8.7 Rear Suspension

THE FLYING SQUIRREL REAR PIVOTED FORK. 1956-67.

As most readers will recollect the rear suspension employed on the Birmingham built Scotts is of the pivoted fork variety, a vogue colloquially known today as the swinging arm.

The Scott design is a cleverly contrived unit possessing considerable torsional rigidity when compared with other makes ; a point often overlooked by would be critics. (I shall not enter into the pros and cons of Mr. Vincents proposals as propounded in *Motorcycle Sport*). The Scott pivoted fork assembly is both simple in concept and simple to adjust, and any limited lateral play which develops in the swinging arm may be taken up without dismantling the unit. The above is not intended to infer that the bearing life is short ; quite the reverse, but like most things Scott it does not suffer fools gladly, and consequently to ensure a long life the bearings should be frequently and copiously lubricated through the grease nipple provided.

Having waffled my way through the introduction, let me next deal with a detailed description, referring throughout to the drawing on the centre pages.

The swinging arm (1) pivots about a tubular steel shaft (2), which is rigidly clamped between the frame cradles (3), by the chromed screwed castellated rings (4a) and (4b). Two plain bronze bushes (5) are pressed into the extremities of the swinging arm cross member (1) and line reamed, rotational movement taking place between these bushes and the hardened surface of the fixed shaft (2), when the suspension is operating. The swinging arm (1) is stabilised laterally by two thrust washers with knurled circumferences (6) situated at the extremities of the swinging arm cross tube (1a) and the attachment bosses (7) on the frame gusset plates (8), through which the fixed shaft (2) passes. These thrust washers (6) are not constrained axially by the fixed cross shaft (2), thus they perform a similar function to the knurled washers fitted to Webb girder forks.

Having now described the suspension side of the pivoted fork assembly, our thoughts must next concern the rear brake linkage. The conventional Scott transmission layout requires that the gearbox and rear wheel sprockets be on the nearside of the machine, and consequently it is convenient for the brake plate assembly to be on the offside. Since convention deems that the brake pedal (9) be also on the nearside, it follows that some form of cross over mechanism is likely to be employed in the rear brake linkage.

Referring once again to the drawing, it may be noted that the problem has been neatly solved by passing the brake cross over shaft (10) through the hollow fixed shaft (2), so that it is concentric with the centre of rotation of the swinging arm (1) and projects out of the fixed shaft (2) at either side. The brake pedal (9) and forward brake lever (11), are attached respectively to the left and right hand projections of the cross over shafts (10), these being machined square to provide the necessary positive circumferential location. The complete brake cross over assembly is retained axially by the two $\frac{3}{8}$ B.S.F. nuts (18), no adjustment for end float being provided as the clearances are predetermined by the makers tolerances.

To complete the brake linkage, a short Bowden cable (17) is mounted on the offside pillion foot rest hanger (20), (23), (24) and (25) also refer, and is connected to the forward brake lever (11) via the clevis pin assembly (14), (15), (16) and the yoke (30) swaged onto the inner cable. The other end of this inner cable terminates with a length of $\frac{1}{4}$ B.S.F. screwed rod passing through the rear brake lever assembly at the rear wheel, in order to provide a means for rear brake adjustment. A brake pedal return spring is interposed between the forward brake lever (11) and the footrest hanger (20), the latter also providing a mounting place for the stop lamp switch (not shown) connected via another spring clamped to the swaged portion of the yoke (30).

Lubricant such as Duckhams HBB or Castrolease Heavy etc., should be injected into the pivoted fork until the excess grease is observed to exude from the ends of the cross over shaft (10) adjacent to the pedal (9) or lever (11). (Four shots of the gun are usually sufficient). Occasionally grease will not escape as described above, but will issue forth past the thrust washers (6), when this occurs, be wary of a worn shaft or bearing, since the clearances between the fixed shaft (2) and the bearing (5) should present a greater resistance to the flow of grease than that offered by the cross over shaft (10) and the inner surface of the fixed shaft (2) notwithstanding a blockage of the lubrication hole (27).

Sequence of Dismantling

Select a firm piece of level ground and place the machine on the centre stand so that the rear wheel will spin free. Grasp the rear tyre or the swinging arm tube near the wheel spindle and test for lateral play by alternately pushing and pulling sideways. If play exists when holding the tyre, but ceases when the same loading procedure is applied to the swinging arm, then you need new wheel bearings, not swinging arm bushes ! If slight lateral play in the pivoted fork assembly is apparent, check for end float in the swinging arm by grasping the knurling on each thrust washer (6) in turn, and attempt to rotate. If correctly adjusted, it will be possible to just turn one or both thrust washers. If either thrust washer turns easily, take up the end float as follows.

Slacken and remove the nut (18) and washer (19) on the nearside cross over shaft (10). Withdraw the rear brake pedal (9) from the square end of the cross over shaft (10) rocking the pedal (9) if necessary. Slacken and remove the nearside outer castellated screwed ring (4b), using an appropriate "C" spanner (rather than the usual hammer and screwdriver). Tighten the inner nearside castellated screwed ring (4b) by rotating in a clockwise direction until the conditions of correct end float are obtained, as previously mentioned. Before replacing the outer screwed ring (4b) and the brake pedal (9), recheck for swinging arm play. If none is apparent, replace the aforementioned components, recheck for play, grease the pivoted fork, and have a cup of tea.

It also follows that if both thrust washers (6) are immovable, the inner castellated ring (4b) should be slackened to obtain the required end float, care being exercised to avoid moving the inner ring (4b), when locking up the outer one. Always check for correct end float at this stage.

To dismantle the pivoted fork assembly, first select a plot of ground as before and place the machine on the centre stand. Slacken off and remove the rear brake adjuster (at the rear wheel) : the chain ; brake anchor bolt on the swinging arm ; loosen the wheel spindle nuts and remove the rear wheel. Using fingers, disconnect the brake pedal return spring (12), and slacken both ⅜ B.S.F. nut (18) on the cross over shaft ends (10), using the appropriate spanner. Unscrew and remove the nearside nut (18), and with the aid of a soft drift or hide mallet, tap the cross over shaft (10) through the fixed shaft (2), until the forward brake lever (11) is released from the square end of (10). If required, the clevis pin assembly (14), (15), (16) may also be removed now. Grasp the brake pedal (9) and pull, withdrawing the cross over shaft (10) from the fixed shaft (2). When convenient, remove the pedal (9) from the shaft (10) on the bench. Slacken and remove both nearside castellated rings (4b) and similarly remove the offside rings (4a). Loosen and remove both bolts attaching the suspension units to the ends of swinging arm tubes. Select a heavy hammer and soft drift, and proceed to drive the fixed cross shafts (2) through the fork attachment bosses (7), striking the offside end of the shaft, so releasing the swinging arm (1), and the two thrust washers (6), together with the chainguard which is still mounted on the swinging arm by the formers forward attachment bolt.

Lubrication

As mentioned earlier in this article, lubrication is the key to long bearing life and consequently, road holding. Referring once more to the drawing, the path of the lubricant is as follows. Grease injected through the nipple (26) passes along the annular space between the swinging arm cross tube (1a) and the fixed cross shaft (2) to the bronze bearings (5) at each end. Once this annular space is full, some grease is forced between the bronze bearings (5) and the cross shaft (2) to escape past the thrust washers (6), whilst the remainder flows through a radial hole (27) drilled in the cross shaft (2), and along the brake cross over shaft (10) to finally escape by the brake pedal (9) and lever (11).

Examine the components for wear, replacing if necessary, if the thrust washers (6) are badly worn and replacement are not available, turn the originals diametrically through 180 degrees and replace. This is unlikely to be successful if severe wear has taken place.

To assemble is the reverse of the above, but once the cross over shaft (2), has been driven home, the offside inner castellated ring (4a), should be **fully** screwed up and locked with the outer ring (4a), before adjusting for end float using the **nearside** castelled ring (4b) **only**.

Finally, it would perhaps be advisable to mention some of the possible trials and tribulations likely to be experienced by the unsuspecting mechanic.

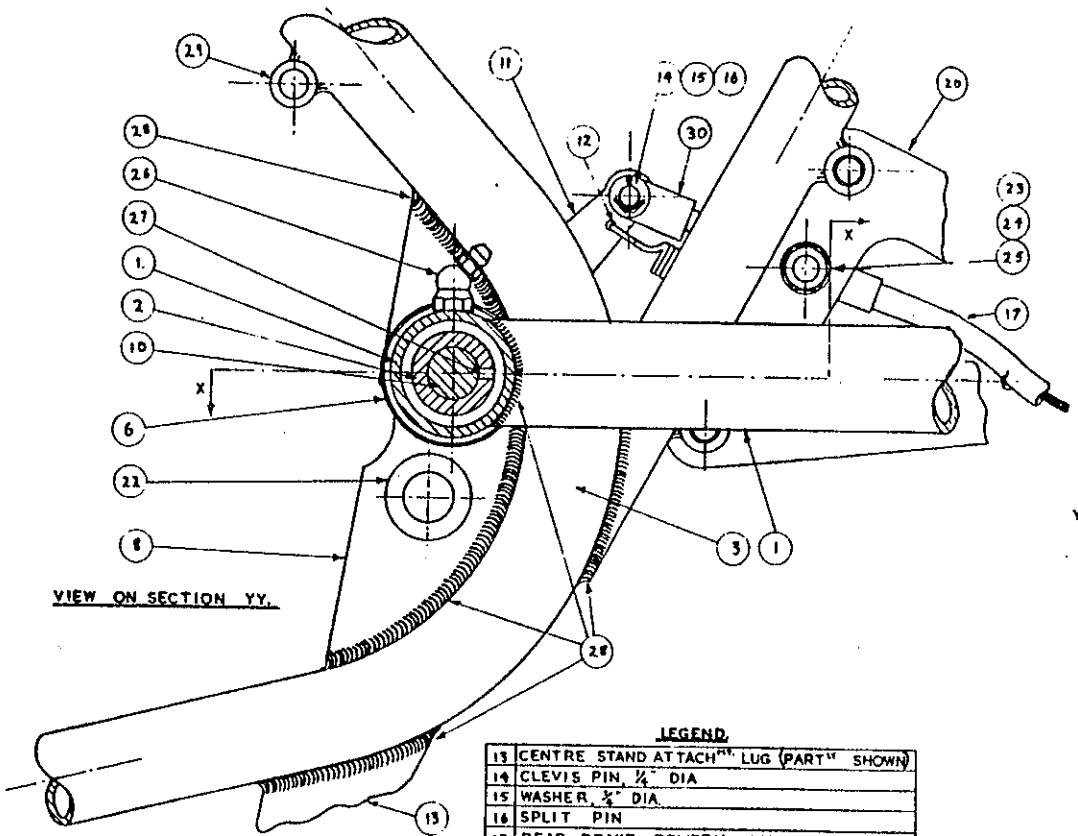
Firstly it should be remembered that the fixed shaft (2), is a slight interference fit in the bosses (7), and may prove obstinate to remove in some cases. The cure is effected by the use of a heavy hammer and soft drift, having first removed the cross over shaft (10), and castelled rings (4a) and (4b).

Secondly; if it is necessary to replace the bronze bushes, it should be noted that these are line reamed as an assembly, and consequently, it is usual for the work's to undertake this work, or supply an exchange swinging arm (1) .The cost of the above is not as high as might be imagined, so ask your Scott agent for details (Sic—Ed)

Thirdly; some of the early cross shafts (2), were not case hardened (probably by accident), and as such will not last 10,000 miles even when properly lubricated. A properly case hardened ground shaft effects a complete cure, and will last many thousands of miles.

In this article I have tried to cover all aspects relevant to the Scott pivoted fork; but inevitably some individual will be able to criticise or add to the above. If that person is you dear reader, please sharpen your quill and send your jottings to the editor, as *Yowl* consumes scribes at such an alarming rate more fuel is needed for the literal furnaces.

HUGH HARRISON.



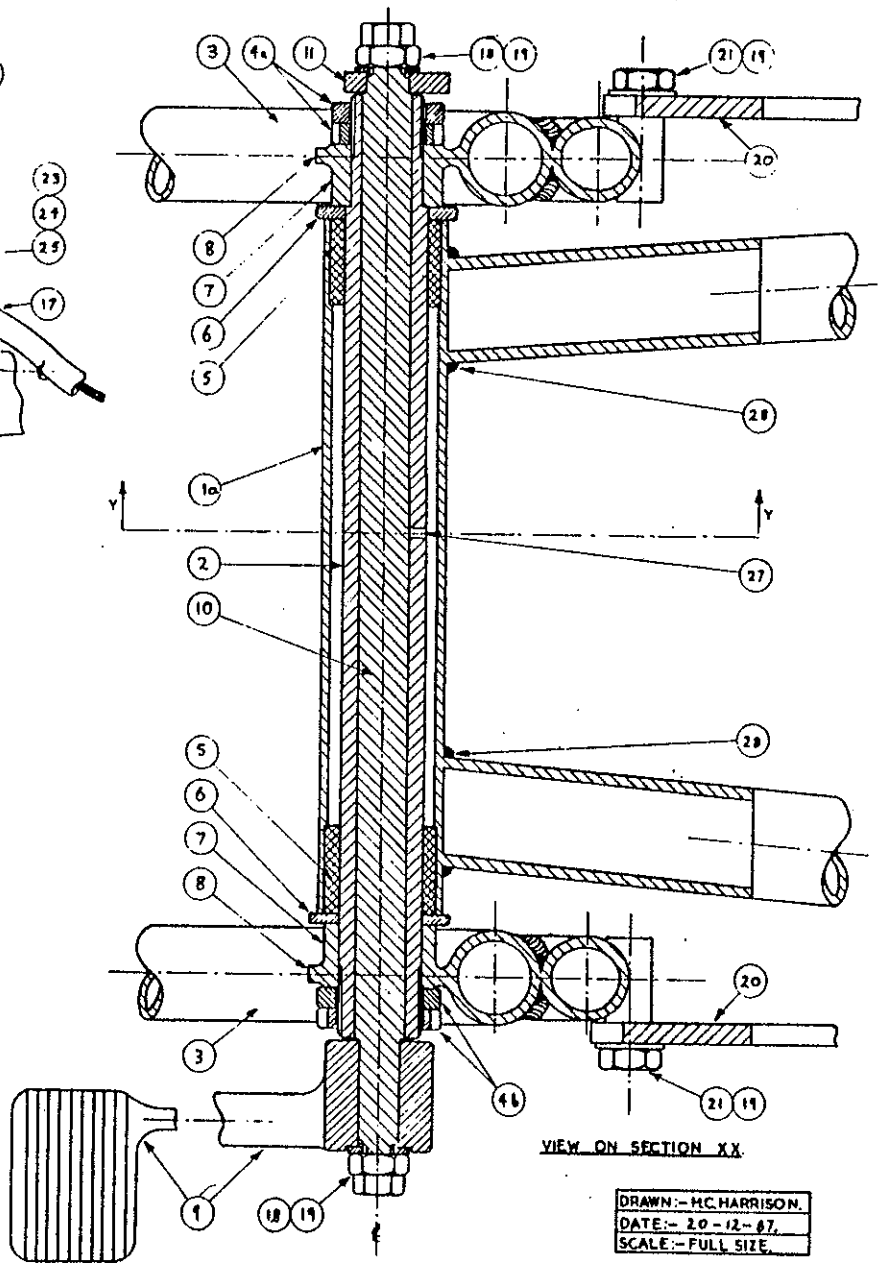
VIEW ON SECTION YY.

LEGEND.

1	SWINGING ARM (PIVOTED FORK).
2	FIXED STEEL CROSS SHAFT.
3	FRAME CRADLE.
4a	CASTELLATED SCREWED RING 20 T.P.I. X ⅜" I.D.
4b	" " " " " X 1" I.D.
5	BRONZE BUSH (NOMINAL I.D. 1")
6	KNURLED THRUST WASHER.
7	PIVOTED FORK ATTACHMENT BOSS.
8	FRAME GUSSET PLATE. (⅛" THICK)
9	REAR BRAKE PEDAL.
10	REAR BRAKE CROSS OVER SHAFT (⅝" DIA)
11	" " LEVER, FORWARD.
12	" " PEDAL RETURN SPRING.

LEGEND.

13	CENTRE STAND ATTACH^{MT}. LUG (PART^{LY} SHOWN)
14	CLEVIS PIN, ¼" DIA
15	WASHER, ⅜" DIA.
16	SPLIT PIN
17	REAR BRAKE BOWDEN CABLE.
18	⅜" B.S.F. STEPPED NUT. (TO FIT ⅜"-⅞" SPANNER)
19	WASHER, ⅜" DIA.
20	PILLION FOOTREST HANGER.
21	⅜ B.S.F. BOLT.
22	G/BOX UNDERTRAY ATTACH^{MT}. BOSS.
23	FORWARD BOWDEN CABLE FIXTURE.
24	⅜" B.S.F. STIFFNUT.
25	WASHER, ⅜" DIA.
26	GREASE NIPPLE.
27	LUBRICATION HOLE. (⅛" DIA.)
28	WELD.
29	SUBFRAME MOUNTING LUG.
30	CABLE YOKE.



VIEW ON SECTION XX.

SCOTT FLYER PIVOTED FORK: 1956-1967.

DRAWN:- H.C. HARRISON.
DATE:- 20-12-67.
SCALE:- FULL SIZE.

8.7.04