Sept. 12, 1944.

C. E. TACK

2,358,134

ROTOR

Filed March 13, 1942

2 Sheets-Sheet 1

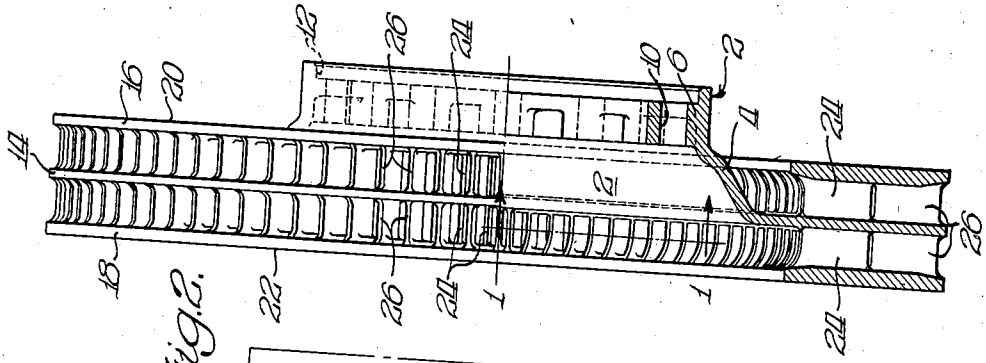


Fig. 2.

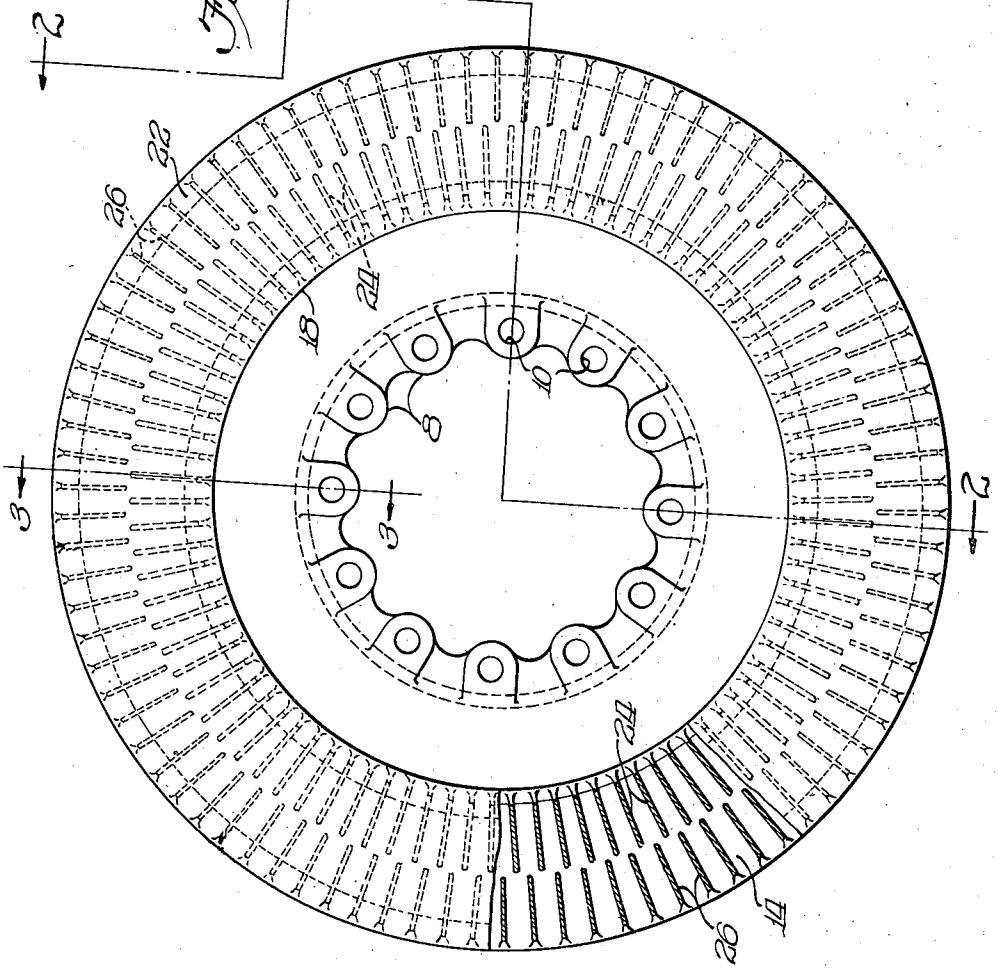


Fig. 1.

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Fig.3.

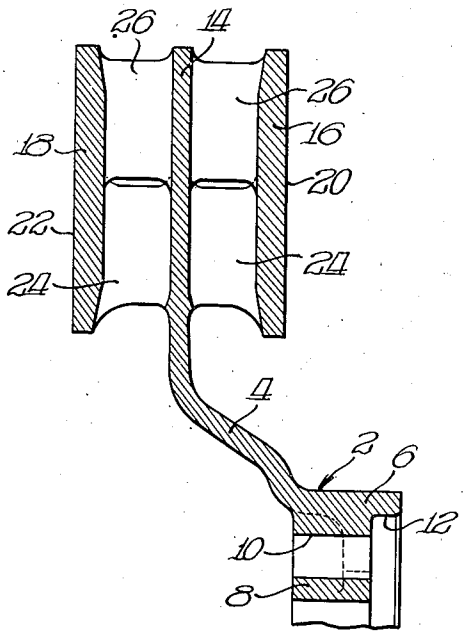


Fig.4.

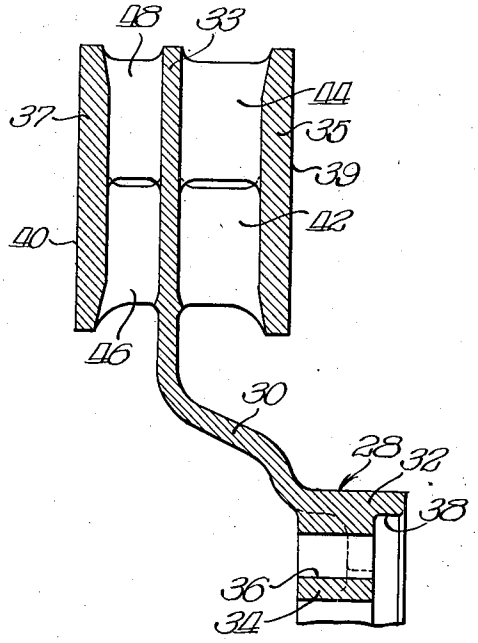


Fig.5.

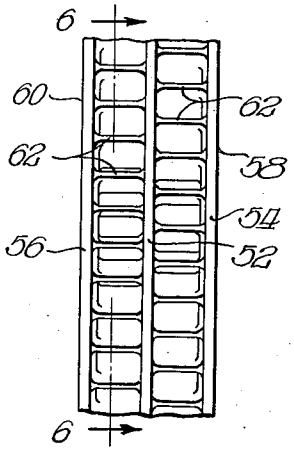
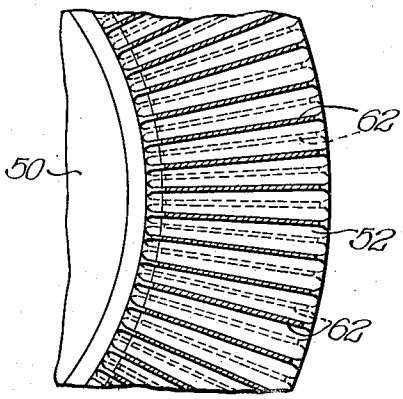


Fig.6.



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UNITED STATES PATENT OFFICE

2,358,134

ROTOR

Carl E. Tack, Chicago, Ill., assignor to American Steel Foundries, Chicago, Ill., a corporation of New Jersey

Application March 13, 1942, Serial No. 434,500

15 Claims. (Cl. 188—218)

My invention relates to brake equipment and particularly to a novel form of rotor designed to be associated with other braking means commonly called stators whose engagement with said rotor is commonly utilized as a means of stopping a wheel or other rotating member. My novel rotor is particularly adapted for use with railway rolling stock although it will be understood that such a rotor may be utilized for any equivalent purpose for which it may be readily adapted.

My invention comprehends a rotor of the general form shown and described in my co-pending application, Serial No. 409,999, filed September 8, 1941 in the United States Patent Office. Said rotor comprises three spaced annular plates interconnected by radially arranged equi-distantly spaced blades, the central of said plates being integrally formed at its inner perimeter with a support member affording a connection to a rotating member. This arrangement not only permits air to be drawn through both sides of the rotor during actuation thereof, but also reduces thermal stresses on the support member by spacing it from the friction plates.

It will be readily apparent to those skilled in the art that during actuation of a rotor, such as above described, air will be drawn from the inner perimeter thereof between the radially arranged blades, and said air will pass between said blades in the form of columns.

It is an object of the present invention to provide means for splitting said columns of air so as to derive additional cooling effects therefrom.

A specific object of my invention is to provide a rotor of the above described type wherein each friction plate is joined to the associated side of the support member by a series of radially arranged blades extending from the inner perimeter of said plate and spaced from the outer perimeter thereof, said plate also being joined to the support member by a series of radially arranged blades alternately disposed with respect to said first-mentioned blades and spaced from the inner perimeter of said plate.

Still another object of my invention is to design a rotor such as above described in which the radial blades are alternately arranged at opposite sides of the intermediate support member. In this manner thermal stresses on said member are reduced inasmuch as heat is transferred thereto at alternately arranged points on opposite sides thereof.

In the drawings,

Figure 1 is a side elevation of my novel rotor, partly in section, the section being taken in the vertical plane indicated by the line 1—1 of Figure 2.

Figure 2 is an edge elevation of the structure shown in Figure 1 with a portion cut away along the planes indicated by the line 2—2 of Figure 1.

Figure 3 is an enlarged sectional view taken in the plane indicated by the line 3—3 of Figure 1, and Figure 4 is a sectional view taken substantially in the same plane as that of Figure 3 but showing a different modification of my novel rotor.

Figure 5 is a fragmentary edge elevation showing a modified form of my rotor, and Figure 6 is a sectional view taken in the plane indicated by the line 6—6 of Figure 5.

Describing my rotor in detail, the support member generally designated 2 comprises a bell-like portion 4 with a hub portion 6, said hub portion comprising a plurality of spaced bosses 8, 8, and a plurality of openings 10, 10 extending therethrough and through said bosses. It will be readily apparent to those skilled in the art that the bore 12 in the hub portion 6 may be fitted over a complementary portion on an associated rotating member and may be secured thereto by any convenient means such as bolts (not shown) extending through the openings 10, 10, said hub portion 6 being reinforced at its points of connection to said rotating member by the bosses 8, 8.

Integrally formed on the outer perimeter of the bell-shaped support member 4 is a support plate 14 and positioned at opposite sides of said support plate are the spaced friction plates 16 and 18 comprising the friction surfaces 20 and 22 respectively, said surfaces being formed and arranged for frictional engagement with non-rotating brake members (not shown) generally termed stators, whereby the rotor is decelerated and the rotating member to which it is connected is braked.

Joining each friction plate 16 and 18 to the adjacent side of the support plate 14 is a series of equi-distantly spaced radially arranged blades 24, 24 extending from the inner perimeter of the associated plate and spaced from the outer perimeter thereof as will be clearly seen from a consideration of Figures 1 and 3. Also joining said friction plate to the associated side of the support plate 14 are a series of equi-distantly spaced radially arranged blades 26, 26 extending from the outer perimeter of said plate and spaced from the inner perimeter thereof, said

blades 26, 26 being alternately arranged with respect to the blades 24, 24 as will be best understood from a consideration of Figure 1.

In the arrangement shown in Figures 1 to 3 inclusive, it will be apparent that the blades 26, 26 at opposite sides of the rotor are aligned in such a manner as to form columns thereacross, said columns effectively resisting the braking pressure applied to the friction surfaces 20 and 22, as more fully described in the above-mentioned co-pending application, and likewise the blades 24, 24 at opposite sides of the rotor are aligned so as to form columns thereacross, said columns serving a similar purpose to that served by the columns formed by the blades 26, 26.

It may be noted that in my novel arrangement the pressure applied to the outer surfaces 20 and 22 of the friction plates 16 and 18 is evenly distributed among the blades 24, 24 and 26, 26, said blades being evenly disposed about the circumference of the rotor as already described, and inasmuch as the blades at opposite sides of the rotor are aligned with each other thus forming columns across the rotor as previously described, I am able to calculate the stresses to which my novel rotor may be safely subjected as more fully described in my above-mentioned co-pending application.

Figure 4 shows another modification of my novel rotor, said rotor comprising support means generally designated 28 and including the bell-shaped support member 30 comprising the hub portion 32, said hub portion having spaced bosses 34, 34 and openings 36, 36 therethrough, and said hub portion also having a bore 38, said bore, said bosses, and said openings serving a purpose described for the corresponding structure shown in Figures 1 to 3 inclusive. Integrally formed with the outer perimeter of the bell-shaped support member 30 is the intermediate support plate 33 and at opposite sides of said support plate are the friction plates 35 and 37 comprising respectively the friction surfaces 39 and 40, said surfaces being formed and arranged for engagement with braking means as previously described for the modification shown in Figures 1 to 3.

It will be noted that the support plate 33 is positioned closer to the friction plate 37 than to the friction plate 35, said support plate being so positioned in order to afford a greater air intake from the one side of the rotor, as will be clearly apparent to those skilled in the art. Joining the friction plate 35 to the adjacent side of the support plate 33 is a series of equi-distantly spaced radially arranged blades 42, 42 extending from the inner perimeter of the plate 35 to a point spaced from the outer perimeter thereof, and alternately arranged with the blades 42, 42 are blades 44, 44 extending from the outer perimeters of the plates 33 and 35 and extending radially inwardly to a point spaced from the inner perimeters thereof. In similar manner, the friction plate 37 is joined to the support plate 33 by the inner and outer blades 46, 46 and 48, 48, said blades being arranged in a manner similar to that in which the blades 42, 42 and 44, 44 are arranged. It may be noted that the blades 42, 42 and 44, 44 are relatively wide with respect to the blades 46, 46 and 48, 48 in order that greater air intake may be afforded for the rotor between the blades 42, 42 and 44, 44 as above described.

Figures 5 and 6 show still another modification of my novel rotor which comprises support means 50 (Figure 6), said support means being fragmentarily shown inasmuch as it is identical with the support means 2 and 28 shown in the previous modifications. The support means 50 comprises the intermediate support plate 52 and spaced friction plates 54 and 56 are positioned at opposite sides thereof, said friction plates comprising respectively the friction surfaces 58 and 60 serving a purpose described for the friction surfaces shown in the previous modifications. Joining each friction plate 54 and 56 to the adjacent side of the support plate 52 is a series of equi-distantly spaced radially arranged blades 62, 62, the blades at each side of said rotor extending from the inner to the outer perimeter of the associated friction plate and being alternately arranged with the blades at the opposite side of the rotor. In this manner, as will be clearly apparent to those skilled in the art, thermal stresses on the support plate 52 will be reduced inasmuch as heat is transferred thereto by the blades 62, 62 at alternately arranged points on opposite sides of said support plate 52.

It will be understood that in either of the modifications shown in Figures 1 to 3 and 5 and 6 respectively, the support plate may be positioned closer to one of the friction plates than to the other as shown in Figure 4, and it will be further understood that in either of the modifications shown in Figures 1 to 3 and Figure 4 respectively, corresponding blades at opposite sides of the rotor may be alternately arranged as shown in the modification illustrated in Figures 5 and 6.

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 support member comprising a hub portion at the inner perimeter thereof and an integral support plate at the outer perimeter thereof, annular friction plates at opposite sides of said support plate, and spaced radially arranged blades joining each of said friction plates to said support plate, said blades extending outwardly from the inner perimeters of said plates and being spaced from the outer perimeters thereof, and means adjacent the outer ends of said blades, said means being alternately arranged with said blades and being adapted to split the columns of air thrown outwardly from between said blades during rotation of said rotor.

2. In a rotor, an annular support member comprising a hub portion at the inner perimeter thereof and integral support means at the outer perimeter thereof, annular friction plates at opposite sides of said support means, and spaced inner and outer radially arranged blades joining each of said plates to said support means, the inner of said blades extending outwardly from the inner perimeter of said plate and being spaced from the outer perimeter thereof, and the outer of said blades being alternately arranged with said inner blades, extending inwardly from the outer perimeter of said plate, and being spaced from the inner perimeter thereof.

3. In a rotor, an annular support member comprising securing means at the inner perimeter thereof and integral support means at the outer perimeter thereof, annular friction plates at opposite sides of said support means, and spaced radially arranged blades joining each of said plates to said support means, certain of said blades extending outwardly from the inner per-

imeter of said plate and being spaced from the outer perimeter thereof, and other of said blades extending inwardly from the outer perimeter of said plate and being spaced from the inner perimeter thereof.

4. In a rotor, a support member comprising a hug portion at the inner perimeter thereof and an integral support plate at the outer perimeter thereof, annular friction plates at opposite sides of said support plate and in parallel relationship therewith, and spaced radially arranged blades joining each of said plates to said support means, certain of said blades extending outwardly from the inner perimeter of said plate and being spaced from the outer perimeter thereof, and other of said blades extending inwardly from the outer perimeter of said plate and being spaced from the inner perimeter thereof, the blades at opposite sides of said rotor being aligned to form columns thereacross.

5. In a rotor, a support plate, annular friction plates at opposite sides thereof, spaced inner and outer, alternately disposed, radially arranged blades joining each friction plate to said support plate, the blades at each side of said rotor being alternately arranged with respect to corresponding blades at the opposite side of said rotor, and the blades at one side of said rotor being wider than the blades at the opposite side thereof.

6. In a rotor, a support plate, annular friction plates at opposite sides thereof, spaced inner and outer, alternately disposed, radially arranged blades joining each friction plate to said support plate, the blades at each side of said rotor being alternately arranged with respect to corresponding blades at the opposite side thereof whereby thermal stresses on said support plate are reduced, and means spaced from said friction plates, integrally formed with said support plate, and extending from the inner perimeter thereof for connection to an associated rotating member.

7. In a rotor, spaced annular friction plates, a parallel support member therebetween and positioned closer to one of said blades than to the other, equi-distantly spaced radially arranged blades joining each friction plate to said support member, certain of said blades extending from the inner perimeter of said plate and being spaced from the outer perimeter thereof, and other of said blades extending inwardly from the outer perimeter of said plate and being spaced from the inner perimeter thereof.

8. In a rotor, a support plate, annular friction plates at opposite sides thereof, spaced inner and outer, alternately disposed, radially arranged blades joining each friction plate to said support plate, the blades at each side of said rotor being alternately arranged with respect to corresponding blades at the opposite side of said rotor whereby thermal stresses on said support plate are reduced, and means for securing said rotor to an associated rotating member.

9. In a rotor, a brake ring comprising a plurality of plates at least one of which is substantially annular, brace means comprising spaced blades extending between said plates and spaced from the outer perimeter thereof, and means on said plates adjacent the radially outer ends of said blades and spaced therefrom for splitting the columns of fluid thrown outwardly therebetween during rotation of said rotor.

10. In a rotor, a brake ring comprising at least two substantially annular plates in substantially parallel relationship, brace means comprising a plurality of inner and outer alternately arranged blades extending between said plates, the inner blades being spaced a substantial distance from the outer perimeter of said plates and the outer blades being spaced a substantial distance from the inner perimeter of said plates.

11. In a rotor, a brake ring comprising a substantially annular support plate, friction plates at opposite sides thereof at least one of said friction plates having a central opening affording an air inlet to the space between said plates, and inner and outer, alternately arranged, blades joining each friction plate to said support plate, the blades at each side of said rotor being alternately arranged with respect to corresponding blades at opposite sides thereof whereby thermal stresses on said support plate are reduced.

12. In a rotor, a support plate, annular friction plates at opposite sides thereof, spaced inner and outer, alternately disposed, radially arranged blades joining each friction plate to said support plate, and means connected to said support plate for securing the same to an associated rotating member.

13. In a rotor, a support member, annular friction plates at opposite sides thereof, spaced inner and outer alternately arranged blades joining each friction plate to said support member, and hub means connected to said member for removably securing the same to an associated rotating member.

14. In a brake rotor, a brake ring comprising a plurality of plates, fluid inlet means communicating with the space therebetween, and a plurality of inner and outer alternately arranged blades carried by said ring within said space, the inner ends of the outer blades and the outer ends of the inner blades terminating at approximately the same distance from the axis of the rotor.

15. A rotatable brake ring comprising a plurality of plates, fluid inlet means communicating with the space therebetween, a plurality of blades carried by said ring within said space, and means carried by said ring radially outwardly of said blades for splitting columns of fluid thrown outwardly from between said blades during rotation of said ring.

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