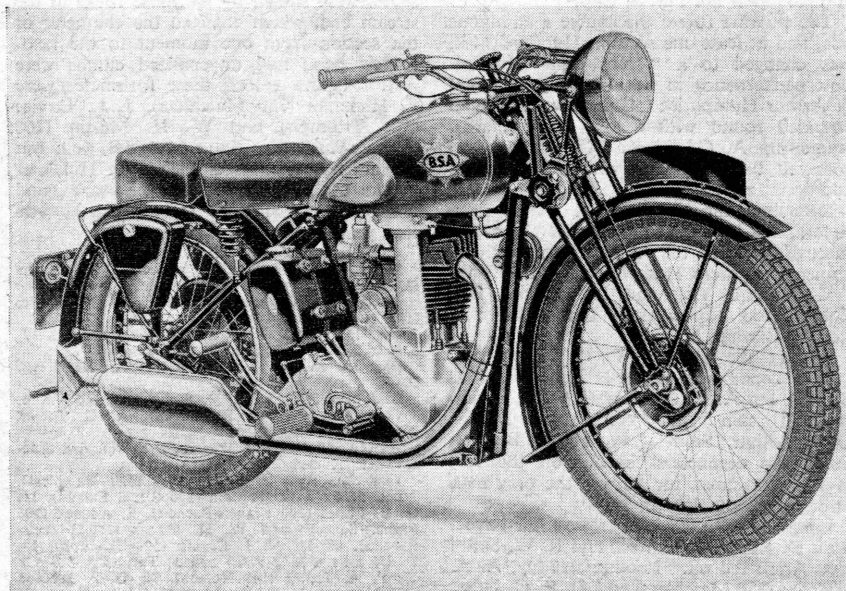


SERVICE SERIES No. 21

Detailed Restoration Routine for the Frame, Forks and Cycle Parts of **THE MODEL M23 "EMPIRE STAR"**



The handsome pre-war 500 c.c. M23 "Empire Star" which utilized the frame described in this article.

It is possible to preface these notes concerning the cycle parts of the B.S.A. M23 in almost the same manner as that employed for the gearbox of this machine, described in *Motor Cycling* on July 30, 1953. Quoting: "Those owners of the M23 'Empire Star' B.S.A. motorcycle who have been acquainted with the M20 sidevalve machines that were issued to the Services during the war, may recognize a similarity. . . ." And later: "for the two were identical . . . and components were interchangeable." Thus the position is put into a nutshell; briefly, for any of the spare parts required, apply to the Service Dept. at the factory for, with very minor exceptions, the components of the one model are suitable for the other.

The work is conventional in that the frame and forks are typical of best pre-war "girder" practice and care and some skill with hand tools are the only necessary qualifications before reconditioning can be commenced. Although one or two special tools were—and are—available to those continually servicing these frames, there is only one job likely to need an extractor or special jig—excepting only, of course, the work that may result from bent or broken frame tubes, in which case, the units bent or broken should be hurried to a specialist for expert attention.

All too frequently, amateurs believe in the application of heat where heat is unnecessary. Subsequent breakage of a tube in which the metal has crystallized

because of excessive heat may have serious consequences.

Amateur work, therefore, should be limited to the replacement or adjustment of various bearings, attention to the front forks and the replacement of worn brake linings.

Front Forks

The geometry of the front forks is arranged so that, unloaded, the front top fork spindle is slightly above the rear fork

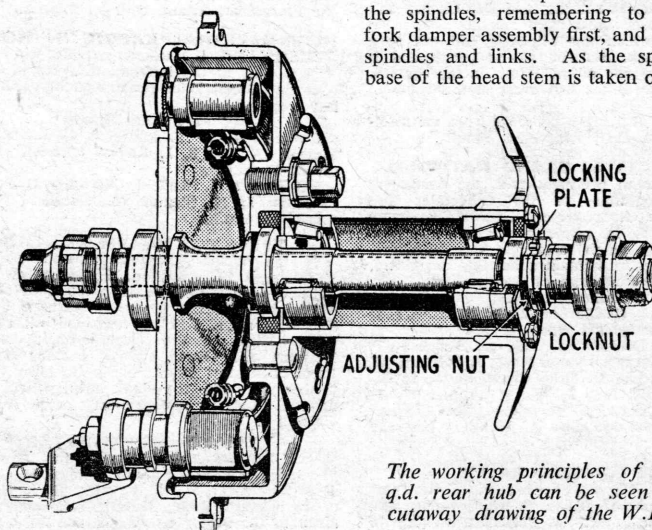
B.S.A.

Overhauling the Frame, Forks and Hubs of One of the Most Popular Small Heath Models

spindle. Any excessive displacement from the horizontal indicates that the fork spring requires renewal. The collapse of a single coil is more obvious, and if this condition exists the spring must be replaced as soon as possible for a breakage is imminent.

On the assumption that a complete rebuild is to be undertaken, the dismantling procedure for the front forks will be described, excluding that work of an obvious nature, such as the removal of wheel, mudguard, etc. Remove the handlebars without disturbing the rubber mounting on the head clip and take out the bolt securing the top spring scroll. Unscrew the steering damper knob and the stem adjusting sleeve. Take out the set screw securing the steering damper plate to the frame head lug and loosen the clamping bolt in the head clip. This will free the head stem which can be tapped out through the head clip carrying the fork girder and steering damper assembly. It is virtually impossible—single handed—to prevent the head bearing balls from falling out on to the floor, but the knowledge that there are 20 $\frac{1}{4}$ -in. balls in each race, 40 in all, should ensure that the correct number are replaced.

Dismantling operations can be continued, with the forks on the bench. With the removal of the fork spindle lock nuts, unscrew the spindles, remembering to remove the fork damper assembly first, and withdraw the spindles and links. As the spindle at the base of the head stem is taken out, the steer-



The working principles of the M23s q.d. rear hub can be seen from this cutaway drawing of the W.D. version.

ing damper assembly will free and drop away from the stem. Three major parts, the head clip, the head stem and the fork girder are now separated.

All three are bushed and inspection will reveal the necessity—or otherwise—for renewal of the bushes. If further work has to be done, remove the fork spring from the girder by undoing the nut at the base of the combined securing bolt and guide pin and tap the scroll free.

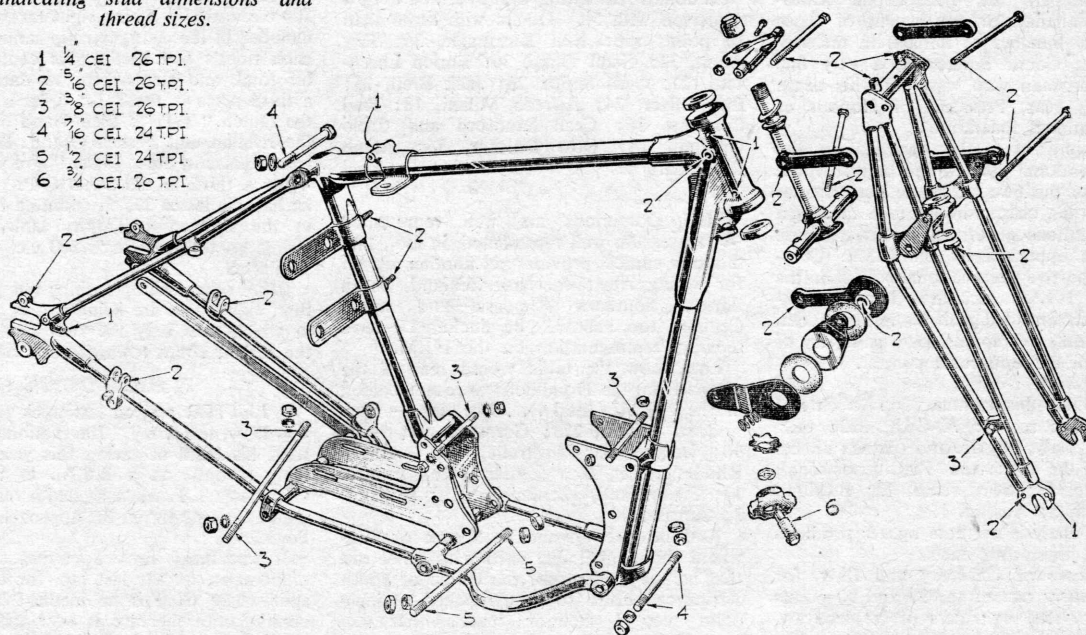
Should it be necessary to renew the fork spring, the scrolls can be gripped in a vice and the spring unwound. A soft drift applied to the end of the spring wire will, when tapped with a hammer, be sufficient to start the tightest spring. Install the new spring by hand and, when later refitting the scroll and guide pin, remember that the pin is not intended to be straight. Therefore it should not be straightened; it must be installed pointing toward the front of the machine.

Some difficulty may be experienced in removing the old bushes, but patience and a long, lipped drift, attacking the bush from the opposite end, are usually the ingredients for success. New bushes should be pulled in carefully with a long bolt and every effort must be made to get them square. Before installing them, ensure that carelessness with the drift has not scored the housings; if this is the case, clean off all burrs before attempting to pull in the new bushes. In a few cases it is possible that the grease nipples may screw in too far and cause trouble. Remove them, for it is a good idea to clean out old grease which may have hardened inside the nipple.

If the cups or cones forming the steering head bearings are pitted to the slightest degree, they must be renewed. This job is simplified if an extractor for the two cups is made up by putting a 24 T.P.I. (C.E.I.) thread on a short length of 1½-in. round bar.

A detail drawing of the M23 frame and fork assembly with key indicating stud dimensions and thread sizes.

- 1 ¼" C.E.I. 26 T.P.I.
- 2 ⅝" C.E.I. 26 T.P.I.
- 3 ⅜" C.E.I. 26 T.P.I.
- 4 ⅞" C.E.I. 24 T.P.I.
- 5 ½" C.E.I. 24 T.P.I.
- 6 ¾" C.E.I. 20 T.P.I.



An extractor such as this is virtually indispensable for removing the steering-head races.

This is screwed into the thread formed on the inner diameter of the cup and both cup and extractor are tapped out from the opposite end. Make sure the new cups are pressed squarely into the steering head.

Re-assembly is quite straightforward but do not forget the dust cap between the head clip and the race, or that the steering damper rod and sleeve must be installed when the head stem spindle is replaced.

Adjustment of both head bearings and fork spindles must be done carefully, a little at a time, until freedom of movement without play exists. It is suggested that the fork spindles are adjusted before the top fork scroll is bolted into position; this will ensure maximum sensitivity. Do not forget to see that the fork and steering dampers are free before making these final adjustments.

In perfecting the frame and forks of an old motorcycle, the all-important question of engine plates is often overlooked. Vibration can frequently be traced to elongation of engine-plate fixings and the performance of a well-used machine can sometimes be improved by the renewal of those plates which, after a long period of service, permit a small degree of engine or gearbox movement. Fortunately, in this instance, most of the parts are obtainable from the Service Department.

Wheels and Hubs

Both front and rear wheels are fitted with hubs running on taper roller bearings and both have 7-in. brakes, the linings of which are 1½ in. wide.

The rear wheel is of the quickly detachable type and it is only necessary to remove the three retaining bolts, the spindle lock nut and the distance piece before withdrawing the spindle (which is a light push fit), releasing the wheel from the driving studs and lifting it out. To inspect the bearings, the bearing lock nut, adjusting nut and locking plate on the off side must be removed, after which the bearing sleeve and inner parts of the taper bearings can be pulled out from the brake drum side. Both outer tracks are a light press fit in the hub and can be tapped out after the dust caps have been removed. When replaced, the bearings—new, if any sign of pitting is in evidence—must be adjusted. This is done by removing the sleeve lock nut and the pegged locking plate, moving the adjusting sleeve until there is just perceptible play at the wheel rim, finally positioning the sleeve so the peg on the locking plate engages in the nearest suitable position; then retightening the lock nut.

In principle, there is little difference between the adjustment of the front and rear hub. It is, however, easier to attend to the former, for the means of adjustment consists of an adjusting nut and a lock nut only. These will be found on the side opposite the brake drum.

Brakes

Both front and rear brakes are conventional, cam-operated single-leading-shoe components which should present no difficulty. Relined shoes must be centralized, for there is some latitude radially at the fulcrum pin. With the relined shoes assembled and positioned in the drum, the fulcrum pin lock nut should be slackened, the shoes expanded and the nut retightened only when the pin has ceased to move in the slot.