A PRACTICAL GUIDE COVERING ALL MODELS FROM 1933

Velocette

R. W. BURGESS

MOTOR CYCLE
MAINTENANCE
AND REPAIR
SERIES

VELOCETTE MOTOR CYCLES

A PRACTICAL GUIDE COVERING MODELS FROM 1933

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CHAPTER III

THE GTP TWO-STROKE ENGINE

UNLIKE the four-stroke engines, the two-stroke engine needs decarbonising fairly frequently in terms of mileage.

During the process the piston-rings will usually be found to have " carboned up " and stuck in their grooves. The piston-rings cannot rotate in their grooves because the ring pegs prevent them working round, the object being to ensure that the ends do not become caught in the ports or openings in the cylinder.

DECARBONISING

Decarbonising is much easier, however, as there are no valves to grind-in and no " timing " to worry about.

Remove the cylinder-head first, and then the cylinder. On late machines the petrol tank must be taken off first.

Next take off the piston. The gudgeon-pin is located by wire circlips as on the larger machines, and one has to be taken out and the gudgeon-pin driven out from the other side. It is convenient to take off the oil pipe, even if the tank is not removed, as it gets in the way, so a blank nut or wooden peg should be provided to stop the contents of the oil tank running out when the pipe is removed. Before attempting to remove the circlip, cover over the opening in the crankcase as a precaution against the circlip falling in if it is dropped.

Removing Piston-rings

By soaking the piston in clean paraffin the work of removing the rings will be made easier, but as they are often broken in the course of being freed, it is a wise precaution to have two new ones handy. (The numbers are SL3/3 standard, SL3/4—0·020 in. and SL3/8—0·040 in.) The Velocette GTP pistons are all grooved to take rings of 0·090 in.

width, but some proprietary makes of pistons have wider grooves, so that the width should be roughly checked before attempting to take out the old rings, as a piston not of Veloce make may have been fitted at some time. The make is usually stamped on the crown or cast in the inside.

To free and remove the rings clear all carbon from around the edges of the rings and grooves with a wire brush, and then carefully prise one end of the ring out of the groove. Slide a thin piece of tinplate or pen steel behind the ring and edge it round gradually to raise the ring from the groove. After removal clear the grooves of all carbon and clean the rings all over. Clean the piston crown, the sides of the deflector, inside the crown and also the combustion space in the head.

Cylinder-head Jointings

The head on these engines is jointed direct to the cylinder, and a leaking joint may be rectified by lapping the head to the cylinder using the grinding compound, and making the joint on the lower face of the cylinder through which the cylinder-head bolt-holes are drilled. Do not use any jointing compound when replacing the head, but be careful to clean off all traces of grinding compound. Note that the hole for the sparking-plug faces forward.

The only point to watch when re-assembling the piston and cylinder is that the piston must fit with the gentle slope of the deflector facing forward. Use a new joint washer (T61/2).

Cleaning Silencers and Exhaust-pipes

The silencers will need clearing of carbon, and all late models have detachable baffle tubes which will pull out with the fishtail from the rear. This type may be scraped clear or the excess oil burned off in a gas flame. Non-detachable types are best cleaned by boiling for about an hour in a solution of water and caustic potash, one pound to the gallon. This solution corrodes aluminium, and is most painful in cuts in the skin, so that great care is needed in using it.

Do not be tempted to cut off the drilled cones from the ends of the exhaust pipes—their removal will reduce the

performance of the machine a lot; just clean them out thoroughly. The same remarks apply to the silencers. Alterations may make the machine sound as if it is going fast, but nearly always the speed is reduced by tampering with the maker's standard arrangement.

Re-setting Coil-ignition Timing

Should it be necessary to check or re-set the ignition timing, this is easily done. Nearly all GTP models have coil ignition, and the contact-breaker cam is on the right-hand end of the crankshaft. A few were made with magneto ignition to special order and for export.

The cam is held by a hexagon-head bolt, which on removal will expose a thread cut inside the cam. The cam is withdrawn by screwing into it a bolt $\frac{3}{8}$ in. in diameter by 26 T.P.I. (Same thread and diameter as the engine bolts.)

To re-time, fit the cam in place and hold it lightly in position with its fixing bolt, set the contact-point gap 0·018–0·020 in. Set the piston exactly to top dead centre and make a mark on the rim of the flywheel opposite some fixed point on the engine or chaincase, or fix a pointer to the engine and set it to the mark. A piece of stiff wire held under a cylinder-base nut will do.

Now move the flywheel backwards until the mark on the flywheel is $2\frac{3}{4}$ in. away from the fixed point or the pointer, measurement being made along the periphery of the flywheel. Set the cam so that the points are just separating, tighten the fixing bolt. Connect the low-tension wire to the contact-breaker and switch on the ignition. Move the fly-wheel a little farther back, and then slowly forward, at the same time watching the ignition warning lamp or the ammeter. At the moment the points separate the lamp will go out and the ammeter needle will return to zero; this should occur when the mark on the flywheel reaches the pointer.

Re-setting Magneto-ignition Timing

The same setting is used for magneto ignition. Re-setting in this case involves dislodging one of the magneto-chain

sprockets to re-set the timing, but the process is otherwise similar. As no ignition current goes through the ammeter on such machines, the contact-point separation is best checked by pulling back the flywheel and inserting a piece of cigarette paper between the points, and then pulling the flywheel forward while maintaining a light tension on the paper, which will pull out when the points separate.

As two-stroke engines usually run much hotter than four-strokes of equal size, the choice of a sparking-plug is most important. The plug must not oil up easily, but on the other hand, it must be capable of standing up to high temperatures without pre-igniting the charge in the cylinder.

In an extreme case pre-ignition may cause a bad seizure of the piston or even the melting of the piston crown. For recent engines use a KLG F70 or Lodge H14. Earlier engines with cylinder-heads bored to take 18-mm. plugs require a Lodge H1, KLG M60 or Champion Type 17.

ENGINE LUBRICATION

Engine lubrication is by a mechanical oil-pump working on the total-loss system. That is to say the oil which is pumped into the engine is not circulated back to the tank, but is fed in small quantities and is all consumed.

Oil-pump Design

The oil-pump is very simple, having no ball valves which could cause trouble. A plunger is turned from the crankshaft and rotates in the pump body, in which it is a very close working fit. As it turns it is caused to reciprocate by the action of a face cam formed on the inner end of the pump body. At the other end the pump spindle has a flat cut on its side, and the effect of rotating the spindle covers and uncovers holes drilled in the body. The upper hole is uncovered as the plunger moves forward, and oil is drawn into the pump body from the tank. As the plunger turns still more the oil-hole is covered and the plunger uncovers the hole at the bottom as it is forced back by the strong plunger spring, which holds it against the face cam. The oil which

was drawn in from the tank is thus forced out into the oil pipe to the driving-side main-bearing.

Through the main bearing the oil is forced into the hollow mainshaft and through a drilling in the crankshaft web to the roller-bearing big-end. The rapidly turning big-end spreads the oil over the cylinder and piston, and a small amount is caught in a drilling in the timing-side crankcase and is led down to the main-bearing bush on that side.

Regulation of Oil Supply

To regulate the oil supply to suit varying conditions of speed and load, the stroke of the pump-plunger is controlled from the throttle, to which the plunger-adjusting sleeve is coupled by a short rod. The oil supply is thereby increased as the throttle is opened, and lubrication is proportionate to the load on the engine. The supply is never cut off entirely, so that there is no risk of the engine seizing up should the machine be run fast down long hills with the throttle almost shut. This is a failing of engines lubricated on the " petroil " system.

Oil-pump Adjustment

The oil-pump is carefully adjusted at the factory before being sent out, and normally needs no re-setting at all. Its life is almost indefinite. All that is needed in the ordinary way is to adjust the control rod so that the adjusting sleeve is at its lowest point when the throttle is shut. The supply may easily be increased temporarily, as for example when running in a new piston in a recently overhauled engine, by adjusting the rod so that the adjusting sleeve does not quite reach the lowest position when the throttle is closed.

Should the supply of oil be excessive with the control rod correctly set, the adjusting screw in the sleeve may be turned in a clock-wise direction after first taking out the split pin which locks it. Always replace the split pin before re-starting the engine, and do not adjust more than a quarter turn before checking results.

As an engine which has been receiving too much oil will have blown quite a lot of it into the silencers, it is possible

to be misled into believing that the supply is still too generous because smoke comes from the fishtails. This smoke can be, and probably is, from oil accumulated in the silencers during the previous over-oiling, and the possibility of this must be taken into account when making adjustments to the pump. A sticking oil-pump control will, of course, cause over-oiling, and before adjusting the screw in the control sleeve make certain that the inter-connection to the throttle is working freely.

Prevention of Oil-leakage to Contact-breaker

To prevent oil from the pump chamber in the timing-side crankcase from leaking into the contact-breaker an arrange-

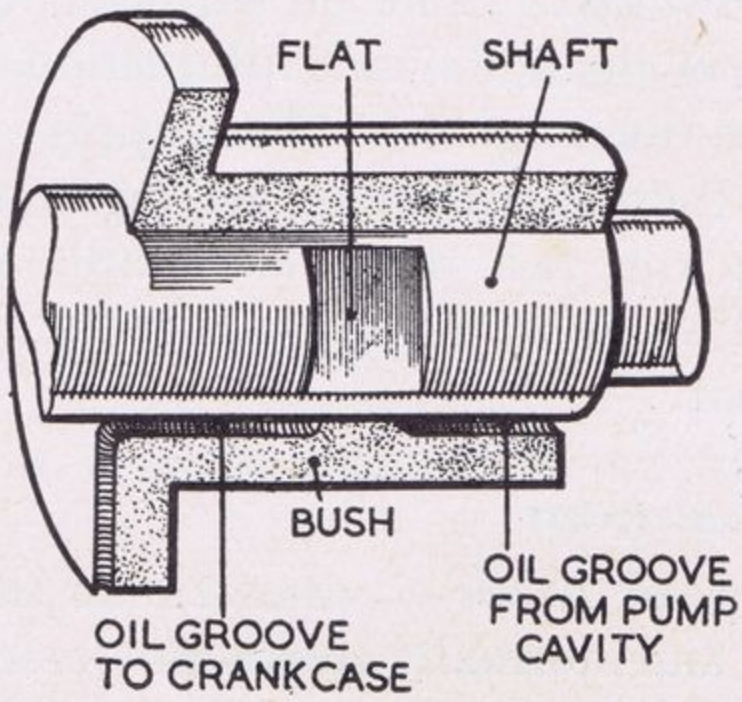

FIG. 18.—SECTION OF MAINSHAFT BUSH ON GTP MODEL (PUMP SIDE).

ment of oil-grooves in the timing-side main-bearing carries oil back into the crank-chamber. This is done by cutting two oil-grooves in line with each other across the lowest point of the bush (Fig. 18). The grooves do not quite meet, so that half-way across the bush there is a portion in contact with the crankshaft interrupting the flow. A flat is machined on the crankshaft so that it overlaps the ends of the grooves when the piston is moving upwards, and the resulting depression in the crank-chamber causes oil from the pump to be drawn through the outer oil-groove, across the flat and along the inner groove. The principle is just the same as that used to lubricate the cams and rockers of the overhead-camshaft engines,

except that in the one case external atmospheric pressure forces the oil through the bearing, and in the other the pressure is supplied by the oil-pump.

There is also a felt washer behind the contact-breaker, but if there is a leakage which a new felt does not cure, the engine should be dismantled to check that the oil-grooves are correctly cut, are quite clear and are being overlapped by the flat on the shaft. Before fitting new felt oil-retaining washers, always soak them in oil.

ENGINE SERVICE

Removing the Engine from Frame

Remove the engine from the frame after taking off the flywheel, chaincase and the chain. Take off the left-hand foot-rest and the brake pedal with its mounting. Take off the rear chain-guard, and the rear-chain driving-sprocket. Loosen the clutch-sleeve-gear nut with spanner A61/2AS, but do not remove it. With the other end of spanner A61/2AS loosen the flywheel nut, which will require driving round by using a mallet against the spanner. After the nut loosens it will almost immediately tighten again. Continue to hammer the spanner until the flywheel centre is felt to come off the taper end of the mainshaft. Remove the nut securing the dynamo-belt cover to the crankcase. Take off the six nuts around the centre of the flywheel and pull off the flywheel and belt cover. Remove the nut securing the pulley to the dynamo and take off the pulley. Take out all screws from around the edge of the primary chaincase. Screw the clutch-sleeve-gear nut (previously loosened) right off. The flywheel centre, sprocket, primary chain and clutch will now all pull off together.

The engine can now be taken out after the withdrawal of the engine bolts.

Dismantling the Engine

Remove the contact-breaker, ignition cam (see page 71) the six screws from the oil-pump plate and the pump. Remove the cylinder and the piston as when decarbonising, take

out the ¼-in. bolts holding the two halves of the crankcase together and part the crankcase.

The crankshaft is built up from five separate parts, two mainshafts, two balance-weights and the crank-pin. The shanks of the crank-pin are tapered, and are pressed into correspondingly tapered holes in the balance-weights. Unless a really stout vice or a press are at hand, the dismantling and re-assembling of the crank-pin and big-end rollers and the remainder of the assembly are best left to the nearest Velocette agent, as considerable force is required to dislodge the crank-pin.

Inspection of Balance Weight

The balance weight from which the crank-pin is to be removed has to be uppermost, and can either be held firmly in a vice, leaving the other balance weight clear, or it can be supported on stout strips of steel under a press. In either case the force is applied to the upper end of the crank-pin, which is either driven out with a drift and heavy hammer or pressed out.

Inspection of Big-end Bearing

To inspect the big-end only one balance weight need be removed, and new rollers may be tried in an endeavour to take up play in the bearing. Rollers are supplied standard diameter 0·242 in. × 0·3125 in. long (RT191), 0·0005 in. oversize (RT191/2) and 0·001 in. oversize (RT191/3). There are fourteen to a set. Carefully inspect the roller tracks on the crank-pin and in the connecting-rod for pitting or corrugations. Renew the parts as required. The rollers run direct in the big-end of the rod, which is hardened and ground, so that wear at this point means a new rod (T79/2AS). Do not mistake the Rockwell hardness test mark on the crank-pin roller track for a " pit " due to wear. This mark is a very fine regular " pin-prick " in the centre of the track, and is made during manufacture for test purposes.

Renewal of Crank-pin

Should the crank-pin (RT61/2) need renewing, press it out of the other balance weight and push a new pin into its place.

Press the pin home firmly until the end is exactly flush with the face of the crankshaft throw surrounding the crank-pin hole. Note that this face is slightly lower than the portion around the edges of the crank throw and the balance weight.

Refitting Crank-pin

Having selected the correct size rollers (standard if a new pin and rod are being fitted), stick them in place around the crank-pin with yellow grease or Vaseline. Place the connecting-rod carefully in place over them and fit the other balance weight on to the crank-pin. Set the shafts as accurately as possible, using a lathe, or supporting the shaft in V-blocks on a face-plate. Take the balance weight to which the crank-pin was first fitted (or if the old pin is in use, the one which was left undisturbed) and support it, crank-pin uppermost, on a flat, firm surface so that when pressure is applied to the upper balance weight the crank-pin cannot be forced farther through beyond the face of the crankshaft throw.

Press down the upper balance weight part-way, leaving about $\frac{1}{8}$ in. to go. This will not only hold the balance weights sufficiently firm for another check to be made but will also permit them to be moved if further trueing is needed to line up the shafts. After lining up press down the balance weight till the end of the crank-pin is flush. Finally, check again, making certain that the shafts are running within 0·0015 in. of complete truth.

Special stress has been laid on the fact that the crank-pin must not be forced in too far. This is because in addition to distorting the holes in the balance weights by permanently enlarging them, the flanges of the pin will tend to close in and nip the rollers.

Crankcase Re-assembly

When re-assembling the crankcase, jointing compound but no joint washer is used on the faces, and with the two halves tightly bolted together the crankshaft must have a minimum end-float of 0·002 in. Unless new bushes (RT170/3 and RT170/4) have been fitted, there is unlikely to be too little, so

that packing shims will be needed to take up anything over 0·010 in. Shims are obtainable in thicknesses of 0·003 in., 0·005 in. and 0·008 in. (Numbers K107, K107/2 and K107/3, respectively.) They are fitted over the mainshaft between the balance weight and the bush flanges. As far as possible avoid using the thinner shims and use the smallest quantity possible, and set them on the driving side for preference.

If new bushes are fitted, they must be reamed out to a finished diameter of 0·8764–0·8775 in., and if the shaft binds when the case is bolted up some material must be removed from the end faces to allow end-float. Take care that the timing-side bush (RT170/3) is properly grooved as previously described.