Oct. 27, 1942. W. H. BASELT ET AL 2,299,726

BRAKE ARRANGEMENT

Filed Dec. 19, 1940 2 Sheets-Sheet 1

Fig. 3.

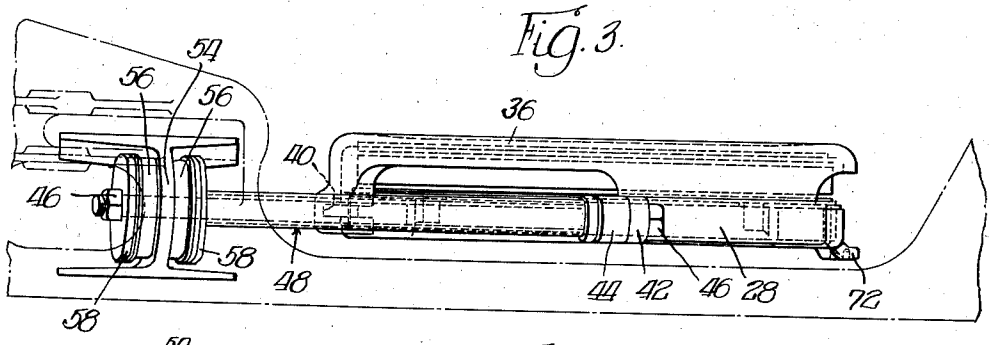


Fig. 1.

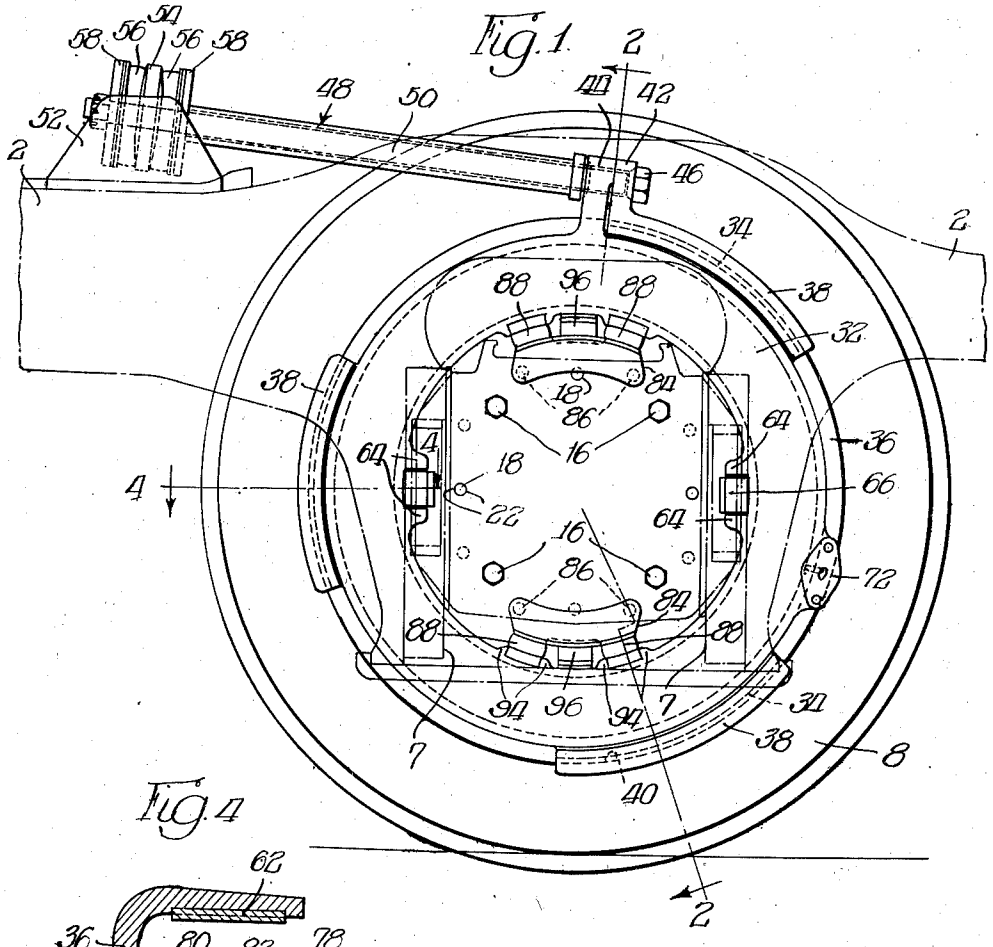
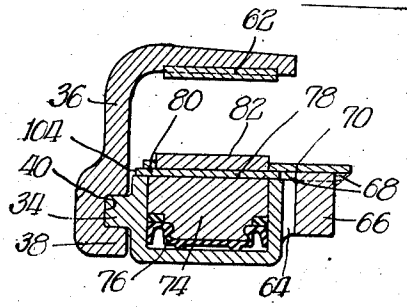


Fig. 4



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BRAKE ARRANGEMENT

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Fig. 2

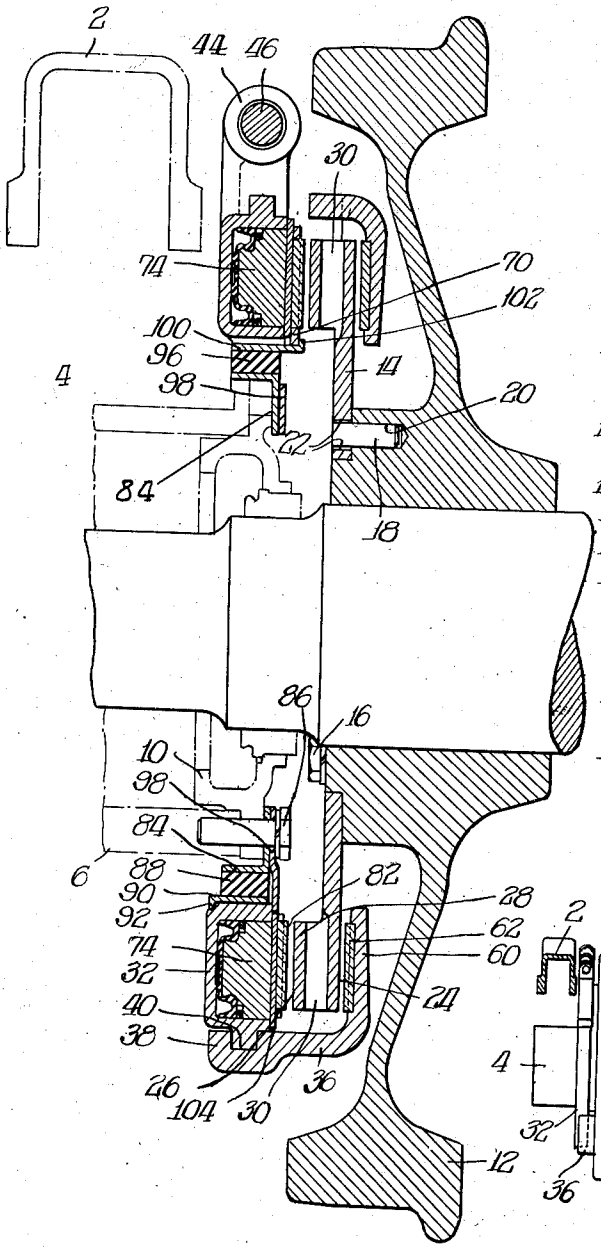


Fig. 5

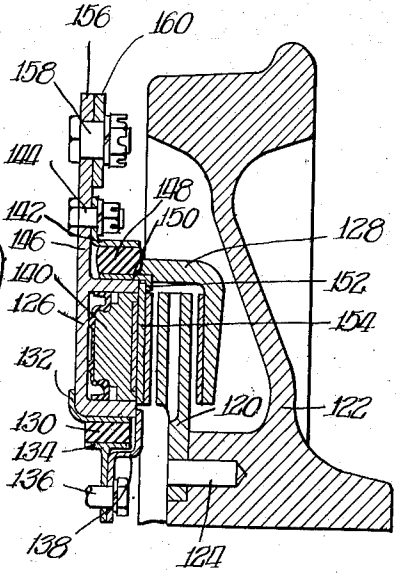
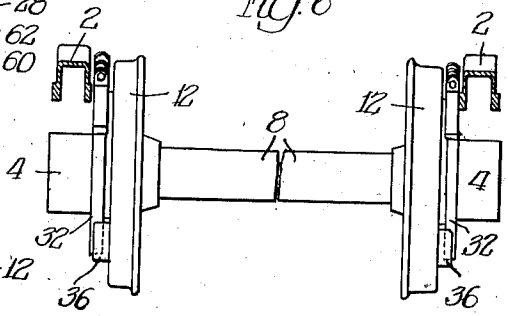


Fig. 6



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UNITED STATES PATENT OFFICE

2,299,726

BRAKE ARRANGEMENT

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Application December 19, 1940, Serial No. 370,780

30 Claims. (Cl. 188—153)

Our invention relates to a brake arrangement for a railway car truck and more particularly to a form of brake commonly designated rotor type wherein the braking means comprises a series of rotors and stators mounted for engagement with each other when the brakes are actuated.

The general object of our invention is to design a rotor brake of relatively simple form suitable for application to railway wheel and axle assemblies of ordinary friction or anti-friction type.

Our invention comprehends an arrangement wherein a ring cylinder may be resiliently mounted on a frame member such as a journal box and stators may be supported from said cylinder for engagement with a rotor carried on a rotating portion of the associated wheel and axle assembly. Our invention contemplates such an arrangement as that described wherein the actuating means or brake cylinder by being resiliently supported may be displaced slightly from its normal position by the reaction as the power means is operated, the piston of course moving in the reverse direction a substantially equal amount.

A more specific object of our invention is a combination such as that described wherein a stator casting may be supported on a cylinder casting to move laterally therewith, said stator engaging the inboard braking surface of the associated rotor while the outboard braking surface of said rotor may be engaged by another stator moving in unison with the piston. By such an arrangement the braking force applied to the outboard face of the rotor by the piston and its associated stator moving in one direction may be opposed by the substantially equal reaction furnished by the cylinder acting through the inner stator against the inboard face of the rotor in the reverse direction. By this means there is eliminated any transfer of the braking forces into the frame or wheel and axle assembly as far as action and reaction of the piston and cylinder are concerned. This arrangement affords an unusually compact setup wherein minimum space is required while offering maximum efficiency of performance.

Figure 1 is a fragmentary side elevation of a railway car truck embodying our novel brake arrangement.

Figure 2 is a transverse sectional view through the truck and brake arrangement shown in Figure 1, the section being taken in the radial planes indicated by the lines 2—2 of Figure 1.

Figure 3 is a fragmentary top plan view of the truck and brake structure shown in Figures 1 and 2.

Figure 4 is a fragmentary sectional view through a portion of the brake means taken in the horizontal plane indicated by the line 4—4 of Figure 1.

Figure 5 is a fragmentary view comparable to the showing in Figure 2 illustrating an alternate arrangement for the release means associated with one of the stators.

Figure 6 is a showing of reduced size of a complete wheel and axle assembly with a braking unit for each end of the assembly, the structure corresponding to that shown in the modification shown and described for Figures 1 to 5.

Describing our novel structure in greater detail, the truck frame comprises a side member 2 of well-known form, said truck having equalizers (not shown) which may be supported at 4 on the journal box 6, said equalizers forming the usual means of support for spring means (not shown) on which may be carried the side member 2. The journal box 6 may be guided between the pedestal jaws 7, 7 and forms the usual means of connection with the supporting wheel and axle assembly 8 and the inboard end of the journal box is afforded a closure plate 10 of usual form.

On the outboard face of the wheel 12 may be supported the rotor 14, said rotor being secured on said wheel against relative lateral motion with respect thereto by the stud bolts 16, 16 threaded into the hub of the wheel, said stud bolts being in alternate arrangement with the shear bolts 18, 18 which may be press-fitted as at 20 into the wheel hub. Radial clearance is afforded on opposite sides of said shear bolts as at 22, 22 to accommodate expansion and contraction of the rotor 14 without distortion under normal operating conditions while at the same time restraining said rotor against relative rotation with respect to said wheel. The rotor 14 is formed with an inboard annular braking surface 24 and an outboard annular braking surface 26, the surface 26 being formed on an annular plate-like member 28 integrally joined to the main body portion of the rotor by spaced radial ribs 30, 30 spaces between said ribs affording access for a cooling medium such as air when the brakes are in operation.

The power means is in the form of a ring cylinder 32, centrally about the outer periphery of which is formed a series of three spaced annular flanges 34, 34 serving as a means of interlocking the inboard stator casting or carrier 36 against relative lateral movement with respect to said cylinder. Said carrier 36 is formed with a series of spaced flanges 38, 38 defining annular

slots 40, 40 about the periphery of said carrier, said flanges and slots being so arranged as to permit the mounting of said carrier on said cylinder by relative rotation thereof in the assembly operation. After the carrier has been assembled on the cylinder the torque lug 42 (Figure 1) on said carrier may be brought flush against the torque lug 44 at the top of said cylinder and secured thereagainst by the retaining bolt or tension member 46 which is a part of the torque arm 48, the said torque arm also comprising the tube or casing 50 which serves as the compression member of said torque arm while the retaining bolt 46 serves as the tension member thereof. The truck side frame member 2 may be formed with a torque bracket 52 comprising vertical flanges joined by the transverse web or plate 54 and the torque arm may be secured to the web 54 with blocks of resilient material 56, 56 being interposed between the plate 54 and the compression member 50 and the tension member 46 of said torque arm, said tension and compression members being afforded end plates 58, 58 as suitable seating means for said resilient pads.

The carrier 36 is of ring-like or annular form and comprises the inwardly directed annular flange or stator portion 60 on the outboard face of which may be supported the brake facing 62 arranged for engagement with the inboard face or braking surface 24 of the rotor 14.

At opposite sides of the cylinder casting 32 may be formed spaced shear lugs 64, 64 (Figure 4) between which may be received the shear lugs 66, 66 welded as at 68, 68 on the outboard stator 70 thus preventing relative rotation of the stator 70 and the piston and ring cylinder.

The ring type cylinder is formed with a face plate 72 serving as convenient mounting means for a fitting through which compressed air may be applied as needed.

Fitted within the cylinder is the ring type piston 74, said piston being fitted with a gasket 76 of suitable form to prevent air leakage. The annular inboard face of the ring piston 74 seats as at 78 against the insulator ring 80, said facing ring affording convenient seating means for said piston against the outboard stator 70 to which said facing ring may be secured. Said stator 70 is afforded an annular brake surface 82 which may abut the outboard brake surface 26 of the rotor 14.

The cylinder 32 is resiliently supported from the journal box by means of angle irons 84, 84 which may be secured on the closure plate of the journal box at the top and bottom thereof by means of stud bolts 86, 86 which also serve as securing means for said closure plate. Secured to the angle irons or support plates 84, 84 at opposite edges thereof as by vulcanizing are spaced resilient pads or cylinder support and release means 88, 88 and on the opposite faces of said pads 88 may be vulcanized the plates 90, 90 (Figure 2), said plates being flanged over as at 92 to have bearing against the outboard edge of the inner perpihery of the cylinder 32. Likewise the edges of the plates 90, 90 bear against the shear lugs 94, 94 (Figure 1) provided on said inner periphery to prevent relative rotational movement between the cylinder and said plates. Intermediate the plates 90, 90 are positioned the resilient pads 96, 96 serving as release means for the ring piston. Each piston release spring 96 is carried on and may be vulcanized to one of the before-mentioned plates 84 and the offset plate 98 which is also secured by means of the stud bolts 86, 86 may serve as a stop to limit inboard travel of the cylinder 32. On the opposite face of each release pad 96 may be fulcrumed the plate 100 which may be flanged over at its inboard edge as at 102 (Figure 2) to afford bearing against the inner peripehry of the outboard stator 70. The outboard stator 70 is prevented from assuming an eccentric position with regard to the cylinder or piston by spaced peripheral abutments as at 104 (Figures 2 and 4) against the carrier 36. The release pads 96 are applied in shear so as to urge the flange 102 of the plate 100 against the stator 70 thus holding the said stator normally in position against the ring piston 74.

In operation assuming the parts to be in normal relationship as shown in the drawings, application of air to the ring cylinder will cause relative lateral movement between the cylinder and the piston, said cylinder being resiliently mounted on the pads 88, 88 and the piston resiliently restrained by further flexure of the release springs 96, 96. This spreading movement between the cylinder and the piston will continue until the inboard stator bears against the inboard face of the rotor at 24 and simultaneously the outboard stator will bear against the outboard face of the rotor as at 26. With release of the brakes the parts will return to their normal position as shown in the drawings. With the cylinder and piston mounted as shown some provision is thus afforded for relative lateral motion between the wheel and axle assembly on which the rotor is carried and the journal box on which the power means and stator are supported. Adjustment of the relative positions of the stators and rotors may be secured by shimming the closure plate 10 as may be desired.

The modification of our invention shown in Figure 5 corresponds generally to that just described except that the piston release springs are supported about the outer periphery of the cylinder instead of about the inner periphery thereof. As seen in Figure 5 the rotor 120 may be supported on the outboard face of the wheel 122 in manner similar to that described for the previous modification with shear bolts 124 preventing relative rotation between said rotor and said wheel. In this modification the cylinder casting 126 may be supported as described for the previous modification and the inboard stator 128 may be mounted from the casting 126 likewise as described for the previous modification. The cylinder casting 126 is supported from a series of resilient pads 130 interposed between the angle plates 132 and 134, the latter of which may be secured by a series of stud bolts 136 in the manner described for the previous modification. In this modification the cylinder casting 126 is restrained against inboard movement by the angle plate 138 also maintained in position by the bolts 136, 136. In this modification the release springs for the piston 140 are supported from angle plates 142 bolted as at 144 to the annular flange 146 integrally formed on the cylinder casting. The angle plate 142 may be vulcanized to one face of the release spring 148 and the opposite face of said release spring pad may be vulcanized to the angle plate 150 which is flanged over as at 152 at its inboard edge to bear against the outer periphery of the outboard stator 154. The annular flange 146 on the cylinder casting is projected at one point in the torque lug 156 which may be bolted as at 158 to the torque arm 160, the opposite end of which may be connected to the

frame as desired. Otherwise this modification corresponds to that previously described and the method of operation is similar thereto.

It is to be understood that we do not wish to be limited by the exact embodiment of the device shown which is 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 arrangement, a wheel and axle having a journal end, a frame member supported thereon, spaced resilient pads on said frame member supporting a ring cylinder therearound, brakes comprising a rotor mounted on said wheel to rotate therewith, stators supported from said cylinder on opposite sides of said rotor, a piston in said cylinder operable to actuate said brakes, one of said stators being laterally movable with said piston, and the other of said stators being laterally movable with said cylinder in the reverse direction upon actuation of said brakes, said resilient pads serving as release means to restore said cylinder to normal position after actuation of said brakes, and other release means mounted about the outer periphery of said cylinder to restore said piston to normal position.

2. In a brake arrangement, a wheel and axle having a journal end, a frame member supported thereon, spaced resilient pads on said frame member supporting a ring cylinder therearound, brakes comprising a rotor mounted on said wheel to rotate therewith, stators supported from said cylinder on opposite sides of said rotor, a piston in said cylinder operable to actuate said brakes, one of said stators being laterally movable with said piston, and the other of said stators being laterally movable with said cylinder in the reverse direction upon actuation of said brakes, said resilient pads serving as release means to restore said cylinder to normal position after actuation of said brakes, and other release means mounted about the inner periphery of said cylinder for restoring said piston to normal position.

3. In a brake arrangement for a vehicle, a frame member, a wheel and axle assembly having a journal end, a journal box affording a connection between said member and said journal end, and braking means comprising a rotor supported on said wheel, power means resiliently supported from said box, and a plurality of stators supported from said power means on opposite sides of said rotor for engagement therewith, said power means comprising a piston, said resilient mounting permitting said power means to react in one direction when said piston is actuated in the opposite direction upon application of said brakes, and said resilient mounting operating as release means after actuation of said brakes to restore said power means to normal position.

4. In a brake arrangement, a wheel and axle having a journal end, a frame member supported thereon, spaced resilient pads on said frame member supporting a ring cylinder therearound, brakes comprising a rotor mounted on said wheel to rotate therewith, stators supported from said cylinder on opposite sides of said rotor, a piston in said cylinder operable to actuate said brakes, one of said stators being laterally movable with said piston, and the other of said stators being laterally movable with said cylinder in the reverse direction upon actuation of said brakes, said resilient pads serving as release means to restore said cylinder to normal position after actuation of said brakes.

5. In a brake arrangement, a wheel and axle having a journal end, a frame member supported thereon, spaced resilient pads on said frame member supporting a ring cylinder therearound, brakes comprising a rotor mounted on said wheel to rotate therewith, stators supported from said cylinder on opposite sides of said rotor, a piston in said cylinder operable to actuate said brakes, one of said stators being laterally movable with said piston, and the other of said stators being laterally movable with said cylinder in the reverse direction upon actuation of said brakes, and release means mounted on said cylinder for restoring said piston to normal position, said spaced pads operating as release means for said cylinder after actuation thereof.

6. In a brake arrangement for a vehicle, a frame member, a wheel and axle assembly having a journal end, a journal box affording a connection between said member and said journal end, and braking means comprising a rotor supported on said wheel, power means resiliently supported from said box, and a plurality of stators supported from said power means on opposite sides of said rotor for engagement therewith, said power means comprising a piston, said resilient mounting permitting said power means to react and move in one direction when said piston is actuated in the opposite direction upon application of said brakes.

7. In a brake arrangement, a wheel and axle assembly having journal ends, frame members supported on said journal ends, stators supported from said wheels, power means supported from said members at opposite ends of the assembly and the carrying stators for engagement with opposite sides of the adjacent rotors, pistons in said power means, one of said stators associated with each rotor being laterally movable with the associated power means upon application of said brakes, and the other of said stators and the associated piston being laterally movable in the reverse direction upon application of said brakes, each of said power means being supported from the associated frame member by spaced resilient pads about a periphery of said power means.

8. In a brake for a vehicle, a wheel and axle having a journal end, a journal box supported thereon, a rotor carried by said wheel, spaced resilient means on said box supporting a ring cylinder therearound, spaced stators supported from said cylinder at opposite sides of said rotor, a piston in said cylinder, one of said stators having fixed relationship with said cylinder for lateral movement therewith as actuation of said power means causes movement of said piston and the other of said stators in the reverse direction, and release means for said piston mounted at spaced points around said cylinder.

9. In a brake for a vehicle, a wheel and axle having a journal end, a journal box supported thereon, a rotor carried by said wheel, spaced resilient means on said box supporting a ring cylinder therearound, spaced stators supported from said cylinder at opposite sides of said rotor, a piston in said cylinder, one of said stators having fixed relationship with said cylinder for lateral movement therewith as actuation of said power means causes movement of said piston and the other of said stators in the reverse direction, and release means for said piston and the associated stator mounted at spaced points on said cylinder.

10. In a brake for a vehicle, a wheel and axle having a journal end, a journal box supported thereon, a rotor carried by said wheel, spaced resilient means on said box supporting a ring cylinder therearound, spaced stators supported from said cylinder at opposite sides of said rotor, a piston in said cylinder, one of said stators having fixed relationship with said cylinder for lateral movement therewith as actuation of said power means causes movement of said piston and the other of said stators in the reverse direction, and release means for said piston mounted at spaced points about the periphery of said cylinder.

11. In a brake arrangement, a frame member, a supporting wheel and axle, power means resiliently mounted on said member, said resilient mounting comprising a plurality of resilient pads fixed at spaced points on said member and respectively connected to said power means, a rotor mounted on said wheel, and stators supported from said power means for engagement with opposite sides of said rotor, one of said stators having fixed relationship with said power means, and the other of said stators being movable with respect to said power means upon actuation of said brakes, resilient mounting of said power means serving as release means to restore said power means to normal position after actuation of said brakes.

12. In a brake arrangement, a frame comprising a member, a supporting wheel and axle, power means resiliently supported at spaced areas from said member, a rotor supported from said wheel, spaced stators supported from said power means on opposite sides of said rotor, one of said stators having fixed relationship with said power means for lateral movement therewith upon application of said brakes, and the other of said stators being laterally movable with respect to said power means upon application of said brakes whereby said stators are brought into engagement with opposite sides of said rotor, a resilient torque connection between said frame and said power means, said fixed stator being rotatable relative to said power means for dismantling thereof.

13. In a brake arrangement, a wheel and axle having a journal end, a frame member supported thereon, spaced resilient pads mounted on said frame member for supporting a ring cylinder therearound, a rotor mounted on said wheel to rotate therewith, stators supported from said cylinder on opposite sides of said rotor, a piston in said cylinder operable to actuate said brakes, one of said stators being laterally movable with said piston, and the other of said stators being laterally movable with said cylinder in the reverse direction upon actuation of said brakes, said spaced resilient pads serving as release means for said ring cylinder after actuation of said brakes.

14. In a brake for a vehicle, a wheel and axle having a journal end, a journal box supported thereon, a rotor carried by said wheel, spaced resilient means on said box supporting a ring cylinder therearound, spaced stators supported from said cylinder at opposite sides of said rotor, a piston in said cylinder, one of said stators having fixed relationship with said cylinder for lateral movement therewith as actuation of said cylinder causes movement of said piston and the other of said stators in the reverse direction, said spaced resilient means also operating to restore said cylinder to normal position after actuation thereof.

15. In a vehicle brake, a wheel and axle having a journal end, a journal box supported thereon, a frame comprising a member supported from said box, a rotor mounted on said wheel, a ring cylinder resiliently supported around said box and having a resilient torque connection to said frame, spaced stators supported from said cylinder, one of said stators being fixed with relation thereto, and the other of said stators being laterally movable with respect thereto upon application of said brakes, said fixed stator being removable from said cylinder by relative rotation with respect thereto.

16. In a brake arrangement, a wheel and axle assembly having journal ends, frame members supported on said ends, rotors supported from said wheels outboard thereof, power means supported on each of said frame members and carrying stators for engagement with opposite sides of the adjacent rotors, one of said stators being fixedly mounted on the associated power means, and the other of said stators being supported for lateral movement with respect thereto upon application of said brakes, each of said fixed stators being removable from the associated power means by relative rotation with respect thereto.

17. In a brake arrangement, a frame member, a supporting wheel and axle, spaced resilient pads affording support for power means mounted on said member, a rotor mounted on said wheel, and stators supported from said power means for engagement with opposite sides of said rotor, one of said stators having fixed relationship with said power means, and the other of said stators being movable with respect to said power means upon actuation of said brakes, said pads serving as release means for said power means.

18. In a vehicle brake, a wheel and axle having a journal end, a journal box supported thereon, a frame comprising a member supported from said box, a rotor mounted on said wheel, a ring cylinder resiliently supported around said box and having a torque connection to said frame, spaced stators supported from said cylinder, one of said stators having fixed relationship with said cylinder for lateral movement therewith upon application of said brakes, and being releasable from said cylinder by relative rotation with respect thereto.

19. In a brake arrangement, a frame member, a supporting wheel and axle, spaced resilient pads affording support for power means supported from said member, a rotor supported from said wheel, and spaced stators supported from said power means on opposite sides of said rotor, one of said stators having fixed relationship with said power means for lateral movement therewith upon application of said brakes, said pads affording release for said power means after actuation thereof.

20. In a brake arrangement, a frame member, a supporting wheel and axle, spaced resilient pads affording support for power means mounted on said member, a rotor mounted on said wheel, and stators supported from said power means for engagement with opposite sides of said rotor, one of said stators having fixed relationship with said power means, said pads affording release for said power means after actuation thereof.

21. In a brake arrangement, a frame, a wheel and axle assembly affording support for said frame through the medium of a journal box, spaced resilient pads fixed about the periphery of said box, power means secured to said pads, brakes comprising a rotor mounted on said wheel and stators supported from said power means at opposite sides of said rotor, and a piston resilient-

ly mounted on said power means for actuation of said brakes.

22. In a brake arrangement, a frame, a wheel and axle assembly affording support for said frame through the medium of a journal box, spaced resilient pads fixed about the periphery of said box, power means secured to said pads, brakes comprising a rotor mounted on said wheel and stators supported from said power means at opposite sides of said rotor, and a piston resiliently mounted on said power means for actuation of said brakes, the respective resilient mountings of said power means and piston permitting their movement in reverse directions upon operation of said power means and serving to restore said piston and power means to normal position thereafter.

23. In a rotor brake arrangement, a frame, a wheel and axle assembly having a journal end, a journal box on said end affording support for said frame, resilient pads fixed at spaced points about said box, and a ring cylinder movably mounted on said pads and axially movable by distortion thereof.

24. In a rotor brake arrangement, a frame, a wheel and axle assembly having a journal end, a journal box on said end affording support for said frame, resilient pads fixed at spaced points about said box, a ring cylinder movably mounted on said pads, a piston in said cylinder, and other resilient pads fixed at spaced points about the periphery of said cylinder for release of said piston.

25. In a brake arrangement, a journal box, a supporting wheel and axle, and rotor brake means associated with said box and said wheel, spaced resilient pads fixed about the periphery of said box, and a ring cylinder secured on said pads for actuation of said brake means, said ring cylinder being axially movable by distortion of said pads and said pads being effective to restore said cylinder to normal position.

26. In a brake arrangement, a wheel and axle assembly, an associated journal box, spaced resilient pads fixed on said box, and power means mounted on said pads for movement relative to said box, said power means being axially movable by distortion of said pads and said pads being effective to restore said power means to normal position.

27. In a brake arrangement, a wheel and axle assembly, an associated journal box, spaced resilient pads fixed on said box, power means mounted on said pads for movement relative to said box, a piston associated with said power means, and other resilient pads fixed on said power means for release of said piston.

28. In a brake arrangement, a frame comprising a journal box, a supporting wheel and axle, rotor brakes mounted between said wheel and said frame, resilient means fixed on said box at spaced points, a ring cylinder mounted on said resilient means around said axle, said cylinder being axially movable by distortion of said resilient means and said resilient means being effective to restore said cylinder to normal position, a stator associated with said cylinder, and a resilient torque connection between said frame and said cylinder.

29. In a brake arrangement, a frame comprising a journal box, a supporting wheel and axle, rotor brakes mounted between said wheel and said frame, resilient means fixed on said box at spaced points, a ring cylinder mounted on said resilient means around said axle, a stator associated with said cylinder, and a resilient torque connection between said frame and said cylinder, said stator being releasable from said cylinder by relative rotation with respect thereto.

30. In a brake arrangement, a frame comprising a journal box, a supporting wheel and axle, rotor brakes mounted between said wheel and said frame, resilient means fixed on said box at spaced points, a ring cylinder mounted on said resilient means around said axle, a stator associated with said cylinder, a resilient torque connection between said frame and said cylinder, and resilient pads fixed about a periphery of said cylinder for release of the associated piston.

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