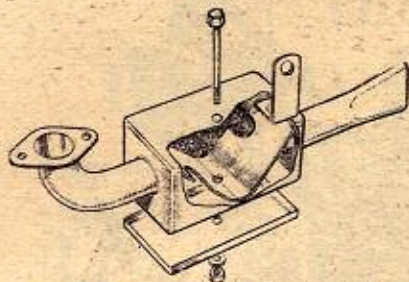


A B.S.A. Cyclemotor

Ingenious Power Unit Which Incorporates Gear Drive
Through a Three-plate Clutch



The silencer takes to pieces for decarbonization

A 35 c.c. cyclemotor, to be called the Winged Wheel, is to be marketed by B.S.A. Designed to replace the rear wheel of a normal bicycle, the unit embodies gear drive transmission through a three-plate clutch, a 9½-in-diameter internal expanding brake and a heavy duty free-wheel of the locking roller type. Complete with control cables and levers, tyre and tube, fuel tank and fittings, the unit will retail at £25.

The two-stroke engine is incorporated in a 26 × 1½ in cycle wheel with the cylinder horizontally disposed, in line with the

cycle frame; the cylinder head faces forward into the air stream. Strengthened by heavy duty spokes, the wheel can be fitted to most types of standard bicycle. A separate fuel tank of half-gallon capacity is intended to be fitted in the carrier position above the rear wheel. Weight of the engine-wheel unit is given as just under 27 lb.

Bore and stroke measurements of the engine are 36 × 34 mm. The cylinder is machined from high-grade cast iron and is finned horizontally. At its top (or forward) end, the cylinder is spigoted to receive the light-alloy cylinder head, which has a hemispherical combustion space and a centrally disposed boss for the long-reach sparking plug. Cylinder and head are secured to the crankcase by four long studs and nuts and special

saddle washers which bridge four pairs of adjacent head fins. Diametrically opposed inside the barrel, the outlet ends of the transfer ports are flared to impart a swirl to the partially compressed charge from the crankcase.

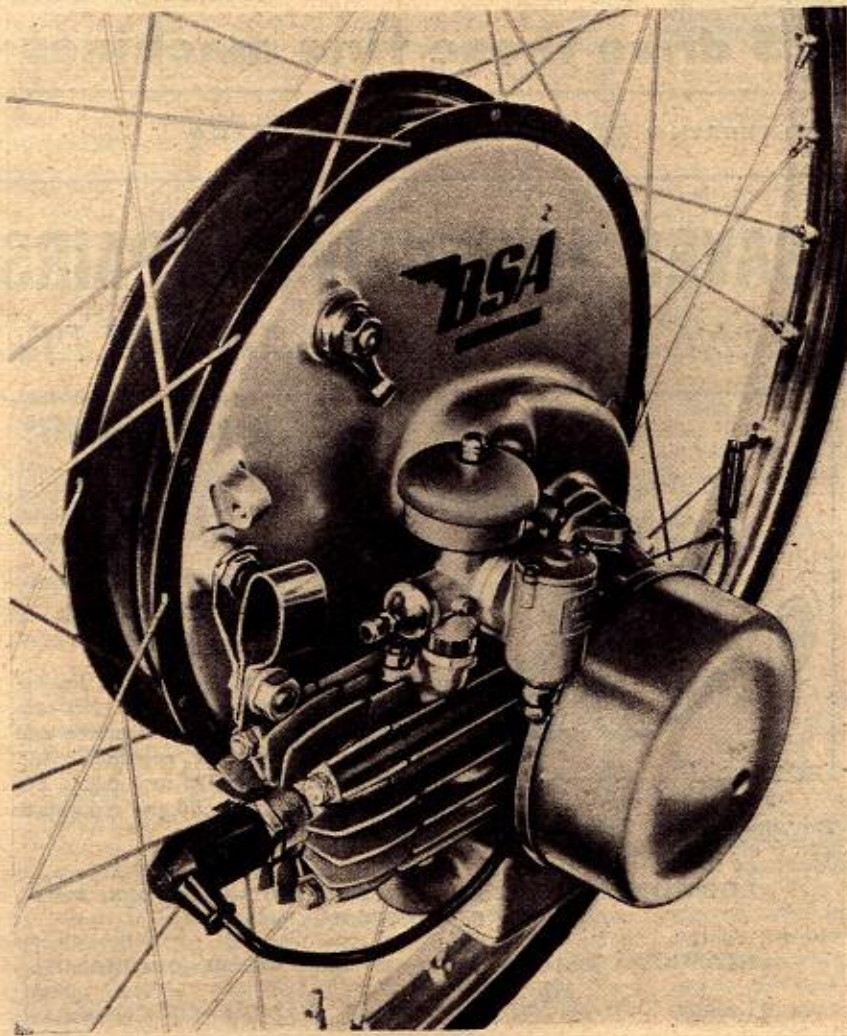
The carburettor is an Amal, fitted with an unusual strangler operated from the throttle lever. The aim, of course, is to keep the number of controls down to the minimum. This is achieved by employing a throttle lever fitted with a small ratchet which, when lifted, allows the lever to be moved past the position where the throttle is fully open. Movement of the lever beyond this point causes the blind end of a groove in the throttle slide to actuate a small tongue on the end of the pivoted strangler butterfly valve. Thus the valve is brought down to blank off the choke tube in order to provide the necessary rich mixture for cold starting.

A low-expansion, silicon-aluminium alloy casting, the piston is of the slightly domed, deflectorless type and carries two pegged compression rings. The gudgeon-pin is fully floating, takes its bearing in a phosphor-bronze small-end bush and is retained by circlips. The big-end bearing consists of a single row of rollers which run between the crankpin and the hardened and ground big-end eye of the connecting rod. Material employed for the connecting rod is case-hardened nickel-chrome steel with a tensile strength of 50 tons.

Three-piece Assembly

The mainshafts and their webs are of medium-carbon case-hardened steel and, with the crankpin, form a three-piece crankshaft assembly. Parallel ground, the crankpin is an interference fit in the webs. Supporting the crankshaft are two line-outside-diameter roller bearings, one at each side.

Aluminium alloy is used for the crankcase castings. The inner, or right-hand, crankcase half is an integral part of a single, large casting which forms the shoe-plate of the brake as well as an enclosing shell to house the clutch and gear transmission mechanism. The outer, or left-hand portion of the crankcase carries a roller journal bearing and a pressure oil seal, and it is extended to form a spigot on which the stator of a Series 90 Wico-Pacy mag-generator is mounted. The rotor, of course, is carried on the left-hand side engine mainshaft. The Series 90 mag-generator is the latest version of the Bantamag and was fully described in *The Motor Cycle* for 11 September, 1952. For the Winged Wheel, the generator is fitted with a separate dome cover, retained by a spring clip.

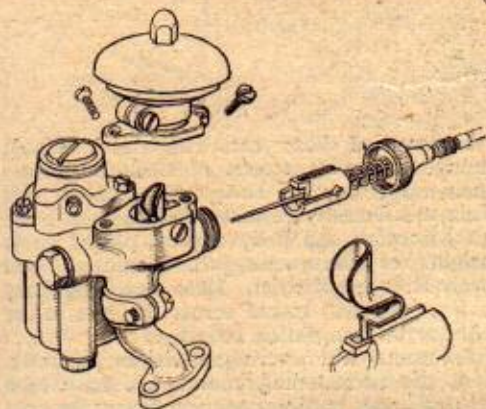
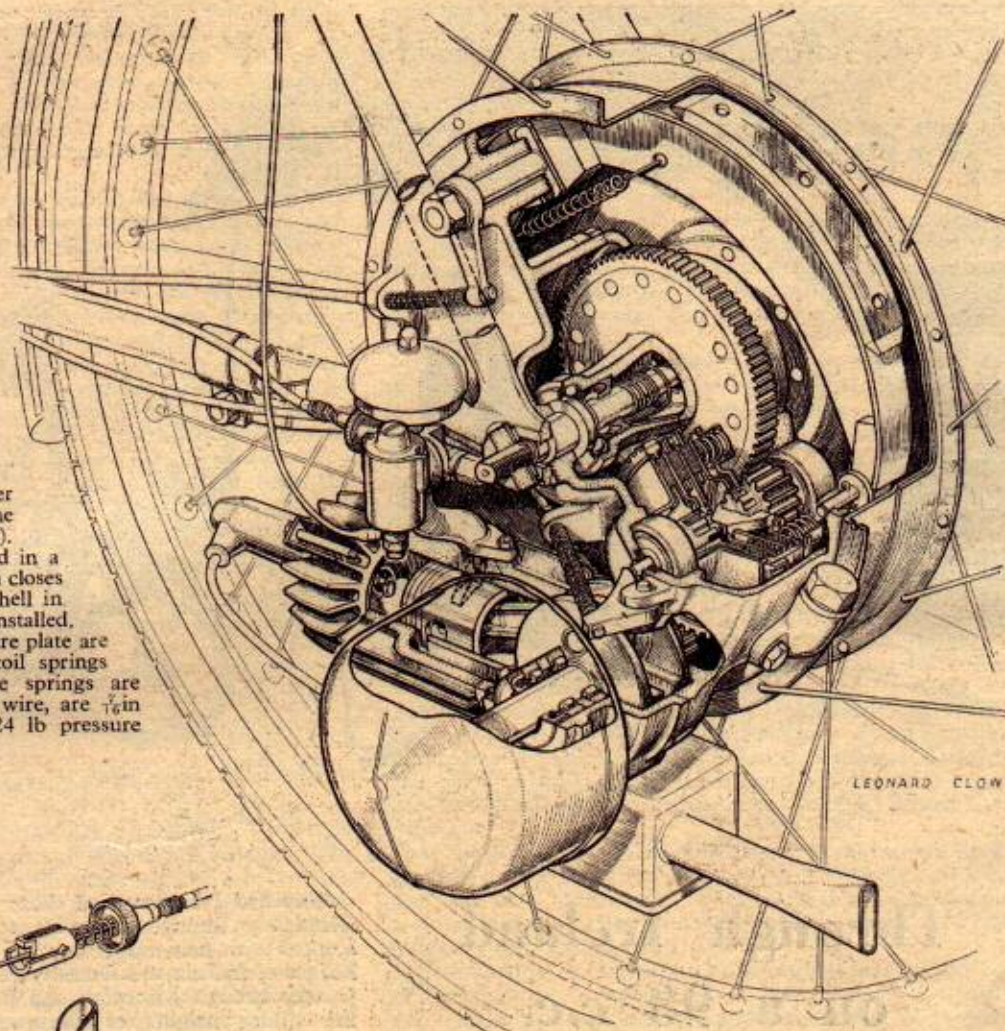


External appearance of the prototype unit; it forms a complete rear wheel

The right-hand main-shaft is splined to carry a 17-tooth spur pinion which, situated in the transmission box, drives the clutch through a 66-tooth gear pinion on the clutch drum periphery. When the clutch is engaged, the drive is transmitted from a pinion on the clutch shaft to a fourth pinion in the gear train. This last pinion is riveted to the wheel hub, which is keyed to the large-diameter brake drum.

The clutch shaft is carried by two ball journal bearings, one at each end. One bearing is housed in the combined crankcase and brake cover plate (which houses also one of the main wheel bearings). The other bearing is housed in a secondary cover plate which closes that portion of the main shell in which the transmission is installed.

Loading the clutch pressure plate are no fewer than ten small coil springs located in thimbles. The springs are manufactured in 18 s.w.g. wire, are $\frac{7}{16}$ in in diameter and have a 24 lb pressure



Above: Internal details of the 35 c.c. two-stroke unit

Left: Amal carburettor with a pivoted strangler butterfly valve operated by throttle control

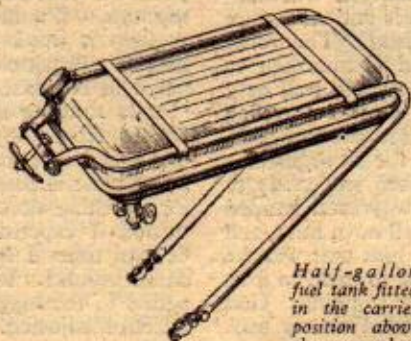
rating. Cork inserts are used in the friction plates. A short clutch push-rod is actuated by a cable-operated bell-crank mounted on the outside of the transmission housing. The entire gear train runs in oil. Synthetic rubber oil seals are fitted on the clutch shaft and in the hub assembly as well as on the crankshaft.

Apart from its large diameter, the brake is unusual in that each shoe is mounted on a separate pivot. Operation is by means of a single, parallel cam. The shoes are linked by means of a single return spring situated close to the cam. In order to eliminate any possibility of chatter, each shoe has a locating screw which is inserted into the shoe plate and operates in a slot midway between the shoe pivot and the cam. Dimensions of the linings are 5½ in long x ½ in wide. Brake operation is by cable from a handlebar lever.

The silencer comprises a box-section expansion chamber and short discharge

pipe. The unit is readily dismantled for cleaning purposes. Its lid is retained by one nut and, on its removal, the single baffle plate can be withdrawn.

Power developed by the wheel, it is stated, is sufficient to propel an ordinary cycle at a cruising speed of 20 m.p.h.;



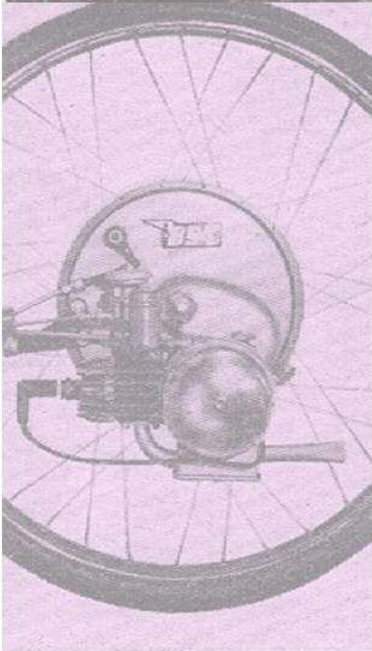
Half-gallon fuel tank fitted in the carrier position above the rear wheel

maximum speed is approximately 26 m.p.h. Fuel consumption is expected to average around 200 m.p.g.

Last week a member of the staff of *The Motor Cycle* rode a bicycle fitted with a prototype model of the Winged Wheel. Starting with the engine either cold or warm was accomplished after a few easy turns of the pedals. The procedure was to pedal off with the clutch held out, and, with the throttle lever set at about one-third open, engage the clutch when a fast-walking speed had been reached. The engine appeared to be quite happy, and two-stroked perfectly, at speeds in the region of 20 m.p.h. Maximum speed achieved on level ground was 25 m.p.h. At the lower end of the scale, the engine pulled extremely well. The large rear brake was most effective, and was endowed with sufficient sponginess to provide true delicacy of control. Power on hills was well sustained. After a baulk on average main-road gradients, the pedal assistance required was of a light nature. There was no vibration, and roughness was perceptible only when the engine was made to pull at inordinately low speeds.

Makers are B.S.A. Cycles, Ltd., Small Heath, Birmingham, 11.

IceniCAM Information Service



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B.S.A. Announces a Cyclicmotor

ALTHOUGH the final appraisal of the new 35 c.c. B.S.A. "Winged Wheel" must rest with the buying public, it would appear that the efforts of B.S.A. Cycles Ltd., of Small Heath, Birmingham, to present a motor attachment for bicycles which combines attractive appearance, economical but adequate performance, safe operation and simple maintenance have been successful. None can deny that the compact and neat exterior of the recently announced motor wheel, characteristically green in finish, is good looking. With a claimed power output of 1 b.h.p. and a fuel consumption of 200 m.p.g. the performance should be at least satisfactory, whilst the incorporation of an outsize internal expanding brake in the unit overcomes the most doubtful factor in cycles to which an engine is fitted. Maintenance of this type of two-stroke power unit is usually confined to the removal of carbon deposit from cylinder head and silencer. Therefore, of all parts of the "Winged Wheel," these have been planned to be the most accessible.

Gear Drive

The transmission is quite positive, and utilizes a train of internal gears operating in a self-contained oilbath; the system is quite unaffected by water. No friction roller, of course, is employed and tyre wear should be very little above that to be expected from a machine operated solely by pedals. It is unlikely that the gears will need servicing for long periods, other than for attention to the oil level. No "fitting" in the normally accepted sense is required and the unit can be installed in a few minutes. Electrical equipment is by Wico-Pacy and the flywheel-magneto-generator supplies a 6 volt output for 6-w. head and 3-w. tail lamps and high tension current for ignition.

As a complete unit, including the 1-gallon petrol container, the "Winged Wheel" costs £25, there being no purchase tax chargeable.

What can be described as the brake back-plate is the main component of the assembly and carries not only the engine but the clutch, transmission and flywheel-magneto-generator and forms one half of the crankcase.

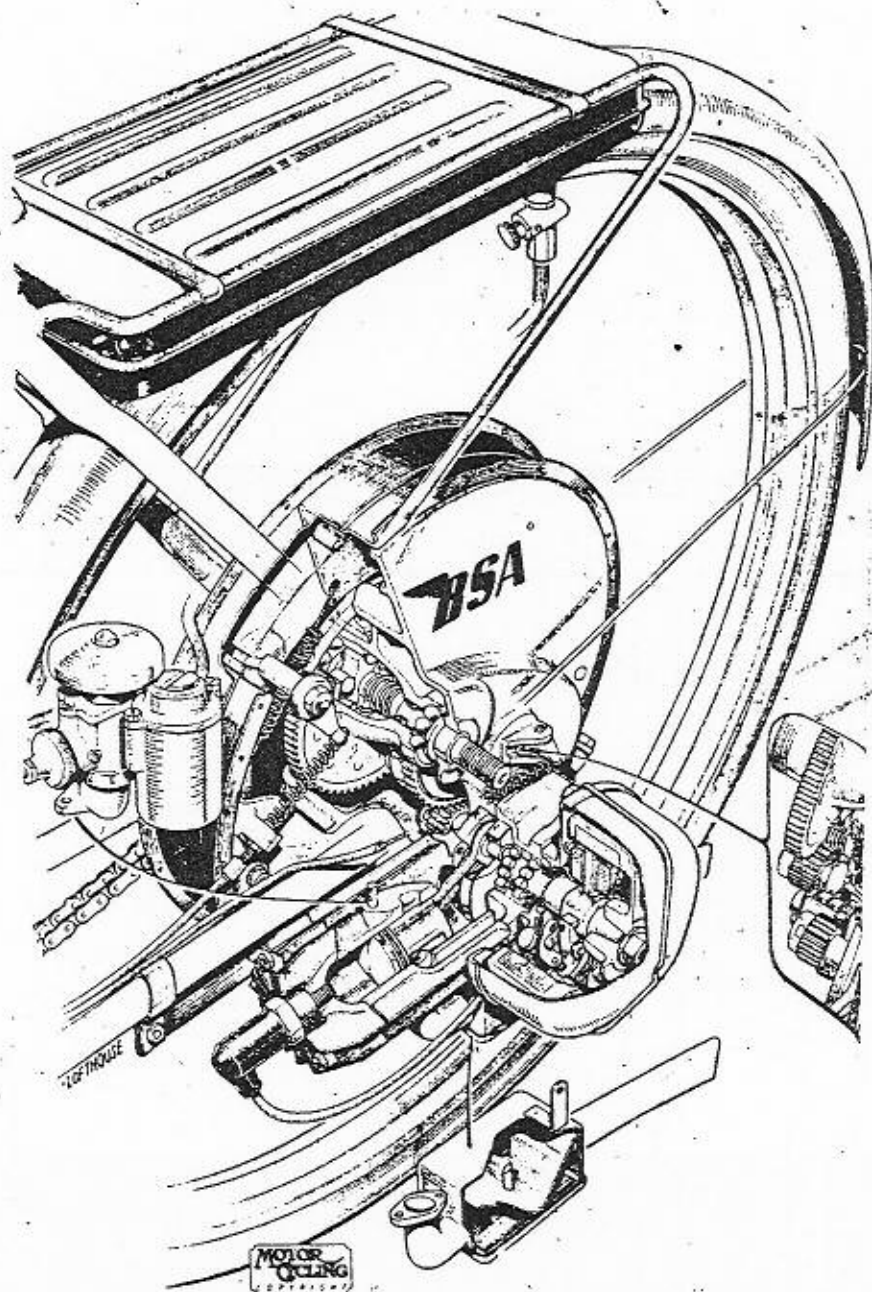
The cylinder lies horizontally in front of, and below, the wheel spindle. It is air-cooled and, machined from an iron casting, has longitudinal fins. The long studs, passing through holes in the flange of the cylinder barrel, position it with relation to the crankcase, but there are no holes in the cylinder head and special saddle-washers bridge four adjacent pairs of head fins and are secured by long nuts.

In the cylinder casting is a single exhaust port, an induction tract and a pair of transfer ports, the latter with specially shaped orifices to impart a

directional swirl to the ingoing charge which, by sweeping upward and round the periphery of the bore, assists in scavenging the exhaust gases. The latter travel downward, through the exhaust port, to a box-shaped silencer which, thanks to a quickly detachable base, is easily cleaned. A cranked, external induction tract bolted to the inlet port has a special Amal carburettor clipped to it.

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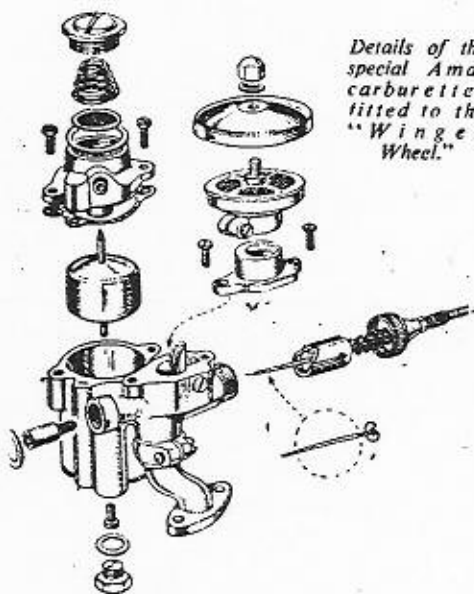
Small Heath Factor
addition to the Ranks
Auxiliary Engines for Cy



The new B.S.A. cyclicmotor unit, built into a wheel, with its innermost details exposed. This is another view of the transmission to show how the various pinions engage.

D WHEEL"

This carburetter has been cleverly designed to provide a single control which serves not only the throttle but also a subsidiary starting device located above the throttle slide. When the throttle lever is pushed past the limit of normal travel of the slide, the latter moves beyond the maximum aperture position; pivoted in the mixing chamber is a leaf-shaped choke which, throughout the normal throttle travel, sits in a slot in the slide. This choke has a peg which is engaged by a stop as the slide moves on and the choke hinges downward. In doing this, it almost closes the choke-tube and provides a rich



Details of the special Amal carburetter fitted to the "Winged Wheel."

mixture for starting. To prevent small particles of dirt from blocking the minute jets, the lid of the float chamber is enlarged to form a well in which is located a filter gauze.

Centrally disposed in the hemispherical cylinder head, the 14-mm. plug is a long-reach component specially developed for two-stroke engines and is fitted with a waterproof terminal. Of low expansion silicon-aluminium alloy, the slightly domed-top, deflectorless piston has two pegged compression rings. An alloy steel connecting-rod carries the floating gudgeon pin in a phosphor-bronze bush, the pin being located by two circlips. A single row of rollers running on the hardened and ground crankpin and in a ground eye in the connecting-rod form the big-end bearing.

The crankpin is pressed into the flywheels which have both mainshafts

forged integrally. On the magneto side, two hardened steel sleeves with thrust faces, a distance piece and an oil seal are pressed into the crankcase, while a single, steel sleeve and oil seal are located on the drive side. The rollers which form the main bearings run in these sleeves, and directly on to the mainshafts which are hardened and ground.

Two ball journals carry the clutch assembly which is mounted on a shaft parallel to, but on one side of, the engine mainshaft. A pinion on the periphery of the clutch housing engages with a small pinion splined to the engine mainshaft: the drive reduction ratio is 17 to 66. A third pinion, fitted to the shaft carrying the clutch, drives the final pinion in the train which is mounted on the hub itself. The secondary reduction ratio is 17 to 82 and the final, effective, ratio between mainshaft and wheel is 18.7 to 1.

As these gears and the clutch are housed in an oil-tight case, the inserts of the three driven plates are of cork. A clutch pushrod protrudes through the main outer casing and is operated by a small external bell crank and flexible cable.

Of sturdy construction, the hub carrying the final drive pinion runs on a pair of large cup and cone ball races and carries a B.S.A. Eadie Coaster free-wheel in place of the ratchet mechanism conventional on bicycles. Oil seals are suitably located to prevent leakage of lubricant.

As noted earlier, both ignition and lighting are functions of the Wico-Pacy flywheel magneto-generator. This is attached to the boss of the outside main bearing and its rotor is keyed to a tapered extension of the engine mainshaft.

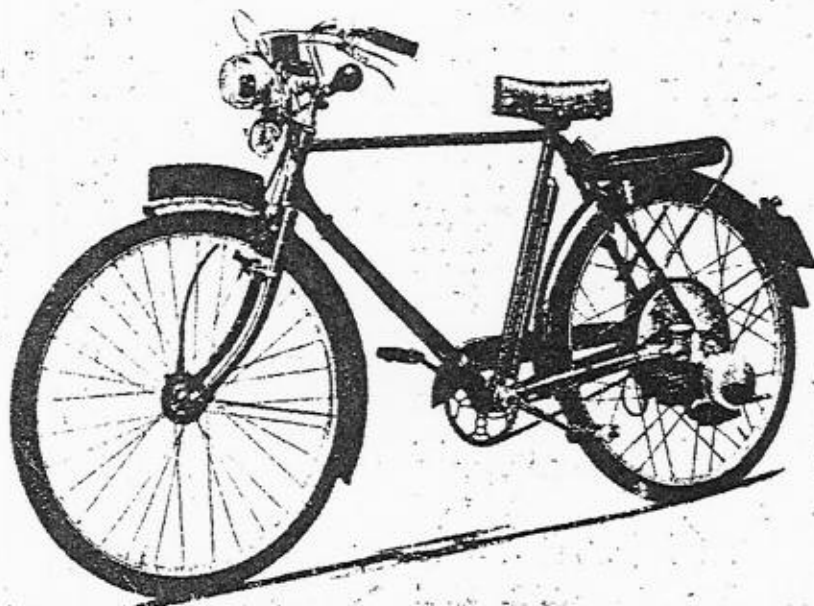
Encircling these light-alloy castings

which enclose "the works" is a steel cover, riveted to the hub, and to which the spokes are laced. It also forms the drum of the 9½-in. internal expanding brake. Each brake shoe has a fulcrum point of steel integral with the light alloy of the outer main casting. A boss in this casting, in which there is a phosphor-bronze bush, provides the bearing for the brake-cam spindle. Both steel shoes are lined with normal fabric material, and the cam lever is operated from the handlebars by a flexible cable.

Both drive and brake torque reaction are absorbed by the cycle frame via a clip attached to a short steel bracket bolted to the main outer light-alloy casting. Various frame tube sections can be accommodated by clips of different shape.

A combined filler and oil level plug is bolted to the external wall of the transmission chamber which holds 1½th of a pint of oil. A separate, pressed-steel petrol container of ¼-gallon capacity with a suitably-disposed petrol tap is provided with two tubular stays for attachment to the cycle frame behind the saddle. Combined with the filler cap is a measure for the oil which ensures that the correct quantity is added to the petrol.

Impressions on the road confirmed that the power output of the "Winged Wheel" was well up to expectations. With the new carburetter, starting was commendably easy and a few turns of the pedals to get the machine under way were enough to bring the engine to life immediately the clutch lever was released. To maintain a steady speed of 20 to 25 m.p.h. on level going, only half-throttle was required and this left enough power for climbs of average gradients to be made without pedal assistance.



A complete bicycle, equipped with the 35 c.c. B.S.A. "Winged Wheel."