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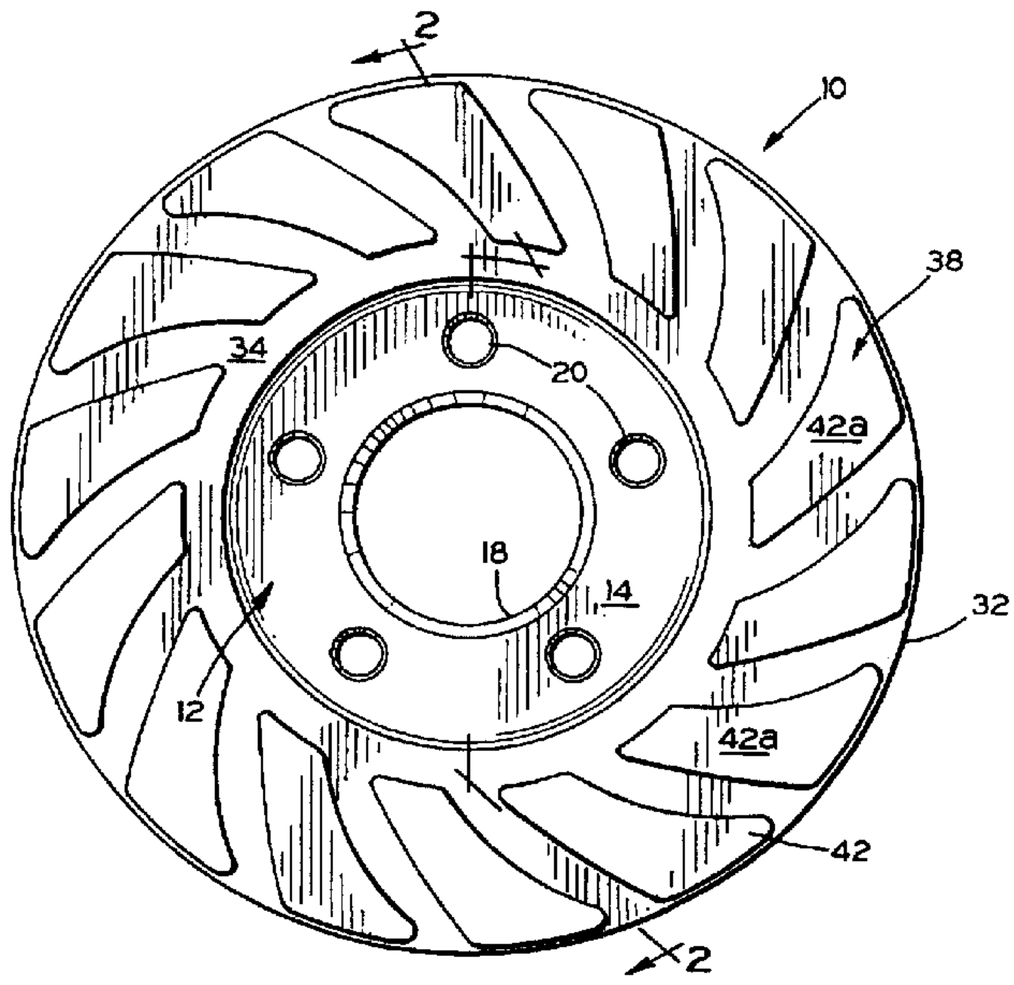
(54) **ROTOR MONOBLOC A AILETTES POUR FREINS A DISQUE A COMPAS ET ANALOGUES**

(54) **SOLID FINNED ROTOR FOR CALIPER DISC BRAKES AND THE LIKE**



(57) Cette invention se rapporte à un rotor (10) pour freins à disque à compas et analogues, qui comporte une partie externe à frottement comprenant une plaque de support annulaire (32) ayant une section de bague de frottement sur chacune de ses deux surfaces principales, chaque section étant conçue pour faire l'interface avec un élément de frottement associé, tel qu'un patin de frein. Chacune des sections de bague de frottement est constituée d'une pluralité d'ailettes (42, 44) distantes les unes des autres le long de la circonférence, de sorte que la pluralité des surfaces d'ailettes (42a) se combinent pour définir une surface de frottement annulaire, non continue, de part et d'autre de la plaque de support (32). Le rotor (10) de cette invention associe la solidité d'un rotor monobloc aux caractéristiques souhaitables de refroidissement accru d'un rotor ventilé.

(57) A rotor (10) for caliper disc brakes and the like has an outer friction portion including an annular support plate (32) having a friction ring section on both of the major surfaces thereof adapted to interface with an associated friction member, such as a brake pad. Each of the friction ring sections is formed of a plurality of circumferentially spaced apart fins (42, 44). Each of the fins, (42, 44) includes a substantially flat friction surface (42a), so that the plurality of such surfaces (42a) combine to define an annular, non-continuous friction surface on each face of the support plate (32). The rotor (10) of the invention combines the strength of a solid rotor with the desirable increased cooling characteristics of a vented rotor.

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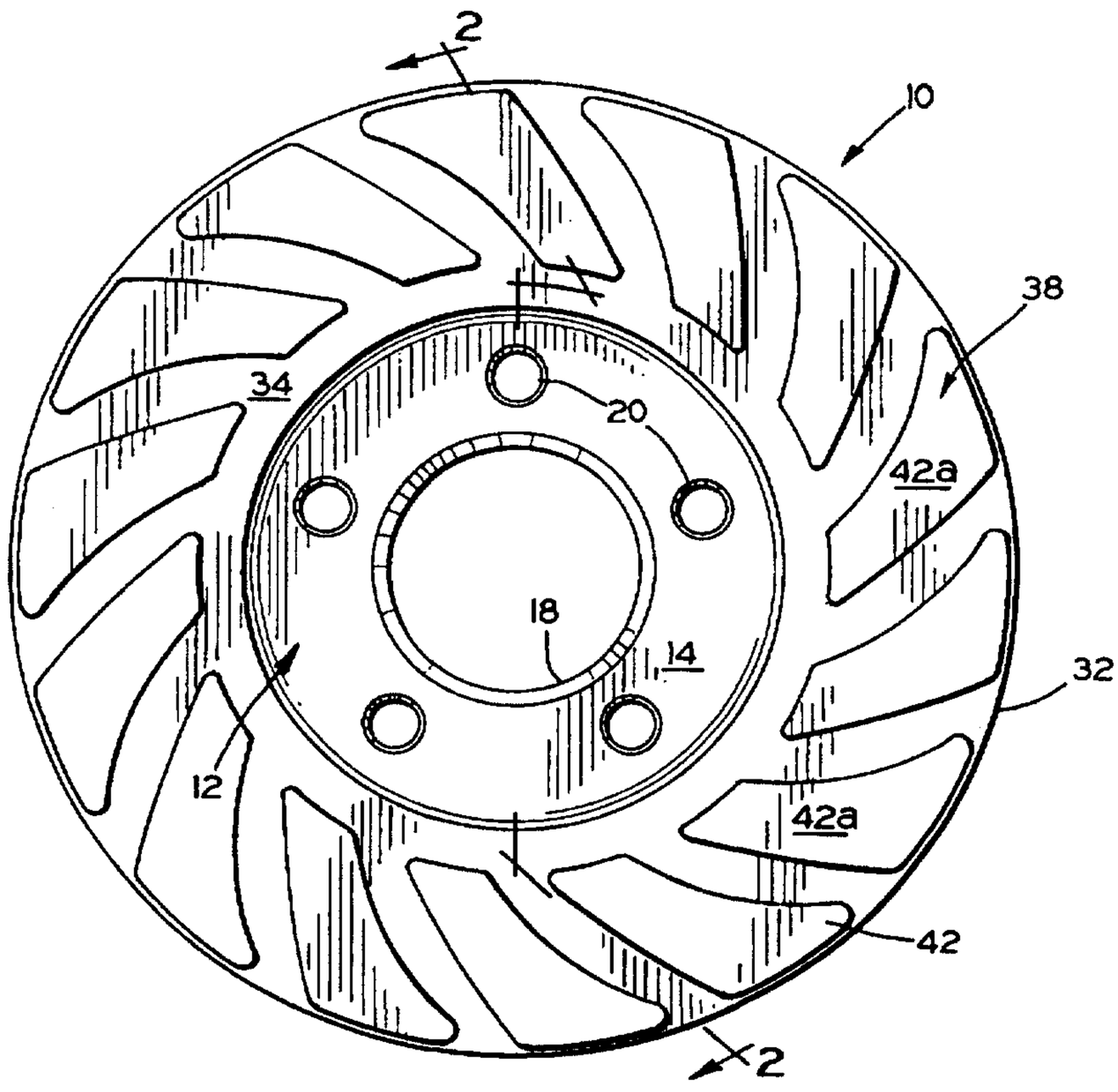
(54) Title: SOLID FINNED ROTOR FOR CALIPER DISC BRAKES AND THE LIKE

(57) Abstract

A rotor (10) for caliper disc brakes and the like has an outer friction portion including an annular support plate (32) having a friction ring section on both of the major surfaces thereof adapted to interface with an associated friction member, such as a brake pad. Each of the friction ring sections is formed of a plurality of circumferentially spaced apart fins (42, 44). Each of the fins, (42, 44) includes a substantially flat friction surface (42a), so that the plurality of such surfaces (42a) combine to define an annular, non–continuous friction surface on each face of the support plate (32). The rotor (10) of the invention combines the strength of a solid rotor with the desirable increased cooling characteristics of a vented rotor.



TITLE

SOLID FINNED ROTOR FOR CALIPER DISC BRAKES AND THE LIKE

BACKGROUND OF THE INVENTION

The present invention relates to rotors for caliper disc brakes and the like.

Rotors are generally well known in the art, and are used extensively in caliper disc brakes, power transmission devices, clutches, and other similar machinery and mechanisms. Brake rotors are typically cast from a ferrous material, such as cast grey iron, and are then machined in multiple operations to shape the rotor, and form the opposite friction surfaces which interface with associated brake pads. Cast aluminum rotors are available to reduce the weight and corrosion problems associated with ferrous metal rotors, although the heat resistance and brake surface toughness of cast aluminum is typically less desirable than that of other types of rotors. In addition, there are some composite rotors, in which different portions of the rotor are formed of different materials.

In general, solid cast iron or cast aluminum rotors are preferred from the standpoint of strength. However, the ability of a brake rotor to quickly transfer and dissipate heat generated during the braking process is also a very desirable feature, as excess heat leads to premature brake

wear and/or failure. Thus, vented rotors are generally preferred for their increased cooling characteristics.

It would therefore be desirable to provide a rotor which combines the desirable strength of a solid rotor with the improved cooling characteristics of a vented rotor.

SUMMARY OF THE INVENTION

The present invention is a rotor for caliper disc brakes and the like. The rotor of the invention includes an inner hub or hat section having a central, outboard mounting face for mounting the rotor on a drive member and a hat wall which extends from the periphery of the mounting face. An outer friction portion adapted to interface with associated friction members is connected to the hat wall of the hat section.

The outer friction portion of the rotor of the invention includes an annular support plate having a friction ring section on both of the major surfaces thereof. Each of the friction ring sections is formed of a plurality of circumferentially spaced apart fins. Each of the fins includes a substantially flat friction surface, so that the plurality of fins combines to define an annular, non-continuous friction surface on each face of the support plate adapted to interface with an associated friction member, such as a brake pad.

BRIEF DESCRIPTION OF THE DRAWINGS

The advantages of the invention will become readily apparent to those skilled in the art from the following detailed description of a preferred embodiment when considered in the light of the accompanying drawings, in which:

Fig. 1 is a front elevational view of a rotor embodying the present invention; and

Fig. 2 is a cross-sectional view, taken along the line 2-2 in Fig. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

For purposes of description herein, the terms "upper," "lower," "right," "left," "rear," "front," "vertical," "horizontal," and derivatives thereof shall relate to the invention oriented in Figs. 1 and 2. However, it is to be understood that the invention may assume various alternative orientations, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

Referring now to the drawings, there is illustrated in

Fig. 1 a rotor in accordance with the invention, denoted generally by the reference numeral 10. The rotor 10 is of the type adapted for use in conjunction with a variety of mechanical devices, such as caliper disc brakes and the like. The rotor 10 includes a radially inner hub or hat section 12 having a central mounting face 14 for mounting the rotor 10 on an associated drive member (not shown), such as a spindle or vehicle axle. The hat section 12 also includes a generally cylindrical shoulder or hat wall 16 extending from the periphery of the mounting face 14.

The central mounting face 14 of the hat section 12 of rotor 10 is provided with a central pilot aperture 18 in which a spindle hub or the like (not shown) may be closely received, and a plurality of circumferentially spaced apart fastener apertures 20 in which fasteners (also not shown) may be received to mount the rotor 10 on an associated drive mechanism in the conventional manner.

The rotor 10 also includes an outer friction portion, denoted generally by the reference numeral 30 in the drawings. The outer friction portion 30 of the rotor 10 of the invention includes an annular core or support plate 32 extending from the hat wall 16 of the hat section 12, proximate the inboard edge thereof (on the left as shown in Fig. 2). The support plate 32 is preferably of a solid construction for increased strength, and includes an annular inboard surface 34 and an annular outboard surface 36.

An inboard friction ring section 38 is provided on the inboard surface 34 of the support plate 32, and an outboard friction ring section 40 is provided on the outboard surface 36 of the support plate 32. The friction ring section 38 is formed of a plurality of circumferentially spaced apart fins 42 extending from the inboard surface 34 of the support plate 32. Likewise, the friction ring section 40 is formed of a plurality of circumferentially spaced apart fins 44 extending from the outboard surface 36 of the support plate 32.

In the preferred embodiment illustrated, the plurality of fins 42 and 44 are mirror images of one another, so that only the fins 42 will be discussed in further detail. Each of the fins 42 includes a substantially flat friction surface 42a, so that the combination of the plurality of surfaces 42a of fins 42 defines an annular, though non-continuous, friction surface adapted to interface with an associated friction member, such as a brake pad.

The fins 42 are generally radially extending, although they are preferably angled somewhat from a true radial direction, and are most preferably formed in the generally spiral configuration illustrated in Fig 1. In this manner, an associated friction member, such as a brake pad, will not simultaneously engage the entire leading edge of any of the fins 42. The fins 42 are also preferably shaped so as to increase in width from the radially inner ends to the radially outer ends thereof, as best seen in Fig. 1. In addition, the

fins 42 are preferably formed so that the peripheral edge defining the friction surface 42a is rounded, thereby further facilitating the smooth engagement of the fins 42 with the associated friction member.

Moreover, the fins 42 are preferably formed of a size and shape and with a particular spacing for a given application such that the associated friction member simultaneously engages more than one fin 42 upon activation. In many applications, it will be desired to have the associated friction member simultaneously engage three or more fins 42 upon activation.

The generally radially extending space between fins 42 should be as large as possible to provide for enhanced air flow about the fins 42, as long as the total surface area 42a engaged by the associated friction member is sufficient to provide the desired braking force. In addition, in a preferred embodiment, the fins 42 are spaced radially from the radially outer surface of the hat wall 16 of the rotor 10 to further enhance the air flow about the fins 42. Of course, the shape, size and location of the fins 42 and 44 can be varied to achieve the desired braking force and air flow characteristics.

The rotor 10 of the invention may be formed of any suitable material, such as cast grey iron, aluminum or alloys or composites thereof, as examples. The rotor 10 may be formed using conventional manufacturing methods, such as

casting. The rotor 10 is preferably formed of cast grey iron using conventional techniques with a core modified to provide for a rotor structure embodying the invention.

The rotor 10 of the invention provides the strength of a solid rotor with the desirable increased cooling characteristics of a vented rotor.

WHAT IS CLAIMED IS:

1. A rotor comprising:

a hat section including a mounting face and a hat wall extending from said mounting face;

an annular support plate extending radially outwardly from the hat wall of said hat section, said support plate having first and second annular surfaces; and

a first plurality of circumferentially spaced apart fins extending from the first annular surface of said support plate and a second plurality of circumferentially spaced apart fins extending from the second annular surface of said support plate.

2. A rotor as defined in claim 1, wherein the annular support plate includes a solid annular member.

3. A rotor as define in claim 1, wherein the first plurality of circumferentially spaced apart fins is mirror image of the second plurality of circumferentially spaced apart fins.

4. A rotor as defined in claim 1, wherein the fins of said first and second plurality of fins are generally radially extending.

5. A rotor as defined in claim 1, wherein the fins of said first and second plurality of fins are slightly angled from a radial direction so that an associated friction member will not simultaneously engage the entire leading edge of any of the fins.

6. A rotor as defined in claim 5, wherein the fins of said first and second plurality of fins are slightly angled from a radial direction so that the radially inner end of each fin is offset from the radially outer end thereof in the intended forward direction of rotation for the rotor.

7. A rotor as defined in claim 1, wherein the fins of said first and second plurality of fins are shaped so as to increase in width from the radially inner ends to the radially outer ends thereof.

8. A rotor as defined in claim 1, the fins of said first and second plurality of fins are formed so that at least a portion of the peripheral edge defining the friction surface of each of said fins is rounded to facilitate the smooth engagement of the fins with an associated friction member.

9. A rotor comprising:

a mounting section including a mounting face and a wall extending from said mounting face;

an annular support plate extending radially outwardly from the wall of said mounting section, said support plate having first and second annular surfaces; and

a first plurality of circumferentially spaced apart fins extending from the first annular surface of said support plate.

10. A rotor comprising:

a mounting section including a mounting face and a wall extending from said mounting face;

an annular support member extending radially outwardly from the wall of said mounting section, said support plate having a first annular, non-continuous friction surface adapted to interface with an associated friction member.

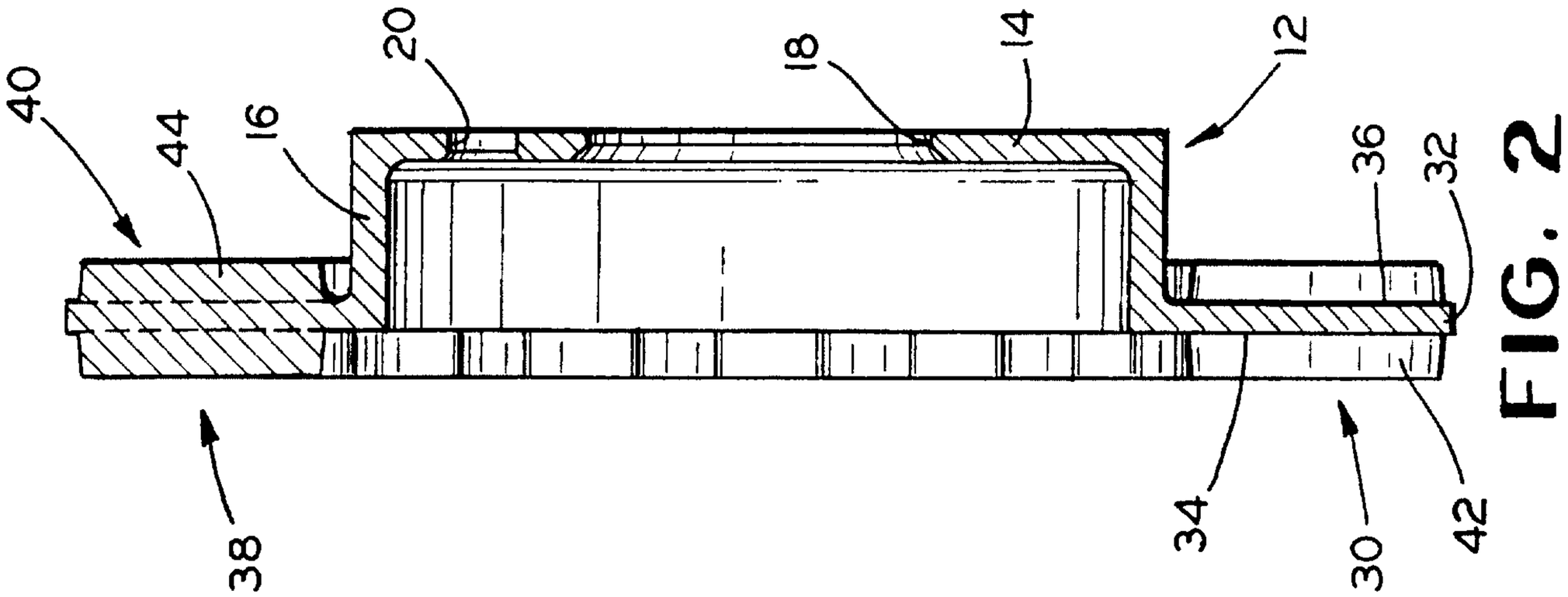

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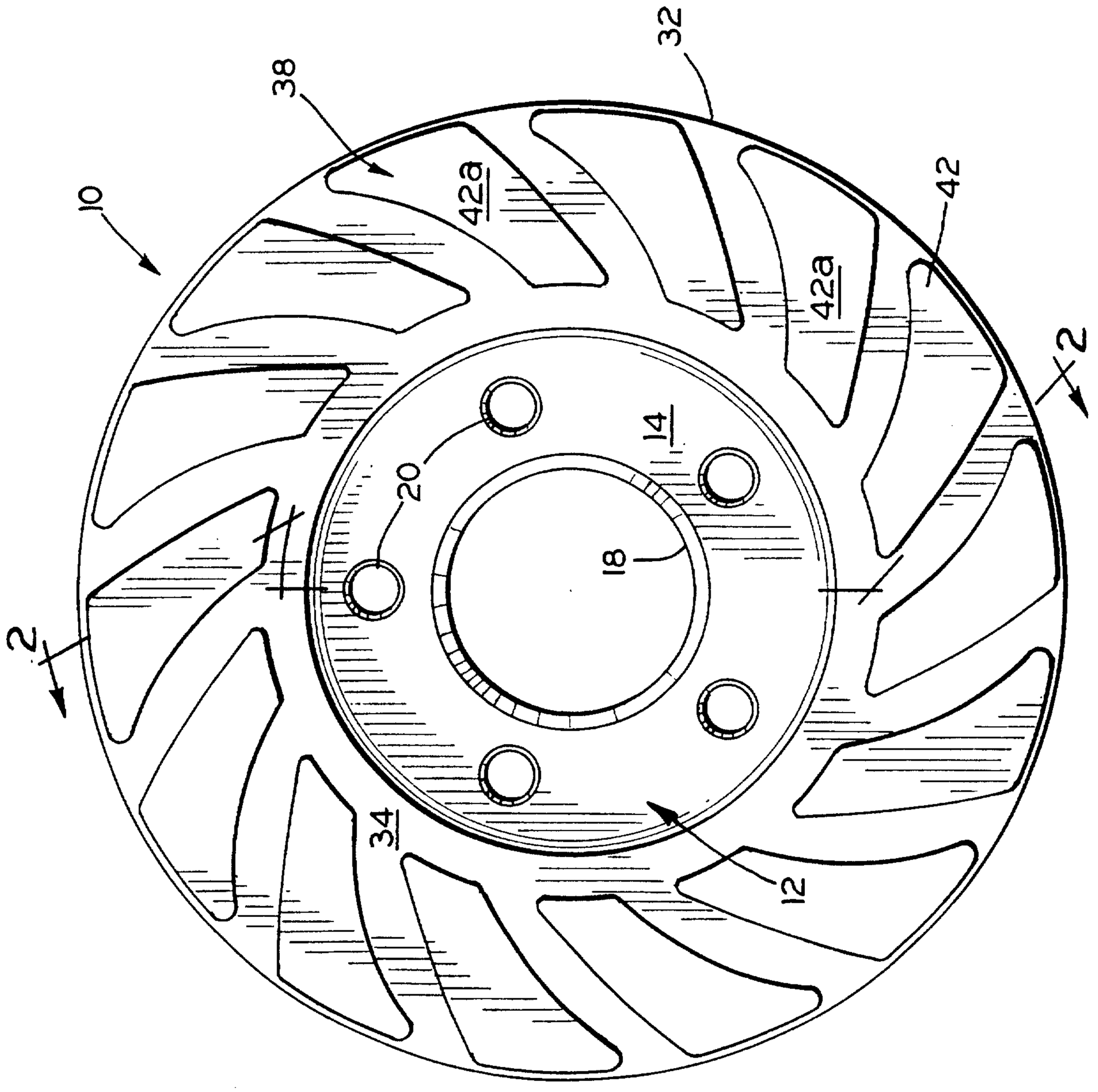
FIG. 2


10
38
32
42a
42
42a
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18
2
2
34
12

FIG. 1