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(54) **A brake disc for a vehicle disc brake**

(57) The disc carries at its radially inner periphery a retaining flange 5 split up into flange portions 10 by radial recesses 9. The retaining flange 5 serves to mount the brake disc on a hub via a pair of axially spaced and parallel conical surfaces 7, 8 which engage corresponding surfaces of the hub. The flange portions 10 are provided with axial holes 11 to form structures which are flexibly distortable in a peripheral direction in the area of their connection to the annular body 2, so that differential thermal expansion between the annular body 2 and the retaining flange 5 can be absorbed by flexible distortion of the flange portion 10, without causing unduly high inner stresses in the brake ring.

It is possible to reinforce the flange portion 10 with axial reinforcement ribs 12 without noticeably influencing their flexibility, which serves to further absorb differential thermal expansions.

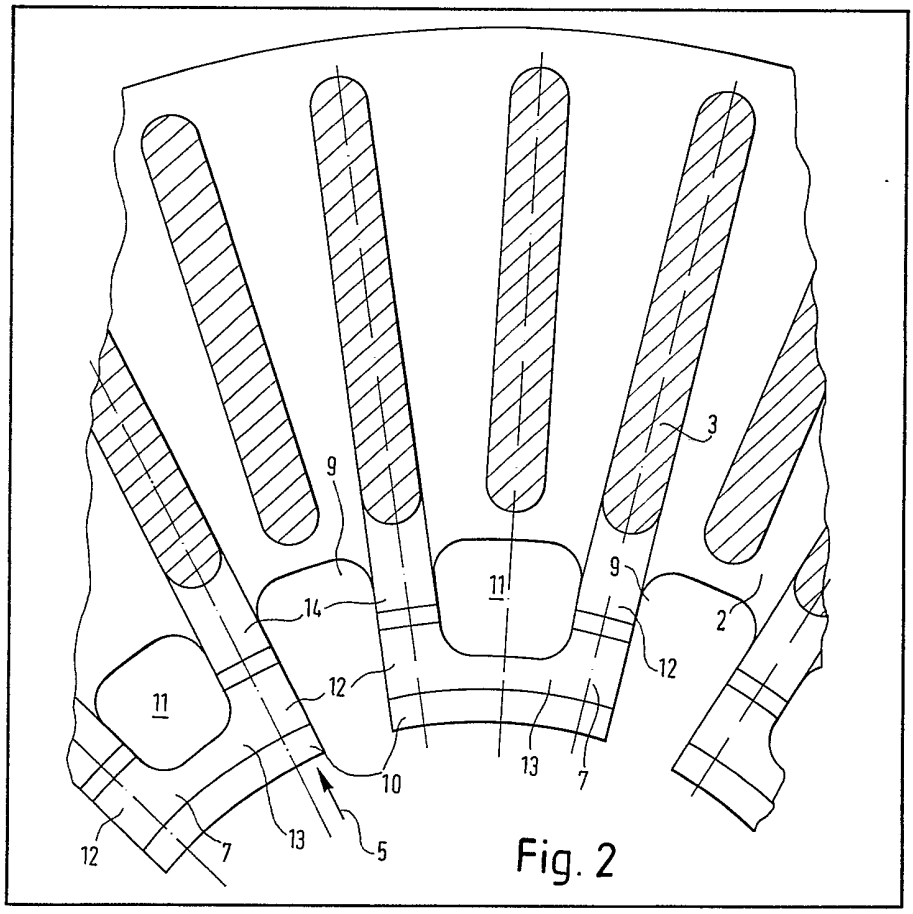

Fig. 2

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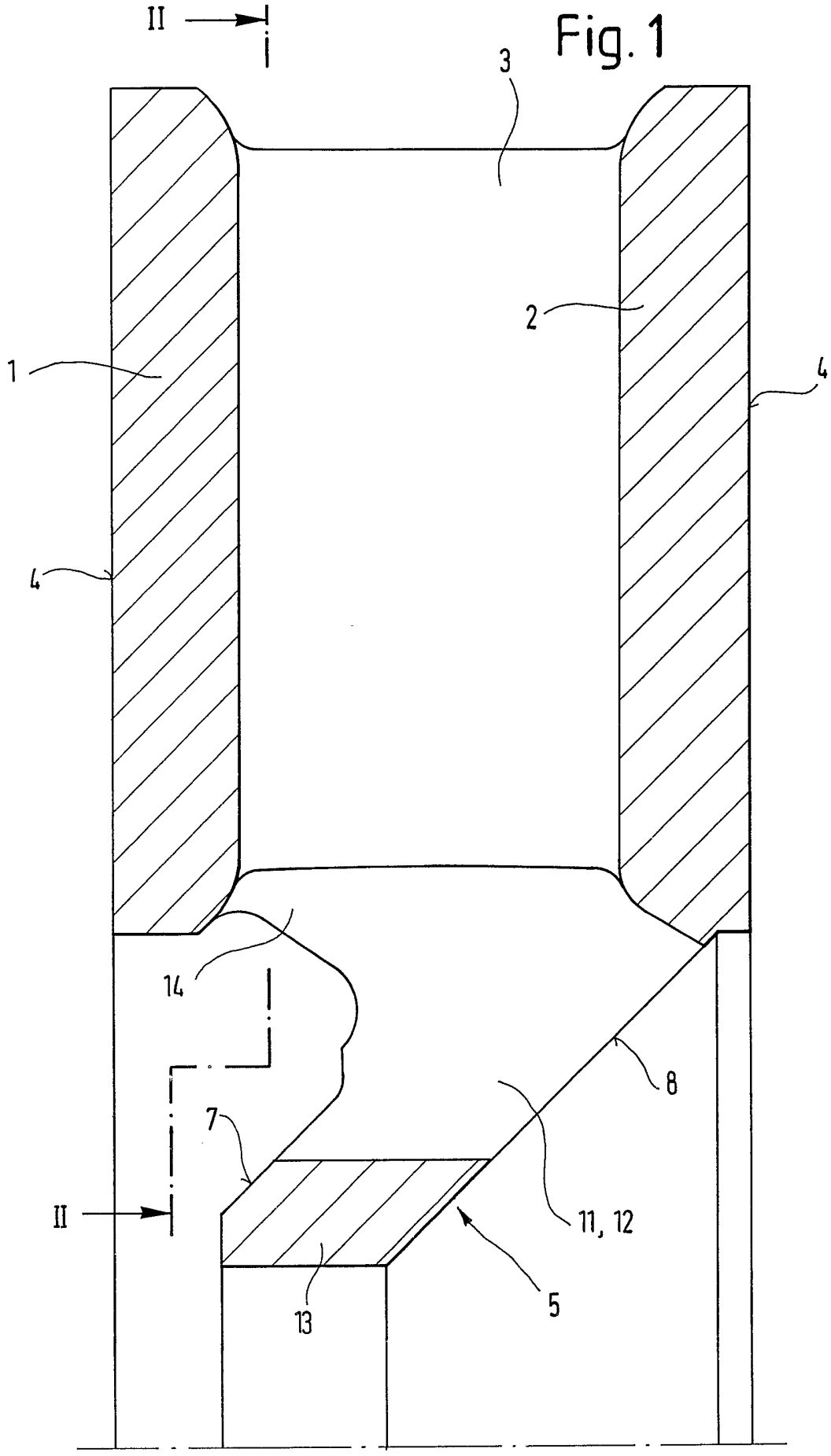
Fig. 1



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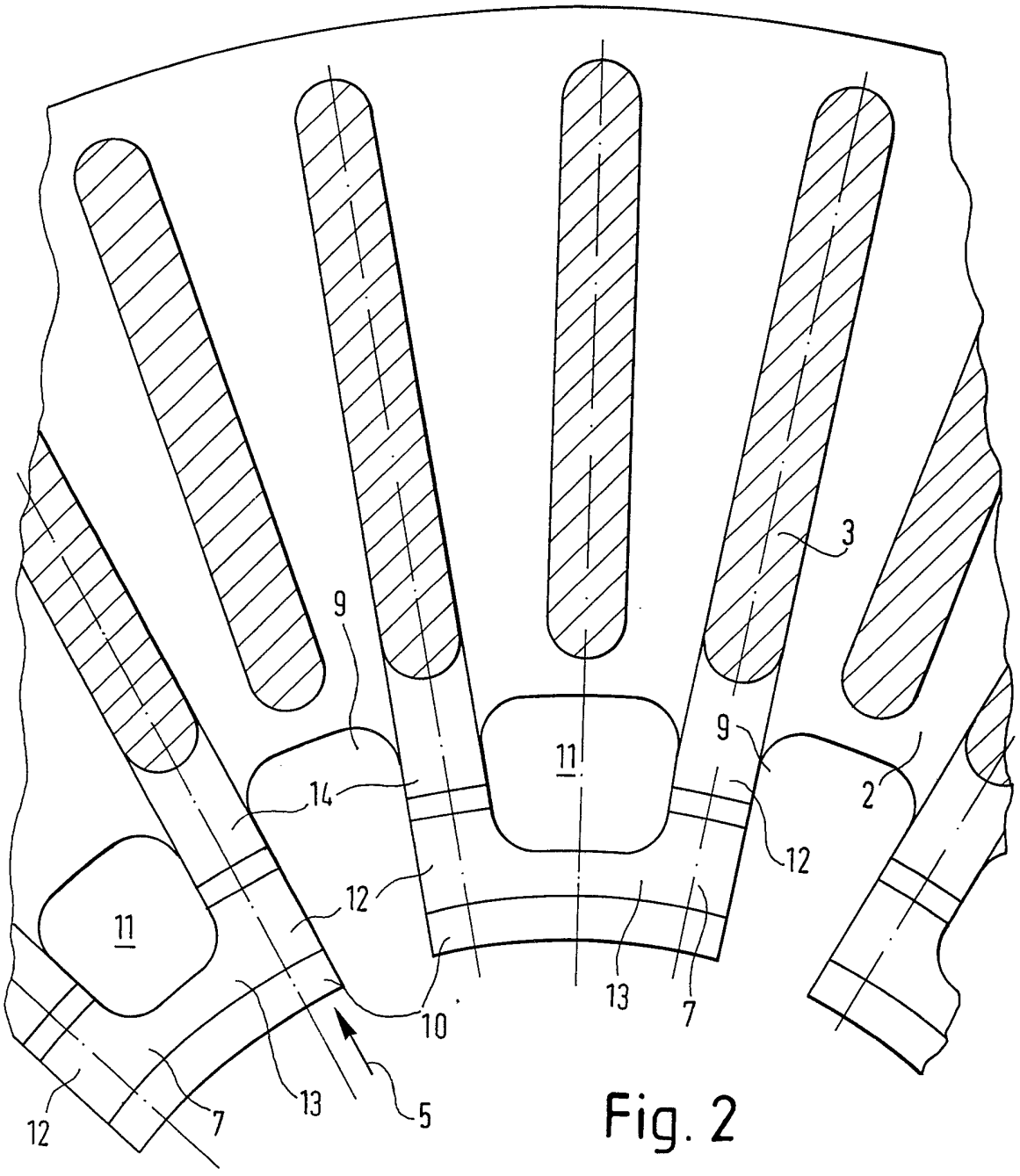

Fig. 2

SPECIFICATION

Brake ring for brake disc

This invention relates to a brake ring for a brake disc of, for example, rolling stock, the brake ring having a retaining flange situated at its radially inner periphery and divided into a plurality of circumferentially spaced ring portions, the flange having axially spaced and parallel conical surfaces which are engageable with corresponding surfaces of a hub in order to mount the brake ring thereon.

A brake ring of this type is known from DE-OS-28 28 101. The annular retaining flange in this case is divided up into individual flange sections by slots running in a radial direction to relieve tensions in the event of thermal expansions. The slots are of a relatively small design, and the flange sections extending in a peripheral direction over a considerable angle range are relatively rigid, remain relatively cool when braking occurs, and thus still bring about considerable inner stresses in the brake ring when it is subjected to differential thermal expansions.

The present invention has been developed primarily with a view to provide a brake ring of the above type in a simple manner, so that even when temperature gradients occur in the brake ring, internal stresses in the brake ring caused by its thermal expansions are minimised.

According to the invention there is provided a brake ring for a brake disc having, at its radially inner periphery, a retaining ring which serves to mount the brake ring on a hub, said retaining ring being split into a plurality of circumferentially spaced retaining ring portions, and said retaining ring having axially spaced and parallel conical surfaces which are engageable with corresponding surfaces of the hub in order to mount the brake ring thereon:

in which each of said retaining ring portions has an axially extending hole formed therethrough.

As a result of the holes formed in the flange portions, there remain of the portions only the edge sections, which are preferably of a generally quadrilateral shape, whereby the flange portions are flexibly distortable to a large extent even with low stresses; the flange portions thus represent flexibly distortable quadrilaterals, which prevent the occurrence of high inner stresses by virtue of their flexible distortion.

Preferably, the flange portions comprise reinforcement ribs on their peripheral limits, which are reinforced radially outwards by a gain in strength only in an axial direction, so that a strengthened retention of the brake ring is possible without a corresponding increase in the inner stresses occurring in the event of thermal expansions. In an embodiment of brake ring having two annular bodies in adjacent spaced arrangement and connected to each other by ventilation ribs or bolts, it can be advantageous if the reinforcement ribs are set radially inwards onto the ventilation ribs or bolts and extend these radially inwards.

One embodiment of brake ring according to the invention will now be described in detail, by way of example only, with reference to the accompanying drawing in which:-

Figure 1 is an axial sectional view of the brake ring; and

Figure 2 is a section taken along the line II-II in Figure 1.

Referring now to the drawing, there is shown a brake ring for a rail vehicle disc brake. The brake ring comprises two annular bodies 1 and 2, which are in adjacent spaced arrangement and are connected to each other by radially extending ventilation ribs 3. Brake shoes (not shown) of a disc brake can be pressed against the outer friction surfaces 4 (facing away from each other) of the annular bodies 1 and 2. Starting roughly from the annular body 2, the brake ring comprises at its radially inner periphery a retaining flange 5, which projects obliquely and radially inwards and carries on both sides parallel conical surfaces 7 and 8. Corresponding opposite conical surfaces of a hub (not shown) can be pressed against the conical surfaces 7 and 8, whereby the brake ring is connected to the hub, taken along by it when it rotates and held in a centered position. The retaining flange 5 is divided into circumferentially spaced flange portions 10 by radial recesses 9 arranged in even distribution over the periphery.

Each flange portion 10 has formed therethrough, seen in an axial direction approximately in the centre, a perforation 11, in such a way that there remains a quadrilateral arrangement of limbs including two stays 12 projecting obliquely and radially inwards and, at the radially inner end, an arcuate connecting section 13. Seen in an axial direction, the stays 12 and the connecting section 13 have approximately the same width. The stays 12 are provided with reinforcement ribs 14, or else form one piece with these reinforcement ribs 14; the reinforcement ribs 14 start in the vicinity of the connecting sections 13, extend only in an axial direction from the stays 12 and expand radially outwards in such a way that they reach the radially inner edge of the annular body 1 and pass over into this. The reinforcement ribs 14 pass between the two annular bodies 1 and 2 with their radially outer edge and pass across into the radially inner limit of the ventilation ribs 13. The reinforement ribs 14 strengthen the stays 12 therefore in axial and radial directions, whilst particularly through the flexibility of the connecting sections, the flange portions 10 are flexibly distortable in a peripheral direction in the area of their connection to the annular body 2. If, during braking, the annular bodies 1 and 2 and the ventilation ribs 3 experience greater heating and therefore thermal expansion than the retaining flange 5, the flange portions 10 can adapt to the greater thermal expansion of the annular bodies 1 and 2 by flexible distortion without any unduly high inner stresses; the different thermal expansions thus cause no danger to the brake ring of breaking or tearing.

Turning away from the described embodiment, the splitting-up of the retaining flange into flange portions comprising recesses is also possible for brake rings having only one annular body or for brake rings having two annular bodies, but spaced apart, for example, by ventilation ribs or individual

bolts, as known from DE-OS-25 05 205. Even with this type of brake ring, the flexibility of the flange portions effected by the recesses guarantees that they can be adapted to different thermal expansions of the annular body or bodies without causing high inner stresses.

CLAIMS

1. A brake ring for a brake disc having, at its radially inner periphery, a retaining ring which serves to mount the brake ring on a hub, said retaining ring being split into a plurality of circumferentially spaced retaining ring portions, and said retaining ring having axially spaced and parallel conical surfaces which are engageable with corresponding surfaces of the hub in order to mount the brake ring thereon:

in which each of said retaining ring portions has an axially extending hole formed therethrough.

2. A brake ring according to claim 1, in which each retaining ring portion has reinforcement ribs arranged to impart strength to the portion both axially and radially.

3. A brake ring according to claim 2, in which the reinforcement ribs are arranged at the peripheral limits of each retaining ring portion in such a way that the ribs reinforce the ring portion radially outwards by a gain in strength only in an axial direction.

4. A brake ring according to claim 2 or 3, having two annular friction bodies which are spaced apart by ventilation ribs or bolts and which form opposed friction faces of the brake ring, in which the reinforcement ribs are arranged so as to extend radially inwardly from the radially inner peripheries of the ventilation ribs or the bolts.

5. A brake ring according to any one of the preceding claims, in which the hole in each retaining ring portion is defined by four quadrilateral limbs of the ring portion, one pair of said limbs extending radially and the other pair each extending generally arcuately.

6. A brake ring according to claim 1 and substantially as hereinbefore described with reference to, and as shown in the accompanying drawing.

7. A brake disc for rolling stock having a brake ring according to any one of the preceding claims.

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