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(54) A disc for a disc brake

(57) A ventilated disc for a motor vehicle disc brake comprises two spaced co-axial annular parts (11) and (12) the opposed back faces (13) and (14) of which are interconnected by cross members (16), (17) and each opposed back face (13) and (14) has an array of spaced axially projecting knobs (19) (19′) thereon extending towards but not contacting the other of the two back faces (13) or (14). Knobs (19, 19′) are in form of cones having spherical or rounded off ends—knobs may be aligned or interdigited.

As shown, members (16) are in the form of substantially radial vanes—members (17) are pillars. Details of distribution and number of pillars and knobs are given. The embodiment of Figures 3, 4 also has ribs (115) projecting from back faces of parts (11, 12).

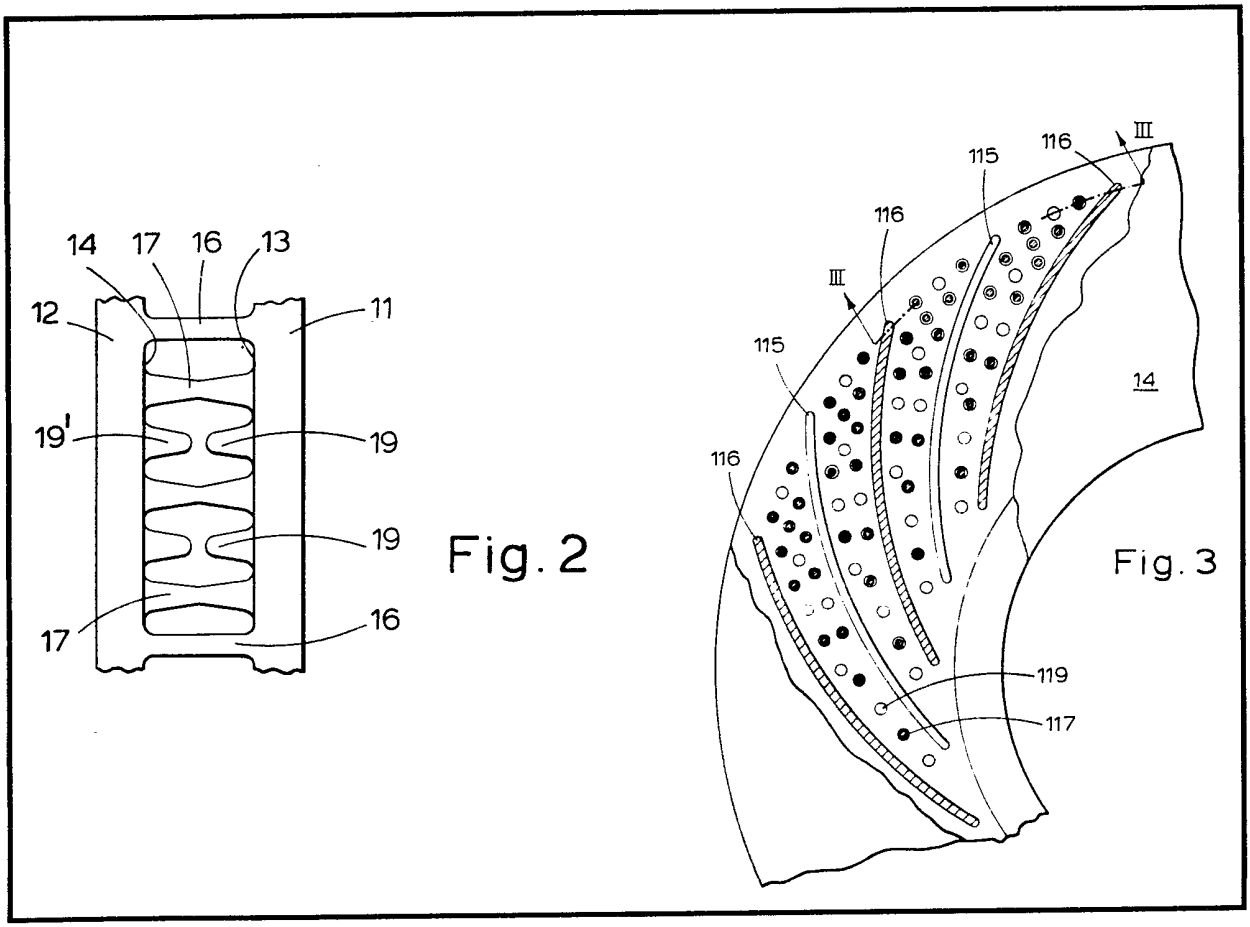
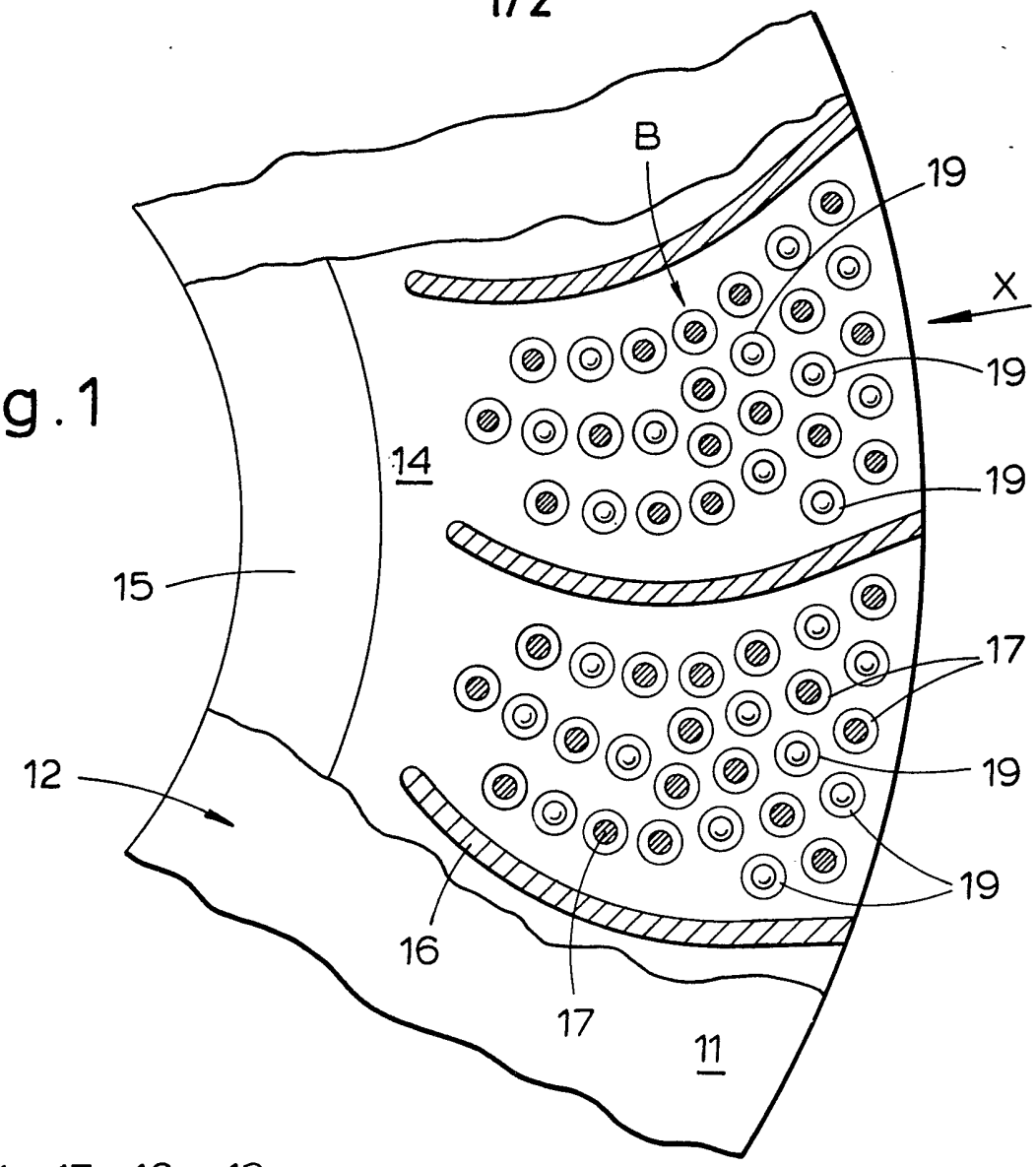


Fig. 2

Fig. 3

Fig.1



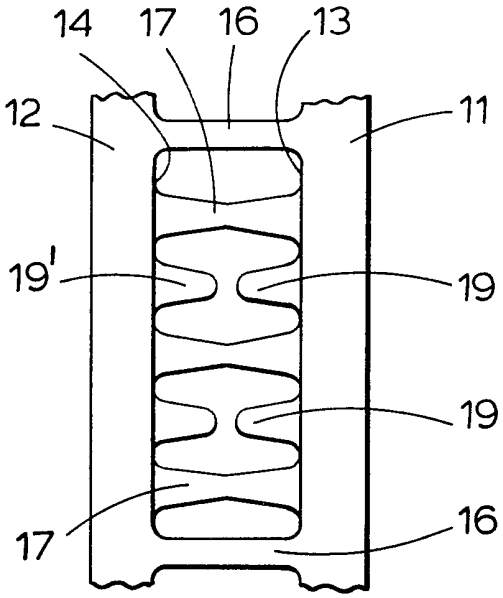


Fig.2

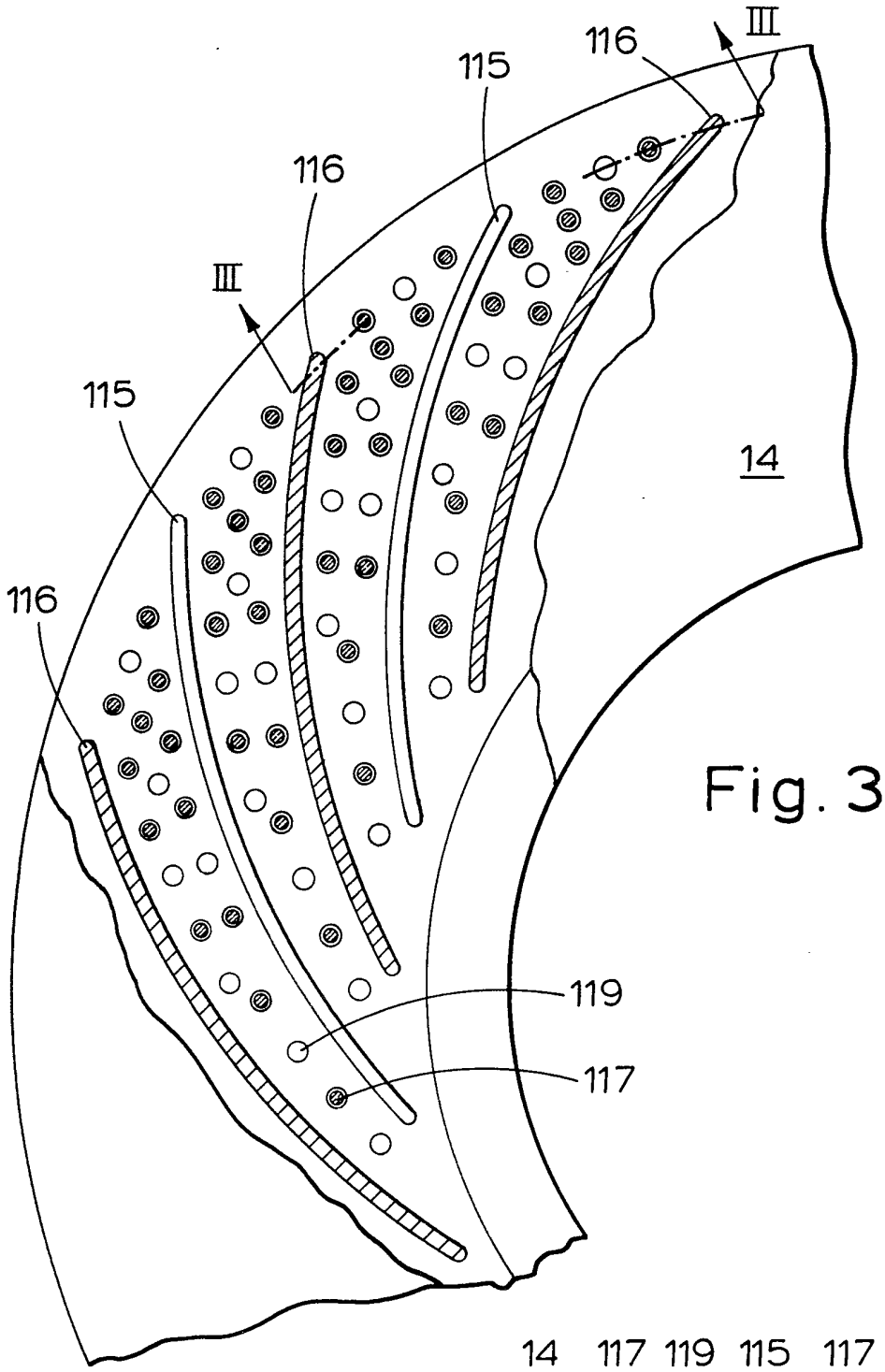

III
116
115
116
III
115
14
116
119
117

Fig. 3

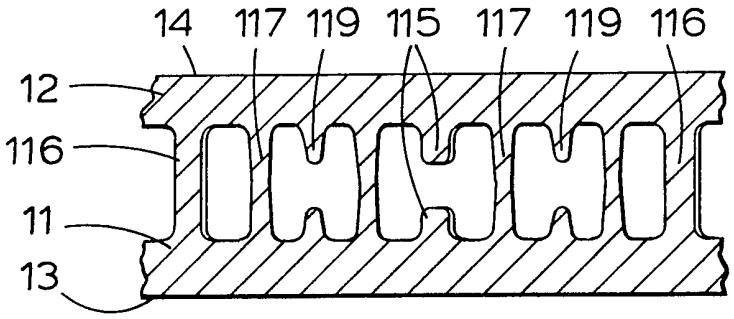

14
117
119
115
117
119
116
12
116
11
13

Fig. 4

SPECIFICATION

A disc for a disc brake

This invention relates to a disc for a disc brake. Those discs of disc brakes that are utilised in the braking systems of heavy vehicles, or of vehicles which necessarily travel at sustained high speeds, must sometimes dissipate very large amounts of heat during the braking of such vehicles. This is because the high kinetic energy of the vehicle is transformed into heat energy during braking.

It is desirable to remove the heat from the disc as quickly as possible. This is because the vehicle brake friction pads are typically an organic resin bound asbestos compound and if the discs become over heated then this can cause the rapid breakdown of the organic resin binder and hence rapid wear of the brake pads. Also the heat can be conducted to the brake calipers and the wheel hub.

In order to remove heat rapidly it is known to form passages in the brake disc for the through flow of cooling air. A typical prior art disc comprises two co-axial annular parts having opposed back faces which are spaced apart by helical or radial vanes, and the cooling air flows through the disc between the vanes. It has been found that this construction of disc whilst giving an improved capability of heat dissipation over a solid disc, does not have sufficient capability for removing large amounts of heat energy in extreme circumstances, e.g. when used in the brakes of racing cars, and heavy commercial vehicles.

The object of the present invention is to provide a disc brake which alleviates the above problem.

Accordingly, there is provided a disc for a disc brake comprising two spaced apart co-axial annular parts, the opposed back faces of which are interconnected by cross-members wherein each of the opposed back faces has thereon an array of spaced axially projecting knobs extending towards but not contacting the other of the two back faces.

Preferably the cross members include vanes extending across the annular part between the back faces, and the knobs are arranged in groups between pairs of adjacent vanes.

Alternatively the cross members may be pillars extending between the two back faces, or the pillars may be utilised together with the vanes, and the pillars may be randomly mixed amongst the groups of knobs located between adjacent vanes.

The invention will be described by way of example and with reference to the accompanying drawings in which:—

Figure 1 shows a sector of a brake disc with a portion of one annular part removed;

Figure 2 shows a portion of the outer periphery of the disc as viewed in the direction of arrow X;

Figure 3 shows a sector of a modified brake disc with a portion of one annular part removed; and

Figure 4 is a section through the line III–III.

With reference to Fig. 1 and Fig. 2, a brake disc for a motor vehicle disc comprises two spaced apart co-axial annular parts 11 and 12 having opposed back faces 13 and 14 respectively. The one annular part 12 has a radially inwardly projecting portion 15 which is utilised for fitting the disc to a hub (not shown).

The back faces 13 and 14 of the two annular parts are interconnected by cross members which are in the form of both substantially radial vanes 16 and pillars 17. There are eighteen vanes 16 equiangularly spaced around the disc and the pillars 17 are located in the spaces between adjacent pairs of vanes.

Each of the opposed back faces 13 or 14, has an array of spaced axially projecting knobs 19 thereon, that extend towards and are aligned with oppositely extending knobs 19′ on the other of the two back faces. The aligned knobs 19 do not contact each other and there is a sufficient gap therebetween for air flow over the top surface. The knobs 19 are in the form of cones having spherical or rounded off ends, and the array of knobs 19 which extend from each of the two back faces is divided into separate groups located between adjacent vanes 16.

The pillars 17 are in the form of two aligned conical knobs 19 which are extended to be joined together, and these pillars, are unevenly distributed in amongst the knobs 19 and 19′ of each group.

The intermixed pillars 17 and knobs 19 are arranged in bands, each band being located on a circular path. There are eight bands running across the radial width of the brake disc and one of the middle bands 'B' comprises solely pillars 17. This increases the numerical density of pillars in the middle of the disc. The distribution of pillars and knobs in the bands is such that their total numerical density increases radially outwardly from the inner periphery of the disc. The pillars and knobs are arranged so that they also form bands across the radial width of the disc. Each radial band being in the formation of one of the vanes 16.

Between each pair of adjacent vanes 16 the number of pillars 17 projecting from each back surface is approximately one and one half times the number of knobs 19 projecting from that surface, i.e. there are seventeen pillars and eleven knobs projecting from each surface, this making a total of seventeen pillars and twenty-two knobs 19 in each group.

In some brake disc applications it may be necessary for one annular part of the disc to be cooler than the other of the two annular parts. In such applications the number of knobs extending from one back face may be

different to the number of knobs extending from the other face depending upon the temperature requirements of the respective annular parts.

Whilst the brake disc which has been described has two arrays of aligned but spaced apart knobs, it is envisaged that the knobs on oen back face could be interdigited with the knobs of the other back face.

The brake disc shown in Fig. 3 and Fig. 4 has two annular parts 11 and 12 interconnected by twelve equispaced helical vanes 116, between each adjacent pair of which are located a pair of aligned spaced ribs 115 projecting one from each back face of the parts 11 and 12. The vanes 116 and spaced ribs 115 divide the disc into twenty four sectors, each containing pillars 117 and knobs 119. There are twelve full pillars 117 and seven knobs 119 extending from each back face making a total of twelve pillars and fourteen knobs in each sector. The knobs and pillars are arranged on ten circumferential bands across the radial width of the disc there being one band as previously described for Fig. 1 and 2, that comprises only pillars.

CLAIMS

1. A disc for a disc brake comprising two spaced apart co-axial annular parts the opposed back faces of which are interconnected by cross members, wherein each of the opposed back faces has thereon an array of spaced axially projecting knobs extending towards but not contacting the other of the two back faces.

2. A disc as claimed in Claim 1, in which the cross members include vanes extending across the annular between the back faces and the knobs are arranged in groups between the vanes.

3. A disc as claimed in Claim 2, wherein ribs are provided between the vanes and arranged as axially opposed and spaced pairs of ribs projecting one from each respective back face of the annular parts.

4. A disc as claimed in any one of Claims 1 to 3, wherein each of the knobs is a cone.

5. A disc as claimed in Claim 4, wherein the top of each cone is rounded off into a substantially spherical shape.

6. A disc as claimed in any one of Claims 1 to 5, wherein knobs on each back face are axially aligned with and extend towards but are spaced from knobs on the other back face.

7. A disc as claimed in any one of Claims 1 to 6, wherein the cross members include pillars that extend between the two back faces.

8. A disc as claimed in Claim 7, wherein the pillars are unevenly distributed amongst groups of knobs.

9. A disc as claimed in Claim 8, wherein the pillars are in the form of two aligned conical knobs joined together by their apices.

10. A disc as claimed in Claim 8 or 9, wherein the pillars and knobs are arranged in arcular bands.

11. A disc as claimed in one of Claims 8, 9 or 10, wherein the numerical density of the pillars and knobs increases radially outwards from the radially inner periphery of the disc.

12. A disc as claimed in any one of Claims 8 to 11, wherein in each group of pillars and knobs there are approximately one and one half times as many pillars as knobs originating on each of said opposed back faces.

13. A disc as claimed in any one of Claims 7 to 11, wherein the pillars and knobs are aligned across the radial width of the disc so as to take up the formation of a vane.

14. A disc as claimed in any preceeding claim, wherein the number of knobs projecting from one back face is greater than the number of knobs projecting from the other of the opposed back faces.

15. A disc for a disc brake substantially as described herein and as illustrated in Fig. 1 and Fig. 2 of the accompanying drawings.

16. A disc for a disc brake and which is substantially as described herein and as illustrated in Fig. 3 and Fig. 4 of the accompanying drawings.

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