Feb. 6, 1945. C. E. TACK 2,368,621

BRAKE ROTOR

Filed Dec. 30, 1942 2 Sheets-Sheet 1

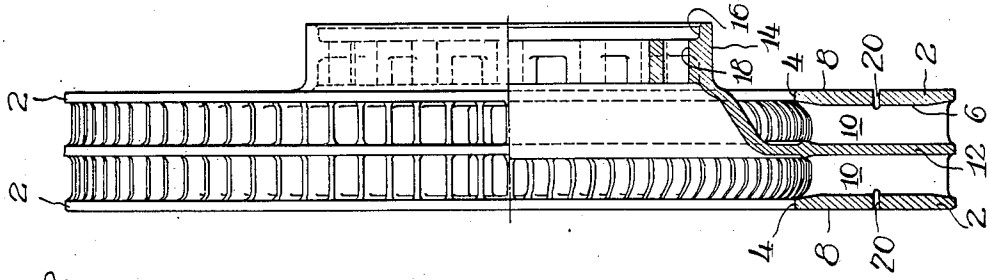


Fig. 2

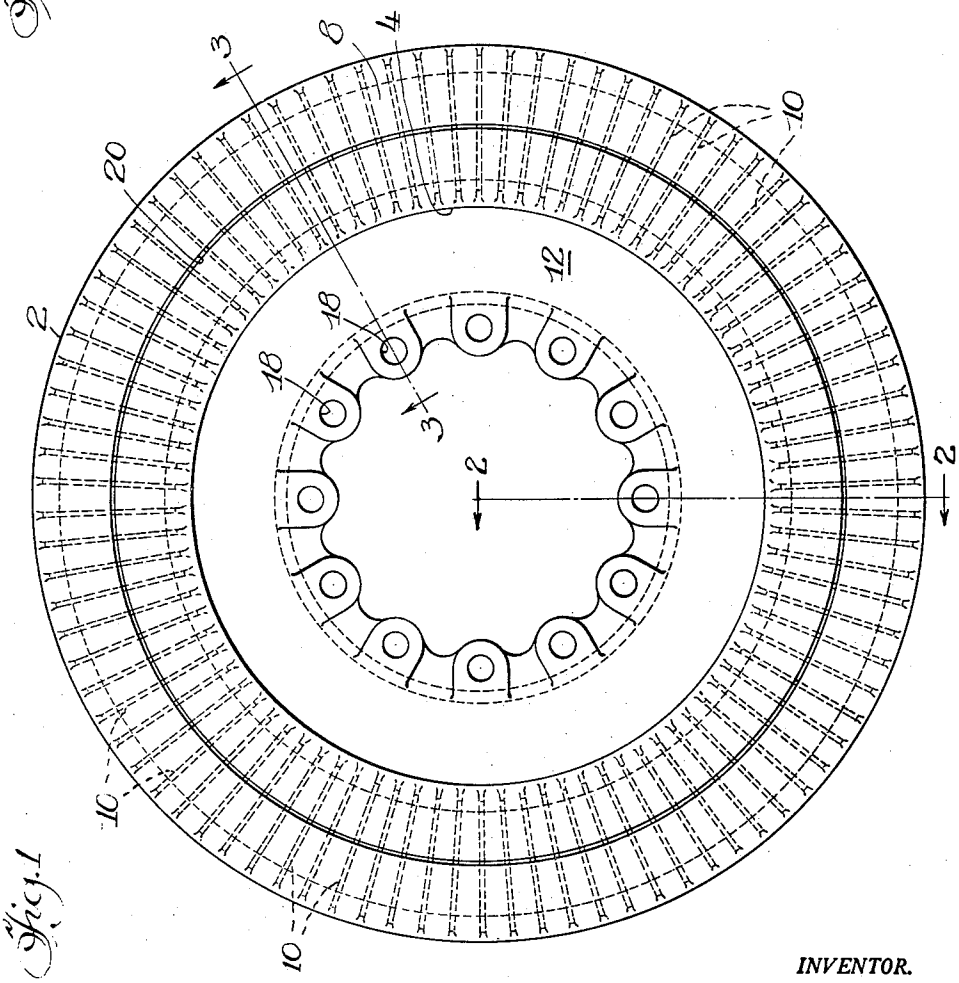


Fig. 1

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BRAKE ROTOR

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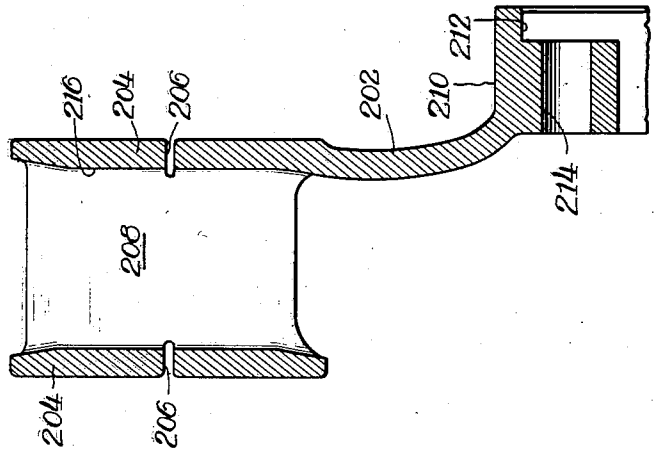


Fig. 6

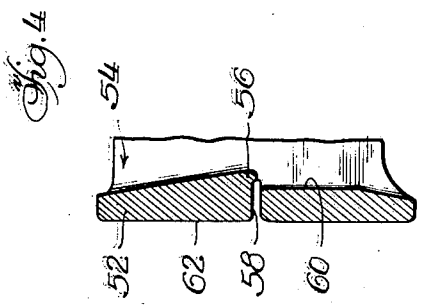


Fig. 4

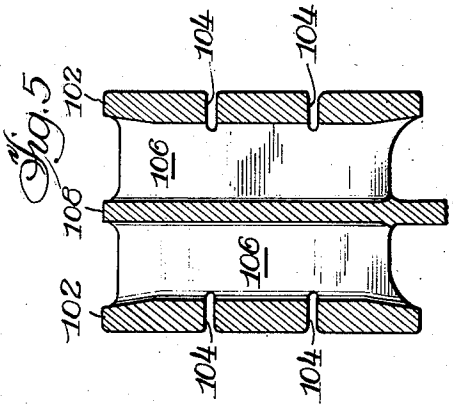


Fig. 5

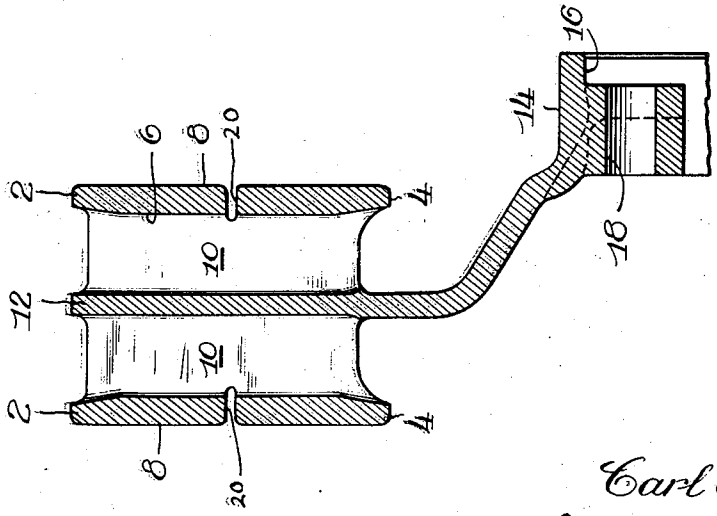


Fig. 3

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UNITED STATES PATENT OFFICE

2,368,621

BRAKE ROTOR

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Application December 30, 1942, Serial No. 470,551

9 Claims. (Cl. 188—264)

This invention relates to brake equipment and more particularly to a brake disc or rotor of the centrifugal or peripheral blower type, said rotor being particularly adapted for railway brake equipment but being capable of utilization for any suitable purpose.

My novel rotor may be of the single blower type or it may be a double blower rotor of the form shown and more fully described in my Patent No. 2,350,970, issued June 6, 1944.

My novel rotor comprehends a structure in which a plurality of friction plates are spaced by brace means comprising blower blades extending transversely of the rotor.

An object of my invention is to provide means facilitating expansion and contraction of the friction plates by providing slots therein, said slots dividing each plate into a plurality of substantially co-planar concentric members.

Another object of my invention is to provide means for displacing the film of air normally adhering to and rotating with the friction surface of each plate, said film acting as an insulator to diminish heat dissipation from said surface.

In the drawings, Figure 1 is a side elevation of my novel rotor, and Figure 2 is an edge elevation taken from the right as seen in Figure 1 and partly in section, the section being taken in the radial plane indicated by the line 2—2 of Figure 1.

Figure 3 is an enlarged sectional view taken in the radial plane indicated by the line 3—3 of Figure 1.

Figures 4 to 6 inclusive are fragmentary sectional views taken in respective planes corresponding to that of Figure 3 and each showing a modification of my invention.

Describing my invention in detail and referring first to the modification shown in Figures 1 to 3 inclusive, my novel rotor comprises the spaced friction plates 2, 2 preferably of annular form and having respectively the central openings 4, 4 therethrough to afford air inlets to the chamber 6 between the plates. The plates 2, 2 are formed with friction surfaces 8, 8 on the outer surfaces thereof, and said plates are connected by means of transverse blades 10, 10 to the central support member 12 which may be interposed between said plates. It will be understood that the blades 10, 10 serve as braces or columns to resist braking forces applied to the surfaces 8, 8, and said blades also function to throw air outwardly from the chamber 6 during rotation of the rotor which thus acts as a centrifugal blower, air being drawn into the chamber 6 through the openings 4, 4 and being thrown outwardly by the blades 10, 10 from the outer periphery of the rotor.

The support member 12 may be somewhat bell-shaped in form and may be provided on the inner perimeter thereof with a hub 14 having a bore 16 for the reception of positioning means on an associated rotating member to which the rotor may be secured by any convenient means, extending through openings 18, 18 which may be conveniently formed in the hub 14 for that purpose.

It will be readily apparent to those skilled in the art that heat will be developed in the plates 2, 2 as braking pressure is applied to the surfaces 8, 8 whereby the plates will tend to expand and contract radially as they are respectively heated and cooled. This expansion or contraction may tend to cause cracks or checks in the plates, and to avoid this condition I provide slots 20, 20 of preferably annular contour and extending through the plates and the adjacent edges of the blades 10, 10, said slots dividing the respective plates into a plurality of substantially co-planar concentric members, thus facilitating expansion and contraction of the plates as above described. It will be apparent that while the slots are herein shown as circular in contour, they may be of any desired configuration.

It will be understood that the air adjacent the surfaces 8, 8 rotates therewith in what may be termed laminar flow, inasmuch as said air tends to rotate in layers, the rate of rotation of said layers being proportionate to their distance from the surfaces 8, 8; and it will also be understood that the layer of air immediately adjacent each surface 8 tends to rotate at substantially the same speed therewith and to form an insulating film thereon, thereby diminishing heat dissipation from said surface. The slots 20, 20 may afford displacement of the films of air normally rotating with the surfaces 8, 8 of the respective plates 2, 2 by affording air passages therethrough, and it will be understood that as differences in air pressure are built up, ahead of and behind the friction shoes engaging the surfaces 8, 8, air may pass outwardly and inwardly through the slots 20, 20, thus displacing the insulating films of air on the surfaces 8, 8 and augmenting heat dissipation therefrom. The slots may, of course, be of any desired angularity with respect to the plates 2, 2 in order to facilitate passage of air inwardly or outwardly with respect to the chamber 6 as desired.

Figure 4 is a fragmentary sectional view comparable to Figure 3 and shows a modification of my invention in which each friction plate **52** of the rotor generally designated **54** is provided with an annular projection **56** radially outwardly of the slot **58** through the plate **52**, said projection **56** serving as a baffle or scoop to build up air pressure within the chamber **60** between the friction plates in such manner that during rotation of the rotor air will at all times flow outwardly through the slot **58** despite any differences of air pressure built up ahead of and behind the friction shoe engaging the friction surface **62** of each plate **52**.

Figure 5 is a fragmentary sectional view comparable to that of Figure 3 and showing still another modification of my invention in which each friction plate **102** is provided with a plurality of concentric slots **104, 104** dividing said plate into a plurality of substantially co-planar concentric members. The friction plates **102, 102** are connected by blades **106, 106** to a central support member **108**, as in the previous modifications, and it will be understood that the modification shown in Figure 5 is substantially identical with that shown in Figure 3 except for the fact that each plate **102** is provided with a plurality of slots **104, 104**. It will be further understood that each plate **102** may be provided with any desired number of slots **104, 104**.

Still another modification of my invention is shown in Figure 6, a sectional view comparable to that of Figure 3. In this modification the support member **202** is integrally formed with the inner perimeter of one of the spaced friction plates **204, 204**, said plates being provided with slots **206, 206** and being connected to each other by means of blades **208, 208**, as in the previous modifications. The support member **202** is provided with a hub **210** having a bore **212** and a plurality of openings **214, 214** affording securement to an associated rotating member, as described for the modification shown in Figures 1 to 3 inclusive, and it will be understood that the modification shown in Figure 6 is substantially identical with that shown in Figures 1 to 3 except that the support member **202** is integrally formed with the inner perimeter of one of the friction plates **204, 204** whereby the rotor will function as a single blower rotor, drawing air into the chamber **216** between the plates **204, 204** from one side only of the support member **202**, whereas in the previous modifications, the rotor functions as a double blower to draw air from both sides of the support member.

It is to be understood that I do not wish to be limited by the exact embodiments of the device shown which are merely by way of illustration and not limitation as various and other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a rotor, a plurality of spaced friction plates, blade means extending therebetween, at least one of said plates being provided with an opening affording an air inlet to the space between said plates, air passages extending through said plates and interrupting the friction surfaces on the outer sides thereof, and means for directing air outwardly through said passages during rotation of said rotor whereby the films of air normally rotating with respective surfaces are displaced.

2. In a rotor, spaced annular friction plates, a support member therebetween, blade means joining said plates to said member, at least one annular slot extending through each plate and the adjacent edges of the associated blade means, a hub on said support member affording securement for said rotor to an associated rotating member, and an annular projection formed on the inner surface of each friction plate radially outwardly of each slot.

3. In a brake rotor, a substantially annular plate, a plurality of blades formed on one side thereof and a friction surface on the opposite side, means affording rotation of said plate, a slot through said plate transversely thereof and extending entirely therearound, and means for directing fluid through said slot during rotation of said plate.

4. In a brake rotor, a plurality of concentrically arranged substantially co-planar annular plates, means maintaining said plates in said relationship and permitting independent expansion and contraction thereof caused by heat developed during braking engagement with associated friction means, and means for directing fluid between said plates during rotation of said rotor.

5. In a rotor, a plurality of substantially annular plates, a plurality of blades extending therebetween, means affording support for said plates from an associated rotating member, a slot through certain of said plates transversely thereof and extending entirely therearound, and means for directing fluid through said slot.

6. In a rotor, a plurality of annular plates, brace means comprising blades extending therebetween, annular slots concentric with respective plates and extending transversely therethrough, and annular projections on the inner surfaces of said plates for directing air through said slots during rotation of said rotor.

7. In a rotor, a plurality of annular plates, blades extending therebetween, slots extending through said plates transversely thereof, means for rotating said rotor, and means for directing air outwardly through said slots during said rotation.

8. In a brake rotor, a substantially annular plate, at least one annular slot through said plate and concentric therewith, means on one side of said plate affording support therefor from an associated rotating member, and means for directing fluid through said slot during rotating of said rotor.

9. In a rotor, a plurality of concentrically arranged substantially annular brake plates presenting co-planar friction surfaces on one side thereof, support means for said plates, and means for directing fluid between said plates during rotation of said rotor.

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