FOUR BEFORE ITS TIME

by PHIL VINCENT
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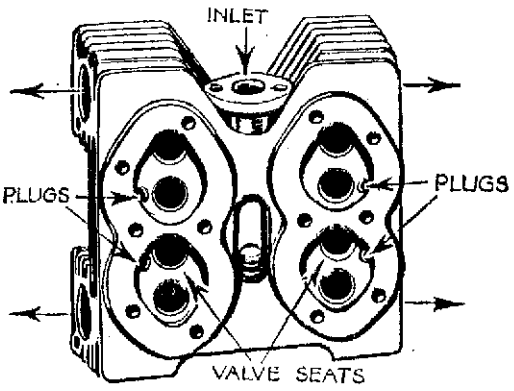
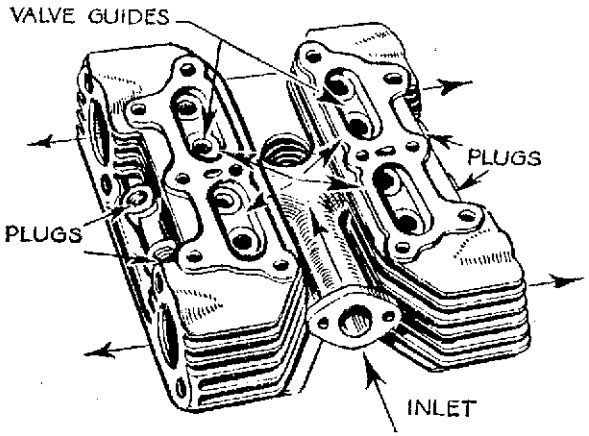
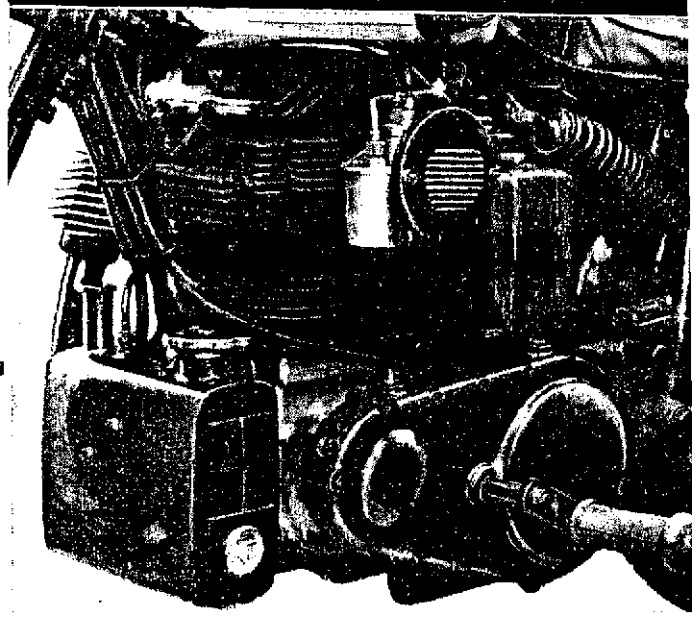
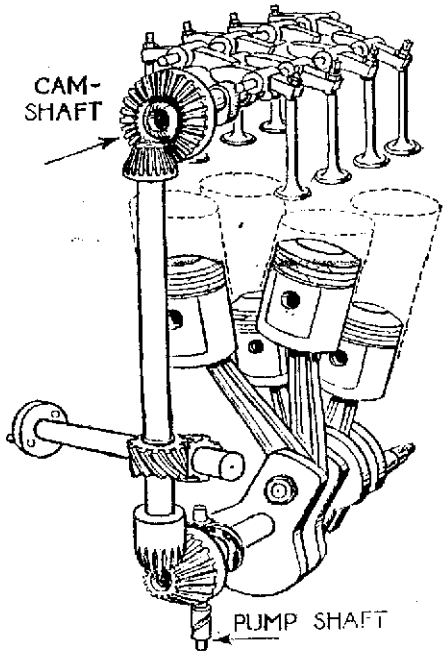




Above: Top and underside views of the one-piece, cast iron cylinder head. In plan view, the combustion chambers are oval to accommodate the relatively large valves. Right: Oil is carried in a steel tank in front of the crankcase. Primary drive is by an automatically adjusted duplex chain



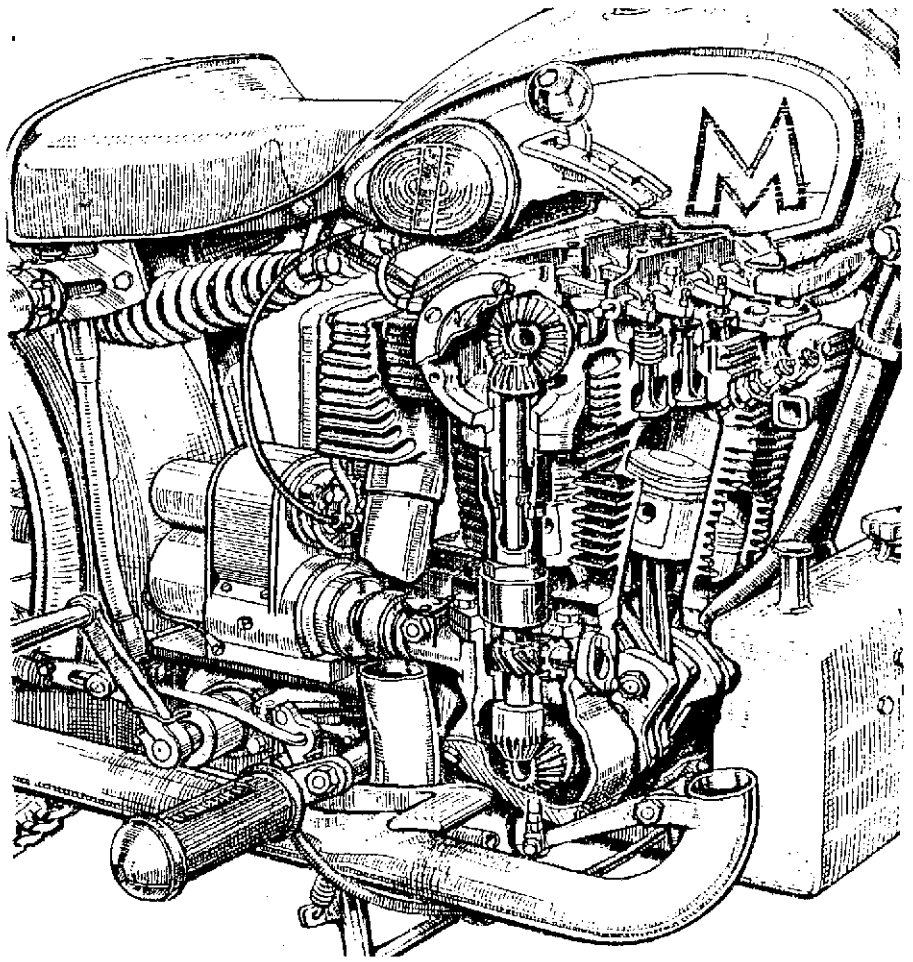


Crankshaft with pairs of con-rods on each crankpin. The horizontal spindle driven by the vertical shaft operates the Lucas dynamo for coil ignition

FOR the keen student of design, the 1930 London Show was a bonanza. Now that our choice is just about confined to singles and parallel twins, it seems incredible that in that far-off winter two overhead-camshaft fours were announced within a span of three weeks.

One was the five-hundred Ariel Square Four which I discussed the other week. The other was the 592 c.c. (50.8×73mm) Matchless Silver Hawk. Notwithstanding a luxury specification that included rear springing and 8in-diameter coupled brakes, the Hawk cost as little as £75 complete with electric lighting which, in those days, was generally catalogued as an extra.

In one respect the Matchless was strikingly similar to the Ariel, for in plan view the cylinders formed a substantially square arrangement and they were cast in a single iron block. However, while all the cylinder axes in the Ariel were parallel, necessitating two crankshafts, the front and rear pairs of cylinders in the Matchless formed a 26-degree vee.



A year earlier Matchless's had launched a 394 cc narrow-angle vee-twin called the Silver Arrow; and though this had side valves and, of course, a different bore and stroke (54 × 86mm), it is apparent that the Hawk was conceived as virtually two Arrows side by side, with a 180-degree crankshaft such as we find today on two-stroke parallel twins.

The vertical valves were arranged in two rows of four across the cast-iron cylinder head with the cams and rockers between them.

Since the distance across each pair of $1\frac{1}{8}$in-diameter valve heads was greater than the cylinder bore, the combustion chambers were elongated to something like an oval shape.

Compression ratio was 6.1 to 1. A copper-asbestos gasket was used for the cylinder-head joint and there were 12 clamping bolts.

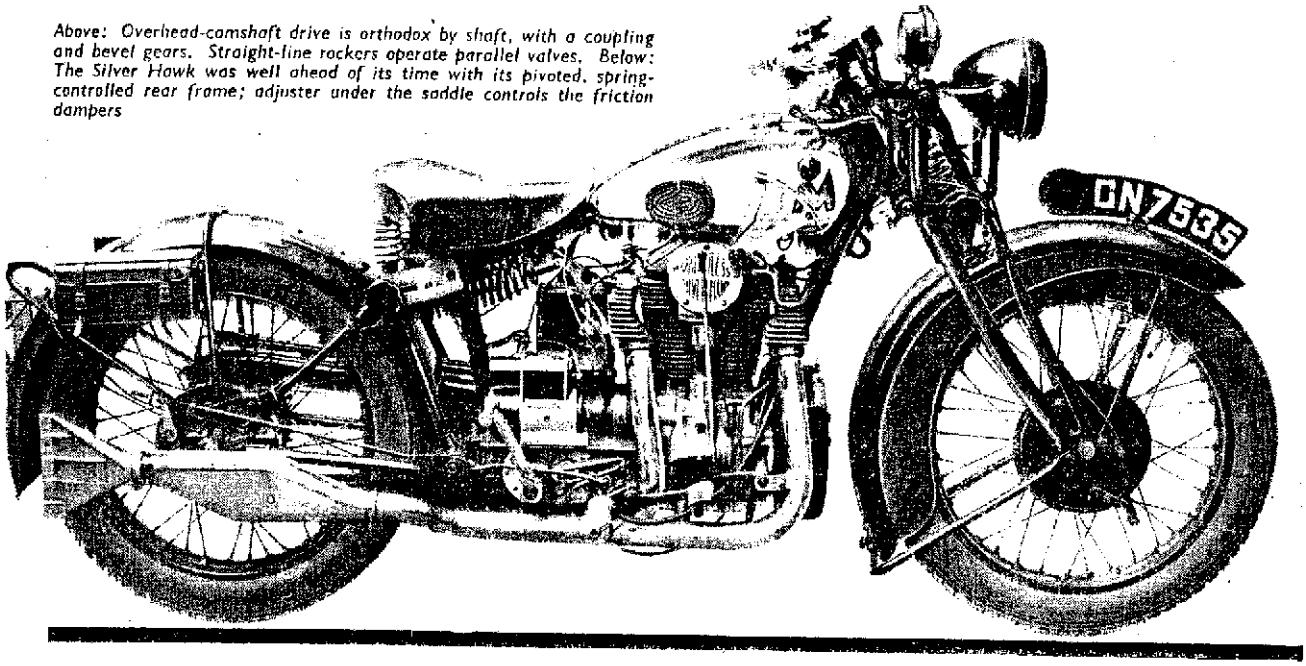
The inlet valves were the inner four and their tracts radiated from the middle of the head, where they were fed by a passage cored from the carburettor flange on the left side of the engine.

Cast-iron exhaust manifolds were bolted across the front and rear of the cylinder head and the two pipes from them were siamesed on the right.

Set about 45 deg to the vertical, the sparking plugs were tucked behind the manifolds.

Drive from crankshaft to camshaft was by bevel gears and a vertical shaft on the right; the 2-to-1 reduction was

Above: Overhead-camshaft drive is orthodox by shaft, with a coupling and bevel gears. Straight-line rockers operate parallel valves. Below: The Silver Hawk was well ahead of its time with its pivoted, spring-controlled rear frame; adjuster under the saddle controls the friction dampers



effected in the upper pair of bevels.

The crankshaft was built up from two pairs of heavy webs incorporating bobweights but there was no flywheel. At each side the shaft was carried in a phosphor-bronze bush and there was a third main bearing in the middle.

This was a row of caged rollers running in a steel plate sandwiched between the two halves of the crankcase.

On each crankpin two connecting rods ran side by side, with crowded-roller, big-end bearings.

As on the Silver Arrow, the six-pint oil tank was bolted to a face on the front of the crankcase and both delivery and return passages passed through this face.

Having a double-diameter, vertical plunger which both rotated and reciprocated, the oil pump was driven by a worm on the crankshaft just behind the bottom bevel gear.

TWO ROUTES

One way [illegible] the plain main bearings, where it entered the shafts to reach the big ends; there were also direct feeds to the cylinder bores.

Another circuit took oil up to a sight-feed in the handlebar-mounted instrument panel. From there the oil fell to the upper bevel box, whence some of it overflowed into the camshaft tunnel while the remainder drained through spiral grooves in the vertical-shaft bushes.

Ignition was by battery and the ignition unit, comprising dynamo, coil and distributor, was shaft driven through a rubber coupling by a skew gear on the vertical shaft, just above the lower bevel.

There was novelty, too, in the oil-bath primary drive to the four-speed Sturmey Archer gear box. Both upper and lower runs of the ½in duplex chain were tensioned by spring-steel blades.

The rear end of each blade was anchored in the cast-aluminium chaincase, while the front end was loaded by a long coil spring, curved into a semi-circle in the nose of the case.

Hence, not only was wear compensated but, as either run took the load, the consequent straightening of its blade pushed the spring round to take up the backlash in the other run.

Long travel was a feature of the pivoted rear suspension with its triangulated fork. Nevertheless, rear springing faced such stubborn prejudice in those days that it may well have lost the factory more sales than it gained.

All-up, the Matchless four weighed 413 lb.

A prototype-test report in *Motor Cycle* for 2 April, 1931, said the engine was so flexible as to accelerate from less than 10 mph in top gear, and was vibrationless at all speeds, save for a minor period at 57 mph.

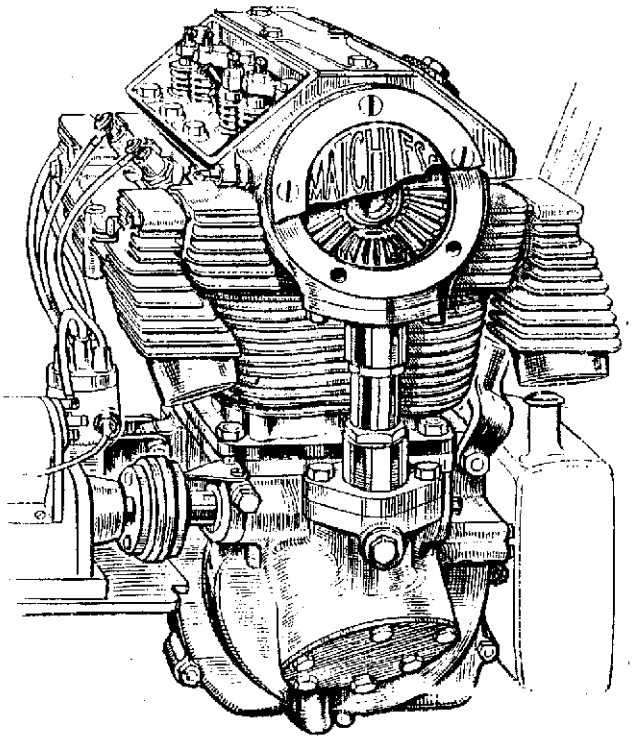
The Hawk cruised happily around 65 mph and would top 80. Overall petrol consumption, on a return trip to the West Country, was 56 mpg. Partly because of bad leakage at the valve covers, however, oil was used at the rate of 550 mpg.

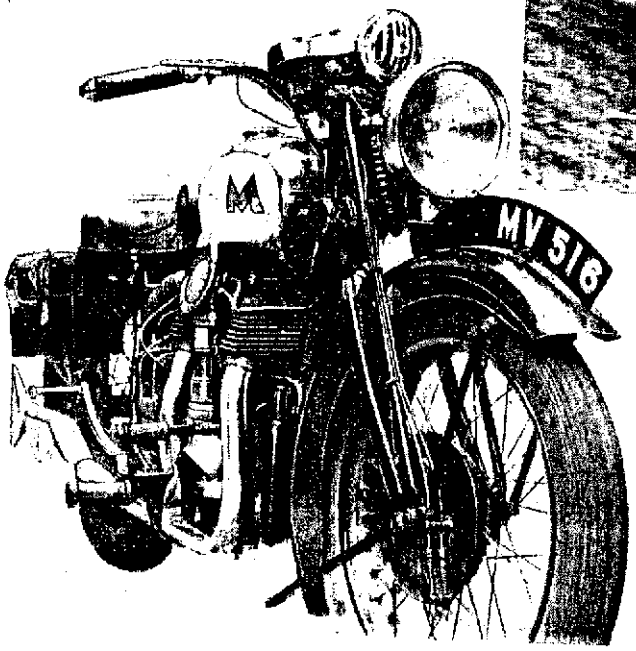
A pukka road test the following week was even more impressive. Oil consumption was down to 4,000 mpg and minimum top-gear speed to 6 mph. At 50 mph, a gallon of petrol was good for 64 miles.

Both tests showed starting to be child's play, while exhaust noise was very subdued and mechanical noise reasonably so. As to the rear springing, this was rated "the crowning glory of a machine that is quite outstanding."

Unfortunately, the Silver Hawk looked a bit tall and ungainly by comparison with the rival Ariel Four. Moreover, the hard times of the early 1930s were hardly right for a specification as luxurious as the Hawk's.

Anyway, while the Squariel survived until 1958, the Hawk failed to come up for 1936.





Top: The exhaust manifolds are iron castings bolted to the sides of the cylinder head. Above: April, 1931, shot of one of the first Silver Hawks, on the steep section of Beggars' Roost in North Devon

Left: Though a spring frame is used, the front fork is of the girder pattern usual in the 1930s. Brakes are coupled—an arrangement that enjoyed a limited popularity at the period