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(54) A disc for a disc brake

(57) The disc comprises two spaced-apart annular parts having opposed back faces interconnected by substantially radial (as shown helical) vanes (17). An array of axially projecting knobs (16, 19) extends from each back face towards the other back face the knobs being arranged in groups between the vanes and in each group there are adjacent knobs having different lengths, to provide a tortuous flow path for cooling air. As shown, each short knob (19) is aligned with opposite a longer knob (16), although the knobs may be interdigitated. Each group of knobs may be arranged in formation of two helical vanes.

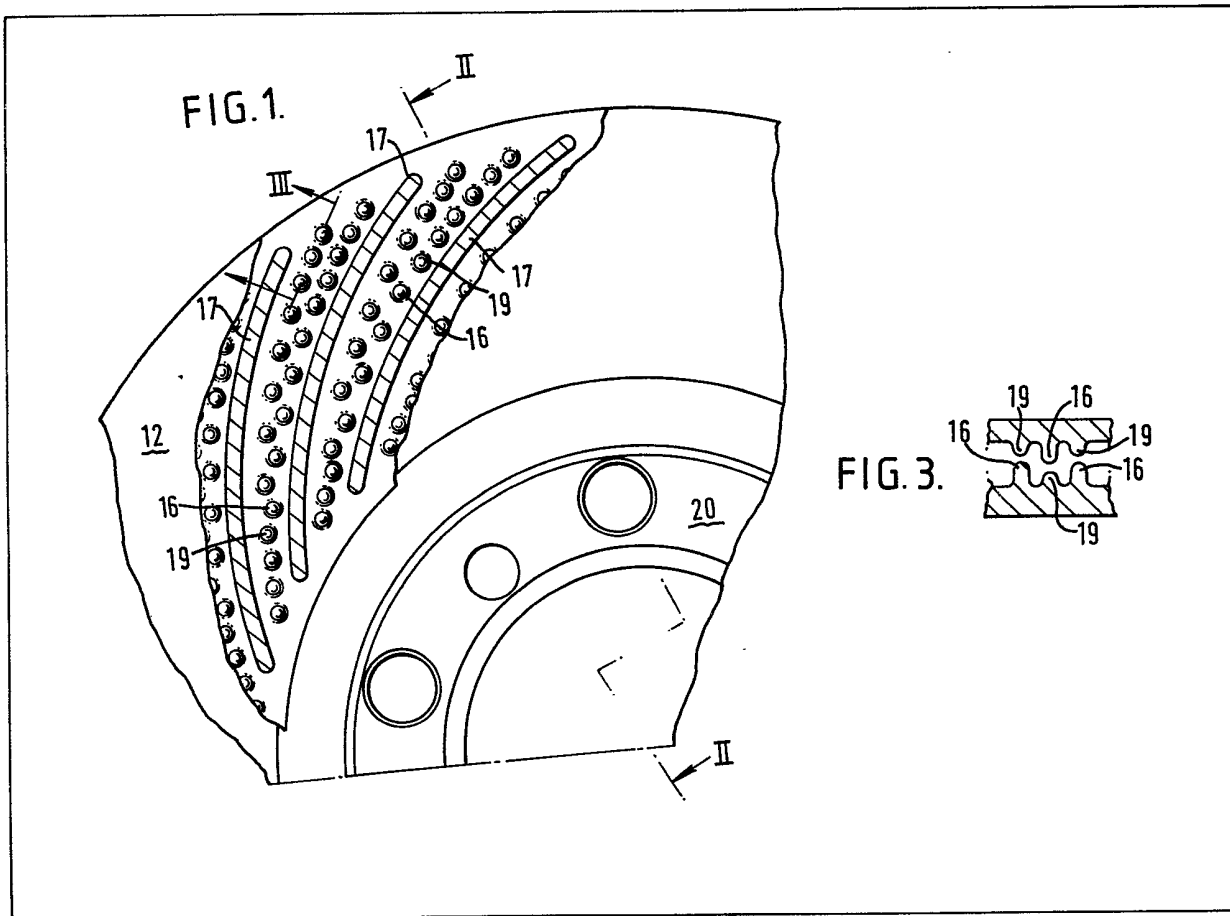


FIG. 1.

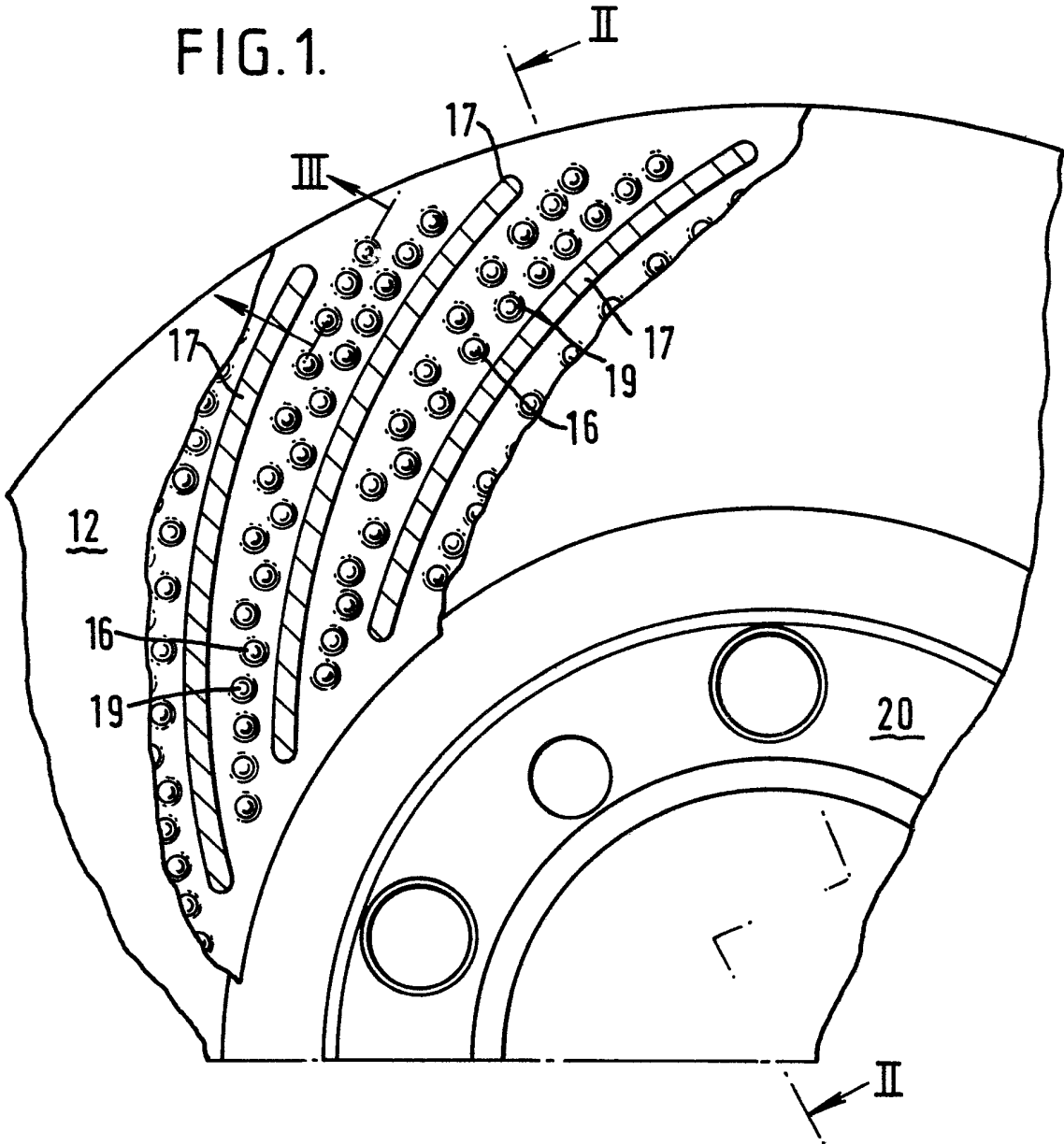
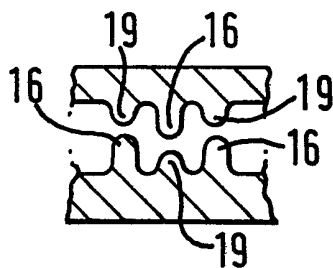


FIG. 3.



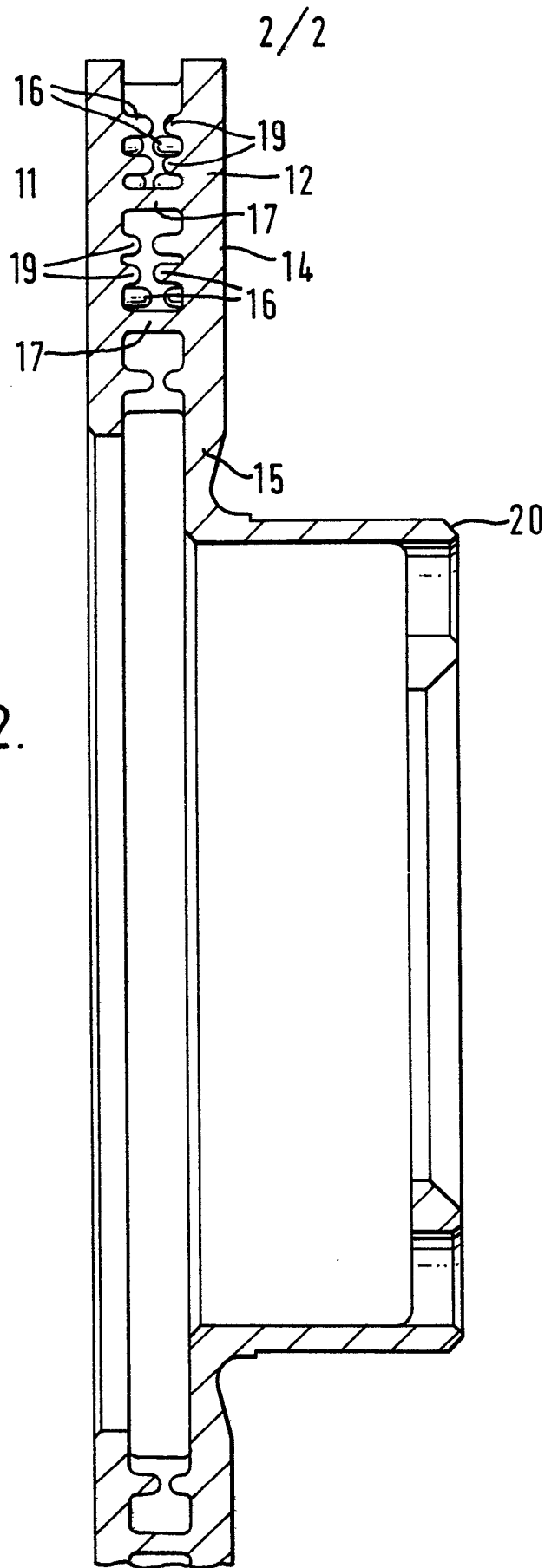


FIG. 2.

## SPECIFICATION

**A disc for a disc brake**

5 This invention relates to a disc for a disc brake. With discs of disc brakes used in the braking systems of some vehicles, it is sometimes necessary to 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.

10 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 break down of the organic resin binder and hence rapid wear of the brake pads.

15 In our co-pending application no. 2 060 796 we have described a brake disc, for a racing car, and which comprises two spaced apart co-axial annular parts having opposed back faces which are interconnected by helical or radial vanes, and the opposed back faces of the parts, each has an array of axially extending knobs thereon that are arranged in groups between the vanes.

20 The knobs extend from one back face towards, but do not contact the opposed back face on the other part. Several different arrangement of the knobs are described for example, the knobs on one part can be axially aligned with the knobs on the other part, or the knobs on one part can be interdigitated with the knobs on the other part.

25 It has been found that for low speed vehicles the air flow through the disc is insufficient for efficient cooling of the disc.

30 The object of the present invention is to provide an arrangement of knobs within the vanes which provides for more efficient cooling for low speed vehicles ie. road vehicles as opposed to racing cars.

35 Accordingly there is provided a disc for a disc brake comprising two spaced apart co-axial annular parts having opposed back faces which are interconnected by vanes extending substantially radially across the disc and each of said back faces has thereon an array of axially projecting knobs which extend towards but do not contact the other of the two back faces and which are arranged in groups between the vanes characterised in that in each group there are adjacent knobs having different lengths.

40 Conveniently the knobs are in the form of shorter knobs of equal lengths, and longer knobs of equal lengths.

45 The effect of having long and short knobs is to provide a tortuous flow path for the cooling air through the disc is particularly so for the preferred embodiment of the invention in which, the knobs on one face are axially aligned with and extend towards the knobs on the other face there being a gap therebetween such that a longer knob on one face extends towards a shorter knob on the other face.

The term 'substantially radial' is intended to embrace 'helical vanes' as shown in Fig. 1 of the drawings.

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

70 Fig. 1 shows a sector of a brake disc with a portion of one annular part removed to show the vanes and knobs;

Fig. 2 shows a section on the line II-II of Fig. 1; and Fig. 3 is a section on the line III-III of Fig. 1.

75 With reference to Figs. 1 to 3, a cast iron brake disc for a motor vehicle disc brake 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 integral with a central portion 20 for fitting the disc to a wheel hub (not shown).

80 The back faces 13 and 14 of the two annular parts are interconnected by cross members which are in the form of substantially radial vanes 17, which extend in a helical formation across the disc. The helical formation is the most efficient for pumping cooling air through the disc and the circumferential overlap between adjacent vanes 16 helps to reduce crack propagation across the disc. There are twenty four vanes 17 equiangularly spaced around the disc.

85 Each of the opposed back faces 13 and 14, has an array of spaced axially projecting knobs 16 and 19 thereon. The knobs 16 are longer than the knobs 19 and are arranged so that the knobs 16 and 19 on one of the back faces 13 or 14 extend towards, and are aligned with, the oppositely extending knobs 16 and 19 on the other of the two back faces. The arrangement being that each short knob 19 on one face is aligned opposite a longer knob 16 on the other face (Fig. 3). The aligned knobs 16 and 19 do not contact each other and there is a sufficient gap therebetween for air flow over the top surface.

90 The knobs 16 and 19 are in the form of cones having spherical or rounded off ends, and the array of knobs which extend from each of the two back faces is divided into separate groups located between adjacent vanes 16. Each group of knobs consists of twelve longer knobs 16 and ten shorter knobs 19 which are arranged in a formation of two helical vanes which intersect at the radially inner margin of the disc. In each vane formation the knobs 16 and 19 are arranged, as far as is practical to alternate radially across the disc so that any air flowing between the vanes will have to take a tortuous flow path over the knobs. This results in turbulent air flow within the disc which produces more efficient cooling.

95 Whilst the disc has been described as having the shorter and longer knobs on one annular part being aligned opposite the other of said knobs on the other part, it is possible that the short and longer knobs on the one part could be interdigitated with the shorter and longer knobs on the other part.

## CLAIMS

1. A disc for a disc brake comprising two spaced

- apart co-axial annular parts having opposed back faces which are interconnected by vanes extending substantially radially across the disc and each of said back faces has thereon an array of axially projecting
- 5 knobs which extend towards but do not contact the other of the two back faces and which are arranged in groups between the vanes characterised in that in each group there are adjacent knobs having different lengths.
- 10 2. A disc as claimed in Claim 1, characterised in that each group of knobs comprises a plurality of shorter knobs of equal lengths intermixed with a plurality of longer knobs of equal lengths.
- 15 3. A disc as claimed in Claim 2, characterised in that the knobs on one face are axially aligned with and extend towards the knobs on the other face there being a gap therebetween such that a longer knob on one face extends towards a shorter knob on the other face.
- 20 4. A disc as claimed in in anyone of Claims 1 to 3, characterised in that the knobs in each group are arranged in a formation of two helical vanes that intersect at the radially inner margin of the disc.
- 25 5. A disc as claimed in Claim 4, when dependent upon Claim 2 or 3, characterised in that the knobs are arranged to alternate shorter knobs with longer knobs radially across each vane formation.
6. A brake disc substantially as described herein and as illustrated in the accompanying drawings.