Sidney-Barton Limited

27 OLD BOND STREET, LONDON, W1

GROSVENOR 4617-8-9

37th INTERNATIONAL MOTOR EXHIBITION

EARLS COURT - OCT 22ND/NOV 1ST

GIRLING LIMITED - STAND NO. 288.

THE GIRLING HYDRA-STATIC DISC BRAKE.

The Girling Hydra-static Disc Brake which incorporates patents licensed from the Dunlop Rubber Company Ltd., has several important technical features summarised as follows:-

(1) Fully automatic lining wear adjustment.

(2) High resistance to brake fade.

(3) Substantially constant pedal travel under severe driving conditions.

(4) Improved means of getting rid of the heat generated by means of better exposure of heated surfaces and better brake ventilation.

(5) Reduced distortion due to simplicity and sturdiness of disc design.

(6) Improved brake stability.

(7) Up to 20% weight saving compared with drum brake equipment according to size.

1. BRAKE OPERATION:

The design consists in principle of a flat metal disc replacing the normal brake drum. Parallel to the axis of the disc and disposed either side of the disc are pairs of hydraulically operated wheel cylinders containing cylindrical lining pads. These cylinders are arranged co-axially to clamp the pads to the brake disc when the brake is applied. Any number of pairs of cylinders may be employed dependent on the total drag load required and other variables.

2. CONSTRUCTIONAL FEATURES:

In this brake the cylinders are grouped in two or three pairs in a single caliper construction mounted locally on the disc. The area of the disc shrouded by the brake is therefore reduced to a minimum, and maximum area of the disc for ventilation is permitted. When compared with the normal drum brake design it will readily be appreciated that a great step forward in cooling of the braking surface has been obtained.

The U-section bracket housing the opposed pairs of cylinders is designed in box form to obtain maximum rigidity for a given weight of material. The cylinders and lining pads are interchangeable so that maximum simplicity of construction is obtained.

3. SELF ADJUSTMENT FOR WEAR:

In the Girling design, no springs are required in the wheel cylinders, the pistons with their lining pads being held in light rubbing contact with the brake disc by means of the static brake fluid head and some seal and piston friction when the brake is "off". Thus, as lining wear occurs, the brake pads are automatically adjusted out to the disc during brake operation and no manual adjustment is required.

4. RESISTANCE TO FADE:

The provision of adequate disc heat capacity and adequate disc ventilation both combine to achieve a low temperature rise for a given braking effort as compared with the drum brake. An additional feature is the larger area swept by the lining as compared with the comparable drum brake lining path. It will be apparent, therefore, that the drop in lining friction coefficient due to temperature rise is less on this disc brake than on the drum brake and the resistance to fade of the disc brake is therefore much greater. Actual road tests show that fade resistance of the disc brake is several times greater than the drum brake.

5. BRAKE PEDAL TRAVEL:

A normal drum brake of 12" diameter will expand .036" on diameter for 500°F temperature rise. A comparable disc brake with $\frac{3}{4}$" thick disc will expand only .0025" for the same temperature rise. It is clear, therefore, that during a stop from high speed, drum expansion can account for a large loss of pedal travel. On the other hand, the change of temperature has much less effect on the disc brake and if anything the pedal travel is slightly reduced. Road tests show that after hard driving the pedal travel appears to be substantially unchanged.

6. DISTORTION FREE DISC DESIGN:

By suitable choice of design proportions of the brake disc, adequate heat capacity of the disc can be obtained. The section is already simple and compact so that distortion of the disc due to temperature changes can be

kept to a minimum.

7. BRAKE STABILITY:

Due to almost complete absence of servo in this brake, the deceleration of the car is proportional to pedal effort and a very stable brake is thus obtained.

8. WEIGHT SAVING:

The disc brake equipment so designed has effected a saving in weight up to approximately 20% over the drum brake equipment it replaces.

3PM. Hendon Police College
Jaguar Mk 7.

Report to Mr. Grant
Sidney - Barlow

Girling

(TV Release Non.)

Used on BRM :- Dixie Dales 18 mth
Motorbike
Rover Jet car
Production car written next few months.

Trafford Publd

Sidney-Barton Limited

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GIRLING LIMITED

DISC BRAKE DEVELOPMENT

Over 100,000 miles of road tests.

The introduction of the disc brake, in a form suitable for volume produced cars, is the outcome of many years intensive development work. Girling Ltd. alone have carried out over 100,000 miles of road tests on disc brakes of one kind or another fitted to a wide variety of cars. The present Girling design which will be the central feature of their stand at the Motor Show, is known as the Girling Hydrastatic Disc Brake and incorporates patents licensed from the Dunlop Rubber Company as well as Girling patents. It was adopted as the best design from a number of alternatives two years ago and has since been improved and developed to its present form.

Technical Problems

The problems involved in the successful application of the disc principle were many. They included the method of construction, strength and position of the caliper in relation to the axle, shape and material for the disc, the effects of corrosion and weather, choice of suitable lining materials, the amount of brake boost necessary, brake judder, effect on steering, and many other factors. The caliper, for example, was originally machined from a solid block of steel and altogether over twenty designs were tested before the present design of caliper was decided upon. The early discs were bell shaped to take the place of the brake drum and were unnecessarily cumbersome. Modified hub designs enabled the present type of light, flat disc to be used. In the case of boost it was soon discovered that disc brakes could be designed without the need for additional boost equipment. The brakes could be operated normally from a master cylinder with maximum braking at generally below 100 lbs. pedal effort for a maximum stop. This compares very favourably with the pedal effort required for drum brakes.

/Contd.

The Test Programme

Early tests to discover the best position for mounting the caliper showed that wheel deflection, particularly on corners, caused the disc to knock back the lining pads from the disc surface. Measurement of the deflection under various driving conditions proved it was at a minimum if the caliper were placed on the horizontal centre line.

Many types of practical test on the road and track were made under a wide variety of conditions. A typical example was as follows:- A Jaguar XK 120 equipped with $10\frac{3}{4}$" disc brakes was driven at speed round the triangular track at the M.I.R.A. test ground. The maximum speed reached in each lap was 110 to 115 m.p.h. and on each corner the car was braked from 100 down to 50 m.p.h. - 3 brake applications per lap. The intervals between brake applicatior were approximately 43 seconds and the estimated rate of deceleration was 18ft/sec./sec. or 0.56g. The total period of the test was 92 minutes during which well over 100 brake applications were made. At no time during the test was there a tendency toward brake fade and pedal travel remained constant. Normal drum brakes under the same conditions would have shown considerable fade after 10 stops.

As the brake is open to the atmosphere a number of tests were specially held to determine the effect of water and grit. The effect of water being thrown up on the disc results in only a very slight fall in braking power and no tendency to uneven braking. The brake is largely self cleaning as far as road grit is concerned and this presents no major problem at the present time. Tests are however still going on to determine the type of finish that will give the disc maximum protection against grit, corrosion etc.

Tests to determine the rate of lining wear have established that it is about equal to the rate of wear of drum brake linings for the same duty. Under normal driving conditions over a period of nine months lining wear was equivalent to a total lining life of 30,000 miles.

General

There is no doubt that the anti-fade and self adjusting properties of the disc brake are immeasurably superior to the best drum brake. As motor cars get faster, the fade problem assumes greater importance. Since in the average motor car the heaviest braking falls on the front wheels, and it is the brakes on these that suffer first from fade, it is here that disc brakes really prove themselves and many satisfactory tests have been carried out with front disc brakes and rear drum brakes.

October, 1952.

~~Weedman~~.

Green

Aco. 2831

3 Lane.

Sidney Burton.

Fro. 4617. Grant.

Savoy (Pinafore Room).

5-30

Will pick a car for photographs trial runs demonstrate how speedily pull up etc

FOR INFORMATION OF THE PRESS NOT TO BE PUBLISHED

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NEW LOW COST MOTORING

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At last every family can afford their own car for running around in the town or country, shopping, holidays or as an extra car for the wife.

Of the very latest design, the "PETITE" three wheeler incorporates the latest engineering principles and has undergone vigorous tests to ensure that a high standard has been maintained, but at a price hitherto unknown.

60-70 MILES PER GALLON

CRUISE AT 30 mph. MAXIMUM 40 mph.

SEAT TWO ADULTS PLUS LUGGAGE ETC.

INDEPENDENT SUSPENSION ALL 3 WHEELS.

346cc REAR MOUNTED ENGINE.

STEERING COLUMN GEAR CHANGE.
3 forward and reverse.

TYRES 18" x 3.25" and 8" x 4"

OVERALL SIZE 10'3" x 4'7" x 4'5"

PRICE: £255. plus Purchase Tax £143. 10. 0d

£398. 10. 0d

A. C. "PETITE"

S P E C I F I C A T I O N

FRAME — Chassis and body are integral light gauge steel framing of generous section for strength plus lightness. Four members take complete torque and bending load, and provide support for seat and general body structure. Rubber mounted boom carries engine, gearbox and differential.

BODY — Light aluminium panelling. Two doors. Toughened glass to screen and all windows. Vertically sliding door glasses. Exceptional all round visibility. Easily operated roll type hood. Upholstery in plastic on rubberised hair base. Seat 43" wide at elbows, height of seat from roof 36½". Overall length 10'3", width 4'7", height 4'5". Total weight 7½ cwts.

ROAD SPRINGS — Independent to all three wheels. Rear wheels have coil springs with compression controlled by direct action tubular hydraulic damper attached to each trailing arm. Single front wheel has two coil springs also controlled by damper.

REAR MOUNTED ENGINE — Villiers type 27B single cylinder 346 c.c. 2-stroke, bore 70 - 90 mm. Electric starter. Cooling fan. Gearbox provides 3 forward and 1 reverse, ratios: top 6.01, second 11.12, first 23.25, reverse 22.35. Fuel tank with reserve.

TRANSMISSION — Primary drive by triple vee belt, which provides quietness and excellent cushioning. Multi-plate clutch on gearbox. Final drive to differential by chain.

REAR AXLE — Separate differential assembly mounted on chassis. Two open half shafts incorporating double Hardy Spicer universal joints allow drive to be transmitted to road wheels without hindrance.
Track 42". Wheelbase 72".

TYRE SIZE — Rear 18" x 3.25". Front 8" x 4"

BRAKES — 7" ~~6"~~ drums on both rear wheels.

ELECTRICAL — Electric starter and dynamo system. Double dip to both headlamps. Separate side lamps, tail lamp incorporating brake stop light. Windscreen wiper and horn.

CONTROLS — Steering column control to gear shift. 16" steering wheel. Normal clutch, brake and accelerator pedals with pistol type hand brake.