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THE ENFIELD CYCLE COMPANY LIMITED

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HEAD OFFICE AND WORKS
REDDITCH
WORCS. ENGLAND

6th October, 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, September, 1961

(Sub-Section Nos. Refer to Minutes of Meeting held on 13th September, 1961)

1. Bottom Link Forks

The ball head clip has been machined from a malleable iron casting and fitted to the prototype Crusader Super 5.

A pair of links have been machined from production stampings but are awaiting bearing bushes before being fitted to the machine.

A sample casquette pressing made from the tools has been received and fitted to the machine ^{for} marking positions of holes for cables, etc.

Trouble has been experienced with the production damper units due to the springs buckling and hitting the top of the extended bump stop tube inside the spring. Examination showed that the springs were not to Messrs. Armstrong's drawing but even springs correct to the drawing cannot be guaranteed not to buckle. The extension to the bump stop has, therefore, been removed and replaced by additional rubber stops at the upper end of the piston rod. All the damper units delivered have been returned to Messrs. Armstrong to have the correct springs fitted and the bump stops modified.

Mr. Thomas has not had time to prepare a design for a mudguard to move with

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1. Bottom Link Forks (Cont)

the wheel.

2. Lubrication on 700 cc Engines

The Constellation engine with the cam tunnels open to the crankcase has now covered a total distance of 3,184 miles and is still keeping exceptionally clean with a satisfactory rate of oil consumption. This mileage includes 50 laps (140 miles) on the outer circuit at the M.I.R.A. Proving Grounds at speeds between 70 - 100 m.p.h.

3. 750 cc engine

This has been returned to Westwood at their request.

4. Silencing

Mr. Baker has produced a modified form of the experimental round silencer. This is being run on the 350 Crusader prototype. It was stated to be rather difficult to assemble. Another modification to the experimental silencer consists of using stab-tubing surrounded by fibre-glass, the object of the stabbing being to try to keep the fibre-glass in position. The silencer of this type is being run on a Crusader Sports machine.

A visit has been received from a Mr. Knight, Birmingham representative of Fibre Glass Ltd who has promised to send some sample cartridges of more suitable material than those previously tested which were intended for thermal insulation.

The experimental oval silencer has been bench tested on a Crusader Sports engine. Apart from a very poor reading at the lowest speed used for the test (3,000 r.p.m.) this shows small gains or losses at various speeds as compared with a standard silencer. There is no significant difference between the two silencers at 7,000 and 7,500 r.p.m. On the other hand, Mr. Rogers reports that so far as he could tell there was no difference in the noise produced by the two silencers during the test.

5. 5-speed gear box

The 5-speed gear box on the Constellation machine has again given trouble which, however, does not appear to be associated in any way with the fact that it has five gears instead of four. After a total of 3,184 miles on this machine the tester reported difficulty in engaging gears and finally the box locking up solid. Examination showed that most of the oil in the box had been transferred to the space between the inner and outer

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5. 5-speed Gear Box (Cont)

covers due apparently to the oil thrower outside the main shaft ball bearing being loose on the shaft and so ceasing to function. As a result of this the box ran without sufficient oil and eventually the inner end of the bushed final drive sleeve seized on the main shaft. Two teeth of the layshaft third gear pinion are broken probably as a result of the seizure. One tooth of the main shaft high gear pinion was chipped and several teeth on this pinion show considerable signs of wear and pitting. There is also considerable wear on the gear operator fork due to it having run with insufficient oil in the box.

The gear box is being returned to Messrs. Albions for repair and for their comments. There does not seem, however, any reason to suppose that any of the above troubles (except possibly the wear on the main shaft high gear pinion) would have occurred if the oil thrower had remained tight on the shaft. The fact that this came loose indicates that the nuts securing it had not been properly tightened, possibly due to the tongue on the tab washer between the nut of the thrower having jammed in the groove in the shaft. This oil thrower and nut are exactly the same as on the 4-speed box.

6. 350 Crusader

This has now covered a total of 4,291 miles. After 3,293 miles running, the exhaust valve failed for the second time due to burning, the life of the second valve being 2,505 miles. This is one of several valve failures reported recently. This valve has been sent to the suppliers together with a report on the valve which burned in J. Brittain's Trials Machine which indicated that the chromium content of the steel was too low. When the valve was replaced it was found that all the piston rings were broken and new rings and a new gudgeon pin were fitted. This is still the original piston which has always been too slack a fit in the cylinder.

At the same mileage, the clutch drum was changed for one made of malleable iron with J.17 facings. The original J.17 faced loose friction plates were fitted with a new wider centre and new unslotted interleaving plates

The original chains are still giving satisfactory service.

7. 250 cc Frame with B quality side tubes

This has been run for a further 80 miles on the Pavé, making a total of 110 miles on the Pavé, and is still satisfactory.

8. 175 cc Engine

Mr. Thomas has completed the design of this engine and has been working on a design for the complete machine of attractive and modern pattern incorporating the engine.

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9. Siba Self Starter

The Crusader 250 machine fitted with the Siba Self Starter, 24/12v., is being used by Major Mountford who will no doubt report his experience with this.

10. Chromium Plated Cylinder Bores

Barrel Ref. 'B' with a thin deposit of hard chrome fitted to a Crusader Sports Machine has now satisfactorily covered a total of 2,186 miles.

Barrel Ref. 'D', metal sprayed with "Spraybond" (molybdenum) has been fitted to a Crusader Sports machine and has covered about 200 miles. The performance of the machine does not appear to have been adversely affected (as has been the case with some other aluminium cylinders), but the engine is noisier than the standard one, this being apparently due to magnification of the valve gear noise.

Barrel Ref. 'A', with a heavier deposit of Chromium plate, is still with Messrs. Monochrome.

Barrel Ref. 'C' has been returned to Messrs. Metco Ltd., for respraying after removal of the sprayed-on steel deposit which was not sufficiently thick to clean-up at the required size.

11. The Scooter

A stronger spring has been fitted in the gear indexing mechanism in an attempt to make the gear change more positive. This, however, makes the operation too stiff.

The second prototype machine should be on the road within the next few days.

I have ridden the first machine myself for a distance of 16 miles and I offer the following comments on it:-

(1) Performance

The maximum speed I reached was about 46 m.p.h. which was not as good as I can obtain from our standard Prince 2-stroke. Since the scooter's engine capacity is 25 cc greater, this is disappointing although it must be remembered that the scooter engine has to drive a fan and that the weight of the scooter is very much greater than that of the Prince.

What I find more disconcerting is the complete lack of pulling power

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11. The Scooter (Cont)

(i) (Performance)

at very low engine r.p.m. The machine would only just climb the drive to my house in bottom gear from a rolling start and actually stalled on the banking of the works track. Mr. Welcher advises me that his Lambretta has very poor low speed pulling power, most of the performance being at the top end. While this may be accepted scooter practice, it would seem obvious, since scooter riders are not normally the sporty type of motor cyclist, that an engine with a good bottom end performance would be welcomed by them.

I am inclined to think that the lack of low speed performance is due mainly to the long induction pipe which has to be fitted to clear the rear rubber suspension unit.

Two-stroking with the Zenith carburettor was extremely good, but the engine was inclined to run on. These two facts together with the lack of power suggest that a larger main jet might be used to advantage.

(ii) Gear Change

This was far from positive and although easy enough to operate, one had to more or less guess how far to turn the twist grip. As reported above, the effect of the stronger spring makes the change difficult to operate.

(iii) Suspension

This bounced very badly. The use of harder rubber or possibly of high hysteresis rubber may improve this, but many months ago Mr. Blandford of Armstrongs told me that in his experience rubber suspension always needed the addition of hydraulic dampers. If this is so, there seems no object in persisting with the rubber suspension units since a coil spring is certainly a cheaper springing medium than the rubber unit and lends itself to use with a hydraulic damper. If the rear suspension unit were replaced by a spring and damper, the diameter of the pivot bearings could be greatly reduced thus enabling the induction pipe to be shortened or eliminated and probably giving much better characteristics to the engine performance.

(iv) Steering

This is inclined to be frightening when the machine bounces on a curve

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11. The Scooter (Cont)

(iv) Steering (Cont)

on a wet road. I believe, however, that if the bouncing were eliminated, the steering would not be bad by scooter standards, though I think it could be improved by using trailing instead of leading forks for the front forks as is done on the Lambretta. The object of this modification is to put the weight of the steerable parts of the machine further in front of the steering axis so that the steering is made to turn more quickly than when the machine leans over.

- (v) The electric starter always managed to turn the engine over though sometimes after an appreciable delay which must have caused considerable drain on the batteries. Although the starter turned the engine over after the machine had been left out all night, and although ignition was certainly occurring, the engine would not run until the carburettor had been flooded. Use of the choke either made the mixture too rich or reduced the volume of air in the engine too much, or when the choke was not used the mixture was obviously too weak.

The self-starter is in my opinion satisfactory provided an alternative means of starting is available in the event of the battery being run down. I do not consider that it has sufficient reserve to be the only means of starting the machine. An expert can do a run and jump start but paddling off is virtually impossible owing to the width of the foot-boards. The possibility of providing a pulley and string starter as a stand-by should be investigated.

12. Batch Tests

No batch tests have been run during this period.

13. Nylon Idler Gears

The gears fitted to the 350 Bullet which is still in the hands of the A.C.U. are reported by Mr. Rogers to be still going strong. The idler gear in the pump drive was fitted to the 350 Crusader prototype but failed after 62 miles. The loading on this gear is obviously much greater than on the 350 Bullet.

14. Sports Airflow Fairing

The Avon fairing on loan from Messrs. Green of Sheffield has been fitted to a Crusader Sports machine and sent to Messrs. Dewey-Waters Ltd.

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15. Frame for 750 cc Model

Mr. Thomas has prepared a drawing of a new frame for this model.

16. Dunlop Tyres of special rubber

One of these tyres (which are presumed to be of high hysteresis rubber), has been fitted to a Constellation machine which has covered 2,500 miles. Some of the blocks are beginning to come away from the centre portion of the tread. Dunlop's have asked us to cover 2,000 miles on this tyre before returning it. The tyre is of 3.25" section so that the test is certainly a severe one since a Constellation is normally fitted with 3.50" section tyres.

..... R.A. Wilson-Jones
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THE ENFIELD CYCLE CO. LTD. REDDITCH.

B.H.P. AND B.M.E.P. CURVES FROM CRUSADER SPORTS
ENGINE WITH STANDARD AND EXPERIMENTAL [OVAL] SILENCERS



