

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements relating to Hydraulically Operated Disc Brakes

We, GIRLING LIMITED, a British Company of Kings Road, Tyseley, Birmingham 11, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in hydraulically operated disc brakes of the kind in which friction pads can be applied to opposite faces of a disc rotatable with a vehicle wheel by pistons working in hydraulic cylinders in opposed limbs of a fixed caliper which straddles a portion of the disc.

The disc is usually mounted on the inboard side of and close to the wheel.

The present invention consists in an hydraulic disc brake assembly of the kind set forth in which liquid can be fed into a cylinder in one limb in liquid communication with the cylinder in the other opposed limb by internal passageways, at least two intersecting passageways being provided inclined to each other and of which at least one is inclined to the axis of the disc, a further passageway inclined to the first two mentioned passageways and intersecting one of them being provided extending to the caliper periphery to provide a bleed outlet port.

Preferably the bleed screw and the cylinder into which liquid is fed are in the limb of the caliper which is on the inboard side of the disc. This facilitates access to the bleed screw.

Preferably also, the bleed screw is connected to the outer end of the cylinder in the said other or second limb of the caliper by an independent pipe or passage. This has the advantage that air can pass freely from the second cylinder to the bleed screw, without being impeded by the liquid flowing from the first to the second cylinder.

The passages between the bleed screw and the cylinder may be arranged in various ways.

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Some of these are illustrated by way of example in the accompanying drawings in which:—

Figure 1 is an end elevation of a brake caliper,

Figure 2 is a side view of the caliper,

Figures 3, 4, 5 and 6 are sections of the caliper on the line 3—3 of Figure 2 showing various ways of arranging the internal passages.

The caliper illustrated is formed in two complementary halves 10, 11 secured together by bolts 12, the joint being in the central plane of the disc with which the caliper co-operates. A union 13 to receive a pipe from a master cylinder is located on the limb 10 of the caliper which is on the inboard side of the disc when the caliper is in position, a passage leading from the union into the hydraulic cylinder 14 in that limb. Inclined passages 15, 16 are drilled from the meeting faces of the two halves of the caliper into the outer end of the cylinder 14 and the outer end of the cylinder 17 in the other limb of the caliper. The inner ends of the passages register and one face is recessed as shown at 18 to receive an annular seal.

A bleed passage 19 of smaller diameter than the passages 15, 16 is drilled in the inboard limb 10 of the caliper substantially parallel to the axis of the disc. The inner end of this passage meets the registering inner ends of the passages 15, 16 as shown in Figure 3 and its outer end is normally closed by a bleed screw 21.

The angular disposition of the passages 15, 16 is conveniently such that they communicate with the outer ends of the cylinders at points above the axes of the cylinders and the passages are inclined upwardly towards their junction and to the inner end of the bleed passage 19.

When the cylinders are being filled with

liquid supplied through the union 13 the liquid fills the cylinder 14 and flows through the passages 15, 16 into the cylinder 17. The bleed screw is open and the air in the cylinder flows upwardly through the passages 15, 16 to the bleed passage and so to atmosphere together with any bubbles of air present in the liquid.

In the modification shown in Figure 4 a tube 22 of small bore is taken from the bleed passage 19 through the passage 16 to its junction with cylinder 17. Thus, when filling the system with liquid, air from the cylinder 14 and surplus liquid from that cylinder flows into the cylinder 17 through the passages 15, 16 and the air is discharged through the tube 22 and the bleed passage 19, filling being continued until liquid free of air comes from the bleed screw.

In the modification shown in Figure 5 one end of a tube 23 is cranked and flared to fit into the outer end of the passage 15, and the tube, which is of smaller diameter than the passage 16, extends through that passage to its junction with the cylinder 17. Thus air and liquid from the cylinder 14 are delivered through the passage 16 and tube 23 into the cylinder 17 and the air from both cylinders flows out through the passage 16 around the tube 23 and through the bleed passage 19.

In the modification shown in Figure 6 the passage 16 is divided longitudinally by a partition 24, the part of the passage on one side of the partition being in communication with the passage 15 and the cylinder 17, and the part on the other side connecting the cylinder 17 with the bleed passage 19.

WHAT WE CLAIM IS:—

1. An hydraulic disc brake assembly of the kind set forth in which liquid can be fed into a cylinder in one limb in liquid communication with the cylinder in the other opposed limb by internal passageways, at least two intersecting passageways being provided inclined to each other and of which at least one is inclined to the axis of the disc, a further passageway inclined to the first two mentioned passageways and intersecting one of

them being provided extending to the caliper periphery to provide a bleed outlet port.

2. An hydraulic disc brake assembly according to Claim 1 in which the bleed port is on the inboard side of the caliper and so also is the cylinder to which liquid is fed.

3. An hydraulic disc brake assembly according to either preceding claim in which the caliper is formed in two complementary halves bolted together, the first two passageways being drilled from the meeting faces of the two halves into the cylinders adjacent the outer ends thereof and the bleed passage being drilled in one half to intersect the internal passage in the same half near the junction with the internal passage in the other half.

4. An hydraulic disc brake assembly according to any preceding claim in which the internal passageways are inclined upwards towards the bleed passage from their intersections with the cylinders.

5. An hydraulic disc brake assembly according to any preceding claim in which the bleed screw is connected to the outer end of the cylinder in the said other limb by an independent passage.

6. An hydraulic disc brake assembly according to Claim 5 in which the internal passageway in the said other limb of the caliper is divided by a partition, the arrangement being such that the passage on one side of the partition is connected to the bleed screw while the passage on the other side is connected to the cylinder in the said one limb.

7. An hydraulic disc brake assembly according to Claim 5 in which the bleed screw is connected to the outer end of the cylinder in the said other limb by a tube which extends through the internal passageway in the same limb.

8. An hydraulic disc brake assembly according to Claim 5 in which the internal passageway in the said one limb is connected to the outer end of the cylinder in the said other limb by a tube and in which the bleed screw is connected to the outer end of the cylinder in the said other limb by the internal passageway in that limb.

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In the modification shown in Figure 6 the passage 16 is divided longitudinally by a partition 24, the part of the passage on one side of the partition being in communication with the passage 15 and the cylinder 17, and the part on the other side connecting the cylinder 17 with the bleed passage 19.

WHAT WE CLAIM IS:—

1. An hydraulic disc brake assembly of the kind set forth in which liquid can be fed into a cylinder in one limb in liquid communication with the cylinder in the other opposed limb by internal passageways, at least two intersecting passageways being provided inclined to each other and of which at least one is inclined to the axis of the disc, a further passageway inclined to the first two mentioned passageways and intersecting one of

them being provided extending to the caliper periphery to provide a bleed outlet port.

2. An hydraulic disc brake assembly according to Claim 1 in which the bleed port is on the inboard side of the caliper and so also is the cylinder to which liquid is fed.

3. An hydraulic disc brake assembly according to either preceding claim in which the caliper is formed in two complementary halves bolted together, the first two passageways being drilled from the meeting faces of the two halves into the cylinders adjacent the outer ends thereof and the bleed passage being drilled in one half to intersect the internal passage in the same half near the junction with the internal passage in the other half.

4. An hydraulic disc brake assembly according to any preceding claim in which the internal passageways are inclined upwards towards the bleed passage from their intersections with the cylinders.

5. An hydraulic disc brake assembly according to any preceding claim in which the bleed screw is connected to the outer end of the cylinder in the said other limb by an independent passage.

6. An hydraulic disc brake assembly according to Claim 5 in which the internal passageway in the said other limb of the caliper is divided by a partition, the arrangement being such that the passage on one side of the partition is connected to the bleed screw while the passage on the other side is connected to the cylinder in the said one limb.

7. An hydraulic disc brake assembly according to Claim 5 in which the bleed screw is connected to the outer end of the cylinder in the said other limb by a tube which extends through the internal passageway in the same limb.

8. An hydraulic disc brake assembly according to Claim 5 in which the internal passageway in the said one limb is connected to the outer end of the cylinder in the said other limb by a tube and in which the bleed screw is connected to the outer end of the cylinder in the said other limb by the internal passageway in that limb.

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