed under the cylinder base nut, this can be made of a piece of stiff wire.

Set Exhaust and Inlet Tappet to .012 clearance.

Now set the disc on the crankshaft to show—0 degrees on the pointer when the piston is at the top or bottom of its stroke.

Remove inlet Rocker, turn the engine round until the exhaust cam comes against the rocker, this should be brought firmly against it, sufficient to take all slack; the reading on the disc should be between 65/70 degrees. Now turn the engine backwards, and test the reverse side of the Cam, the reading should be 45/50 degrees after the piston has reached the top.

It is only necessary to check one valve to arrive at the correct timing. To check the inlet valve, the exhaust rocker should be removed, and then proceed as before. Inlet should be open 38/42 degrees before the piston reaches the top, and close 54/58 degrees after it reaches bottom.

To check timing by piston movement, test the overlap.

The inlet valve opens before top of stroke $\frac{3}{8}$ " approximately.

The Exhaust Valve closes after top of stroke $\frac{9}{16}$ "

GEAR RATIOS—

Engine 20 Teeth. Clutch 44 Teeth. Back Wheel 55T.

CLOSE RATIOS. KTT.

	Top.	Mid.	Bottom.	
19.	6.37.	9.4.	12.1	The gears in the gearbox have:
20.	6.05.	8.75.	11.48.	
21.	5.77.	8.35.	10.67.	
22.	5.55.	7.95.	10.4.	
23.	5.25.	7.6.	9.94.	
24.	5.05.	7.3.	9.5.	Sleeve Gear 19T.
25.	4.85.	7.0.		Layshaft 25, 22, 18T.
				Low Gear 25T.
				Middle Gear 22T.

K. STANDARD RATIOS.

	Top.	Mid.	Bottom.	
19.	6.37.	9.4.	16.1	The Gears in the gearbox have
20.	6.05.	8.75.	15.3.	
21.	5.77.	8.35.	14.6.	
22.	5.55.	7.95.	13.9.	
23.	5.25.	7.6.	13.3.	
24.	5.05.	7.3.	12.75.	Sleeve Gear 18T.
25.	4.85.	7.0.	12.1.	Low Gear 28T.
				Layshaft 26—22—16T.
				Middle Gear 22T.

Chain $\frac{1}{2}$ " pitch $\times$.305 wide.

Front Chain has 74 links.

Rear Chain has 120 links with 23 Teeth sprocket.

SPECIAL INSTRUCTIONS

FOR 1931-1932 KTT ENGINES KTT271-KTT399.

VALVE TIMING. No. 27 Racing Cam.

Exhaust open 68° before bottom centre.

Exhaust closes 48° after top centre.

Tappet clearance for above timing .012".

Running clearance for racing .022" exhaust.
.012" inlet.

The inlet timing will come correct as the cams are in one piece.

Note.—It is advisable to have the rocker skids trued up at the works whilst in position in the rockers, this will ensure greater accuracy of timing.

Carburettor setting.

Type 56 Amal 1" bore choke. For 50/50 Petrol-Benzol 200-220.

R.D.I. Jet 450, Double Float Chamber preferred.

Methanol, Jet 750 or 800 Double Float Chamber necessary.

INSTRUCTIONS FOR FITTING and ADJUSTING FOOT GEAR CHANGE.

This control is supplied complete (price 35/-) and can be fitted to any Velocette having a Gearbox incorporating internal Selector and Plunger. It is fitted as standard to the model KTT.

Remove existing hand control lever and rod, also the three top set pins securing the gear box and cover. Exchange kick starter crank for the bent crank provided.

Fit on the foot control by means of the three longer set pins provided. To adjust rod for length proceed as follows:—

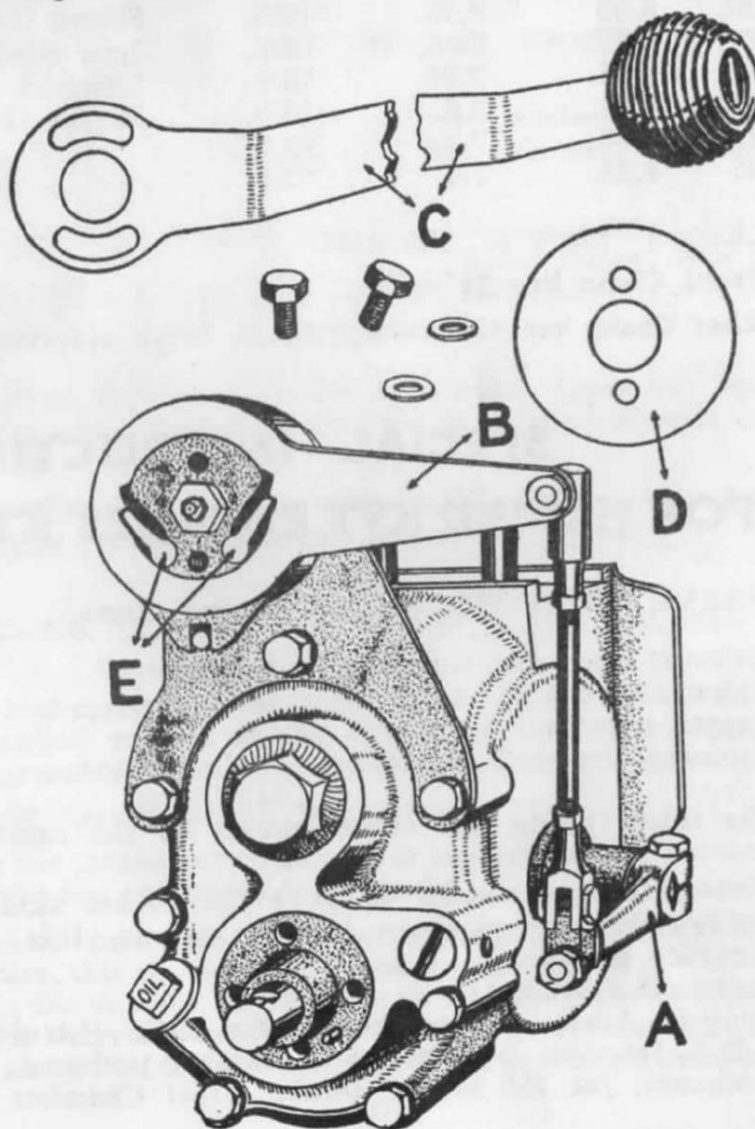
Move outside striking lever on gearbox (A) till middle gear is engaged (it will then be approximately horizontal). Move gear shift lever of foot control (B) till it is approximately horizontal. This is the middle gear position. It will be found that it is possible to move the end of the lever about $\frac{3}{8}$ " up and down between two points at which it feels to come solid against the operating pawls. It is now necessary to lengthen or shorten the rod till when connected up, the lever is exactly midway between these two points.

Removing foot lever (C) and cover plate (D) exposes to view the pawls (E). If all is correctly fitted the clearance between the pawls and the ratchet teeth will be equal front and rear.

This adjustment is important. The position of the foot lever (C) is adjustable to suit the rider by means of the slots shown.

When all is correctly fitted, force in a good light grease such as Light Castrolase through the nipple with a grease gun till it starts to ooze out. Occasional application of grease gun will keep all internal parts lubricated and exclude mud and water. Lubricate ball joint and bottom knuckle joint occasionally with oil.

No other attention is necessary. Do not take the device to pieces unnecessarily, particularly do not remove the centralising springs as they are difficult to replace.



SPECIAL INSTRUCTIONS

FOR

K.T.P. MACHINES.

DRIVING INSTRUCTIONS.

Before this machine can be started the ignition switch must be placed in the "on" position.

When stopping do not forget to place this switch in the "off" position thus switching off the ignition circuit. This is extremely important as should the switch be left in the "on" position there is great risk of completely discharging the battery. The warning lamp shows if the accumulator is actually discharging.

DECARBONIZING.

Before the cam box can be removed from the K.T.P. machine it is necessary to remove the ignition control Bowden Wire which can be done by unscrewing the grub screw out of the plunger on the end of the wire and removing the cable casing stop complete with spring and plunger.

The Terry 250 c.c. size overhead valve spring remover is not suitable for use with the 2 port cylinder head of the K.T.P. machine. For this model we can supply and recommend the 500 c.c. size.

REMOVAL OF CONTACT BREAKER CAM AND IGNITION TIMING FOR MACHINES FITTED WITH COIL IGNITION.

The contact breaker cam is fitted to the end of the camshaft by a taper and may be withdrawn by removing the small set pin securing same and screwing in the $\frac{3}{8}$ " 26 thread bolt provided in the tool kit. This will bear against the end of the cam shaft and force the cam off the taper.

The method of retiming is as follows: Fit cam to camshaft so that contact breaker points are breaking $\frac{5}{8}$ " before top centre with ignition control fully advanced, that is with handlebar lever closed. It is found that slightly more advance is called for with coil ignition than with magneto. The contact breaker points should have a gap of .016" to .018" when fully open.

REMOVING DYNAMO CHAIN ON MACHINES FITTED WITH COIL IGNITION.

Unscrew the two large inspection plugs in the cover by means of sparking plug spanner. Remove the bolt which is situated above the lettering on the cover. Remove the nut and washer from end of dynamo spindle. Remove the six $\frac{3}{16}$ " screws and one $\frac{5}{16}$ " screw and washer securing the cover to the crankcase. Access to these is obtained through the four large holes in the bottom sprocket. It is necessary to turn the engine slightly to reach all of these.

The cover complete with chain, both sprockets and driving gear K.72 may now be withdrawn.

Slack off $\frac{3}{8}$ " nut on end of driving gear K.72 about two turns and support the sprocket by inserting the jaw of an open ended spanner through one of the holes in the sprocket using the back of the chain case to obtain leverage. A smart blow on this nut will then drive out the taper end of the driving gear from the large sprocket. Remove nut and

washer and withdraw driving gear. It is then possible to remove chain from large sprocket and lift out after which the chain and the small dynamo sprocket may be removed.

In refitting it is advisable to pass a bar through the dynamo sprocket to hold it up in place till it is started on to the dynamo spindle. Care must also be taken that the driving gear K.72 engages correctly with pump driving piece K.96 and that the driving piece is fitted correctly on pump driving spindle.

ADJUSTMENT OF DYNAMO CHAIN ON MACHINES FITTED WITH COIL IGNITION.

The dynamo spindle is eccentric to the outer shell. Rotating the dynamo backwards therefore tightens the chain. To obtain correct adjustment slack off bolt of dynamo clip, rotate dynamo backwards as far as it will go, then rotate very slightly forward to allow a little play in the chain and lock up the clip. The two sprockets are bound to be in correct alignment provided that the dynamo is hard up against the dynamo chain case.

MAINTENANCE OF THE COIL IGNITION SYSTEM.

VERY IMPORTANT.—BEFORE MAKING ANY ADJUSTMENTS TO THE HEAD LAMP OR DYNAMO DISCONNECT ONE OF THE BATTERY TERMINAL CONNECTIONS, OTHERWISE AN OVER-HEATED OR BURNT-OUT AMMETER MAY RESULT, OR THE DYNAMO POLARITY MAY BE REVERSED.

BATTERY.

This must at all times be maintained in a healthy condition—endeavour to keep it at least half charged and from time to time see that it is fully charged. See that the electrolyte is maintained at its correct level by the addition of distilled water, and that the terminal connections are clean and tightly made. A call at one of the numerous battery service stations every three months for a general inspection would be time well spent and any corrective measures required could then be taken and trouble avoided.

The battery will not keep charged unless the dynamo output is sufficient. With the switch at "charge" and the engine running at a speed sufficient to give a road speed in top gear of over 20 miles per hour, the ammeter should read 3 amps (half charge resistance is in circuit under these conditions). With all lights on at a similar speed ammeter should read from $\frac{1}{2}$ to $1\frac{1}{2}$ amps.

COIL.

The coil being a stationary unit, no wear takes place and once installed it calls for no attention. Its function is to convert the available battery voltage to a higher one suitable for spark plug purposes.

CONDENSER.

The condenser is attached to the coil fixing plate underneath the tank. It is essential for healthy spark production at the plug and for the elimination of sparking at the contact-breaker points. Like the coil it requires no maintenance attention and once installed may be ignored.

CONTACT BREAKER.

The lever bearing, pad, rotating cam and contact points are the only wearing parts for this form of ignition. They should be given periodical attention, the lever bearing should be clean and lightly lubricated, the cam smeared lightly with vaseline, the contact points must be free of oil. Great care must be taken to prevent petrol entering

the contact breaker when cleaning down (petrol will cause rapid burning of the points) otherwise they may become pitted and dirty and it will be necessary to file them smooth and flat to ensure perfect contact. They should at all times be clean. When in order, the contact surface should present a grey frosted appearance.

When the cam is clear of the pad, the contacts should be pressed firmly together by means of the spring provided. Binding at the pivot bearing will weaken this pressure and prevent the smart make and break so essential to satisfactory working.

If the contacts are badly burned, the condenser should be tested and if faulty replaced. To test condenser, remove it, and apply a lighting mains voltage to its terminals—a lamp should be used in series and thus avoid a short circuit in the event of the condenser proving faulty or breaking down during the test. If in order, on removing the mains voltage, an appreciable snappy spark will be obtained on short circuiting the terminals of condenser even after a few seconds pause. If leaky or partially shorted, no spark will be obtainable.

Excess voltage will give rise to burned contact points but as this condition is only likely to be brought about by running with the battery disconnected, it need hardly be considered.

IGNITION SWITCH.

This switch when off, opens the coil ignition circuit and thus prevents the battery discharging itself when the engine is not required. It is essential that this be used on stopping and starting. (See Driving Instructions).

WARNING LAMP.

The warning lamp will be found to brighten as the engine slows down and on stopping remain full bright if the switch is left on and the contact breaker contacts remain closed.

The warning lamp bulb is connected in parallel with a small resistance and both bulb and resistance are connected in series with the coil circuit when the switch is on. Thus, should the bulb get broken, the ignition will remain unaffected. However the bulb should be replaced at the earliest opportunity. A replacement bulb will be obtainable almost anywhere, this being a 2.5 volt flash lamp type.

TESTS IF TROUBLE IS EXPERIENCED .

The low tension or battery side of the ignition may be checked by turning the ignition switch on and rotating the engine slowly. If the ammeter reading fluctuates between zero and 3.5 amps with the battery up, this part of the system is satisfactory.

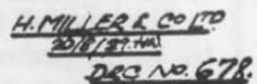
The high tension may be checked by removing the high tension cable and holding the terminal say $\frac{1}{8}$ " to $\frac{1}{4}$ " away from some engine part. Repeat the operation indicated above for low tension test. A spark should be obtainable (when the low tension circuit is broken) if all appears to be in order, examine the plug, clean, and if unable to discover the cause of failure, try another plug. If a spark is unobtainable between the high tension terminal and engine body, examine the cable and renew if damaged in any way, or if the rubber appears to have deteriorated.

If satisfied that the cable is in order, check condenser and if this appears to be in order return coil direct to the makers as this will save delay.

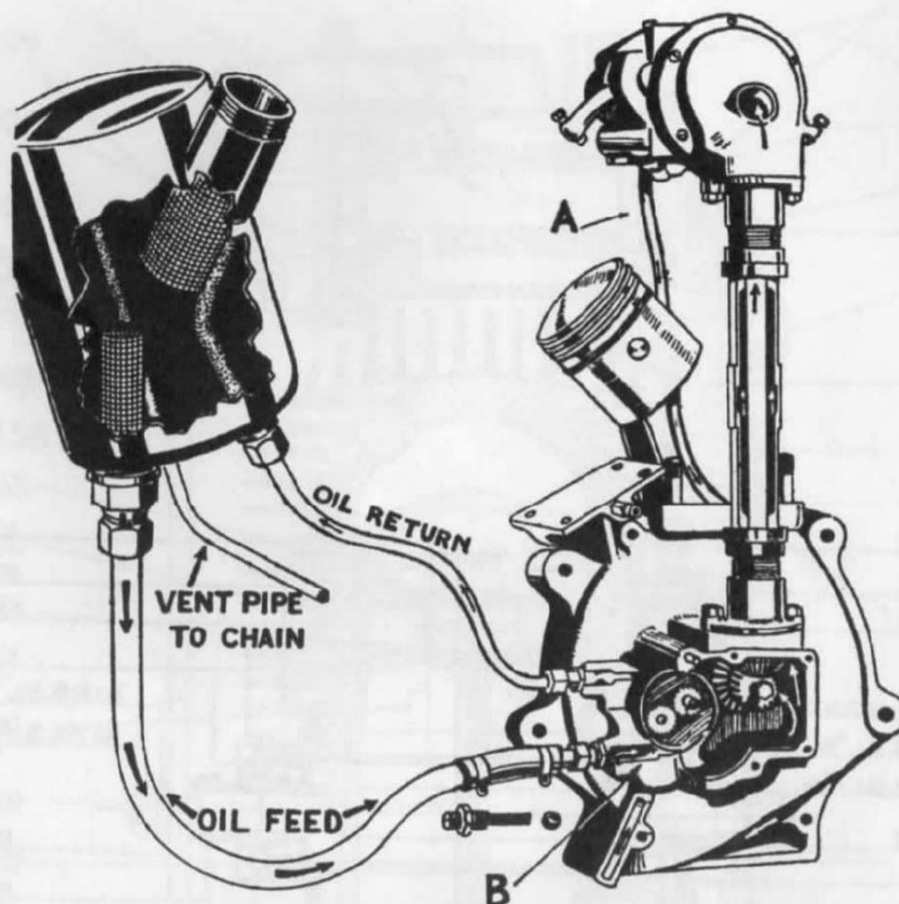
Any part of this ignition system if returned to them, will be tested immediately and a report forwarded by return of post.

The makers of the lighting and ignition system will, upon request, forward any part C.O.D. and the amount charged will be refunded in the event of any faulty part being returned to them and same being found to have broken down, due to faulty material or workmanship on their part.

Inset shows wiring for D.M. 3G. Dynamo of clock rotation, looking from driving end.



The O.H.C. LUBRICATION SYSTEM.

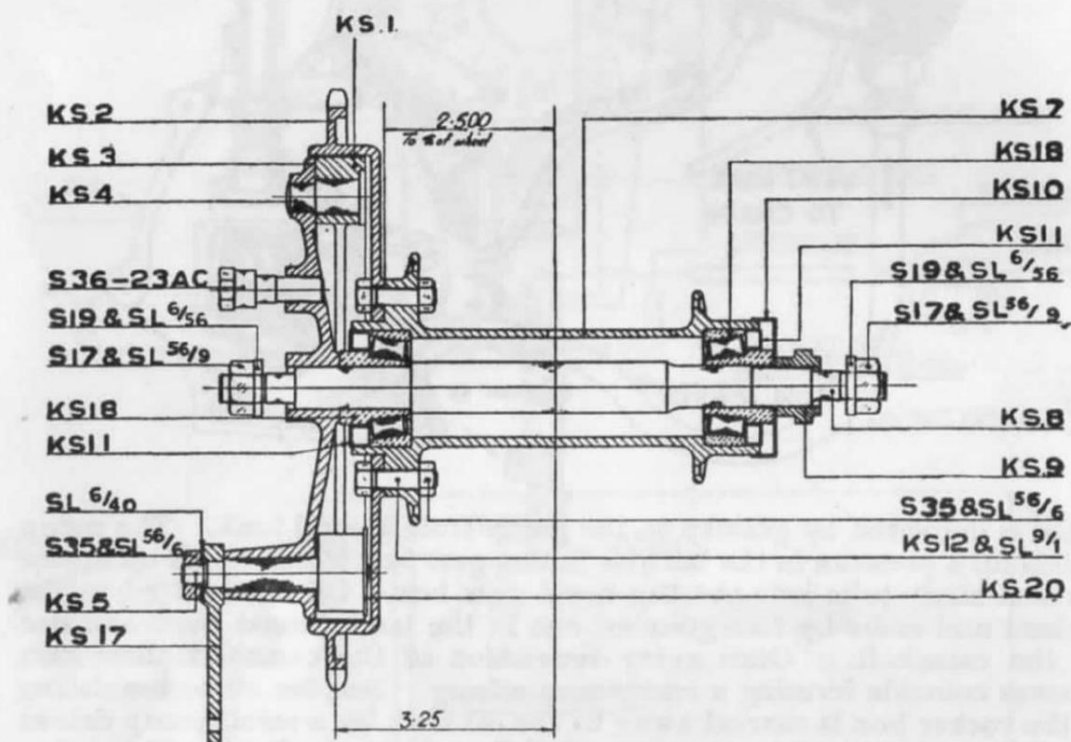


Oil is delivered by gravity to the pump from the oil tank. The pump builds up a pressure in the bottom timing gear box which forces oil up the vertical shaft tube into the top bevel gear box. Oil is admitted to the rockers and cams by two grooves, one in the large bronze bush and one on the camshaft. Once every revolution of the camshaft these two grooves coincide forming a continuous oilway. Surplus oil accumulating in the rocker box is carried away to the oil tank by a small pump driven off the camshaft in the case of the K.T.T., and on the K.S.S., K.N., etc., by way of an oil pipe leading to a disc valve on the driving side crankcase. From here it drains down the inside of the crankcase to the sump and from here to the return pump and so back to the tank. The supply to the big end, piston and cylinder is by way of a ball valve incorporated in the timing side crankshaft and nut K114. This ball valve opens when the pressure in the bottom timing gear box reaches a height which is determined by the setting of the oil adjusting screw K69. From the ball valve in the crankshaft oil is fed past the big end bearing and is thrown off lubricating the cylinder barrel and piston. All surplus oil is collected in the sump at the bottom of the crankcase, and is sucked up through the return pump and passed to the oil tank. Two efficient filters are incorporated in the oil tank to prevent foreign matter constantly circulating with the oil.

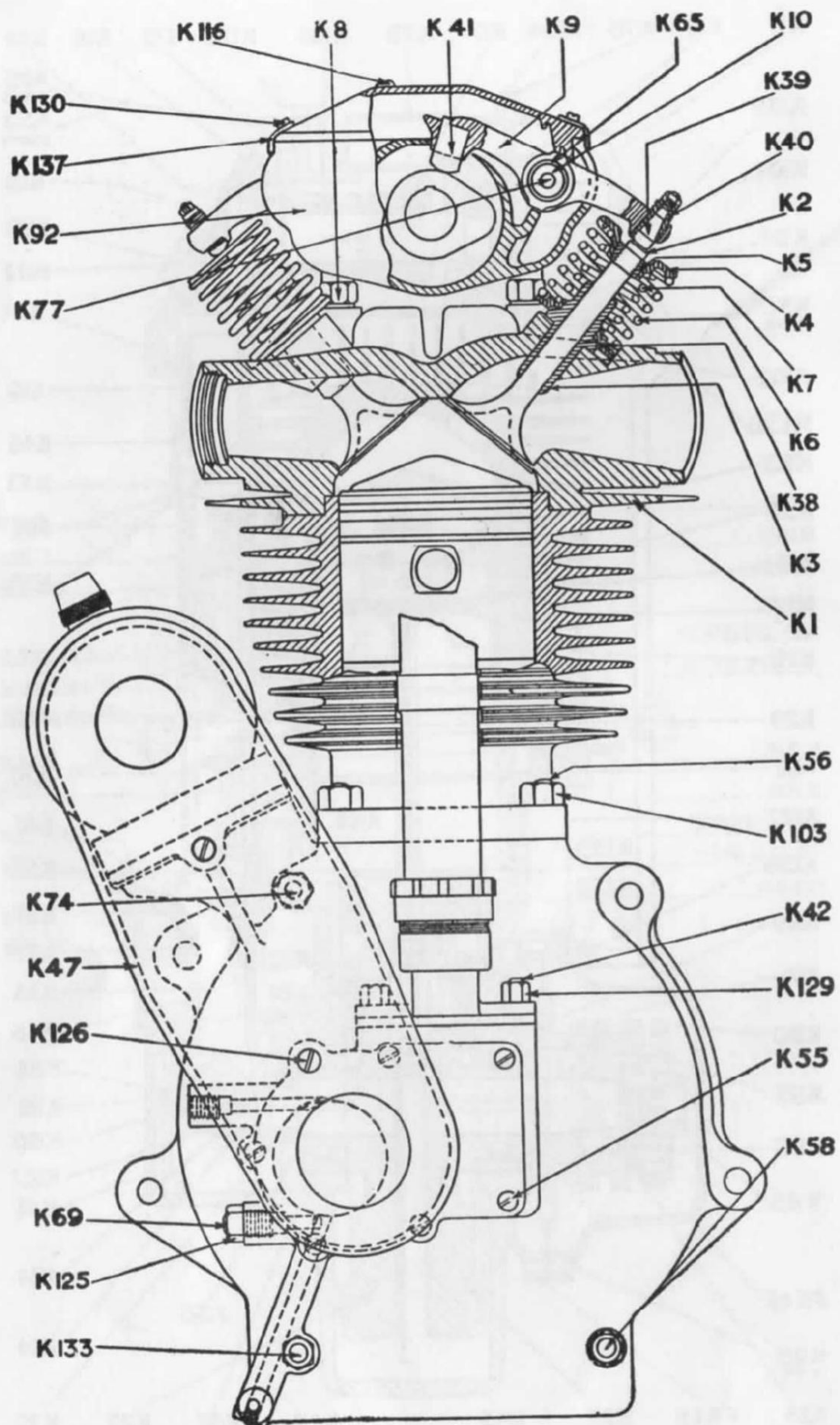
An efficient oil scraper ring is fitted to the piston to prevent oil reaching the combustion chamber.

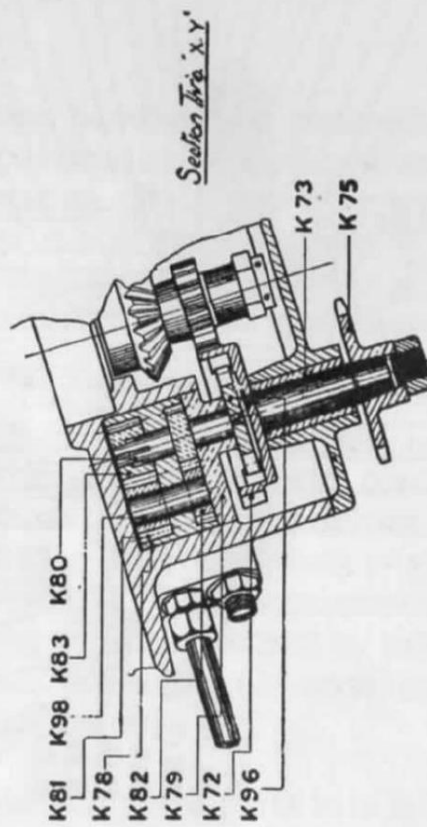
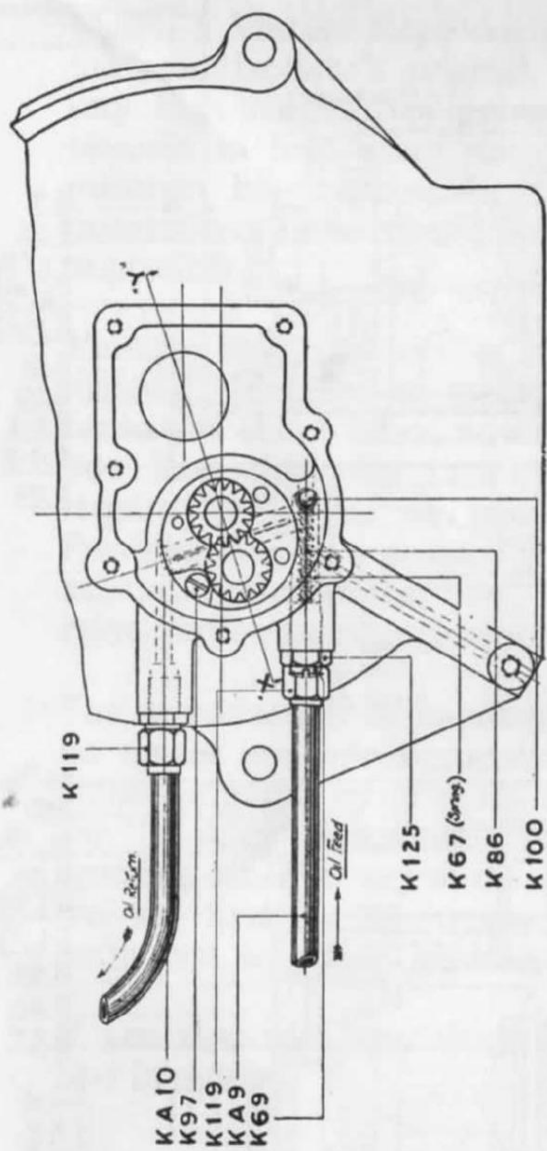
This efficient oiling system ensures that the moving parts of the engine are flooded with oil making certain of ample lubrication under the most severe conditions.

The O.H.C. LUBRICATION SYSTEM.

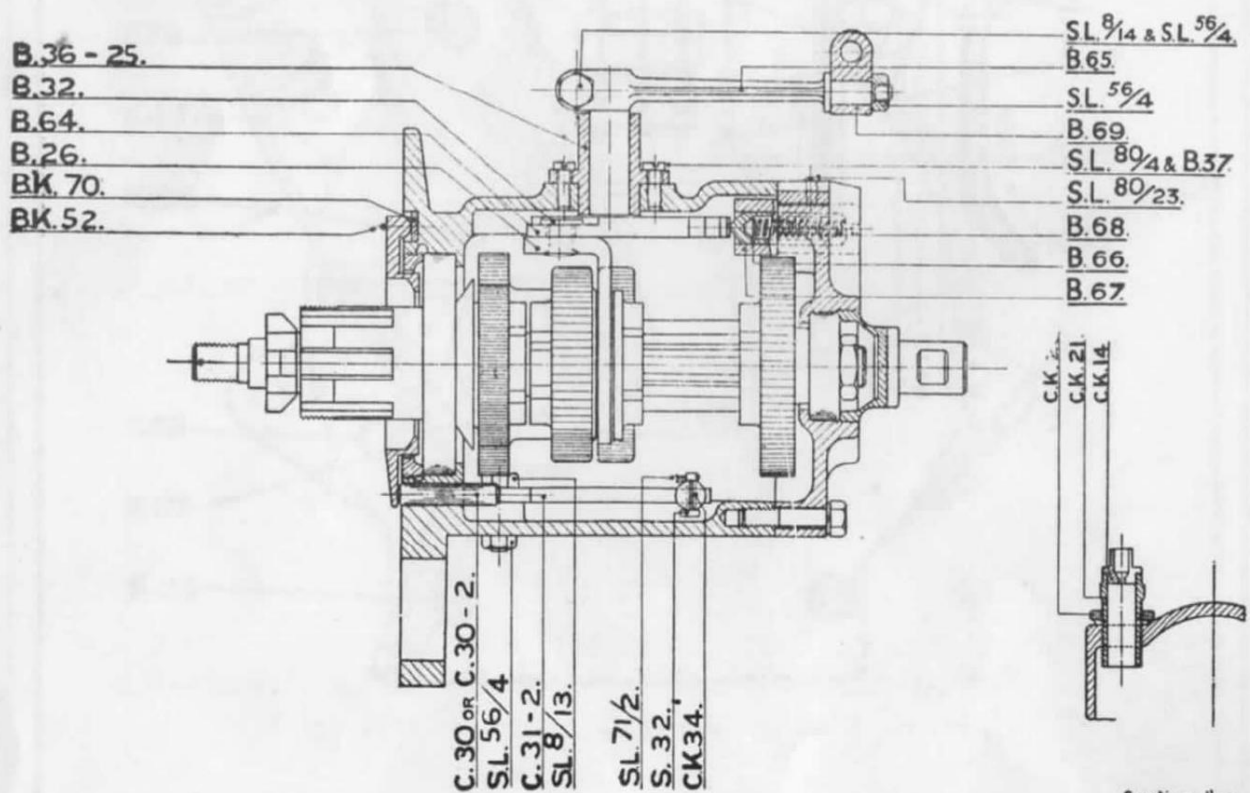
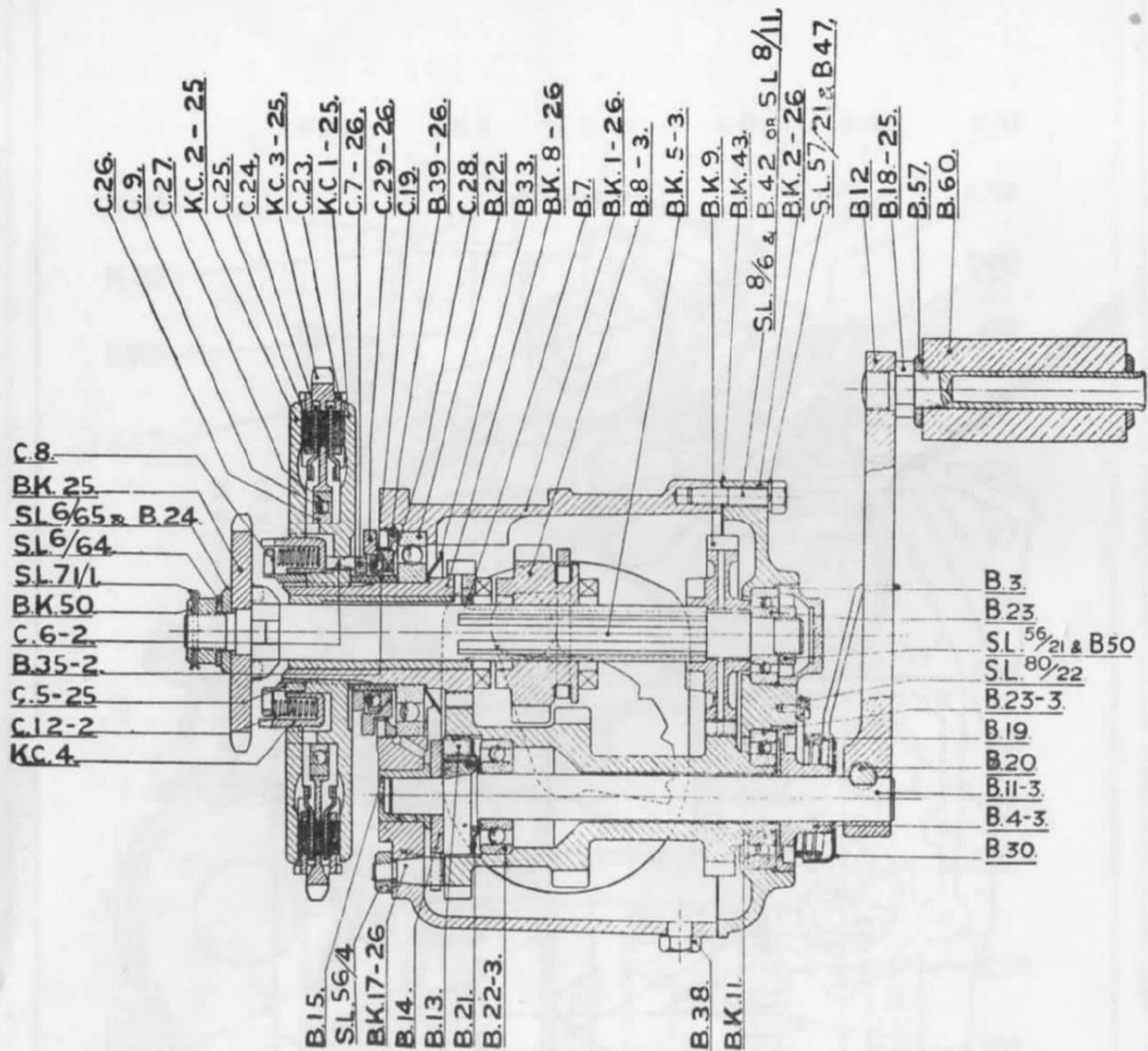








Section Two "X.Y"



Section three
 Clutch Cable Adjuster.