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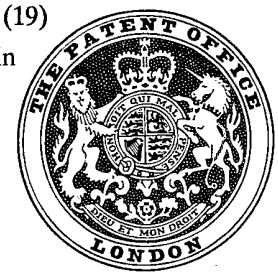

(54) FLOATING TYPE DISC BRAKE

(71) We, SUMITOMO ELECTRIC INDUSTRIES, LTD., a Japanese Company of No. 15, Kitahama 5-chome, Higashi-ku, Osaha-shi, Osaka, Japan, 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 described in and by the following statement:-

This invention relates to a floating type disc brake of the type which includes a caliper guided relative to a fixed member by pins which extend parallel to the disc axis and which are received in respective blind holes in the fixed member.

The closed ends of the blind holes act to prevent intrusion of dust or other particles into the latter. If each guide pin has a cross-sectional area substantially equal to that of the blind hole which receives it, then provision must be made for air to be exhausted from the closed end of the hole or else the insertion of the pins in the holes becomes difficult or even impossible. For this reason, the cross-sectional areas of the pins and holes are made sufficiently different to permit the escape of air through the resulting gap between each pin and the side wall of the respective hole.

Such a construction is, however, prone to the problem of mechanical collision between the pins and the walls of the blind holes. In order to resolve this problem, it has been proposed to cover at least one of the pins with a sleeve of elastic materia, such as rubber, such that the sleeve fills the gap between the pin and the side wall of the respective hole. Exhaust of air from the closed end of the hole is permitted by one or more longitudinal grooves in the sleeve. However, a further problem now arises that the sleeve may come away from the pin or may stretch in the longitudinal direction due to vibration or surface contact with the side wall of the hole.

It is an object of the present invention to obviate or mitigate this problem.

According to the present invention, there is provided a floating type disc brake including a fixed member straddling a disc, a piston supporting an inner pad positioned on one side of said disc, a caliper straddling said disc and supporting an outer pad on the other side of said disc, said caliper having a cylinder in one side thereof which receives said piston and constitutes a pressure device, a pair of guide pins fixed to said caliper and extending parallel to the axis of said disc, a pair of blind holes provided in said fixed member correspondingly to said guide pins for slidably receiving said guide pins, and an elastic sleeve covering at least one of said guide pins, said sleeve having at least one axial groove providing an air passageway for exhausting to atmosphere air compressed in a blind end portion of said blind hole by the respective guide pin, means being provided for preventing said sleeve from slipping off or coming away with respect to said guide pin.

Embodiments of the present invention will now be described, by way of example, with reference to the accmpanying drawings in which:-

figure 1 is a plan view of one embodiment of a floating type disc brake according to the present invention;

Figure 2 is a front view of the brake shown in Figure 1;

Figure 3 is a side view of the brake shown in Figures 1 and 2;

Figure 4 is a sectional view taken along the line IV-IV in Figure 1;

Figure 5 is a sectional view taken along the line V-V in Figure 4 of a guide pin and an associated resilient sleeve;

Figure 6 is a similar sectional view to Figure 5 but taken along the line VI-VI in Figure 4; and

Figure 7 is a sectional view of a guide pin

and an associated resilient sleeve which form part of a modified embodiment of a floating type disk brake according to the present invention.

Referring first to Figures 1, 2 and 3 of the drawings, the floating type disc brake shown therein comprises a fixed member 9 which has two arms 14 and 14' and which forms a U-shaped structure straddling a disc 1. The fixed member 9 is fixedly secured to a knuckle of an automobile, for example, by means of screws (not shown) which pass through screw holes 15 in the member 9. Each arm 14, 14' extends along one surface of the disc 1 outwardly thereof, and is turned over the periphery of the disc so that a portion of the arm extends along the other surface of the disc, as shown to advantage in Figure 3.

Referring now also to Figure 4, each arm 14, 14' has formed therein a blind hole 10 which extends in a direction parallel to the axis of the disc 1. The hole 10 in the arm 14 slidably receives a guide pin 6 covered by an elastic sleeve 8. Although not shown in Figure 4, the hole 10 in the arm 14' similarly slidably receives a guide pin 7. An air passage hole 16 is provided in an end wall of the sleeve 8, and four axial grooves 11 (see also Figures 5 and 6) extend along the entire length of the sleeve 8 in the inner surface of the latter. The hole 16 and the grooves 11 permit air in the closed end of the blind hole 10 to be exhausted to atmosphere: such exhaust of air is required when the pin 6 and the sleeve 8 are inserted in the hole 10 and air becomes compressed at the closed end of the latter, and also during operation of the brake as will be described later.

The sleeve 8 is provided integrally on its inner surface with two annular ribs 12' and 12 disposed respectively at its open end and adjacent its closed end, the ribs 12 and 12' being received in respective circumferential grooves 13 and 13' in the external surface of the pin 6 so as to prevent the sleeve from coming away from the pin or from being stretched in the longitudinal direction thereof. The rib 12 adjacent the closed end of the sleeve has four recesses therein so that air flow through the grooves 11 is not obstructed. Instead of recesses, the rib 12 can be formed with holes in positions corresponding to the grooves 11 for the same purpose. Although the sleeve 8 is described as having two ribs 12 and 12' only one such rib may be provided if desired.

The brake further comprises a caliper 5 which straddles the disc 1 and to which the pins 6 and 7 are secured. The caliper 5 is provided with a cylinder which together with a piston constitutes a pressure device 3. An inner pad 2 is mounted between one surface of the disc 1 and the piston, and is moved to the left as viewed in Figure 3 when braking fluid is applied to the piston. An outer pad 4 is supported by the caliper 5 and is disposed between the other surface of the disc 1 and an arm of the caliper 5. Movement of the pads 2 and 4 towards and away from the disc 1 is guided by the fixed member 9. When the pressure device 3 is operated to urge the pad 2 towards said one surface of the disc, the reactive force causes the entire caliper 5 to move to the left as viewed in Figure 3, which in turn urges the pad 4 towards said other surface of the disc. With such movement of the caliper 5, the pins 6 and 7 retract into their respective holes 10: air compressed in the closed ends of the holes is exhausted to atmosphere through the aforementioned air passage holes and grooves in the sleeves covering the pins 6 and 7.

figure 7 illustrates a detail of a modified embodiment of the floating type disc in which the grooves 11 are formed in the outer surface of the sleeve 8 rather than in the inner surface thereof. In this case, it is not necessary to provide the recesses or holes in the rib 12 and the air passage hole 16 in the sleeve.

WHAT WE CLAIM IS:

1. A floating type disc brake including a fixed member straddling a disc, a piston supporting an inner pad positioned on one side of said disc, a caliper straddling said disc and supporting an outer pad on the other side of said disc, said caliper having a cylinder in one side thereof which receives said piston and constitutes a pressure device, a pair of guide pins fixed to said caliper and extending parallel to the axis of said disc, a pair of blind holes provided in said fixed member correspondingly to said guide pins for slidably receiving said guide pins, and an elastic sleeve covering at least one of said guide pins, said sleeve having at least one axial groove providing an air passageway for exhausting to atmosphere air compressed in a blind end portion of said blind hole by the respective guide pin, means being provided for preventing said sleeve from slipping off or coming away with respect to said guide pin.

2. A brake as claimed in Claim 1, wherein a plurality of said axial grooves are provided in an outer surface of said sleeve and extend along the entire length of said s l e e v e .

3. A brake as claimed in Claim 1 or 2 wherein said means comprises at least one rib integrally provided on an inner surface of said sleeve and at least one recess provided correspondingly on a surface of said guide pin for receiving said at least one rib.

4. A brake as claimed in Claim 1 or 2, wherein said means comprises at least one annular rib integrally provided on an inner

circumferential surface of said sleeve and at least one annular groove provided correspondingly on a circumferential surface of said guide pin for receiving said at least one annular rib.

5. A brake as claimed in Claim 1, wherein said means comprises at least one annular rib integrally provided on an inner circumferential surface of said sleeve and at least one annular groove provided correspondingly on a circumferential surface of said guide pin for receiving said at least one annular rib, and wherein said at least one annular rib has recesses in positions corresponding to said axial grooves.

6. A brake as claimed in Claim 1, wherein said means comprises at least one annular rib integrally provided on an inner circumferential surface of said sleeve and at least one annular groove provided correspondingly on a circumferential surface of said guide pin for receiving said at least one annular rib, and wherein said at least one annular rib has holes in positions corresponding to said axial grooves.

7. A floating type disc brake substantially as hereinbefore described with reference to Figures 1 to 6 or Figures 1 to 6 as modified by Figure 7 of the accompanying drawings.

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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

FIG. 1

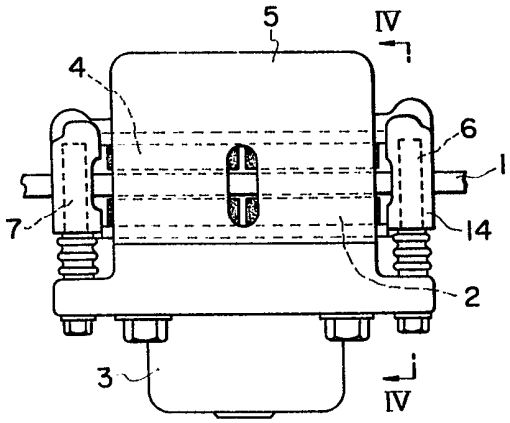

FIG. 2

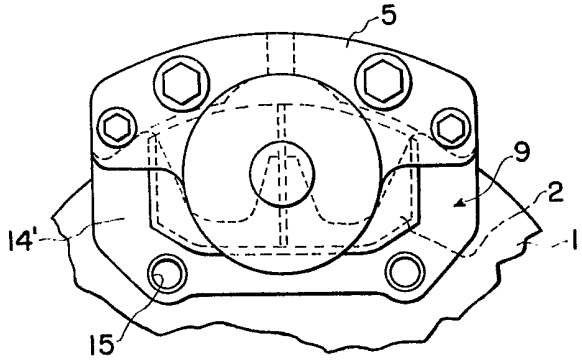

FIG. 3

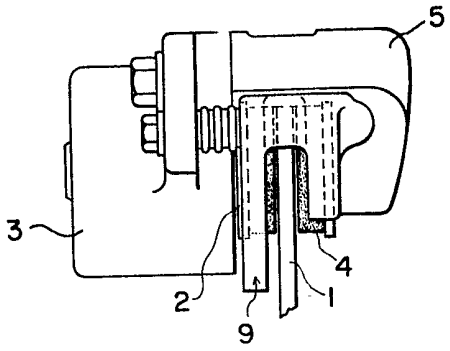

FIG. 4

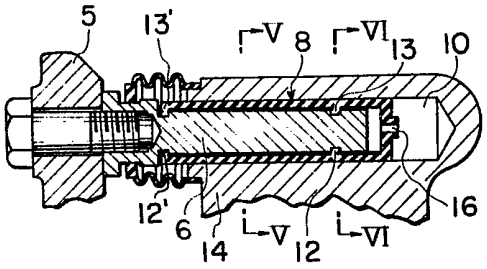

FIG. 5

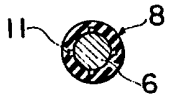

FIG. 6

FIG. 7