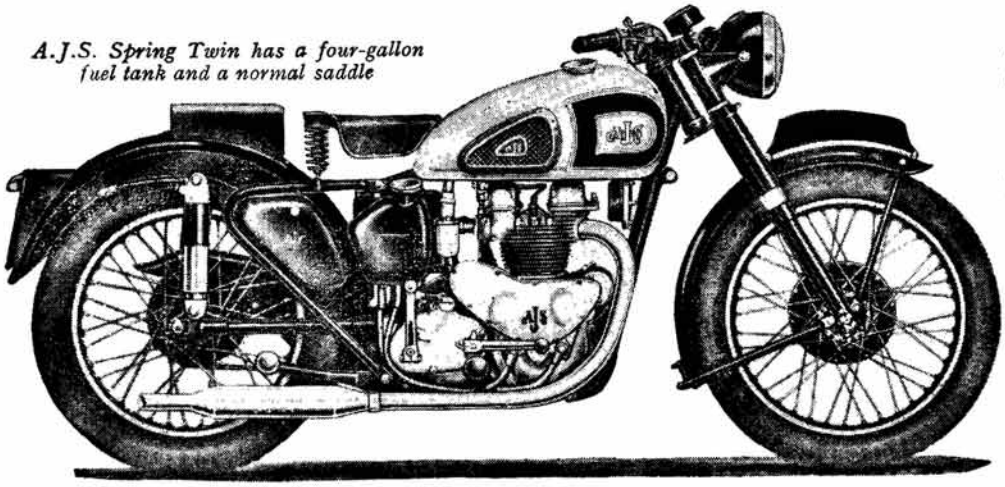
Matchless and A.J.S.

A.J.S. Spring Twin has a four-gallon fuel tank and a normal saddle



A New High-performance Vertical Twin-cylinder Engine with a Three-bearing Crankshaft : Spring-frame for Both Twins and Singles

AN eve-of-the-Show surprise comes from Associated Motor Cycles. Going into production are A.J.S. and Matchless vertical-twins; also the spring-frame employed for these machines is to be made available as an optional extra for the single-cylinder models already announced. The new twin-cylinder power unit is of 498 c.c., 66mm bore and 72.8mm stroke.

As might be expected, the result of racing experience with side-by-side twins is clearly incorporated into the production design. Thus no pains have been spared to provide a crankshaft which will operate up to very high r.p.m. and remain rigid.

High-duty cast iron is employed for this crankshaft. The one-piece casting includes the bobweights between the outer main bearings and the big-end bearings and the flywheels between the big-ends and the main bearing in the middle. Outer main bearings are of the journal roller type, and the shafts measure 1⅜in diameter at the journals. In the middle there is a Vandervell shell white-metal bearing of 1⅝in diameter by 1¼in wide. Bearings for the big-ends are of similar type and diameter but are ⅞in wide.

Location of the crankshaft is effected by the middle bearing. This is a split bearing and is carried by a light-alloy diaphragm plate bolted to the driving-side half of the crankcase; the plate is also spigoted into both halves of the crankcase and thus cannot be seen when the crankcase is assembled. To allow for crankcase expansion the outer roller bearings are not shouldered and therefore permit lateral movement of the case relative to the crankshaft.

Robust Connecting Rods

For the stubby connecting rods, R.R.56 light-alloy is employed. These rods are extremely robust at the big-end eyes and are polished to remove surface scratches. An unusual type of fixing for the bearing cap retaining studs is used. Steel rods, which form trunnions, are pressed into the connecting rods. Into these trunnions screw the big-end cap studs and thus the cutaway necessary to accommodate the head of the usual form of retaining bolt—sometimes a source of weakness—is avoided.

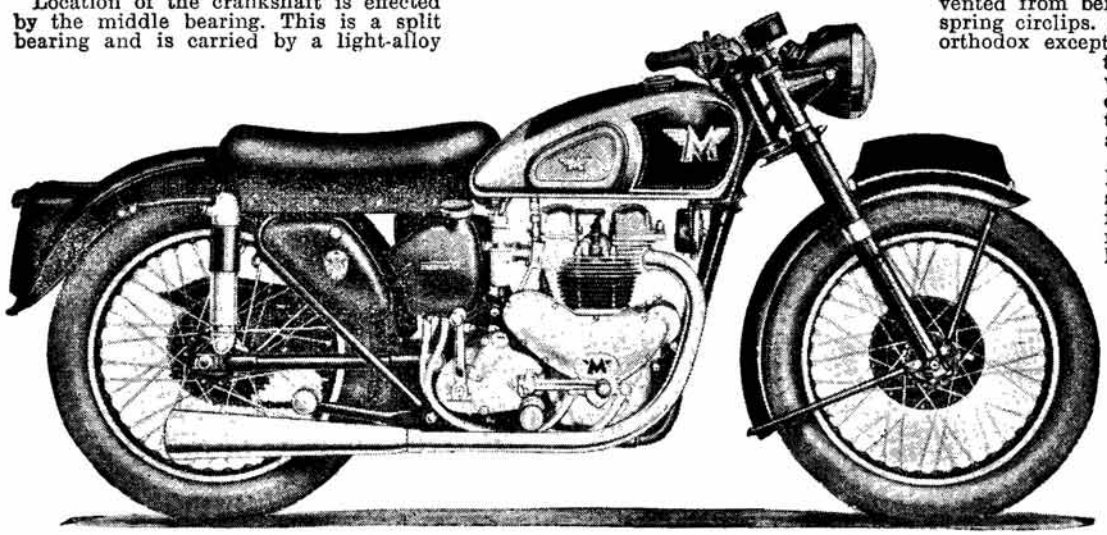
Small-end bushes are not fitted. Instead the connecting rods operate direct on the gudgeon pins. Each small-end eye is provided with four holes—two at the top and two at the bottom—for lubrication purposes. Pistons are the split-skirt, wire-wound type which has proved successful with the single-cylinder engines. Each piston has two compression rings and one slotted scraper ring. The piston crown is domed and has flats to clear the valves. Of ⅞in diameter, the gudgeon pin is taper bored at the ends and retained by spring circlips.

Cylinders are separate iron castings and are sunk to a depth of approximately 2½in in the crankcase mouths; there are, of course, two mouths, and except for the segment below the cap of the middle crankshaft bearing, the diaphragm plate separates the crankcase into two compartments.

Cylinder heads are in light alloy, and each casting includes the inlet and exhaust valve spring wells and the supports for the rocker spindles. Four studs screwed into the crankcase retain each cylinder head and cylinder; on these studs are fitted chromium-plated, domed retaining nuts and, below them, waisted distance pieces. The waisting is provided so that air flow is not impeded. Bolted to the two cylinder heads above the exhaust ports is a flat tie-plate. Between each cylinder, which has a spigot, and its head, is a gasket.

Each combustion chamber is hemispherical in shape and has shrunk-in valve seatings. The iron inlet-valve guide and the bronze exhaust guide are a press fit in their bosses and are prevented from being forced in too far by spring circlips. Cylinder head finning is orthodox except at the crown, between the valve-spring wells, where the fins are diagonal from the outside at the front to the inside at the rear.

Valves have semi-tulip heads and hardened stem ends to resist wear from contact with the rockers. Inlet and exhaust valves are in Sil-



Matchless Super Clubman twin is fitted as standard with a special seating pad for rider and passenger and with pillion footrests

Twins

chrome and K.E.965 steel respectively. Dimensions are: Inlets, 9/32in diameter stem, 1⅜in diameter head; exhausts, ⅜in diameter stem, 1½in diameter head. Each valve is fitted with two concentric coil springs, and split collets seating in a groove in the stem retain the valve-spring collar.

The overhead rockers are one-piece forgings and are fitted each with two ⅝in long phosphor-bronze bushes; the tips which bear on the valve stems, and the integral ball-ends are hardened. Rocker spindles are ½in in diameter and are mounted eccentrically in the supports in the cylinder head. This eccentric mounting is to provide rocker clearance adjustment and follows the practice adopted on the 350 c.c. overhead camshaft racing engine. Each spindle has a wide, flat, circular head with a segment ground back. A small clamp bolt located in the inner rocker support bears on this segment and holds the spindle when the correct rocker setting has been obtained.

Light-alloy Covers

Over each rocker assembly is a domed light-alloy cover, and there is a sealing washer between the cover face and the face round the valve-spring well; four bolts, with extended heads for accessibility, clamp the cover down and ensure an oil-tight joint.

The inlet ports of the two cylinder heads are joined by a light-alloy manifold on which fits the Amal carburettor. Exhaust pipes fit into the exhaust ports.

Timing gear is noteworthy for the attention given to obtaining long life and quietness in operation. Spur gears are employed with teeth of ⅞in width. Above the half-time pinion on the crankshaft is an idler pinion; this meshes with the inlet and exhaust camshaft pinions. The inlet camshaft pinion drives the Lucas flange-fitting magneto, which has manual timing control and a cut-out. The exhaust camshaft pinion drives the long 3in diameter Lucas dynamo at 1½ engine speed. The dynamo is retained in the cradle formed in the crankcase casting by a clamping band; and also by screws from the timing chest into the end cover.

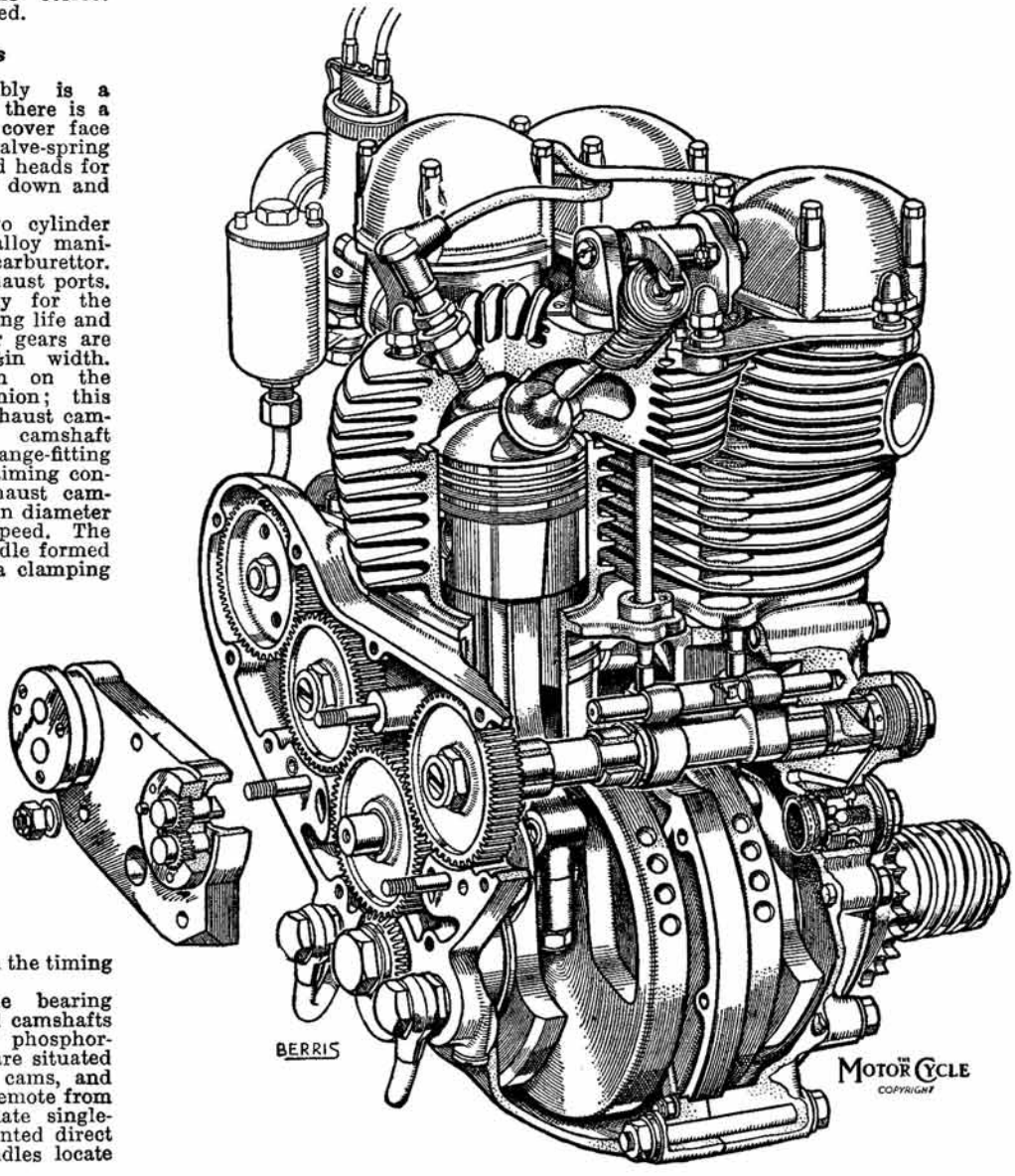
Of ⅝in diameter at the bearing journals, the one-piece forged camshafts each run in three ⅝in long phosphor-bronze bushes. Two bushes are situated between the pinion and the cams, and the third bush is at the end remote from the pinion. The cams actuate single-arm followers which are mounted direct on steel spindles; these spindles locate in each half of the crankcase and act as dowels. Formed in the followers are cups to take the ball ends of the push-rods.

Gear pumps are employed in the lubrication system. Inside the timing chest and bolted to the crankcase is a light-alloy plate which houses the two gear pumps, one for supply and one for return. This plate also provides an outer support for the idler pinion. The pumps are driven by tongues mating with slots in the ends of the camshafts, the exhaust camshaft operating the supply pump and the inlet camshaft the return.

From the ½-gallon tank on the seat tube, oil is led by a flexible pipe to a crankcase banjo union and thus to the supply pump. In the crankcase casting is a spring-loaded ball valve to prevent overloading of the pump gears. Above a pre-determined pressure the valve opens and allows oil to pass back into the feed line. From the pump the oil reaches a filter chamber positioned laterally in the front of the crankcase casting. The filter has a fabric element and is provided with a spring-loaded relief valve to ensure that the element would be by-passed should it become choked. Access to the element is gained by removing a cap on the driving-side of the crankcase. In the filter chamber cap is another non-return ball valve to prevent oil draining from the tank to the crankcase when the engine is not running.

From the filter chamber the oil-way in the crankcase casting bifurcates. The main outlet conveys oil by way of the diaphragm plate to the crankshaft middle bearing and thence through the crankshaft to the big-end bearings. Escaping past these bearings, the oil is flung to the small-end bearings, the pistons and the cylinders and the crankshaft bearings in the crankcase. The smaller outlet from the bifurcation leads to a ported distributor at the end of the exhaust camshaft. It is located in the driving-side of the crankcase and its boss is sealed by a detachable chromium-plated cap. This distributor directs oil to the upper and lower grooves round the deep spigots of the cylinder barrels.

Passages in the cylinder and cylinder head castings lead oil from the upper grooves to the inner rocker support in



New twin-cylinder engine for A.J.S. and Matchless machines is particularly noteworthy for the attention given to obtaining crankshaft rigidity. The crankshaft is a massive iron casting and is supported by three main bearings. Cylinders are separate castings and light alloy is employed for the cylinder heads

MATCHLESS AND A.J.S. TWINS

each rocker box. Again the feed bifurcates. One oil-way is along the middle of the rocker spindle with an outlet between the two bushes; the other directs or, more correctly, squirts, oil into the push-rod end cup in which the rocker ball-end seats. Surplus oil lubricates the valve guide and drains down the push-rod tunnel in the cylinder head and cylinder castings into the camshaft chamber.

From the lower grooves in the cylinder spigots the oil is led direct to the camshaft chambers, and the supply is such that the camshafts operate in an oil-bath.

After circulating under pressure from the supply pump, the oil drains down to the base of the crankcase, whence it is drawn by the return pump through a cast-in pipe and forced back to the tank.

In the driving side of the crankcase and operated by the inlet camshaft is a mechanical release valve. A cap similar to that sealing the oil distributor, is screwed into the crankcase wall. The release pipe leads back to the oil-tank.

On the new twin-cylinder machines a separate Burman four-speed gear box with a five-spring multi-plate clutch and positive-stop foot-change is employed. A cam-type engine-shaft shock-absorber is fitted. Primary drive is orthodox and is enclosed by the well-known A.M.C. pressed-steel oil-bath case. Engine and gear box fit snugly into the new frame, which has pivot-action rear suspension.

Production Point

Much production ingenuity is shown in the spring-frame design. Steering head, front down tube, top tube and saddle tube are identical with the solid frame as standard for the single-cylinder models. Furthermore, the Teledraulic fork and, except for a minor detail, the brakes, are also identical with those employed on the singles. The exception is that for the twin-cylinder models a long front brake torque arm is fitted in place of bolts attaching the shoe plate to the fork leg.

For the spring-frame, the twin cradle tubes which pass under the engine and gear box are attached by a transverse bolt—the cradle tubes are gusseted for added strength at this point—to the bottom of a light-alloy bridge casting, which extends from the base of the seat tube and curves round the back of the gear box. The cradle tubes extend beyond the transverse bolt and provide anchorages for the pillion footrests and silencers.

A lin-diameter steel tube is pressed into the bridge casting and the swinging fork of the rear suspension pivots on this tube. In the eyes of the massive malleable iron lug at the base of the fork are fitted sintered bronze bushes 1in long which operate on the steel tube. Lubrication is achieved very simply by filling the tube with oil—1½oz—on assembly. The tube has end plates which in effect seal the oil reservoir, but the oil feeds round the ends of the tube to the moving surfaces; between the inner ends of the fork eyes and the bridge casting are felt sealing washers.

Cam Chain Adjusters

Orthodox open-end lugs are brazed on the end of the fork arms to receive the wheel spindle. This spindle is of larger diameter than that employed with the solid frame; another difference is that chain adjustment is made by cams on the spindle bearing against projections on the fork lugs.

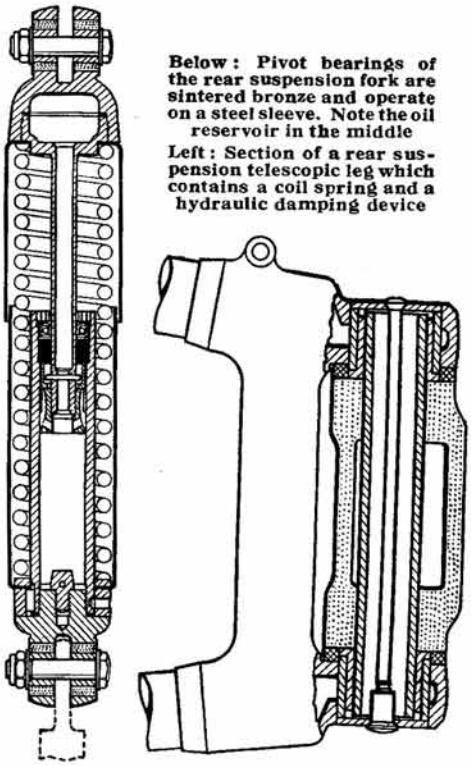
To provide the top (rubber-bushed) pivots for the telescopic legs, single tubes, one on each side of the rear wheel, extend towards the rear from a bolt at the top of the seat tube, and then curve down and forward to the transverse bolt through the base of the bridge casting which also attaches the cradle tubes as mentioned earlier. Short tubes project to the rear of the apex of each loop to give added support for the valanced rear mudguard.

Bottom pivots for the telescopic suspension legs are also rubber bushed, and are integral with the spindle lugs on the pivot fork arms. The suspension legs each have one coil spring to absorb road shocks, and hydraulic means of controlling reaction; there is also a hydraulic cut-off to prevent metal-to-metal contact on extreme depression.

Total movement permitted, as measured at the wheel spindle, is three inches and, since the suspension legs are similar in design to those employed on the Model 7R racing machine, their efficiency may be taken for granted.

A propstand on the left-hand side is fitted as well as a clip-up forged-steel central stand. This central stand raises the machine just sufficiently to allow the rear wheel to be "rolled" out when the hinged portion of the mudguard has been raised. Other detail features are: Head lamp with the latest Lucas fixed-focus bulb; two elongated tool boxes one in each loop of the tubes forming the top pivots for the telescopic legs; 3.25×19in front tyre and 3.50×19in rear; twin petrol taps leading into a single pipe to the float chamber; a highly polished finish for the timing-case cover, rocker covers and gear box end cover.

The Matchless twin has a special integral Dunlopillo seat for rider and pillion passenger and is fitted as standard with pillion footrests. The fuel tank holds three gallons, and the tank finish is chromium plate with Aldwych red enamel panels carrying the winged "M" badge. On the timing cover the "M" is in relief and there is the badge on the driving-side of the crankcase. Silencers taper from front to rear and have an appearance rather similar to a racing megaphone. This model will be known as the Matchless Super Clubman.



Below: Pivot bearings of the rear suspension fork are sintered bronze and operate on a steel sleeve. Note the oil reservoir in the middle

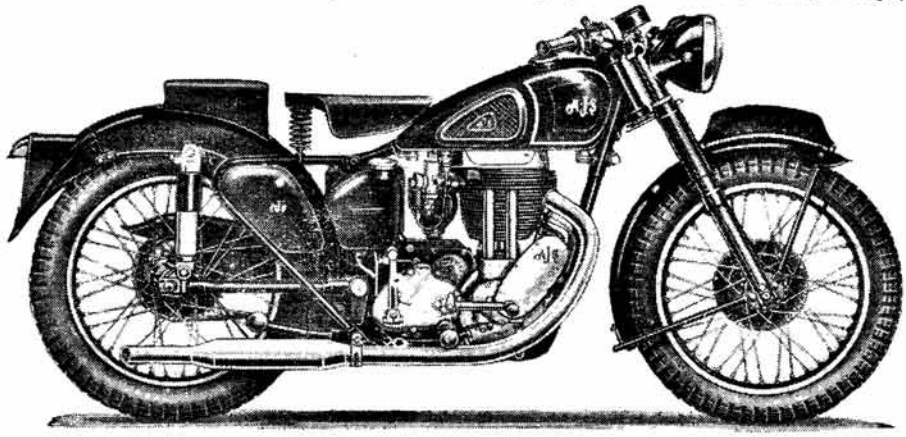
Left: Section of a rear suspension telescopic leg which contains a coil spring and a hydraulic damping device

On the twin-cylinder A.J.S., which is called the Spring Twin, there is a four-gallon tank finished in black enamel with gold lines. An orthodox Lycett saddle is fitted. Pillion seat and footrests are supplied at an extra charge. The timing cover, which carries "A.J.S." in relief, is narrower than that fitted to the Matchless, but two "blisters" are necessary to clear the oil-pumps. On the driving-side of the crankcase is an A.J.S. badge. The silencers are tubular. Apart from the tanks, the finish of both machines is black and chromium plate.

The spring-frame employed with the twins is being marketed as an extra for the single-cylinder models. Production of twin-cylinder engines and of spring-frames will be strictly limited for some considerable time and output will be reserved for export markets.

Makers are Associated Motor Cycles, Ltd., Plumstead Road, London, S.E.18, England. Prices are as follows (Purchase Tax applicable only in Great Britain):—

Model	Basic Price £	Total Price £ s d
A.J.S. Spring Twin	165	209 11 0
Matchless Super Clubman.....	167	212 1 10
Speedometer extra	4	5 1 8
Spring-frame with single cylinder models extra	16	20 6 4



Spring-frame is being marketed as an extra for single-cylinder machines