Oct. 13, 1953 F. E. BACHMAN 2,655,236

DISK BRAKE

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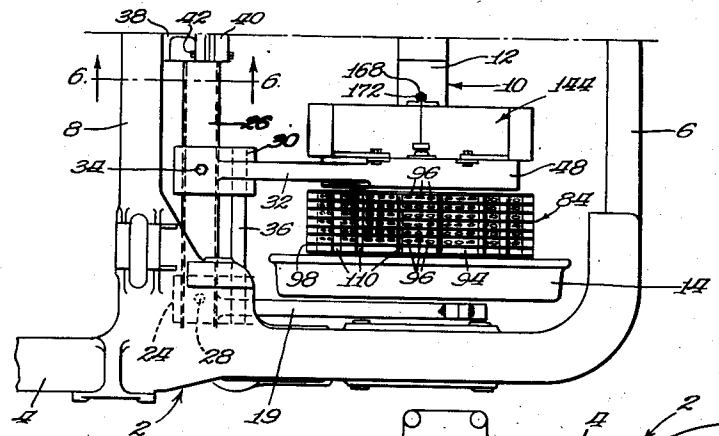


Fig. 1.

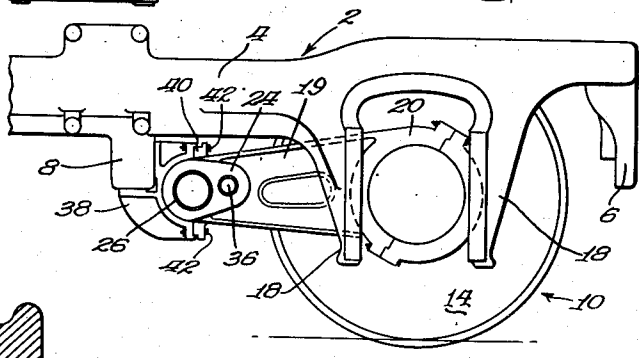


Fig. 2.

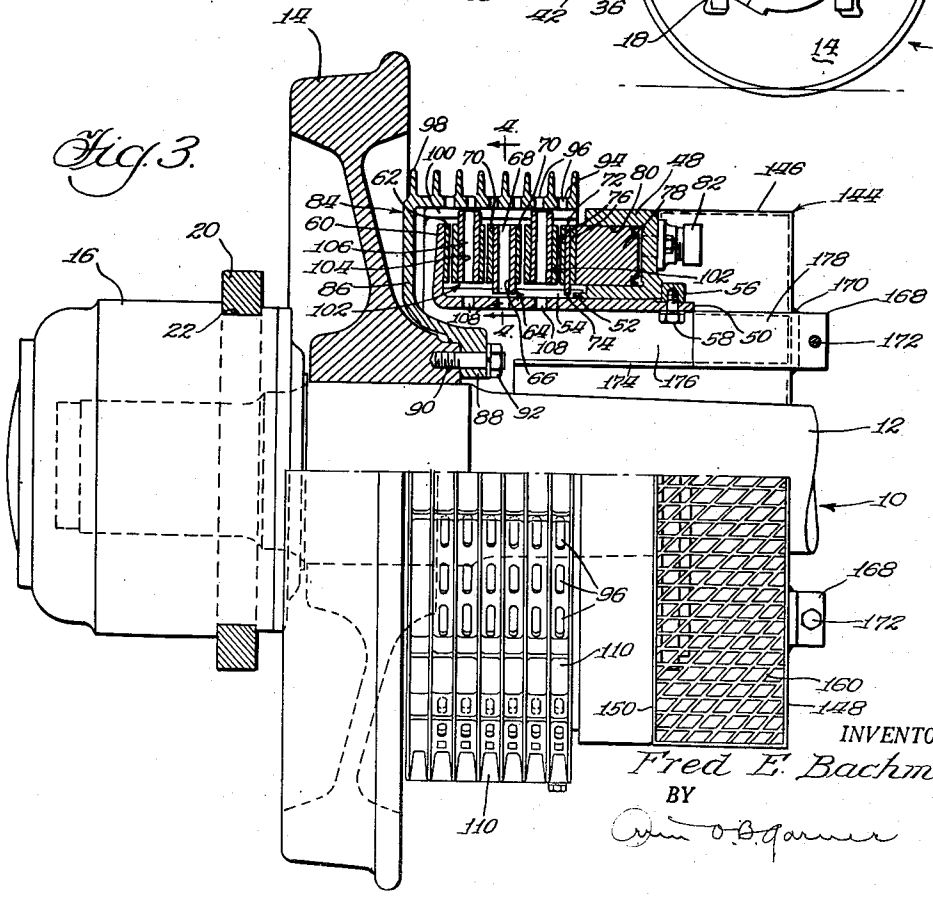


Fig. 3.

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Fig. 4.

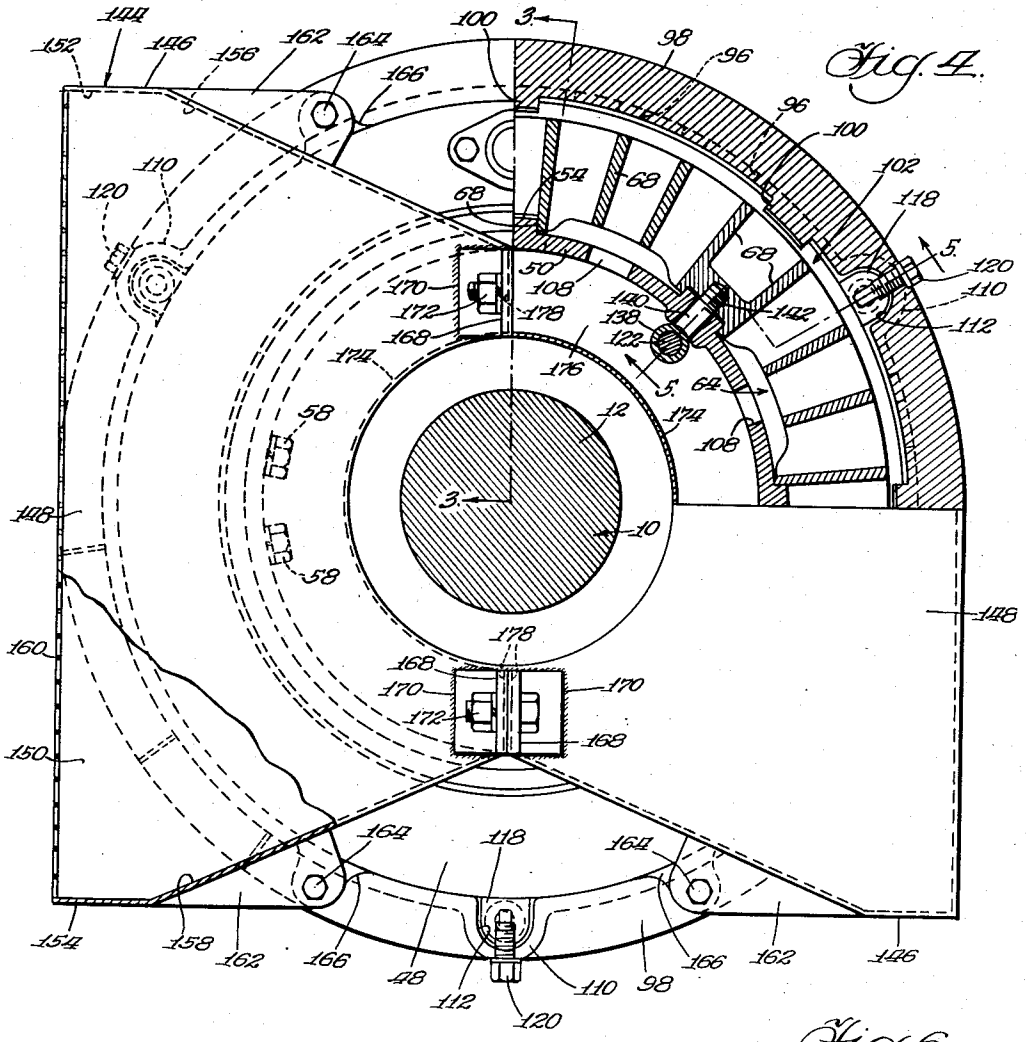


Fig. 5.

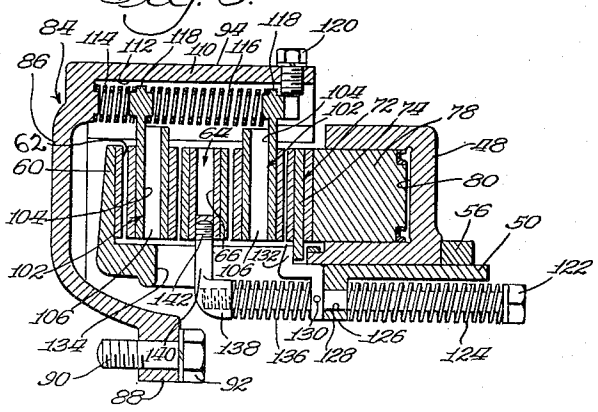
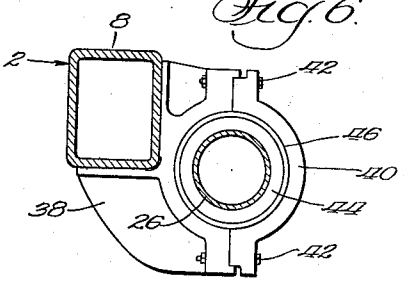


Fig. 6.



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Fig. 7.

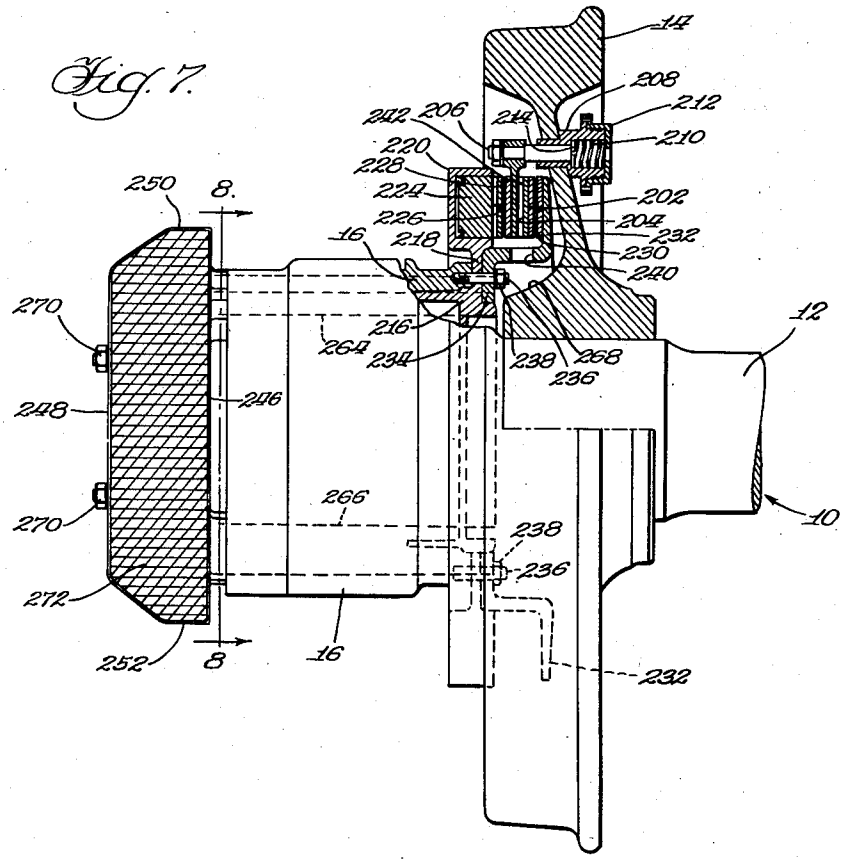


Fig. 8.

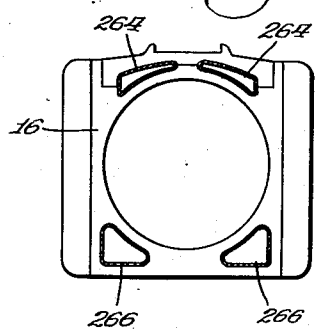
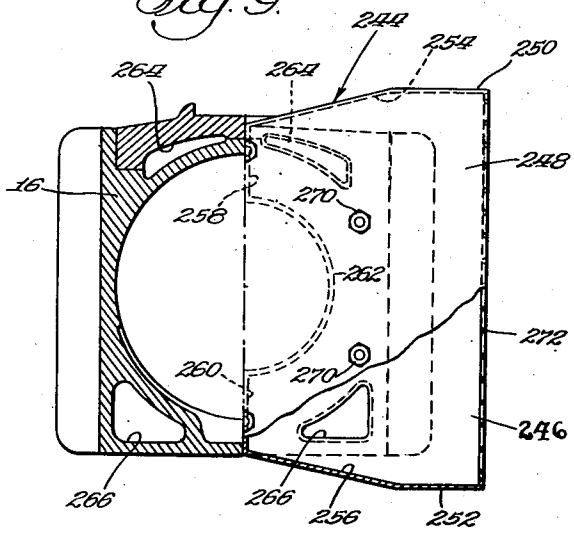


Fig. 9.



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UNITED STATES PATENT OFFICE

2,655,236

DISK BRAKE

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Application May 25, 1949, Serial No. 95,299

22 Claims. (Cl. 188—59)

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This invention relates to brakes and more particularly to a vehicle brake such as is commonly utilized in a railway car truck.

A primary object of the invention is to devise a brake of rugged construction which may be readily assembled and disassembled to facilitate replacement and repair.

A further object of the invention is to devise an air-cooled brake wherein air is circulated through the stator and rotor means of the device.

Another object of the invention is to provide a novel air scoop adapted to force air through the brake when the vehicle is in motion.

A further object of the invention is to devise a novel stator support wherein the torque arm for transmitting torque forces to the vehicle frame is keyed to a guide arm journalled on the wheel and axle assembly to maintain concentricity between the stator and rotor means of the brake.

Still another object of the invention is to provide novel release means for the rotor and stator means and so arranged as to facilitate assembly and dis-assembly thereof.

The foregoing and other objects and advantages of the invention will become apparent upon consideration of the following specification and the accompanying drawings wherein Figure 1 is a fragmentary top plan view of a railway car truck having a preferred embodiment of the novel brake and support structure applied thereto.

Figure 2 is a side elevational view of the structure shown in Figure 1, certain parts of the truck and brake structure being eliminated to clarify the illustration.

Figure 3 is a side elevational view of the wheel and axle assembly taken from the right, as seen in Figure 2, and partly in section on line 3—3 of Figure 4;

Figure 4 is an inboard elevational view taken from the right of Figure 3, partly in section on line 4—4 of Figure 3;

Figure 5 is a sectional view on the line 5—5 of Figure 4;

Figure 6 is a sectional view on the line 6—6 of Figure 1;

Figures 7 to 9 inclusive illustrate a modification of the invention, Figure 7 being a side elevational view, partly in central vertical section, of a wheel and axle assembly having the modiled brake applied thereto. Figure 8 being a sectional view on the line 8—8 of Figure 7, and Figure 9 being an outboard elevational view with

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the air scoop partly broken away and the journal box partly in central vertical section.

In each of said figures certain details may be omitted where more clearly seen in other views.

Describing the invention in detail and referring first to the preferred embodiment illustrated in Figures 1 to 6, a conventional railway car truck frame is shown at 2 and comprises a side rail 4 at each side thereof, an end rail 6 at each end thereof, and a transom 8 interconnecting the side rails adjacent each end of the frame and adapted to afford support for an associated truck bolster (not shown). The truck comprises a wheel and axle assembly generally designated 10 adjacent each end thereof, said assembly comprising an axle 12 and a wheel 14 adjacent to each end thereof, the outboard end of the axle being received within a journal box 16 (Figure 3) said box being adapted to contain conventional bearing means (not shown) for the axle. The truck frame side rail 4 is provided with a pair of legs or pedestals 18 (Figure 2) adapted to confine and guide the journal box 16 in conventional manner and it will be understood that the journal boxes 16 at each side of the truck are adapted to support an equalizer (not shown), affording spring support in the usual manner for the truck frame 2.

Thus under normal service conditions the frame 2 is afforded support by the wheel and axle assembly 10 and is spring-supported for vertical movement with respect thereto, as will be understood by those skilled in the art.

The novel brake support comprises a guide arm 19 having a journal portion 20 encircling the journal box 16 and received within an annular recess or groove 22 (Figure 3) therein. The arm 19 also comprises a hub 24 receiving a beam 26 fixed thereto as by one or more studs or screws 28 (Figure 1).

The beam 26 is also received within a similar hub 30 of a torque arm 32 and is fixed to the hub 30 as by one or more studs or screws 34, the hubs 24 and 30 being keyed by a readily removable key or bar 36 fitted within complementary openings of the hubs 24 and 30 so that the arms 19 and 32 rotate in unison as a unit about the axis of the wheel and axle assembly 10 during relative vertical movement of the truck frame 2.

A bracket 38 is secured in any convenient manner as by bolts (not shown) to the transom 8, said bracket receiving the beam 26 which is clamped therewithin by clamp plate 40 secured as by bolt and nut assemblies 42 to the bracket 38. Preferably the bracket 38 and plate 40 contain

a rubber bushing 44 (Figure 6) confining the beam 26 and contained within a steel bushing 46, to afford a resilient torque connection between the beam 26 and the transom 8.

The torque arm 32 is connected to an annular cylinder casting 48 slidably fitted over an annular stator support 50 and having splines 52 (Figure 3) mating with complementary splines 54 of the stator support 50, to prevent rotation of the stator support. The cylinder casting 48 is removably secured to the statory support by a retainer ring 56 and studs or screws 58 (Figure 3).

The outboard end of the support 50 is provided with a radially outturned annular flange 60 having a stator surface 62 of any desired friction material secured thereto in any convenient manner. The stator support 50 is sleeved within an annular stator 64 having an internal radial chamber or passage 66 and a plurality of spaced radial ribs 68. Annular friction plates 70 of any suitable friction material are secured to opposite sides of the stator 64. As best seen in Figure 4, the splines 54 of the stator support 50 are engaged with the radially inner extremities of certain of the ribs 58 which project radially inwardly of the other ribs for this purpose, thereby affording a torque connection between the stator 64 and the stator support 50. Another stator 72 is sleeved over the stator support 50 and comprise splines 74 (Figure 3) mating with the splines 54 of the stator support, and annular friction plates 76 of any suitable material are secured to opposite sides of the stator 72, the inboard plate 76 being normally engaged with an annular piston 78 received within a complementary annular cylinder 80 of the cylinder casting 48, compressed air being delivered to the cylinder 80 by a suitable fitting 82 for actuation of the piston 78 as hereinafter described in connection with the operation of the brake.

An annular rotor housing 84 including an outboard plate 86 is attached by means of a hub 88 on the inner perimeter of the plate to the wheel 14 by studs 90 and nuts 92. The radially outer extremity of the annular plate 86 is provided with an axially extending flange 94 encircling the stator support 50 and provided with air ports or passages 96 and radial heat radiating fins 98.

The inner perimeter of the flange 94 is splined as at 100 to afford a driving torque connection to a pair of substantially identical rotors 102 which are similar in construction to the stator 64. Each rotor 102 is provided with a radial air flow chamber or passage 104 and a plurality of radial ribs or vanes 106 adapted to function as vanes of a peripheral or centrifugal blower, whereby during rotation of the wheel and axle assembly 12, air is drawn from the inner perimeter of the chambers 104 and is expelled from the outer perimeters thereof through the ports 96 of the flange 94, the stator support 50 being provided with similar air ports 108.

The flange 94 as best seen in Figures 1 and 5 is provided with a plurality of convolutions 110 defining semi-cylindrical housings 112 for a pair of rotor release springs 114 and 116 respectively (Figure 5).

The spring 114 is compressed between the plate 86 and a lug 118 on the outer radially perimeter of the outboard rotor 102, and the spring 116 is compressed against a similar lug 118 on the inboard rotor 102. In release position of the rotors, the lug 118 of the inboard rotor abuts a stop screw 120 threaded into the convolution 110 of the flange 94.

A plurality of release means are provided for the stators, one of said means being shown in Figure 5 and comprising a stud or screw 122 having a compression spring 124 sleeved thereover and seated against a spring seat lug 126 projecting radially inwardly of the annular stator support 50. The stud 122 is sleeved within a complementary opening 128 of the lug 126 and is keyed as at 130 to an arm 132 engageable with the inner perimeter of the stator 74 within a slot 134 in the stator support 50. A compression spring 136 sleeved over the stud 122 is compressible between the arm 132 and a stud 138 threaded on the outboard end of the stud 122, said stud 138 having a radial arm 140 in complementary threaded engagement with the stator 64 as at 142.

Thus it will be understood that the brake is actuated by means of compressed air admitted to the cylinder 80 through the fitting 82 whereby the piston 78 is operable to urge the rotors and stators into a pile against the flange 60 of the stator support 50. Upon release of the piston 78, the springs 114 and 116 are operable to urge the rotor 102 to release position shown in the drawings and the springs 124 and 126 are operable to urge the stators 64 and 72 to the release position shown on the drawings whereat the rotors and stators are spaced from each other to define radial air flow passages as clearly shown in Figures 3 and 5.

It may be noted that upon removal of the studs 120, the springs 114 and 116 may be removed together with the rotors 102 from the rotor housing 84, during disassembly of the brake and upon removal of the key means 130, the studs 122 may be unthreaded from the studs 138 and may be removed along with the springs 124 and the springs 136, whereupon the arms 132 may be removed and the studs may be disconnected from the stator 64. The cylinder casting 48 may be readily removed by removing the screws 58 and the ring 56 from the inboard end of the stator support 50.

A primary object of the invention is to provide means for forcing air through the ports 108 of the stator support 50 to augment circulation of air through the rotor and stator passages as above described, and in the preferred embodiment of the invention this is accomplished by a double air scoop or Venturi chamber, generally designated 144 in Figures 3 and 4. The air scoop 144 comprises a pair of substantially identical oppositely facing segments 146, each including inboard and outboard walls 148 and 150 and top and bottom walls 152 and 154 having segments 156 and 158, respectively, converging toward the rotational axis of the wheel and axle 10 as best seen in Figure 4. The top and bottom walls 152 and 154 define an opening at the remote ends of the walls 156 and 158, said opening being provided with a grate or grill 160 preferably formed of expanded metal and adapted to prevent foreign objects such as small stones from bouncing into the chamber defined by the walls 148, 150, 152 and 154.

The outboard wall 150 is provided with an opening complementary to and receiving the stator support 50 and is provided with top and bottom flanges 162 secured as by screws 164 to lugs 166 of the cylinder casting 48, and the inboard wall 148 is provided with top and bottom lugs 168 secured thereto as by welding at 170 and having openings accommodating bolt and nut assemblies 172, securing the segments 146 to each other.

The inboard and outboard walls 148 and 150 of each segment 146 are connected by a semi-

cylindrical web 174, the webs 174 surrounding the axle 12 and projecting inboardly within the stator support as best seen in Figure 3 to define therewith an annular passage 176 connecting the air scoop 144 with the ports 108 of the stator support 50 and in this connection it may be noted that the inner or adjacent ends of the converging Venturi walls 156 and 158 are formed with baffle plates or walls 178 connected to the web 174.

Thus when the truck is in motion, air is forced into the Venturi chamber 144 along the converging walls 156 and 158 and strikes the baffle plates 178 which change the direction of air flow from radial to axial flow with respect to the wheel and axle assembly 10, thereby causing turbulence in this air flow and directing the air under pressure through the chamber 176 into the ports 108 and thence outwardly through the stator chamber 66 and the rotor chambers 104 through the ports 96 of the rotor housing flange 94. It will be understood that a pair of chamber segments 146 are desirable so that air will be forced through the chamber 176 regardless of the direction of movement of the truck.

A modified form of the invention is shown in Figures 7 to 9 wherein the wheel and axle assembly 10, including the axle 12 and the wheel 14, as well as the journal box 16 are generally similar to those described in connection with the embodiment of Figures 1 and 6. The other truck parts are not shown inasmuch as they are also similar to those previously described.

In the embodiment of Figures 7 to 9, a single rotor 202 having a radial passage 204 is connected by a plurality of bolts 206 to the wheel 14 which is provided with a bushing 208 receiving each bolt 206 and containing a spring 210 compressed between a spring cap 212 on the bushing 208 and a head 214 of the bolt 206, to yieldingly urge the rotor 202 to its released position as shown in Figure 7.

The journal box 16 is provided with an inboard closure plate 216 having a flange 218 formed with an annular cylinder casting 220 containing an annular piston 224. The piston is provided with a plurality of radial chambers 226 and is also provided with an annular stator plate 228 of any suitable friction material adapted to engage the outboard side of the stator 202, the inboard side of which is adapted to engage an annular friction plate 230 secured in any desired manner to an annular flange 232 of a stator support 234 which is secured as by studs 236 and nuts 238 to the flange 218 and to the journal box 16. The stator support 234 is provided with a plurality of radial flow passages 240 aligned with the chamber 206 of the rotor 202.

The box 16 is afforded a torque connection (not shown) to the truck frame as for example by pedestal legs 18, such as those described for the preceding embodiment or by a torque arm (not shown).

In operation of the brake, fluid such as compressed air is admitted to the cylinder 220 actuating the piston 224 to urge the stator plate 228 and the rotor 202 into a pile against the flange 232. Upon release of the piston 224, the spring 210 is operable to return the rotor 202 to its released position shown on the drawings.

It may be noted that as in the previously described embodiment, the rotor 202 is preferably provided with a plurality of radial vanes, one of which is shown at 242 in Figure 7 and functions as a centrifugal or peripheral blower to draw air through the ports 240 and to expel air outwardly from the chamber 204 of the rotor thereby dissipating heat developed during a braking operation; however, a primary object of the invention is to provide additional means for forcing air through the ports 240 thereby augmenting the flow of cooling air therethrough.

This object is accomplished by means of a double air scoop or Venturi chamber 244 generally similar to that described in the preceding embodiment and comprising a pair of segments each having inboard and outboard walls 246 and 248 and top and bottom walls 250 and 252 with converging segments 254 and 256 provided at their adjacent inner extremities with baffle plates or walls 258 and 260 respectively, interconnected by an arcuate semi-cylindrical wall 262 defining a chamber connected by a pair of conduits 264 and 266 respectively, said conduits extending through complementary openings in the journal box 16, which openings extend at their inboard extremities through the flange 218 and the stator support 234 to communicate with a chamber 268, defined by the stator support 234 and the wheel 14.

The segments of the chamber 244 are secured as by screws or studs 270 to the outboard side of the journal box 16, and the top and bottom walls 250 and 252 of each segment are connected at the open side of the Venturi chamber by a grate or grill 272 to prevent foreign matter such as dirt and stones from bouncing into the chamber.

Thus it will be understood that in operation of the brake shown in Figures 7 to 9, coolant air is scooped into one of the segments of the chamber 244 depending upon the direction of movement of the truck and is forced through the related conduits 264 and 266 into the chamber 268 and outwardly to the ports 240 and through the chambers 204 and 226 to dissipate heat developed during braking operation.

In each of the embodiments described, the coolant air provided by the air scoop or Venturi chamber is forced between the adjacent rotor and stator surfaces when the brake is released and is forced through special rotor and stator chambers when the brake is applied to accommodate maximum dissipation of heat developed as the result of brake operation.

I claim:

1. In a brake arrangement for a railway car truck having a truck structure and a supporting wheel and axle assembly including an axle and a wheel; the combination of an annular rotor housing encircling the axle and connected to said assembly for rotation therewith, said housing including an annular plate extending generally radially with respect to the rotational axis of said assembly and an annular flange on said plate extending generally axially of this assembly, said flange having a plurality of convolutions defining chambers, a rotor having a splined connection at its outer perimeter to said flange limiting rotative movement of the rotor relative thereto and accommodating movement of the rotor relative to the flange axially of said assembly, said rotor having spring abutments projecting into the respective chambers, removable stops carried by said flange and projecting into the respective chambers, spring means compressed against said plate and said abutments for urging the latter against said stops, a stator support encircling the axle and projecting into said housing, a torque connection between said structure and said stator support, a plurality of slots in said stator support, a stator having a splined

connection at its inner perimeter to said stator support limiting rotative movement of the stator relative thereto and accommodating movement of the stator relative to the stator support axially of the assembly, a member projecting into each of said slots and connected to the inner perimeter of the stator, spring means carried by the stator support and connected to said member for urging the stator to spaced position with respect to the rotor, and power means for urging the rotor and stator axially of said assembly into a pile against an abutment of said stator support.

2. In a brake arrangement for a railway car truck having a truck structure and a supporting wheel and axle assembly including an axle and a wheel; the combination of a tubular stator support encircling the axle and having a torque connection to said structure, an annular stator carried by said support, an annular rotor encircling the axle and connected to said assembly for rotation therewith, said stator support being disposed within said rotor, said rotor having an internal annular chamber extending from the radially inner perimeter to the radially outer perimeter thereof and having blower vanes in said chamber for impelling air radially outwardly therethrough, resilient release means connected to the rotor for yieldingly maintaining the same in spaced relationship with respect to the stator to define a radial air flow passage therebetween, means for urging the rotor and stator into frictional engagement with each other, ports through said stator support in radial alignment with the rotor chamber, an annular air chamber defined by the stator support and a portion of said assembly radially inwardly thereof, and an air scoop carried by said structure comprising top and bottom walls, spaced inboard and outboard walls and an inner baffle plate extending generally axially with respect to the assembly and defining a chamber opening forwardly of the truck, said baffle plate being adapted during forward movement of the truck to direct turbulent air from the scoop chamber under pressure through the second mentioned chamber and thence through said ports into the inner perimeter of the rotor chamber.

3. A brake arrangement according to claim 2, wherein the outboard end of the axle is provided with a journal box and the stator support is removably mounted on the inboard side of the journal box, the air scoop being removably mounted on the outboard end of the journal box and being connected by passages extending therethrough to the annular passage between the stator support and the portion of the wheel and axle assembly therewithin.

4. A brake arrangement according to claim 2, wherein the air scoop is removably mounted on the inboard end of the stator support.

5. A brake arrangement according to claim 2, wherein a journal box is supported on the outboard end of the axle and the air scoop is removably mounted on the journal box.

6. In a brake arrangement for a railway car truck having a truck structure and a supporting wheel and axle assembly including an axle and a wheel; the combination of an annular rotor surrounding the axle and connected to said assembly for rotation therewith, said rotor having an internal annular chamber extending from the radially inner perimeter to the radially outer perimeter thereof and having blower vanes in said chamber for impelling air radially outwardly therethrough, an annular stator surrounding the

axle and having an internal chamber extending from the radially inner to the radially outer perimeter thereof, a torque connection between the stator and said structure, resilient means for yieldingly maintaining the rotor and stator in spaced relationship to each other to define a radial air flow passage therebetween, power means for urging the rotor and stator into frictional engagement with each other, an air scoop carried by said structure at one side of said wheel and having top and bottom walls and spaced inboard and outboard side walls defining a chamber facing forwardly of the truck and extending radially with respect to the assembly, and passage means extending generally axially of the assembly for directing air from said chamber during forward movement of the truck to the radially inner perimeter of the rotor and stator chambers and into the air flow passage.

7. A brake arrangement according to claim 6, wherein the wheel and axle assembly comprises a journal box outboardly of the wheel and the scoop is carried by the journal box, the passage means connecting the scoop chamber to the rotor and stator chambers and to the air flow passage extending through the journal box.

8. In a brake arrangement for a railway car truck having a truck structure and a supporting wheel and axle assembly including an axle and a wheel; the combination of a rotor housing secured to the wheel for rotation therewith, a plurality of annular rotors surrounding the axle, splined connections between the outer perimeters of the rotors and the rotor housing limiting relative rotation therebetween and accommodating axial movement therebetween, a tubular stator support surrounding the axle and disposed within said rotor housing and having a torque connection with the truck structure, an annular stator having a splined connection at its inner perimeter to the stator support limiting relative rotation therebetween and accommodating axial movement of the stator with respect to the stator support, an annular flow passage through each of said rotors extending from the radially inner to the radially outer perimeter thereof, an annular flow passage through the stator extending from the radially inner perimeter to the radially outer perimeter thereof, ports through the stator support aligned with the rotor passages, other ports through the stator support aligned with the stator passage, means for urging the rotors and stators into frictional engagement with each other, and means for directing air axially through said stator support and then radially through said ports.

9. In a brake arrangement for a railway car truck having a truck structure and a supporting wheel and axle assembly including an axle and a wheel; the combination of a tubular stator support encircling the axle and having a torque connection to said structure, an annular rotor encircling said support, means for operably connecting the rotor to said assembly for rotation therewith, said rotor having an internal annular flow passage extending from the inner perimeter to the outer perimeter thereof, ports through the stator support aligned with the radially inner perimeter of said rotor passage, a stator carried by the stator support, means for frictionally coupling the rotor and stator, and scoop means for forcing air axially through said stator support and thence radially outwardly through said ports said scoop means comprising inlet passage means extending radially with respect to the as-

sembly and also comprising passage means extending axially of the assembly from the inlet passage means and connected to said ports, whereby air flowing from the inlet passage means to the second-mentioned passage means becomes turbulent before passing into said ports.

10. In a brake arrangement for a vehicle having a frame and a supporting wheel and axle assembly, the combination of tubular stator means having a torque connection to the frame, annular rotor means encircling said stator means and having a driving connection to the assembly, means on said stator means for frictionally coupling the rotor and stator means, an air scoop carried by the vehicle and comprising inlet passage means extending radially with respect to the assembly and facing forwardly thereof, and an annular passage defined by said stator means extending axially of the assembly from the inner end of the inlet passage means to the radially inner perimeters of the rotor and stator means, and outlet passage means transversely communicating with the annular passage at the radially inner perimeters of the rotor and stator means and extending radially outwardly through the radially outward perimeters of the rotor and stator means.

11. In a brake arrangement for a railway car truck comprising a wheel and axle assembly and a truck frame spring-supported therefrom; the combination of spaced arms encircling one wheel of said assembly and extending radially therefrom, one of said arms being rotatably journaled on the assembly and the other of said arms being keyed to said one arm against rotation relative thereto about the axis of said assembly, rotor means including a tubular stator support carried by the assembly, stator means carried by said other arm, said stator means being disposed within said rotor means, and power means carried by said other arm for actuation of said stator means.

12. In a brake arrangement for a railway car truck comprising a wheel and axle assembly and a truck frame supported thereby; the combination of spaced arms extending radially from opposite sides of one wheel of the assembly and connected to the frame, said arms being keyed against rotational movement relative to each other about the axis of said assembly, one of said arms being journaled on said assembly for rotation about the axis thereof, rotor means carried by said assembly, and stator means and actuating means therefor carried by the other arm, said stator means being disposed within said rotor means.

13. In a brake arrangement for a railway car truck comprising a wheel and axle assembly and a truck frame spring-supported therefrom; the combination of a U-shaped rigid structure embracing a wheel of said assembly and having a torque connection to the truck frame, said structure being journaled to the assembly outboardly of said wheel for rotation about the axis of said assembly, rotor means carried by said assembly inboardly of the wheel, stator means carried by said structure inboardly of said wheel and disposed within said rotor means, and means for frictionally coupling said rotor and stator means.

14. In a brake arrangement for a railway car truck comprising a wheel and axle assembly including spaced wheels and an axle; the combination of a U-shaped brake support structure having torque connection to the truck and having spaced arms receiving a wheel therebetween, one of said arms being journaled on the wheel and axle assembly for rotation with respect thereto, stator means including a tubular support carried by the other arm, rotor means carried by said assembly and enclosing said stator means, and means including a ring-shaped piston encircling said support for frictionally coupling said rotor and stator means.

15. In a brake arrangement for a railway car truck having a wheel and axle assembly and a truck frame spring-supported therefrom; the combination of spaced arms receiving a wheel of said assembly therebetween and each having a portion encircling the axle, one of said arms being journaled on said assembly for rotation about the axis thereof, means keying the other arm to the first-mentioned arm against rotation relative thereto about the axis of said assembly, rotor means including a housing carried by the assembly between said arms, stator means disposed within said housing carried by said other arm, and means for actuating said rotor and stator means.

16. In a brake mechanism for a railway truck, a truck frame, a wheel, an axle carried by said wheel, a tubular stator support enclosing the axle to define a passageway therebetween, a torque connection between said stator support and said frame, a rotor enclosing said tubular support and including a housing, friction elements for operably connecting the stator support to said rotor, said stator support being provided with air ports, said friction elements being provided with radially disposed openings, and scoop means to force air axially through said stator support and thence radially through said support ports and then through the openings in said friction elements.

17. In a brake mechanism for a railway truck, a truck frame, a wheel, an axle carried by said wheel, a stator means supported on said frame and axle and including a tubular support encircling the axle to define a passageway therebetween, annular non-rotatable friction elements carried by and encircling said support, rotor means including a housing rotatable with said wheel and encircling said stator means and including annular rotatable friction elements interleaved with said non-rotatable elements, means operable to frictionally engage and disengage said rotatable and non-rotable elements, apertures formed in said tubular support communicating with said passageway to direct streams of air outwardly between said elements, and an air scoop to direct a stream of air into said passageway.

18. In a brake mechanism for a railway truck, a truck frame, a wheel, an axle carried by said wheel, a stator means supported on said frame and axle and including a tubular support encircling the axle to define a passageway therebetween, annular non-rotatable friction elements carried by and encircling said support, rotor means rotatable with said wheel and encircling said tubular support and including annular rotatable friction elements interleaved with said non-rotatable elements, means to move said rotatable and non-rotatable elements into and out of frictional engagement, said rotatable elements having openings extending radially therethrough, said tubular support being formed with ports to direct streams of air outwardly through the openings in said rotatable elements, and an air scoop to direct air into the interior of said tubular support.

19. In a brake mechanism for a railway truck, a truck frame, a wheel, an axle carried by said wheel, a stator means suported on said frame and axle and including a tubular support encircling the axle to define a passageway therebetween, annular non-rotatable friction elements carried by and encircling said support, rotor means rotatable with said wheel and encircling said tubular support and including annular rotatable friction elements interleaved with said non-rotatable elements, means to move said rotatable and non-rotatable elements into and out of frictional engagement, said rotatable elements having openings extending radially therethrough, said tubular support being formed with ports to direct streams of air outwardly through the openings in said rotatable elements, and an air scoop to direct air into the interior of said tubular support, said rotor means including a housing to enclose said friction elements, said housing having air ports to exhaust heated air therefrom.

20. In a brake mechanism for a railway truck, a truck frame, a wheel, an axle carried by said wheel, a stator means supported on said frame and axle and including a tubular support encircling the axle to define a passageway therebetween, annular non-rotatable friction elements carried by and encircling said support, rotor means including a housing rotatable with said wheel and encircling said stator means and including rotatable friction elements interleaved with said non-rotatable elements, a ring-shaped cylinder secured on said tubular support, and a ring-shaped piston mounted in said cylinder to move said rotatable and non-rotatable elements into frictional engagement with each other.

21. In a brake mechanism for a railway truck, a truck frame, a wheel, an axle carried by said wheel, a stator means supported on said frame and axle and including a tubular support encircling the axle to define a passageway therebetween, annular non-rotatable friction elements carried by and encircling said support, rotor means including a housing rotatable with said

wheel and encircling said stator means and including rotatable friction elements interleaved with said non-rotatable elements, a ring-shaped cylinder secured on said tubular support, and a ring-shaped piston mounted in said cylinder to move said rotatable and non-rotatable elements into frictional engagement with each other, and resilient means to normally urge said rotatable and non-rotatable elements out of frictional engagement with each other.

22. In a brake mechanism for a railway truck, a truck frame, a wheel, an axle carried by said wheel, a stator means supported on said frame and axle and including a tubular support encircling the axle to define a passageway therebetween, annular non-rotatable friction elements carried by and encircling said support, rotor means rotatable with said wheel and encircling said stator means and including rotatable friction elements interleaved with said non-rotatable elements, a ring-shaped cylinder secured on said tubular support, and a ring-shaped piston mounted in said cylinder to move said rotatable and non-rotatable elements into frictional engagement with each other, and resilient means to normally urge said rotatable and non-rotatable elements out of frictional engagement with each other, said tubular support and at least one of said friction elements having air ports extending radially therethrough and communicating with said passageway, and an air scoop to direct a stream of air to the interior of said tubular support for passage through said air ports to cool said elements.

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