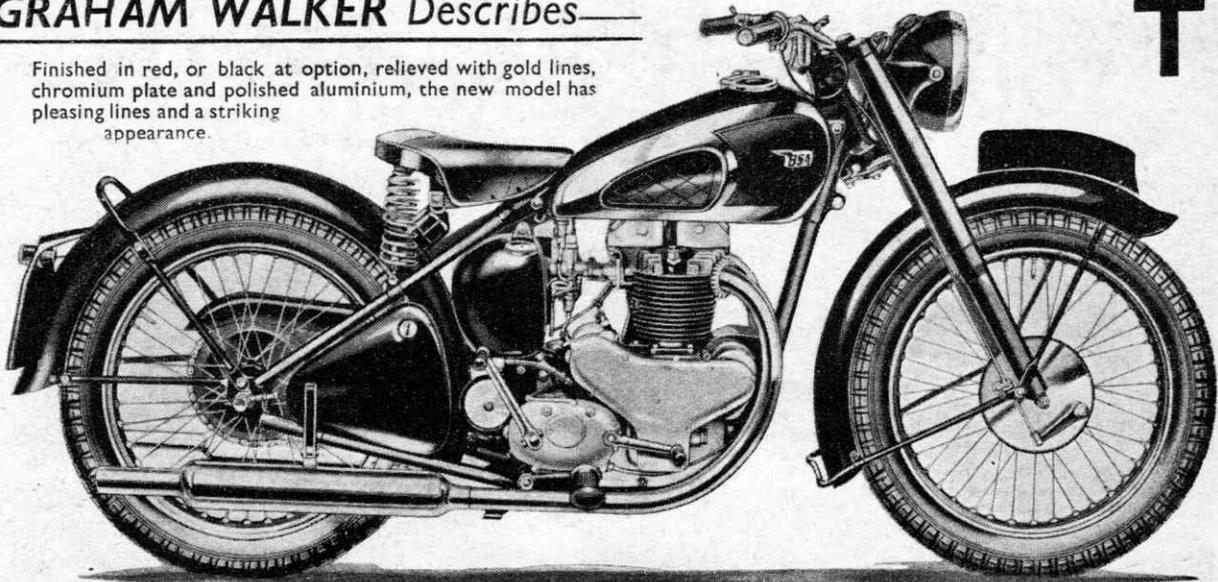


GRAHAM WALKER Describes—

Finished in red, or black at option, relieved with gold lines, chromium plate and polished aluminium, the new model has pleasing lines and a striking appearance.



THE

WAY back in August, 1939, a 500 c.c. vertical twin B.S.A. motorcycle was in process of development for 1940 delivery. Then came the war. The whole resources of the enormous Small Heath, Birmingham, factories were immediately diverted to the production of guns, rifles, intricate predictors and other military equipment in astronomical quantities, including the largest number of military motorcycles manufactured by any one British firm—no fewer than 125,000 of the solid and very reliable 500 c.c. side-valve M.20 model being delivered to the Allied Forces before hostilities ceased.

But if practical development of new civilian types had to cease abruptly in September, 1939, mental planning for the post-war period went on uninterrupted. The results of this "midnight oil" were to be seen in a succession of patents granted to B.S.A. Cycles, Ltd., some of which indicated to hawk-eyed enthusiasts that something particularly good in the way of twins could be expected from Armoury Road in due course.

At the first opportunity those plans were translated into metal. Thus it was that some 15 months back I had the pleasure of taking the prototype Model A.7 o.h.v. vertical twin B.S.A. for a test run. And a very pleasant model it proved to be. But, for the time being, I had to keep my findings to myself, because the company didn't want to be inundated with inquiries at a time when it had to concentrate on exporting thousands of its famous single-cylinder 250, 350 and 500 c.c. models in a Herculean effort to satisfy the overseas demand and to ensure the maximum importation of foreign currency.

Now, however, the time has come to disclose the full details of this "new throughout" model which is already in production. Considerations of space demand that wordage should be kept to the minimum, so I would ask the reader to study carefully the drawings which amplify much of the necessarily brief description.

Of the semi-unit construction type, the 62 mm. by 82 mm. (495 c.c.) engine produces 26 b.h.p. at 6,000 r.p.m. on a 7-to-1 compression ratio and is notable for its robust construction combined with an ingenious simplicity in design.

An excellent example of this ingenuity is to be seen in the unique case-hardened, built-up crankshaft which enables 1½-in. bore by 13/16-in. wide non-split ring-type lead-bronze lined big-ends to be employed. The inner end of each crankpin—forged

in one piece with its appropriate web and mainshaft—is tapered. These tapers are drawn into mating tapers turned in the heavy central flywheel by a transverse bolt on which are cut two threads, one fine, the other coarse, a method which ensures an absolutely foolproof locking system.

The stamped steel connecting rods carry fully floating circlip-retained gudgeon pins in phosphor-bronze bushes, the flat top silicon alloy, full skirt, .010-in. taper-turned pistons each being fitted with two pressure and one scraper rings. The crankshaft assembly is supported in a drive side 1½-in. bore by 13/16-in. wide locating ball journal and on the timing side by a plain steel-backed white metal 1½-in. bore by 13/32-in. wide bush. The light-alloy crankcase is formed integrally with the inner half of the primary drive oilbath case and carries the special gear-driven Lucas magneto at the rear. Fitted with automatic advance and a cut-out button in the contact-breaker cap, this instrument is spigoted and flange-fitted to the timing case.

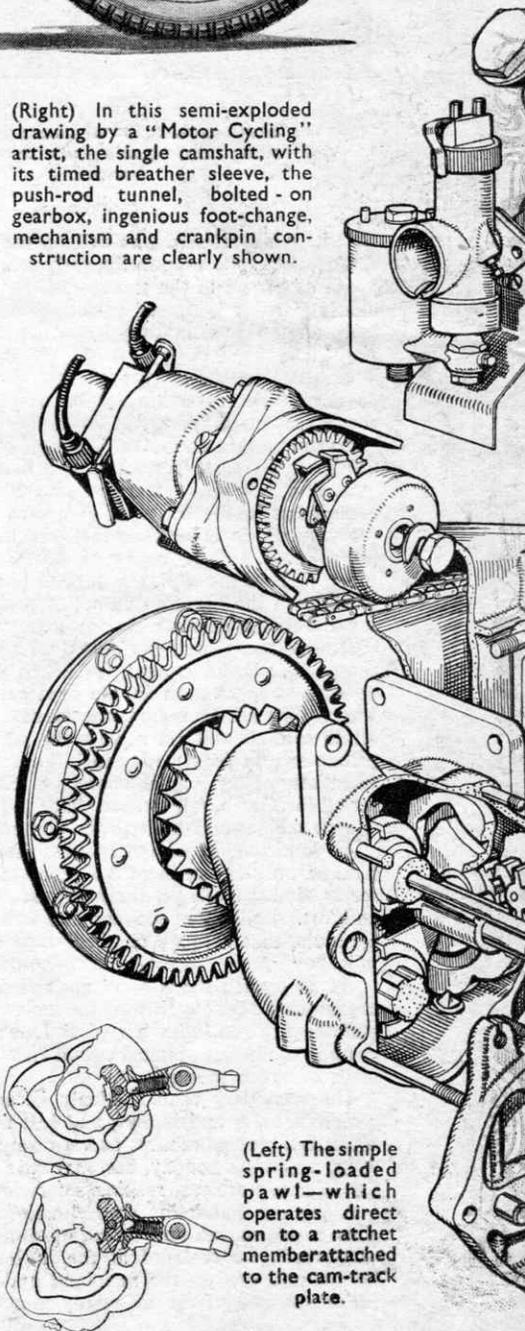
The chain-driven Lucas 6-volt A.V.C. dynamo is carried in a semi-circular cradle at the front of the crankcase, being retained in position by a half-strap and bolt. The dynamo and its chain can be removed without disturbing the timing gear and chain adjustment is made by rotating the instrument bodily.

An outstanding feature of the A.7 is the single rearwardly placed camshaft (Patent No. 567,029), which operates both inlet and exhaust valves by inclined pushrods passing through a separate tunnel, formed in the nickel-molybdenum iron one-piece cylinder casting and passages cored in the cast-iron one-piece head. Supported in three long phosphor-bronze bushes, it is ¾-in. in diameter and driven by an idler wheel mating with the half-time pinion. The direction of flywheel rotation ensures that the cams are flooded with oil.

The cylinder block is deeply spigoted into the crankcase and held down by eight ¾-in. bolts. The absence of a forward camshaft and pushrods permits the free passage of air between the barrels which makes its exit to either side of the pushrod tunnel at the rear. The cylinder head mates with a register formed in the barrel casting and seats on a copper-asbestos gasket, being held down by nine ¾-in. bolts.

The inlet valves (1½-in. diameter at throat) are inclined at 43 degrees and fed with mixture by a 15/16-in. choke Amal needle-type carburetter via an aluminium manifold. The 13/16-in. diameter exhaust

(Right) In this semi-exploded drawing by a "Motor Cycling" artist, the single camshaft, with its timed breather sleeve, the push-rod tunnel, bolted-on gearbox, ingenious foot-change, mechanism and crankpin construction are clearly shown.



(Left) The simple spring-loaded pawl—which operates direct on to a ratchet member attached to the cam-track plate.

NEW VERTICAL TWIN

B. S. A.

The Model A.7—A Semi-unit Construction
495 c.c. o.h.v. with a Single High Camshaft

valves are inclined at 38 degrees in the hemispherical combustion chambers. All valves have 5/16-in. stems, working in cast-iron guides, and are equipped with duplex coil springs and detachable hardened steel end caps. The four individual forged steel rockers and their hardened thrust washers are mounted on stationary case-hardened shafts, each supported in three bearings formed in the detachable die-cast light-alloy rocker boxes, which are secured to the cylinder head by two 1/2-in. and three 5/16-in. studs. This construction allows of the

free passage of air to the centre of the head casting.

The four steel tappets, Monochromed on their working faces, are in direct contact with the cams. They slide in three steel blocks—one for each inlet tappet and a duplex one in the centre for the exhausts—pressed into the crankcase and secured by a keeper plate. The solid 1/4-in. diameter pushrods have spherical bottom-end cups and ball ends at the top, whilst valve clearances are adjusted by the normal stud and locknut on the rocker ends, accessible via

detachable caps in the rocker boxes. The valve timing is an excellent compromise between maximum performance and flexibility—inlet opens 24 degrees B.T.C., closes 65 degrees A.B.C.; exhaust opens 60 degrees B.B.C., closes 21 1/2 degrees A.T.C.

Driven by a worm gear on the timing-side engine shaft, the double spur gear-type oil pump feeds lubricant through passages in the crankshaft to the big-ends, whence it is distributed by splash. Typical of the thought given to detail is the hole drilled in the shoulder of the drive-side connecting rod, which ensures equality of supply to both cylinder bores. A release valve controls the pressure at 50 lb. per sq. in. (hot oil), excess lubricant escaping into the timing gear chest.

The drilled overhead rockers rely on oil mist, sloping "floors" in the head casting returning the oil to the cam faces via the pushrod tunnel. A non-return ball valve on the pressure side of the pump and a gravity ball valve on the scavenge side prevent siphoning when stationary and ensure that the pump is always primed. Crankcase cleanliness is encouraged by a mechanically timed breather—a ported sleeve, mating with passages in the timing chest, being driven by the camshaft wheel. Surplus oil mist is diverted on to the final-drive sprocket.

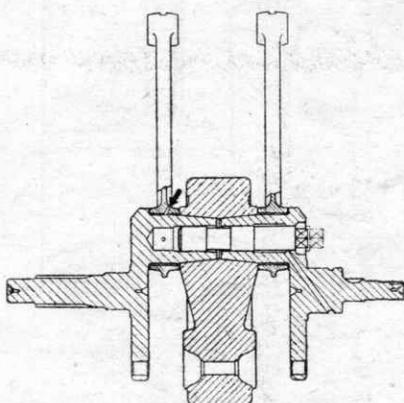
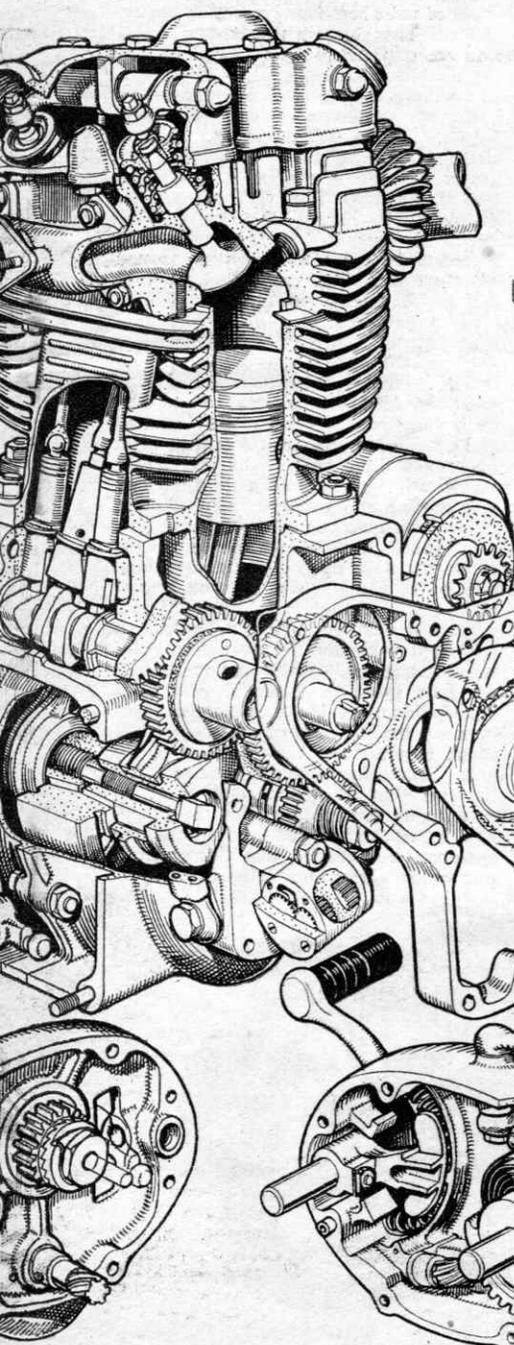
The Transmission

The primary drive is by an endless flat-backed 3/8-in. pitch duplex chain, tensioned by an externally adjustable spring-loaded slipper with a Monochromed working face. An improved two-cam spring-loaded engine shaft cush drive, working on a splined sleeve, eliminates driving snatch. Incidentally, the exceptionally large engine sprocket has no fewer than 27 teeth, whilst the case-hardened clutch sprocket, carrying a five-plate Ferodo-lined totally enclosed clutch, runs on a roller bearing.

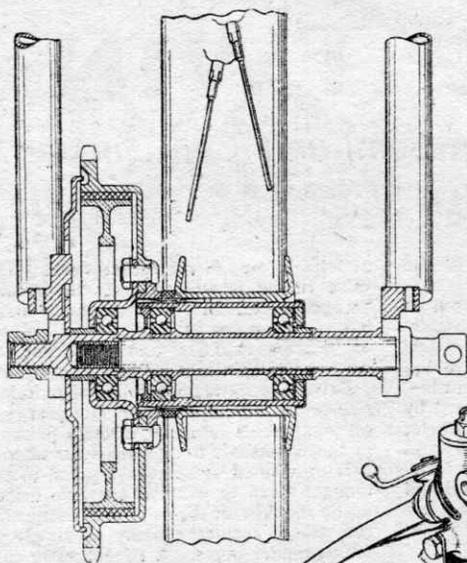
The four-speed gearbox, with driving shaft vertically above the layshaft and with all operating mechanism totally enclosed, is attached to a machined face on the crankcase by four 3/8-in. studs. The sliding gears have rounded ends on their teeth to ensure easy engagement in the recesses formed in the mating wheels. The positive-stop change mechanism is the subject of another patent (No. 569,742) and is a classic example of ingenuity. The method by which the movement of the foot pedal is translated through a spring-loaded ratchet member to the selector cam track is made clear in the sketches.

The mainshaft runs on two heavy duty deep-groove ball journals, whilst the worm gear on an extension of the layshaft drives the Smith's speedometer mounted in the fuel tank. Solo ratios are 5.1, 6.1, 8.9 and 13.1 and sidecar ratios 5.4, 6.5, 9.5 and 13.9—a surprisingly small difference which indicates the flexibility and "flat" power curve of the engine. Final drive is by 1/2-in. by 3/8-in. chain with two guards.

The frame is an all-brazed structure with single large-diameter top and saddle tubes, duplex down tubes running from the sturdy steering head right through to the rear fork ends, whilst the saddle stays are brazed into the seat lug. Sidecar lugs are incorporated. The engine-gear unit is attached to the frame at four points—two



(Above) How the two-piece taper crankpin is drawn into the central flywheel by a bolt with "differential" threads. The flywheel and crank webs are drilled for a lining-up bar. Note oil-way in big-end.



(Above) The quickly detachable, interchangeable rear wheel with straight-pull spokes. Splines on the hub engage with splines in the ball bearing-supported brake drum.

(Right) The oil tank, air filter and battery assembly. Note air lever behind seat lug. (Inset) The ingenious spring-loaded, ratchet controlled central stand concealed in the seat tube.

in front of the crankcase and one each above and below the gearbox.

The hydraulically damped telescopic spring forks are identical in design with those fitted to the 1946 B.S.A. single-cylinder models already fully described in this journal, but are slightly longer. They are notable for their sensitivity and sweet action. The steering head adjustment, subject of yet another B.S.A. patent, overcomes in a very simple manner the fundamental difficulty encountered where the fork attachment centres are fixed. An internally threaded sleeve can be screwed up or down the steering column to vary the bearing clearance and is then locked in position by a cap nut and the split clamp of the upper fork member.

Front and rear wheels are of the quickly detachable and interchangeable type, although the tyre sizes differ—front 26 by 3.25-in., rear 26 by 3.50-in., with pressures respectively of 17 and 22 lb. per square inch. The hubs run on deep groove non-adjustable ball journal bearings mounted on shouldered hollow spindles, through which pass the solid knock-out spindles. The 7-in. by 1½-in. front brakedrum is mounted on a sleeve, pressed into the fork end, which also carries the brake plate with its cast light alloy shoes.

The rear brakedrum-cum-sprocket is similar in size and principle, although carrying a bolted-on steel splined member. The rear fork ends are slotted to permit of chain adjustment. Brake reaction is taken through a lug on the front forks and an "ear" formed on the rear fork-end lug. Special "crinkled" hub flanges accommodate the straight-pull spoke heads, subject of yet one more B.S.A. patent.

The ½-in. handlebars are remarkably clean. The controls consist of (right) quick-action twistgrip, front brake lever and horn button, (left) clutch lever and lamp dipper control. Automatic advance has dispensed with the ignition lever, whilst the seldom-used air slide lever is mounted beneath the saddle.

Mounted in pannier, respectively on the near and off side of the saddle tube, are a 12 A.P.H. battery and a four-pint oil tank, but skilfully sandwiched between them—and therefore a good thing apt to be missed!—is a Vokes

being mounted beneath the saddle. The electric horn is mounted near the off side rear engine plates just abaft the gearbox. The standard equipment includes an exceptionally large capacity triangular metal toolbox and rubber kneegrips, whilst provision is made for pillion rests and seat (or tubular carrier) to order.

The twin silencers are a combination of the internal spiral baffle and absorption types, the exhaust pipes being a push fit in the cylinder head and decorated with finned ring nuts. Mudguards are of the ribbed "helmet" pattern.

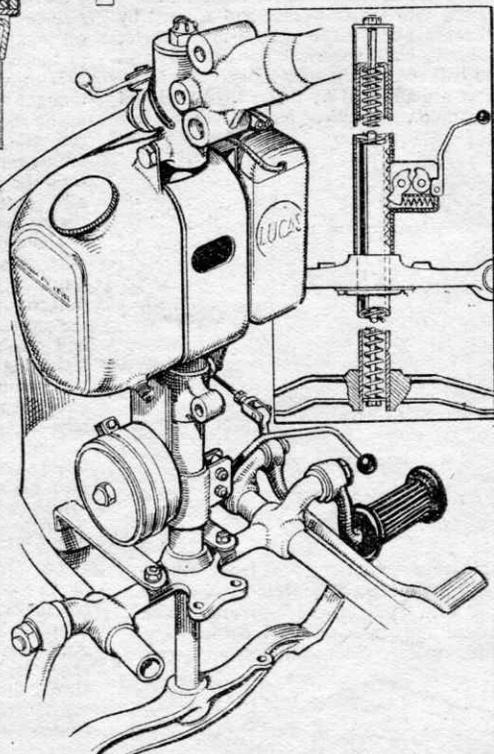
A novel and excellent feature is found in the central stand. Pressure of the foot brings the stand base into contact with the road—a touch of the small hand lever releases the ratchet, whereupon the device disappears up the saddle tube!

The standard of finish is extremely high. Light alloy parts such as timing case, chaincase and gearbox end cover are buffed, whilst ferrous metal parts are enamelled in a rich and most attractive shade of red where they are not chromium plated. The chromium tank and wheel rims are respectively panelled and centred red and lined out in gold. Black with chromium is offered as an alternative.

The overall dimensions are: wheelbase 54½-in., saddle height 29½-in., ground clearance 6½-in., width of bars 29-in., dry weight 365 lb. The price is £135, plus £36 9s. Purchase Tax, with speedometer £4, plus £1 1s. 7d. P.T. as an extra. Production is now well in hand with good prospects of deliveries towards the end of November. A rear sprung model will also be announced later.

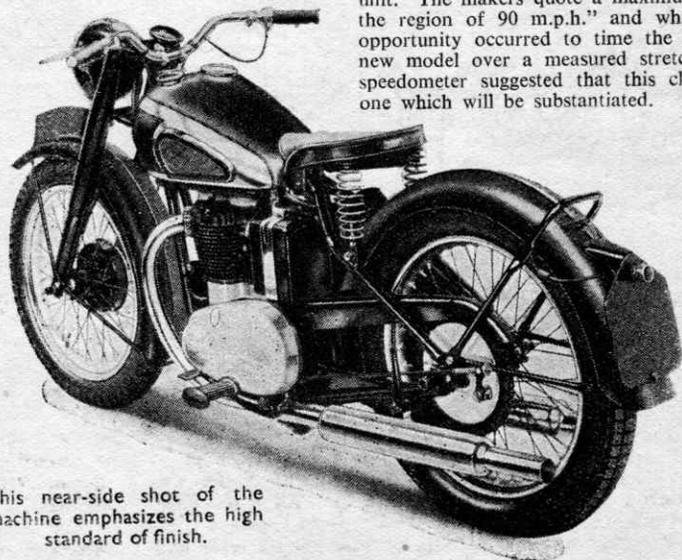
My impressions of this very pleasant model when I rode it in June, '45, were of a comfortable 80 m.p.h. mount with exceptional roadholding qualities and a high degree of mechanical silence. Since then many improvements have been effected and Charles Markham confirms that, when he rode a production model recently he was greatly impressed with the dead certain starting and excellent tick-over, plus the extreme quietness of the engine.

He found, after a few minutes on the road, that once he had accustomed himself to the exceptionally short movement of the gear change pedal changes were sweet and effortless. Particularly was he impressed with the freedom from rear wheel "hammer," whilst the non-scratch top gear speed of 7 m.p.h. with clean acceleration right up to maximum speed indicates the efficiency of the engine shaft shock absorber and the flexibility of the unit. The makers quote a maximum "in the region of 90 m.p.h." and whilst no opportunity occurred to time the brand-new model over a measured stretch, the speedometer suggested that this claim is one which will be substantiated.



pattern air cleaner through which the carburetter draws its supply. The petrol tank holds three gallons and has two taps, there being no cross pipe to interfere with quick detachability.

The 8-in. Lucas head lamp carries the ammeter and switch gear, the A.V.C. unit



This near-side shot of the machine emphasizes the high standard of finish.