

July 10, 1945.

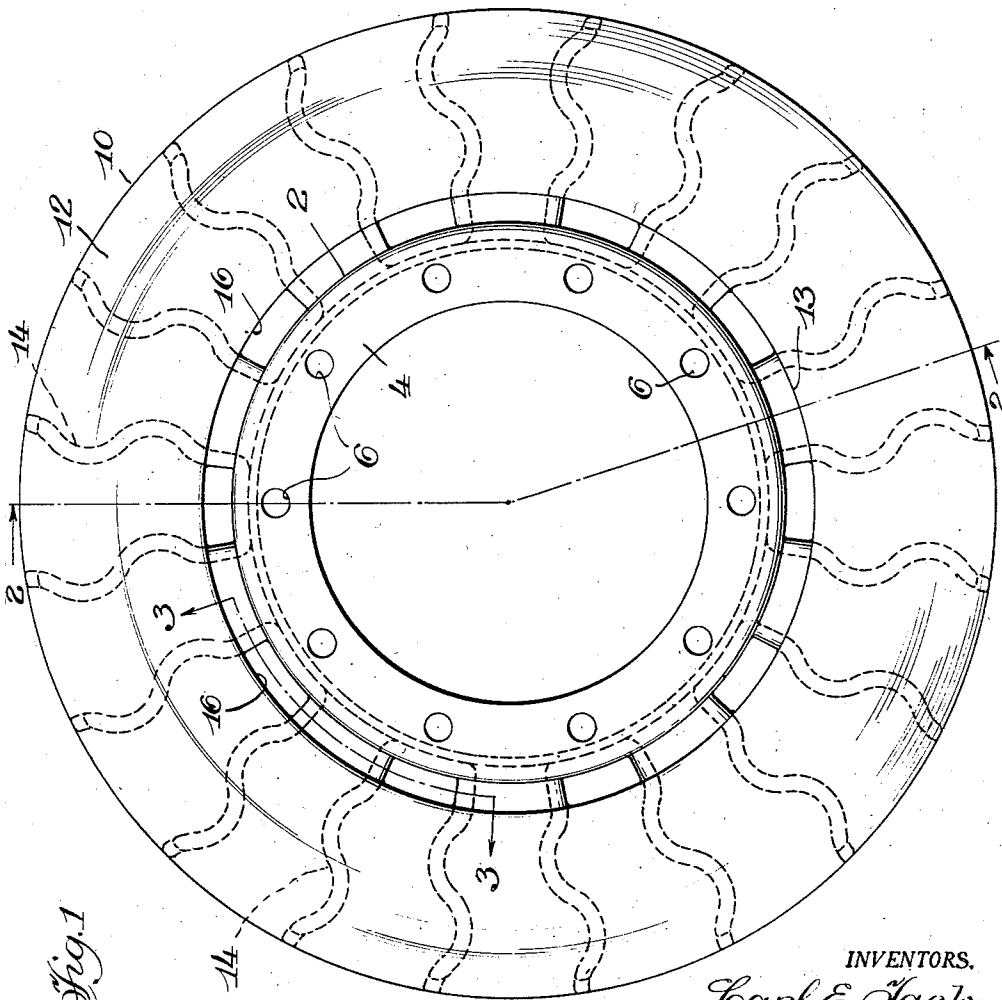
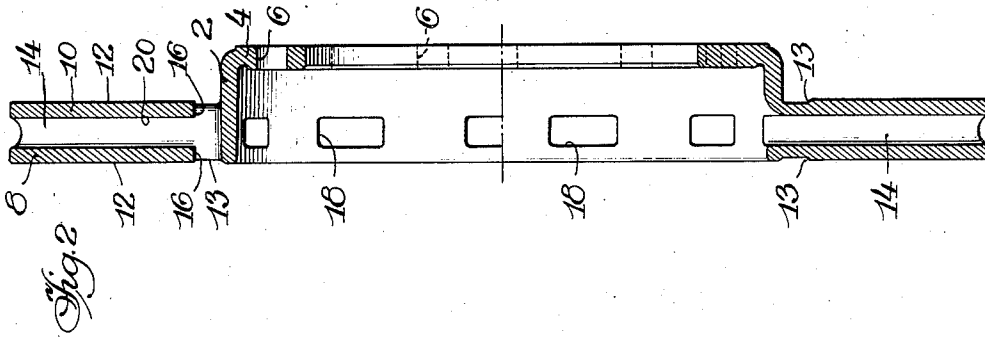
C. E. TACK ET AL

2,380,085

ROTOR

Filed Dec. 12, 1942

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

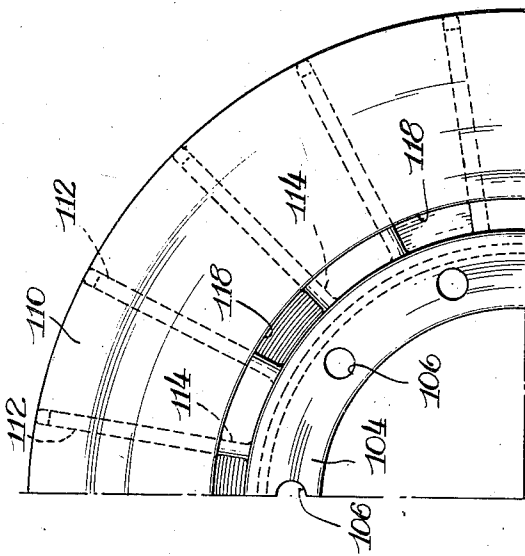


Fig. 6

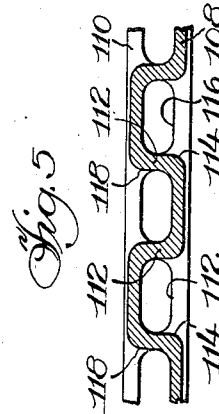


Fig. 5

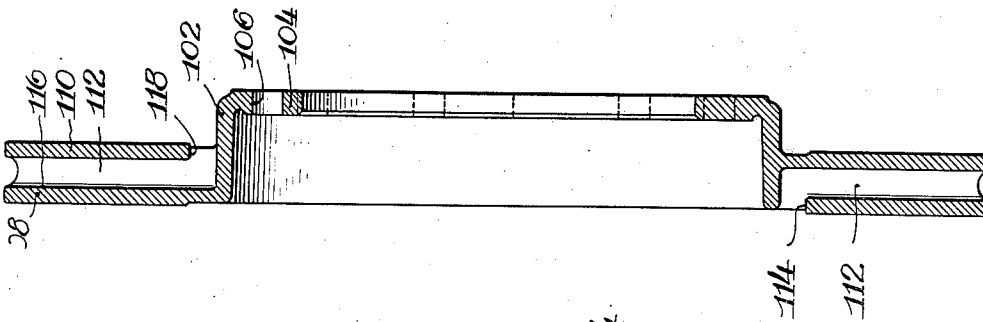


Fig. 4

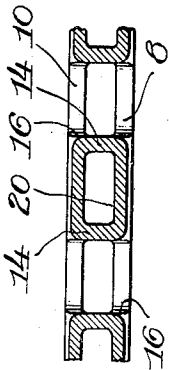


Fig. 3

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UNITED STATES PATENT OFFICE

2,380,085

ROTOR

Carl E. Tack and Louis G. Vree, Chicago, Ill., assignors to American Steel Foundries, Chicago, Ill., a corporation of New Jersey

Application December 12, 1942, Serial No. 468,750

11 Claims. (Cl. 188—218)

Our invention relates to brake equipment and more particularly to a brake disc frequently designated a rotor and adapted for connection to an associated rotating member whereby said member may be decelerated by friction means applied to the rotor. Our novel rotor is particularly adapted for connection to the driving wheel of a track associated with a track-laying vehicle whereby movement of the vehicle may be controlled by braking the rotor. However, it will be understood that the rotor may be used for any analogous purpose to which it may be suited.

An object of our invention is to design a rotor such as above described which will function as a centrifugal or peripheral blower, air inlets being afforded whereby air may be drawn between spaced annular friction plates of the rotor and thrown outwardly by means of blades extending between the plates.

In one embodiment of our invention illustrated herein the blower blades are substantially flat and radially disposed and in the other illustrated embodiment said blades are radially undulate for a purpose more fully described in the co-pending application Serial No. 431,069, filed in the United States Patent Office on February 16, 1942, in the name of Carl E. Tack, Patent No. 2,345,016, March 28, 1944.

In the drawings, Figure 1 is a side elevation of our novel rotor and Figure 2 is a sectional view taken in the radial planes indicated by the line 2—2 of Figure 1. Figure 3 is a further sectional view taken on the line 3—3 of Figure 1.

Figures 4 to 6 show a modification of our novel rotor, Figure 4 being a sectional view corresponding to Figure 2, Figure 5 being a sectional view corresponding to Figure 3, and Figure 6 being a side elevation taken from the right as seen in Figure 4.

Describing our invention in detail and referring first to the modification shown in Figures 1 to 3, our novel rotor comprises an annular support member 2 of generally cylindrical form and provided with the inwardly directed flange 4 having spaced openings 6, 6 for the reception of means securing the rotor to an associated rotating member. Integrally formed on the outer periphery of the member 2 is a brake ring comprising a pair of spaced annular friction plates 8 and 10, each plate presenting on the outer surface thereof a friction surface 12 for engagement with any suitable braking means as will be clearly understood by those skilled in the art, the surfaces 12, 12 being relieved at 13, 13 to prevent the wearing of shoulders thereon as will be apparent.

A plurality of blades 14, 14 extend between the plates 8 and 10, and it may be noted from a consideration of Figure 1 that these blades are pref-

erably undulate in form for a purpose hereinafter described. It will be apparent that the blades 14, 14 serve as columns to resist braking pressures applied to the plates 8 and 10 and, as hereinafter more fully described, said blades also function as blades of a centrifugal or peripheral blower.

Aligned openings 16, 16 are formed in the plates 8 and 10 adjacent their juncture with the member 2 and a plurality of openings 18, 18 (Figure 2) are formed in the member 2, all of said openings serving as air inlets and communicating with the chamber 20 (Figures 2 and 3) between the plates 8 and 10. As may be seen in Figures 1 and 2, the openings 16, 16 are preferably formed in alternating relationship with the openings 18, 18, whereby a pair of aligned openings 16, 16 are disposed at one side of each of the blades 14, 14 and an opening 18 is disposed at the opposite side of said blade.

It will be understood that by means of this arrangement air may be drawn into the chamber 20 from both sides of the brake ring during rotation of the rotor, said air being thrown outwardly by means of the blades. The alternating arrangement of the openings 16, 16 and 18, 18 facilitates uniform cooling of the plates 8 and 10 and also tends to prevent deleterious stress concentrations as may be clearly apparent to those skilled in the art. It may be emphasized that the openings 16, 16 in the plate 10 afford air inlets in the side of the brake ring adjacent the member to which the rotor is secured by means of the flange 4, thus affording air intake from what is normally a dead space between the rotor and the associated supporting member.

The undulate form of the blades 14, 14, as will be clearly apparent to those skilled in the art, serves to cause turbulence of the air passing through the chamber 20 whereby greater cooling of the plates 8 and 10 will be effected, as more fully described in the above-mentioned co-pending application.

It will be understood that the member 2 may be attached in any convenient manner to the associated rotating element or may even be integral therewith if desired, and it will be further understood that if desired the brake ring may comprise three or more plates with blades extending between adjacent plates as shown and described in detail in said co-pending application.

A modification of our novel rotor is shown in Figures 4 to 6 wherein the annular support member 102 of generally cylindrical form is provided with the inturned annular flange 104 having a plurality of openings 106, 106 therethrough for the reception of any convenient means affording securement for the rotor to an associated rotating member. Integrally formed on the outer pe-

riphery of the member 102 is a pair of spaced annular friction plates 108 and 110, and extending between said plates are the spaced flat blades 112, 112 preferably radially disposed, said blades 112, 112 corresponding to the blades 14, 14 described for the previous modification. The plate 108 is provided with a plurality of openings 114, 114 communicating with the chamber 116 between the plates 108 and 110 and the plate 110 is formed with a plurality of openings 118, 118 communicating with the chamber 116 and preferably alternately arranged with respect to the openings 114, 114, whereby an opening 114 is disposed at one side of each blade 112 and an opening 118 is formed at the opposite side of said blade, the alternating relationship of the openings 114, 114 and 118, 118 affording equalized cooling of the plates 108 and 110 and serving to reduce the possibility of undesirable stress concentrations.

It will be understood that during rotation of the rotor air will be drawn into the chamber 116 through the openings 114, 114 and 118, 118 and will be thrown outwardly by means of the blades 112, 112, said rotor thus functioning as a centrifugal or peripheral blower to afford cooling of the friction plates 108 and 110.

It is to be understood that we 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.

We claim:

1. In a brake rotor, a substantially cylindrical support member, a brake ring formed on the outer periphery thereof and comprising a plurality of spaced plates, transverse blades extending between said plates, fluid inlets formed in the side of said ring adjacent its juncture with said member, said inlets communicating with the space between said plates, the inlets in one side of said ring being alternately arranged with respect to the inlets on the opposite side of said ring.

2. In a brake rotor, a substantially cylindrical support member, a brake ring formed on the outer periphery thereof and comprising a plurality of spaced plates, transverse blades extending between said plates, and air inlets formed in the sides of said ring adjacent its juncture with said member, said inlets communicating with the space between said plates, and openings in said member also communicating with said space.

3. In a brake rotor, a substantially cylindrical support member, a pair of spaced annular friction plates formed on the outer periphery thereof, said plates defining a chamber therebetween, spaced blades extending between said plates, a plurality of openings through said member communicating with said chamber, and a plurality of openings through said plates adjacent their juncture with said member, the openings through said plates being in alignment and being alternately arranged with respect to the openings through said member.

4. In a brake rotor, a substantially cylindrical support member, a pair of spaced annular friction plates formed on the outer periphery thereof, spaced blades extending between said plates, and a plurality of openings through said plates

to afford fluid inlets, the openings in one plate being alternately arranged with respect to the openings in the other plate.

5. In a rotor, a generally cylindrical support member, a pair of annular friction plates formed on the outer periphery thereof, blower blades extending between said plates, aligned air inlets in said plates at one side of each blade, and an air inlet through said member on the opposite side of said blade.

6. In a rotor, a substantially cylindrically support member, a pair of annular friction plates formed on the outer periphery thereof, radially undulate blower blades extending between said plates, and air inlets through said plates and through said support member, said inlets communicating with the space between said plates.

7. In a brake rotor, a cylindrical support member, a brake ring on the outer periphery thereof comprising a plurality of plates defining a fluid chamber open at its radially outer extremity to afford a fluid outlet, and blades extending between said plates, said ring having fluid inlet slots in the sides thereof adjacent the juncture of said ring with said support member, said blades joining the outer periphery of said support member at opposite sides of each slot, the slots in one side of said ring being alternately arranged with respect to the slots on the opposite side of said ring.

8. In a rotor, a brake ring comprising a pair of annular friction plates, blower blades extending between said plates, a support member connected to said plates and to said blades, aligned fluid inlets in said plates at one side of each blade, and a fluid inlet through said member on the opposite side of said blade, said inlets communicating with the space between said plates.

9. In a brake rotor, a substantially cylindrical support member, a brake ring formed on the outer periphery thereof and comprising a pair of spaced plates each having spaced inwardly projecting portions thereof connecting said ring to said member and forming therewith a plurality of fluid inlets in the sides of said ring, and transverse blades extending between said plates, the space between said blades and plates providing passages communicating with said fluid inlets.

10. In a brake rotor, a brake ring comprising spaced plates defining a fluid chamber, blades extending between and connecting said plates, said blades forming radial fluid passages through said chamber, an annular integral support member for said brake ring, fluid inlets through said plates communicating with said passages and other fluid inlets through said member communicating with said passages, and means connected to one end of said support member for attaching the rotor to an associated rotatable element.

11. In a brake rotor, a brake ring comprising a plurality of spaced annular plates defining an annular fluid chamber therebetween and blades extending between said plates, a hub member comprising an annular member extending axially of said ring and connected to the inner periphery thereof, fluid passages through said last-mentioned member communicating with said chamber, and other fluid passages through said plates communicating with said chamber.

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