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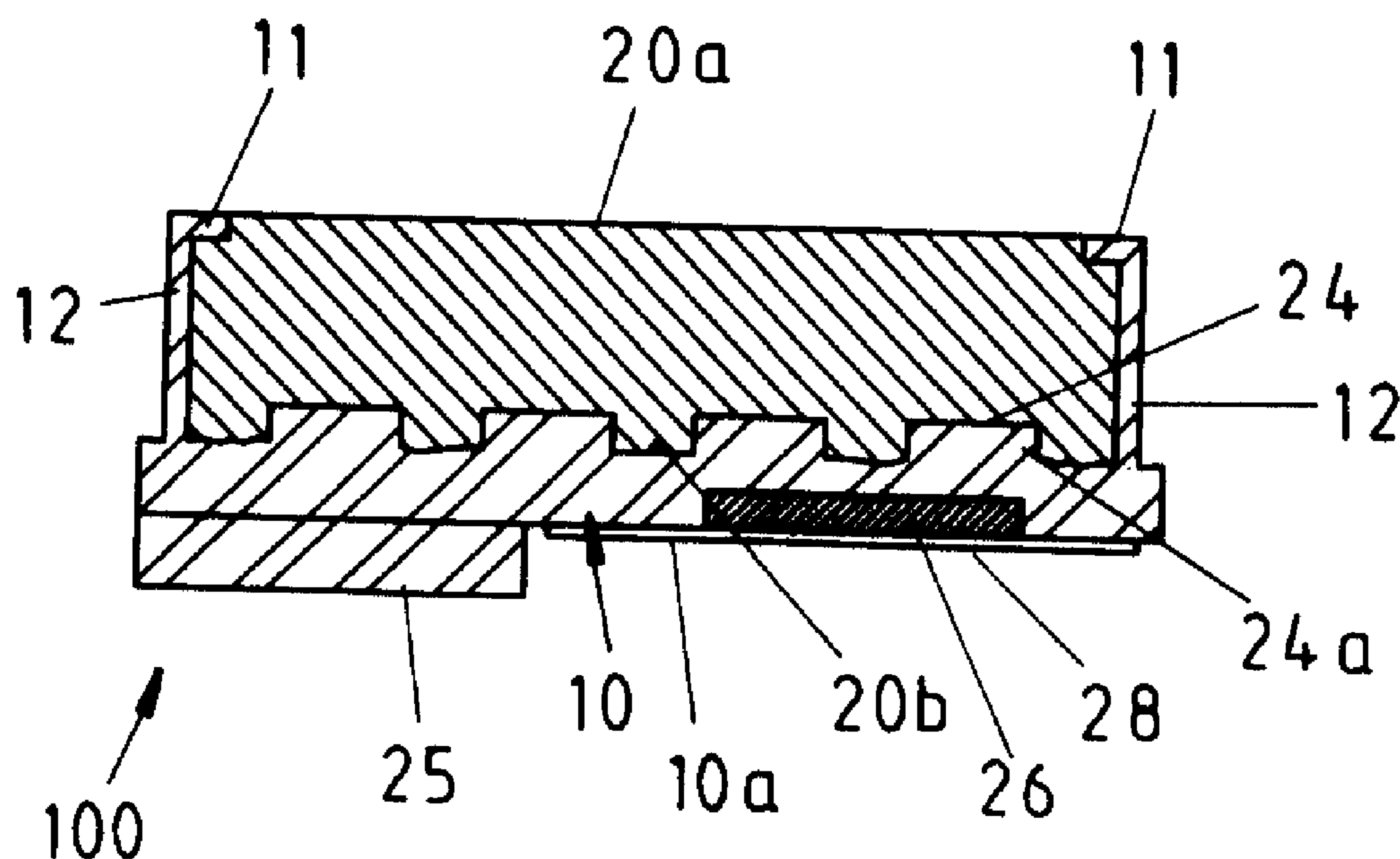
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(54) **GARNITURE DE FREIN POUR FREINS A DISQUE**

(54) **BRAKE LINING FOR DISC BRAKES**



(57) A brake lining for disk brakes, in particular for road and rail vehicles, comprises a carrier plate and a friction material block made from a compressed friction material. The carrier plate is fabricated from a hard amorphous plastic rigid up to its decomposition temperature, for example a polymer comprising spatially close meshed interlaced macromolecules with a high mechanical strength, such as the type known as duroplastics. The material of the carrier plate encases at least three side walls of the friction block and also overlaps the edges of the friction block. During manufacture of the brake lining, the duroplastic material of the carrier melts into the surfaces of the friction block bonding the two of them together.

ABSTRACT OF THE DISCLOSURE

A brake lining for disk brakes, in particular for road and rail vehicles, comprises a carrier plate and a friction material block made from a compressed friction material. The carrier plate is fabricated from a hard amorphous plastic rigid up to its decomposition temperature, for example a polymer comprising spatially close meshed interlaced macromolecules with a high mechanical strength, such as the type known as duroplastics. The material of the carrier plate encases at least three side walls of the friction block and also overlaps the edges of the friction block. During manufacture of the brake lining, the duroplastic material of the carrier melts into the surfaces of the friction block bonding the two of them together.

BRAKE LINING FOR DISC BRAKES

This invention relates to a brake lining for disk brakes, for example for disc brakes used on road vehicles and in railroad rolling stock. A wide number of types of brake linings for disk brakes are known. However, one feature that is common to all these brake linings is that a block made of friction material is attached to a metallic carrier plate. Since the carrier plates are made of metallic materials, they are relatively heavy and have a high thermal conductivity.

This invention seeks to provide a brake lining of this general type, in which the carrier plate has a low weight, a high mechanical strength, and a low heat conductivity. The material of the carrier plate is also integrated to some extent into the surfaces of the friction block during the manufacture of the brake lining.

Accordingly, this invention seeks to provide a brake lining for a disk brake comprising a carrier plate and a block of compressed friction material attached thereto, wherein:

(i) the carrier plate is made of a hard amorphous plastic material with a high mechanical strength which is substantially rigid up to its decomposition temperature and which comprises spatially close meshed interlaced macromolecules;

(ii) the carrier plate includes a base and side walls for retaining the block of friction material;

(iii) the material of at least the side walls of the carrier plate is fused into at least a portion of the side surfaces of the friction material block; and

(iv) the side walls of the carrier plate overlap at least a portion of the outer edges of the side surfaces of the friction material block.

Preferably the carrier plate is made from a polymer of the type known as duroplastics. The material of the carrier plate penetrates into the surface of the block of friction material during manufacture of the brake lining, at least on the side surfaces of the block. Preferably, the material of the carrier plate also penetrates into the bottom surface of the block of friction material. Most preferably, the carrier plate is so shaped that it overlaps the outer edges of the side walls of the block of friction material, so that the material of the carrier plate is more or less welded to or fused into the surface of the block of friction material, so that the block of friction material is integrated into the carrier plate.

Surprisingly it has been discovered that the type of polymers known as duroplastics are particularly suitable as carrier plate material because of their high strength. In addition, a carrier fabricated from a duroplastic has a relatively low weight and the duroplastic has a relatively low thermal conductivity.

In the brake pad of this invention, it is particularly advantageous that during the manufacturing process, for example during an injection moulding process, the polymer material of the carrying plate penetrates into the surface of the block of friction material, especially into its side wall areas. The carrier thus becomes more or less welded to the block of friction material so that it is securely held on the carrier plate, and to a degree is integrated into the carrier plate.

Preferably, the block of friction material has slots, grooves, flutes or recesses on its side walls and inner face for receiving the material of the carrier plate.

One embodiment of the invention will now be described with reference to the drawings in which:

Fig. 1 shows a top view of the brake lining made of a carrier plate and a friction material block, and

Fig. 2 shows an enlarged vertical section, essentially on the line II-II in Fig. 1, of an alternative embodiment.

Referring to Figs. 1 and 2, a brake lining 100 for disk brakes, especially for road vehicles and railway rolling stock, comprises, a block 20 made of a suitable friction material integrated into a carrier plate 10 made of a duroplastic. The cup shaped carrier plate 10 is fabricated by an injection moulding step. During the injection moulding process, the carrier plate 10 is formed around three of the side surfaces 21, 22 and 23, and in contact with the inner face 24, of the friction material block 20. The friction material block 20 is not fixed to the carrier plate 10 which is manufactured in a separate operating cycle. The friction material block is more or less encased when manufacturing the carrier plate 10 so that the carrier plate side walls 12 encase the three connected side walls 21, 22, 23 of the friction material block 20. The side walls 12 of the carrier plate 10 which encases the side walls 21, 22, 23 of the friction material block 20 can also include an inward facing portion 11 overlapping the outer edge of the outer surface 20a of the block of friction material. Further, during the injection moulding process, the hot duroplastic polymer to a degree penetrates at least the side surfaces 21, 22 and 23 of the block of friction

material so that it is more or less welded and integrated into the cup-shape of the carrier plate.

Phenolic plastics or aminoplastics preferably are used as the duroplastic for injection moulding the carrier plate 10, whereby raw materials or raw material mixtures interlacing through polyaddition or polymerisation such as epoxy resins and non plasticized resins and polyurethane systems can be used.

The inner face 20b of the block of friction material 20 can be provided with recesses 24 which are then filled with the material 24a of the carrier plate 10 during the injection moulding step. Thus the material of the carrier plate 10 also penetrates into the surface of the block of friction material 20 so that the inner surface 20b is also integrated into the material of the carrier plate.

As a measure for influencing the noise behaviour, i.e. for influencing the natural frequency of the whole component, comprising the block of friction material 20 and the carrier plate 10, the rear side 10a of the carrier plate 10 can be configured in a geometrically heterogeneous form, namely with inclinations, recesses, raised parts or indentations 25 etc. which can be made of the same material as, and integral with, the carrier plate 10. It is also possible to integrate materials with another density into the material of the carrier plate 10 or to provide inserts 26 in order to influence the noise behaviour.

Strengthening inserts 27a, for example of metal, can be placed into the carrier plate 10, to enhance the mechanical properties of the duroplastic material in the areas in which mechanical properties are particularly important, for example as

guiding surfaces 27a or to strengthen the area of the carrier 10 which is in contact with the brake piston. The inserts 27a can have any suitable geometry.

In order to ensure the mechanical decoupling between the brake lining/carrier plate and the brake piston, in particular during an operating cycle, a separating layer 28, for example made of an elastomer, can be applied directly onto the rear surface of the carrier plate. After having applied a suitable bonding agent, the elastomer is applied and is form-fitted onto the carrier plate 10, for example by injection moulding. The separating layer 28 can also be applied into the raised part 25 and into recesses on the rear side 10a of the carrier plate 10 (not shown).

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We Claim:

1. A brake lining for a disk brake comprising a carrier plate and a block of compressed friction material attached thereto, wherein:

(i) the carrier plate is made of a hard amorphous plastic material with a high mechanical strength which is substantially rigid up to its decomposition temperature and which comprises spatially close meshed interlaced macromolecules;

(ii) the carrier plate includes a base and side walls for retaining the block of friction material;

(iii) the material of at least the side walls of the carrier plate is fused into at least a portion of the side surfaces of the friction material block; and

(iv) the side walls of the carrier plate overlap at least a portion of the outer edges of the side surfaces of the friction material block.

2. A brake lining according to claim 1, wherein the carrier plate is injection moulded onto the block of friction material, and encases three of the side walls of the block of friction material.

3. A brake lining according to claims 1 or 2 wherein the material of the carrier plate penetrates into the surfaces of the block of friction material block.

4. A brake lining according to claims 1, 2 or 3 wherein the inner face of the block of friction material adjacent the carrier plate includes slots or recesses for receiving the material of the carrier plate.

5. A brake lining according to claims 1, 2 or 3 wherein the inner face of the block of friction material includes a profile chosen from at least one of slits, grooves or flutes for receiving the material of the carrier plate.
6. A brake lining according to claims 1, 2, 3, 4 or 5 wherein the rear side of the carrier plate includes recesses, or raised parts, or both raised parts and recesses.
7. A brake lining according to claims 1, 2, 3, 4, 5 or 6 wherein that the carrier plate includes at least one intermediate layer and/or an area with a density different from the density of the material of the carrier plate.
8. A brake lining according to claims 1, 2, 3, 4, 5, 6 or 7 wherein the carrier plate includes at least one strengthening insert.
9. A brake lining according to claims 1, 2, 3, 4, 5, 6, 7 or 8 wherein the rear side of the carrier plate is provided with a separating layer.

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Fig.1

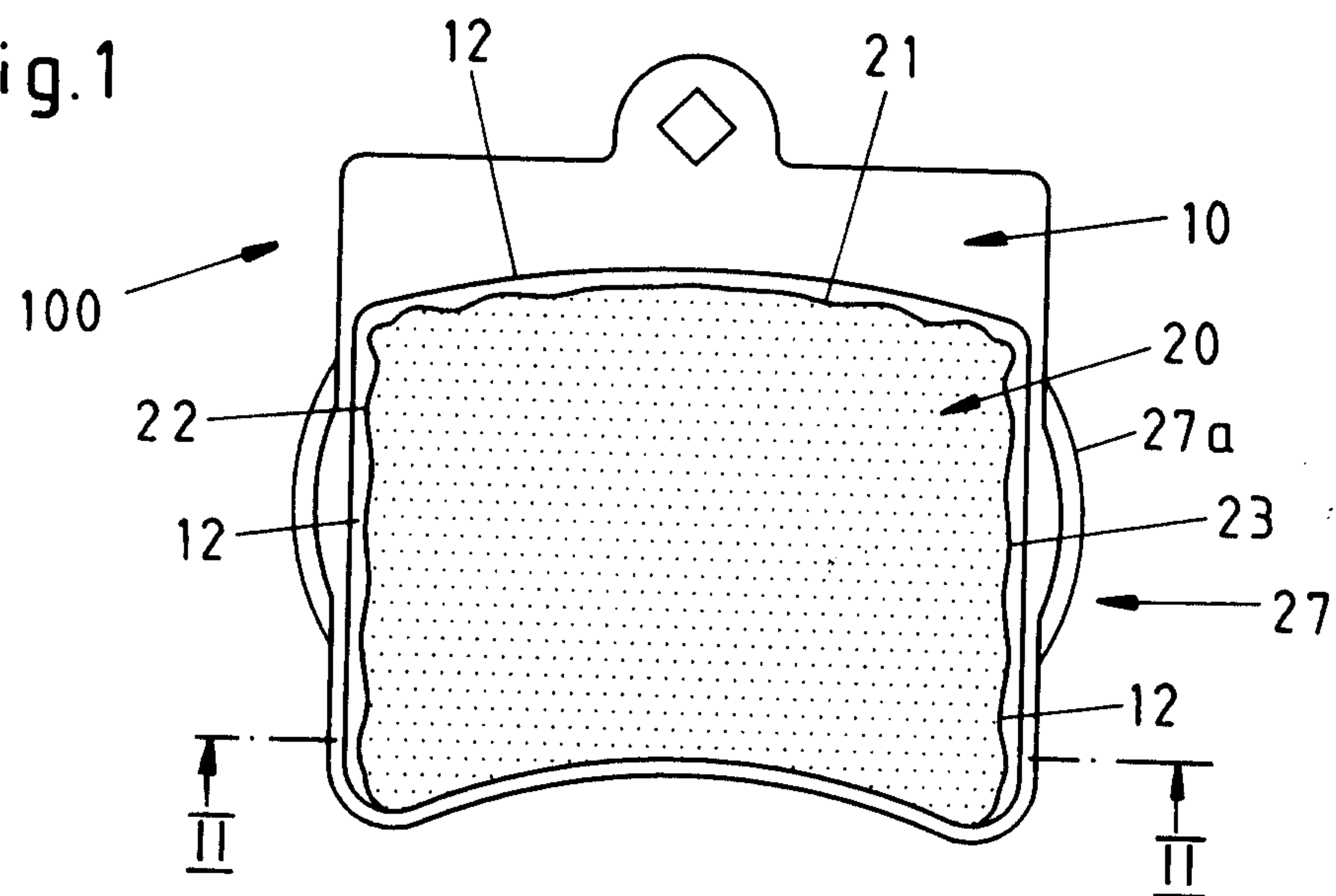


Fig. 2

