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25th July, 1961

Major F.W. Smith,
Major V.T. Mountford
Mr. V.L. Young
Mr. J.J. Booker
Mr. G.H. Baker
Mr. R.E. Thomas
File

Report of Development Work in Progress,
July, 1961

(Sub-section Nos. Refer to Minutes of Meeting Held on 7th July, 1961)

1. Pressed Steel Fork Head for Leading Link Fork

The following delivery promises have been obtained :-

Fork main tubes, 43844	This week
Ball head clip casting, 46945	End of August
Bottom link stampings, W43826	Samples this week
Head lamp casing, W46955	End of August

2. Bottom Link Front Forks

No further tests have been run on these. In view of the serious consequencies in the event of the links themselves failing, I suggest that if the sample links are dimensionally correct, they should be machined, built into the fork and given an indurance test on the Pavé.

3. Lubrication on 700 cc Engines

The engine which has been modified to open the cam shaft tunnels to the crank case, has been fitted to a machine and is performing satisfactorily.

4. 750 cc Engine

A prototype 750 cc engine has been fitted into a frame and run on the road. In my opinion, the vibration on this is worse than the average 1961 700 cc Constellation particularly at fairly high engine speeds equivalent to 60 m.p.h. in second, 70 m.p.h. in third and 80 m.p.h. in top, at which speeds there is considerable vibration thoughout the machine.

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4. 750 cc Engine(Cont)

Drawings have been received from Westwood showing the modifications which they propose to make to the crank case. These include an alteration to the shape of the sump which has not been tested. This modification is designed to give a bigger sump capacity but since this extra capacity is obtained by making the sump wider instead of deeper, it seems to me unlikely that it can do any good and quite possible that it might cause more serious over-oiling at high speeds than that which occurs with the present type of sump.

5. Silencing

The modified version of our 1961 silencer using a glass wool cartridge round a large diameter perforated cylinder instead of, or in addition to, the existing spiral baffle, has been tested on the bench on a 250 cc Crusader Sports engine, both with and without the spiral baffle. This gives practically the same power at all speeds as the standard silencer and is undoubtedly considerably quieter. Since the spiral baffle seems to contribute nothing to the silencer, it is suggested that this modified silencer without the baffle should be used on Crusader Sports and Super Sports and probably other models as an interim measure until a silencer has been devised to meet the noise level limit to be fixed by the Ministry of Transport.

Mr. E. Murray's silencing device has been fitted on to the tail pipe of a Clipper type silencer and has been tried on the road on a 350 Bullet and on a 750 cc Twin.

On the Bullet it gives a considerable reduction in exhaust noise without any apparent falling off in performance. At high speeds, the predominent noise so far as the rider is concerned is now the air intake noise. At low speeds, the spring loaded acoustic lined cap over the end of the tail pipe seems to oscillate at the exhaust frequency. At high speeds, it appears to take up a steady position about $\frac{3}{8}$" to $\frac{1}{4}$" off its seating. At an intermediate speed equivalent to about 30 m.p.h. in top gear it oscillates violently from fully open to closed thus giving an exhaust note which suggests that the engine is 8-stroking or otherwise misfiring, which in fact it is not. The exhaust noise, even when the cap is momentarily open to its fullest extent, is, however, not so loud as the noise from our standard silencer. Although rather disconcerting, these characteristics of the exhaust noise at this particular speed would not affect any noise measurement tests made under I.S.O. regulations since the engine does not run at such low speeds during these tests.

When tried on the 750 cc Twin, the device seemed to prevent the machine from exceeding about 70 m.p.h. in top gear although this may to some extent have been due to the fact that no allowance had been made for the extra

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5. Silencing (Cont.)

stroke of this engine when setting the ignition timing. After eight miles on this machine, the acoustic lining of the cap was found to have largely disappeared.

Dr. P.O.A.L. Davies of Southampton University has produced a silencer which he claims reduces the noise level of a 500 cc single cylinder o.h.v. engine from about 93 dB(A) to 80 - 82 dB(A) under I.S.O. test conditions.

He is bringing this silencer to the Works with noise measuring equipment tomorrow when it is hoped to run bench tests on it and some of our standard silencers on our 250 Crusader Sports and Constellation engines, taking measurements of B.H.P. and noise level. The later will not be strictly comparable with noise level ratings taken under I.S.O. conditions but should give an idea of the comparative noise levels of the different silencers.

Mr. Murray has been advised of the results of our tests on his silencer. The end cap has been returned to him with a request that if possible he should return it with a new lining in time to include his silencer among the other tests tomorrow. He is unable to do this but has promised to call at the Works tomorrow with his Constellation machine which is fitted with one of his silencers so that we can remove the silencer and use it for some of the bench tests.

6. Pistons for 250 cc Super Sports

The delivery promise for these was 16 weeks from mid-April. Although Messrs. Hepworth & Grandage have been asked to improve on this this, they have been unable to do so.

7. Pistons for Crusader Sports and Standard Crusader Models

No comment.

8. Five Speed Gear Box (Constellation)

No comment.

9. 350 cc Crusader

This has now covered a total of 3,167 miles and no further trouble has been reported since the exhaust valve failure at 1,788 miles.

The steel clutch drum and plates have now been returned by the Cork Manufacturing Company faced with their J.17 material. As received, these

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9. 350 cc Crusader (Cont.)

facings were too thick and have had to be skimmed down. The attention of the Cork Manufacturing Company has been drawn to this and they have promised that production plates will be of the correct thickness.

A malleable iron clutch drum has been sent to the Cork Manufacturing Company to have J.17 facings bonded to it and a second malleable iron drum and set of plates has been sent to the Armstrong Cork Company to be faced with their material, 8169.

The first clutch with J.17 facings throughout and Glacier 'DU' plain bearing has just been assembled but no experience has been obtained with it.

The Automotive Engineering Company have dies which will produce a piston very similar to the one which we require. This is a flat topped piston about .050" higher than our drawing and the overall length of skirt is less. This, however, is not important and the extra height can be allowed for by increasing the length of the cylinder barrel. Six sample pistons have been ordered from these dies and a quotation has been asked for in respect of quantity production.

The second burnt out exhaust valve (from a trials machine) has been sent to N.I. Technical Developments Ltd. for analysis but a report on this has not yet been received. It was noted that the valve rocker had worn a groove across the Stellited tip of the valve. Rotation of the valve subsequent to the formation of this groove could cause a reduction in the amount of tappet clearance. The Stellite on the tip of the valve was found to be approximately .040" thick which should certainly be adequate. Consideration should be given to the form of the pad on the valve rocker. The radius of this was reduced to a very small figure some years ago to reduce the amount of wipe across the end of the valve. It seems possible, however, that the slightly larger radius could be used to advantage.

10. 250 cc Frame

The frame with 'B' quality side tubes has been built into a machine but has not yet been tested on the pavé.

11. 175 cc Engine

Mr. Thomas is getting on with the design of the over-head cam shaft engine which looks as though it may be cheaper and simpler than the push-rod design. This, however, depends on the possibility of using a skew gear for the 2 : 1 reduction.

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12. Siba Self Starter

Owing to pressure of more important matters, this has not yet been fitted up for 24 v. operation.

13 Aluminium Cylinders

The aluminium cylinder with .0025" radial thickness of hard chrome in it, is running satisfactorily, and has now covered 678 miles.

The second chrome plated cylinder barrel was returned to Monochrome twice as being too small in the bore at each end. It appears that Monochrome were lapping this by hand which is obviously not practical with a tolerance of .001" on the bore size. Production barrels would be machine lapped. Eventually, Messrs. Monochrome decided that they would have to strip the plate from this barrel and replate it. It is now promised for tomorrow.

The two cylinder barrels have been returned from Messrs. Metco. The one reference 'C' with approximately .015" deposit of steel has been fine bored and lapped in our machine shop. Unfortunately, there was insufficient thickness of deposit and the bore has not cleaned up at several points. This is being held for the Metco District Engineer's inspection on Thursday before being returned to Metco for re-spraying.

The second metal sprayed barrel which has been sprayed with molybdenum has been the subject of correspondence with Messrs. Metco regarding the method of finishing the bore. They have recommended a grade of grinding wheel with speeds and feeds which have been passed on to Mr. GH. Baker who will advise me whether this bore can be finish ground here.

14. Scooter

The hand gear change is working better after removal of the ball indexing mechanism from the operating quadrant to the rocking arm at the lower end of the control cables. It remains to be proved, however, whether the indexing mechanism in this position will ensure that the engine does not jump out of gear in any circumstances.

The stiffer suspension units have not yet been fitted

15. New Fork Head Clip

No comment.

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16. Cross Cylinders and Pistons

No comment.

17. Batch Tests

These have not yet been run. A 250 cc Clipper and a Super Meteor will be tested as soon as possible after the holidays.

18. Nylon Idler Gears

It was not suggested that gears machined from nylon would be as cheap as moulded nylon gears provided, of course, that the latter were produced in sufficient quantities. What was suggested was that gears machined from nylon without bushes might be cheaper than case hardened steel gears with sintered bronze bushes.

The nylon gears in the 350 Bullet continue to function satisfactorily and have now covered 923 miles.

Mr. Baker has supplied a nylon idler gear for driving the oil pump spindle and contact breaker on Crusader type engines. This has been fitted to a Crusader Sports and has now been run 22 hours on the bench at 3,500 r.p.m. This will be a more severe test than the 350 Bullet gear owing to smaller size and greater load. We have in the past tried these gears in Duralumin and in Phosphor-Bronze, but had to revert to case hardened steel owing to excessive tooth wear.

19. 750 cc Constellation Specification

No comment.

R.A. Wilson-Jones.

R.A. Wilson-Jones.