May 13, 1941. C. S. ASH 2,242,049

DUAL WHEEL ASSEMBLY

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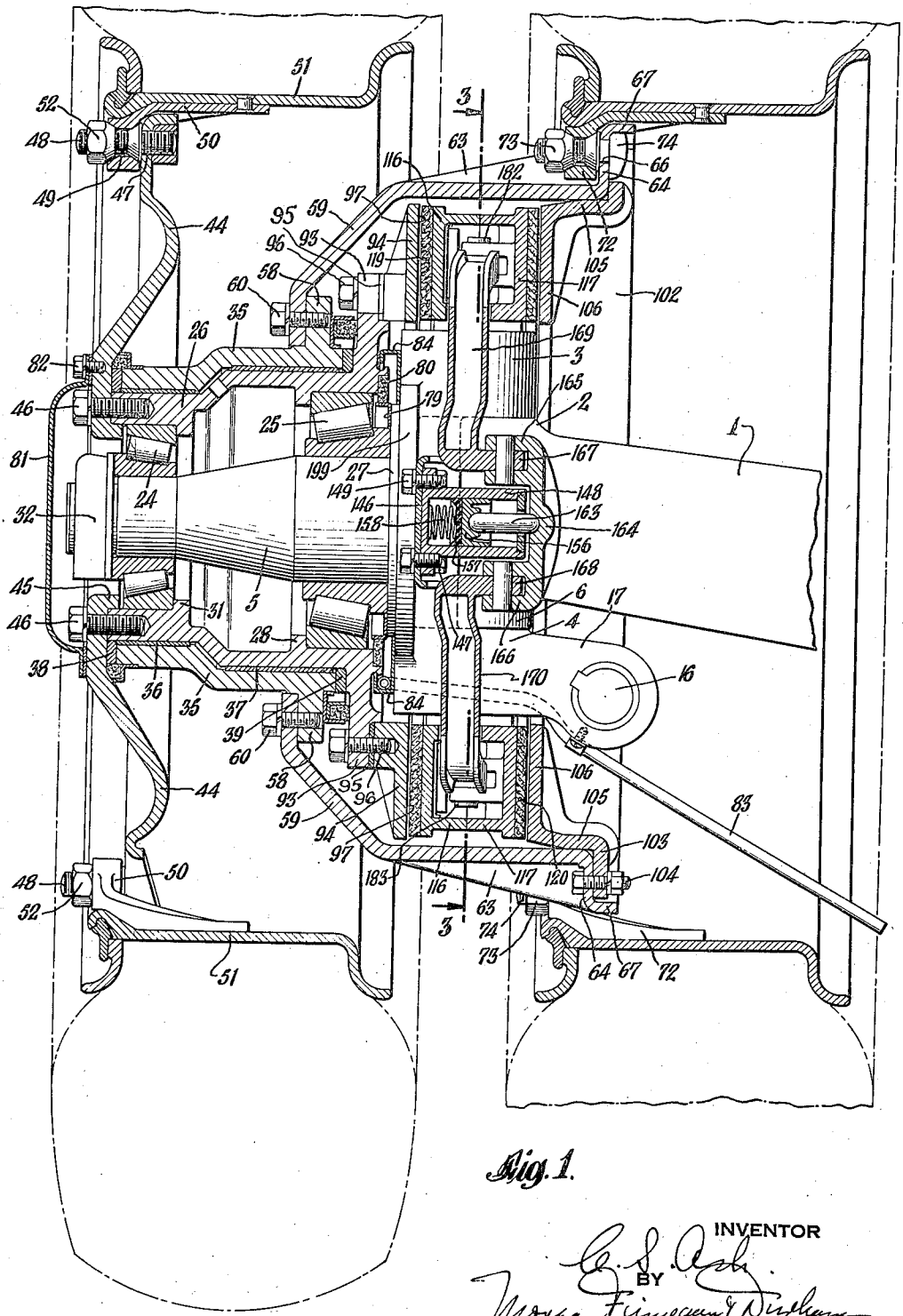


Fig. 1.

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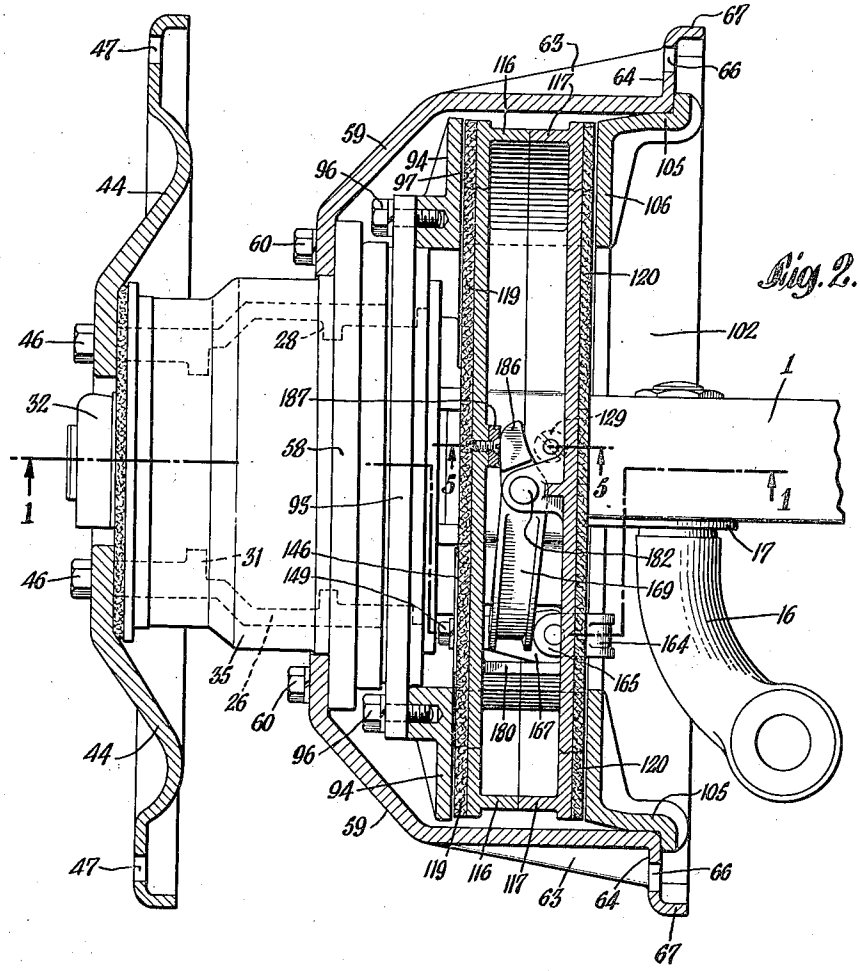


Fig. 2.

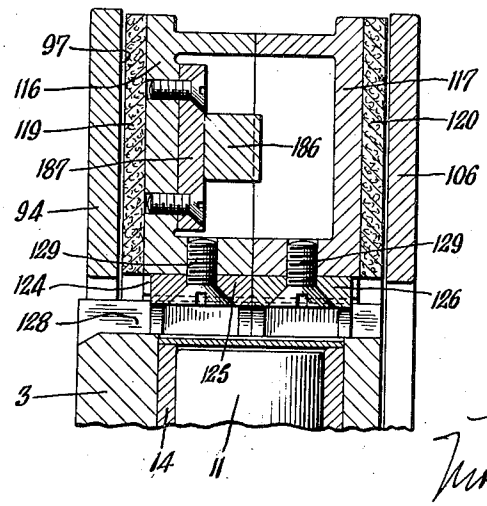


Fig. 5.

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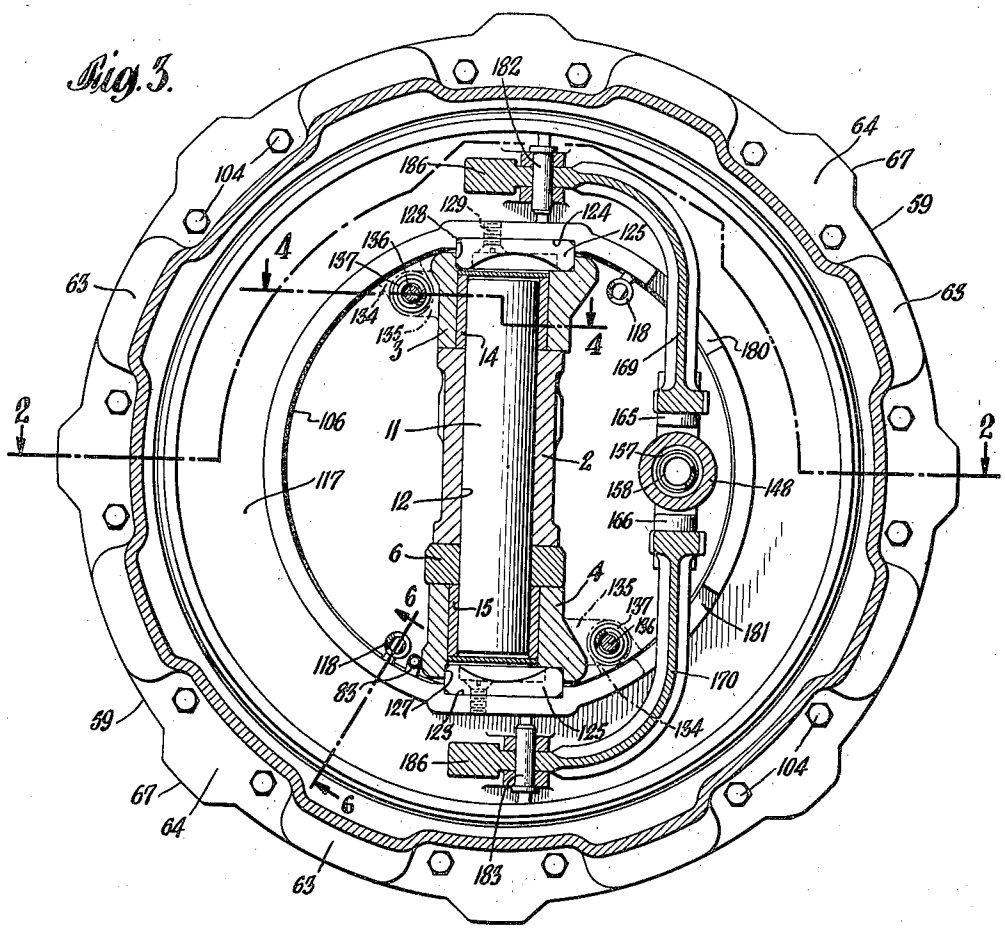
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May 13, 1941. C. S. ASH 2,242,049

DUAL WHEEL ASSEMBLY

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Fig. 3.



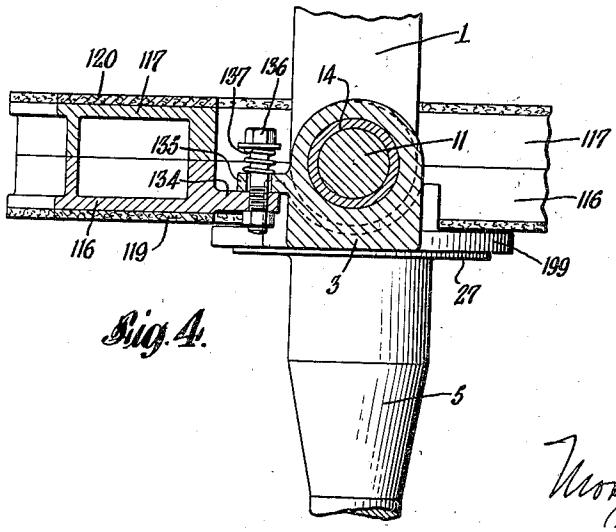


Fig. 4.

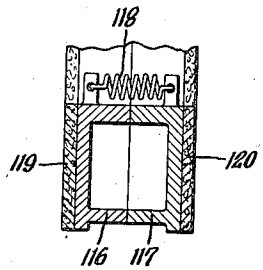


Fig. 6.

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DUAL WHEEL ASSEMBLY

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Fig. 7.

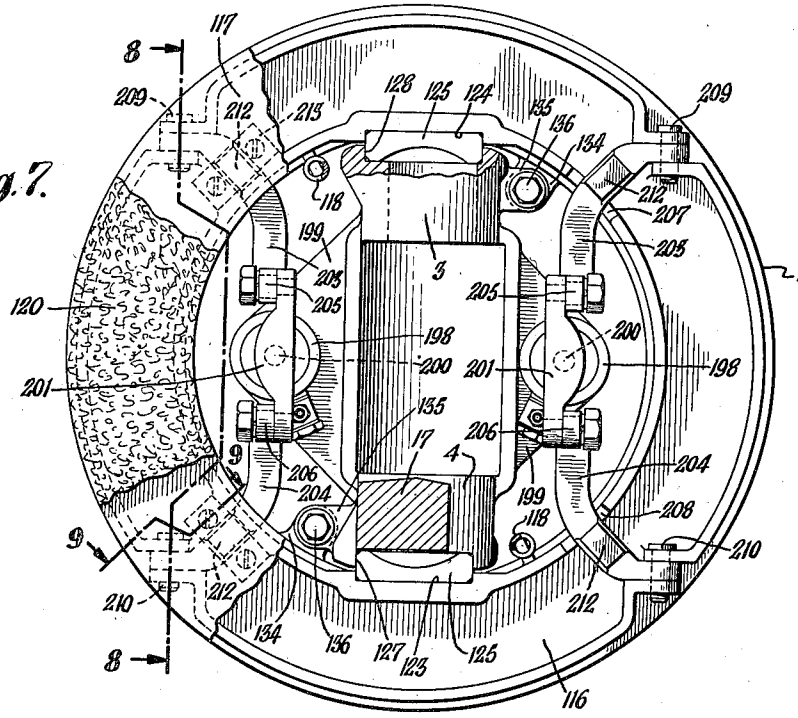
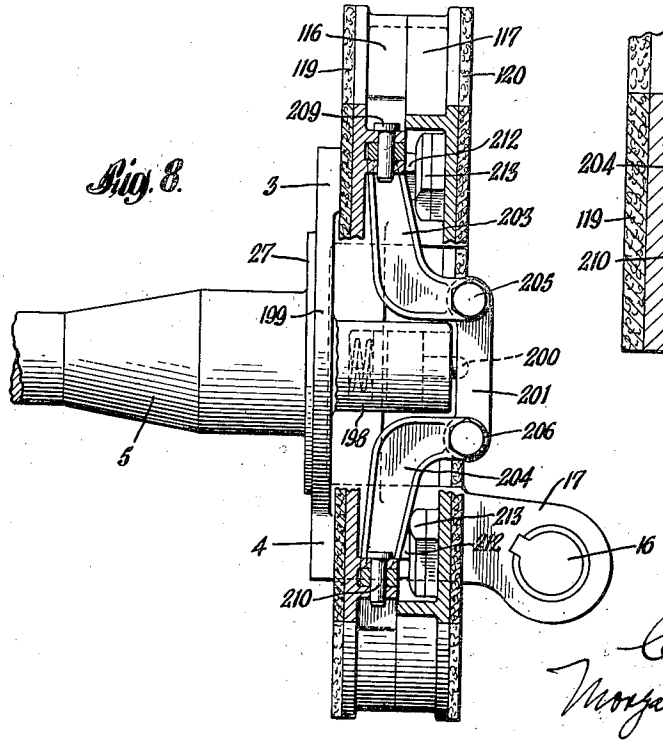


Fig. 8.



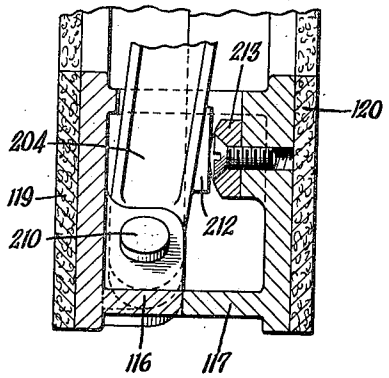


Fig. 9.

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UNITED STATES PATENT OFFICE

2,242,049

DUAL WHEEL ASSEMBLY

Charles S. Ash, Milford, Mich.

Application May 24, 1939, Serial No. 275,438

12 Claims. (Cl. 188—18)

The invention relates to new and useful improvements in dual wheel assemblies for motor vehicles, and more particularly to such improvements in dirigible dual wheel assemblies for the front ends of motor vehicles and to improved braking means applicable to such assemblies and to other dual wheel assemblies.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Fig. 1 is a horizontal section through a dual wheel assembly, with braking mechanism, embodying the invention;

Fig. 2 is a horizontal section on the irregular broken line 2—2 of Fig. 3;

Fig. 3 is a vertical section on the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary detail section on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged fragmentary section on the line 5—5 of Fig. 2;

Fig. 6 is a detail section on the line 6—6 of Fig. 3;

Fig. 7 is a partial elevation, with parts broken away, showing a modified form of braking means;

Fig. 8 is a section on the line 8—8 of Fig. 7; and

Fig. 9 is a detail section on the line 9—9 of Fig. 7.

The present invention in certain of its features is in the nature of an improvement upon the mechanism shown, described and claimed in my Patent No. 1,979,598, dated November 6, 1934, but in other of its aspects the present invention is of more general application.

Objects of the present invention are to provide dual dirigible front wheel assemblies especially applicable and useful on the front end of heavy-duty vehicles such as motor buses, trucks or tractors, and especially to provide in such dual wheel assemblies simple, sturdy, powerful and equalized braking mechanism acting equably on all the wheels; to provide improved braking means for independently rotatable dual wheels which insures application of equal braking force to both of the wheels, so that when applied to the dirigible wheels, there is no tendency in the vehicle to swerve on application of the brakes; to provide a statically and dynamically-balanced brake and wheel structure particularly adaptable to and efficiently independently-rotatable dirigible dual wheels; and especially to provide simple and very powerful fluid pressure means especially applicable to and useful in structures of the type described. To these ends and as here embodied there is provided a brake, dirigible dual wheel assembly having independently-rotatable wheels in which a braking device common to both wheels comprises opposed spaced-apart flat annular braking members fixed to the respective wheels with a pair of flat annular co-axial brake shoes interposed therebetween, the brake shoes being axially movable to apply and to let off the brakes, the brake shoes being actuated by power-multiplying lever arms fulcrumed on one brake shoe and pressing upon the other brake shoe, and acting against resilient restoring devices, the braking energy being applied to the levers from a pressure fluid cylinder. It will be understood that the foregoing general description and the following detail description as well, are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the embodiment of the invention illustrated by way of example in the accompanying drawings, an axle beam 1 has at either end thereof a knuckle 2, which is embraced within arms 3 and 4 of a yoke formed on the inner end of a spindle 5, upon which spindle the dual wheels are journaled as hereinafter described. The spindle and its yoke are mounted to turn on the knuckle on a substantially vertical axis, and for this purpose a king pin 11 extends through a longitudinally-extending aperture 12 in the knuckle 2, and at either end projects into corresponding apertures formed in the top and bottom yoke arms 3 and 4 of the spindle. These ends of the king pin are journaled in bushings 14 and 15 mounted, respectively, in yoke arms 3 and 4, and an anti-friction thrust bearing 6 is interposed between the bottom of the knuckle 2 and the top of the underneath yoke arm 4, to facilitate the turning of the wheel spindles in response to the steering mechanism. An arm 16 is fixed to an extension 17 of each spindle yoke, and these arms are connected together and to the steering mechanism of the vehicle in a known or other suitable manner.

Referring now to the mounting of the dual

wheels upon their spindle 5, they are each provided with broad, nested hubs so as to give each wheel broad and ample bearing within relatively compact space. As embodied, roller bearings 24 and 25 are mounted upon spindle 5, and hub 26 of the outboard wheel is rotatively mounted upon these bearings. Bearing 25 is held axially in position by one raceway abutting on a plate or flange 27 which is integral with spindle 5, and by the other raceway abutting on an inwardly-projecting flange 28, formed on the interior of the hub 26. Bearing 24 has one raceway abutting on an inwardly-projecting flange 31 formed on the interior of the hub 26 and has the other raceway abutting on a nut 32, screw-threaded onto the end of spindle 5. The exterior of hub 26 of the outboard wheel is finished on two diameters to afford journal bearings for hub 35 of the inboard wheel, which is nested thereover for the greater part of its length, anti-friction bushings 36 and 37 being interposed between the hubs at these bearings. Thrust bearing washers 38 and 39, located at either end of hub 35, take up the end thrust between the two wheels.

The outboard wheel comprises a circular dished web 44, having a central, annular, inwardly-projecting flange 45 which fits within the outer end of its hub 26, and the web is fastened to the hub by screw bolts 46 passing through the web 44 into the end face of the hub. Wheel web 44 has circumferentially-arranged, spaced-apart apertures 47, and bolts 48 are set in said apertures and pass through corresponding openings 49 in rim-attaching lugs 50, fixed to the tire rim 51, and nuts 52 are threaded on the bolts to hold the lugs and to hold the rim in position upon the wheel web. Referring now to the inboard wheel, an outwardly-projecting annular flange 58 is formed near the inner end of the hub 35 of said inner wheel, and a deeply-dished wheel web 59 is centrally-apertured to pass over its hub 35 and abut against the outer face of flange 58, screw bolts 60 fastening the two parts together. Near its periphery the dished wheel body 59 has rib-like corrugations 63 formed therein for strength, the periphery terminating in a flat outwardly-extending flange 64, which flange has a series of circumferentially-disposed spaced-apart apertures 66 formed therein, the flange 64 terminating in the short cyclindrically-extending part 67. Hooked bolts 74 pass through and are set and secured in these apertures and apertured rim-retaining lugs 72 are set on the bolts 74 and are held in position by nuts 73 screw-threaded onto bolts 74.

Means are provided for retaining lubricant on the wheel bearings by means of seating devices at the inner and outer ends of the spindle and hub-mountings, and as embodied, a flanged plate 79 and a sealing ring 80 are located between flange 27 of the spindle and the outer raceway of the bearing 25, as a closure between the outer face of the flange 27 and the inner end of hub 26 of the inner wheel. A cap 81 closes the outer end of the axle structure, abutting on the web 44 of the outboard wheel and fastened thereto by tap bolts 82. A flanged drainage or drip ring 84 is located at the inboard face of hub 26 to catch any dripping oil and a drain pipe 83 drains the surplus oil from the bearing and discharges it inside the inner wheel so as to clear the tires and prevent oil from discharging thereon.

In the embodied form of braking means, two concentric, spaced-apart opposed brake discs are fixed to the respective wheels and are engaged and frictionally pressed by flat, concentric interposed brake shoes that are concurrently moved apart into braking engagement with said brake discs by floating leverage applied by fluid pressure means, thereby effecting equal frictional retardation upon both wheels with the expenditure of relatively small energy.

As embodied, said braking means comprises an outwardly-extending, annular, shouldered flange 93 formed on the inner end of hub 26 of the outboard wheel. Fitting into the shouldered recess of flange 93 is an outwardly-extending, annular flange 94, the two being fastened together by tap bolts 96, flange 94 having a flat annular inner surface 97 which acts as the braking surface of said outboard wheel. Means are provided for preventing excess heat transfusion from the brake, through the hub, to the roller bearing, and to this end a heat insulating washer 95 is interposed between the members 93 and 94. The corresponding mechanism for the inboard wheel comprises a dished ring 102, having an outer, radially-extending flange 103, which seats within flange 64, 67 of the outer wheel, the two parts being fastened together by bolts 104. The median part 105 of ring 102 is nested within the interior of dished body 59 of the inboard wheel, and at its inner portion ring 102 terminates in an inwardly-extending, flat annular part 106, which is the braking surface for the inboard wheel.

Interposed between the concentric brake members 97 and 106 are two brake shoes, comprising two inwardly-channeled annular members 116 and 117, their inward edges at the sides of the channels being resiliently held in contact by springs 118 as shown in Fig. 6. On their flat outer annular faces the brake shoes have friction elements 119 and 120. These brake shoes are held against rotative movement while free to move axially to effect the braking action, and as embodied, (Fig. 3) seats 123 and 124 are formed therein a diameter apart, and seated therein are retaining pieces 125 and 126, held in place by screws 129, the retaining pieces also extending into corresponding apertures 127 and 128 formed in the outer faces of spindle yoke arms 3 and 4. This permits axial but not angular movement of the brake shoes. Means (Fig. 4) are also provided for keeping the brake shoes centered, clear of the braking members at either side, and so that they will turn with the spindle 5, and as embodied, lugs 134 are formed at spaced-apart locations on the inner periphery of one of these brake shoes. A coacting lug 135 is formed on the corresponding arm of the spindle yoke. A bolt 136 is screw threaded into the lug 134 and passes loosely through an aperture in lug 135, and a spring 137 is in compression between the head of bolt 136 and lug 135. The spring 118 serves to hold the two shoes resiliently together when no braking pressure is applied, and the spring 137 holds them centered on the spindle yoke and free from the braking members. There are thus provided, flat, annular, non-rotatable axially movable brake shoes, positioned back to back, equipped with brake lining or frictional material 119 and 120 on their exterior surfaces. The layers 119 and 120 being on the outer surfaces of the brake rings serve also as insulation and protect the brake shoes against heat which might warp the shoes.

Referring now to the embodied form of means for applying multiplied equalized floating pressure of the brake shoes against the braking members of the wheels, a supporting plate 146 is fixed, by means of bolts 147, to the inner face of

flange 27, which flange is integral with the spindle 5. A hydraulic cylinder 148 is fixed to plate 146 by bolts 149. Within the cylinder is a piston 156, having on one side a sealing member 157, held in position by a compression spring 158. A pin 163 has one end nested in a central aperture in the piston 156 and its other end nested in an aperture in a floating equalizing yoke 164. The yoke 164 has forked ends 165 and 166 and seated within the forks, respectively, are the ends 167 and 168 of bent levers 169 and 170. These levers project, respectively, through openings 180 and 181 formed in the interior of brake shoe rings 116 and 117, and are curved about within, and extend along, the space within the channeled brake shoe members 116 and 117. These levers have, respectively, pivotal mountings 182 and 183, fixed to the inner face of brake shoe member 117, and the toe 186 of each lever, just beyond its pivot point, bears on a plate 187 fixed within the channel portion of brake shoe 116. Cylinder 148 is fixed on spindle 5, as above described, while the equalizing yoke 164 is floating, and the levers 169 and 170 are pivotally mounted on brake shoe ring 117, and bear against brake shoe ring 116, both of which rings are resiliently held in position by the springs 118 and 137. When pressure is applied in the cylinder 148, the levers move the brake shoes outwardly against their spring, the pressure being exerted against the movable pivot 182 and the movable pressure plate 187, whereby the retarding pressure is exerted equally on both wheels and, due to the long lever arms, with greatly multiplied power.

In Figs. 7, 8 and 9 a modified form of means for applying the braking pressure is shown, wherein two diametrally-opposite fluid-pressure cylinders and two systems of levers are used. Description of one system applies to both equally. A fluid pressure cylinder 198, which may be the same as or similar to cylinder 148, is fixed to a plate 199 integral with or fixed to spindle flange 27. The piston pin 200 of the cylinder 198 presses against a plate 201 to either end of which plate levers 203 and 204 are pivoted at 205 and 206, respectively. These levers extend through openings 207 and 208 in the inner peripheral rims of the brake shoe rings 116 and 117, and the levers are pivoted, respectively, upon brake shoe 116 at 209 and 210. Contact lugs 212 are formed on each lever near its pivot point, and these are in engagement with rounded contact plates 213 formed on the inner face of brake shoe ring 117. Under action of the fluid pressure in cylinders 198, brake shoe rings 116 and 117 are moved apart against the resistance of their springs 118, and equalized and greatly multiplied pressure is exerted against the braking surfaces 97 and 106 of the inboard and outboard wheels.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:

1. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including a lever for moving said brake shoes simultaneously in opposite directions against their respective braking members and means for moving said lever.

2. A dual wheel asssembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including resilient means acting to press said brake shoes together and a lever for moving said brake shoes simultaneously in opposite directions against their respective braking members and means for moving said lever.

3. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including a lever pivoted to one of said brake shoes and pressing against the other brake shoe to move them simultaneously in opposite directions against their respective braking members and means for moving said lever.

4. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including resilient means acting to press said brake shoes together and a lever pivoted to one of said brake shoes and pressing against the other brake shoe to move them simultaneously in opposite directions against their respective braking members and means for moving said lever.

5. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including a lever for moving said brake shoes simultaneously in opposite directions against their respective braking members and a pressure fluid cylinder for moving said lever.

6. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including resilient means acting to press said brake shoes together and a lever pivoted to one of said brake shoes and pressing against the other brake shoe to move them simultaneously in oposite directions against their respective braking members and a pressure fluid cylinder for moving said lever.

7. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including a plurality of levers engaging said brake shoes at diametrally

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opposite points to move said brake shoes simultaneously in opposite directions against their braking members and means for moving said levers.

8. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including resilient means acting on said brake shoes at substantially a diameter apart to press said brake shoes together and a plurality of levers engaging said brake shoes at diametrally opposite points to move said brake shoes simultaneously in opposite directions against their braking members and means for moving said levers.

9. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including a plurality of levers engaging said brake shoes at diametrally opposite points to move said brake shoes simultaneously in opposite directions against their braking members and a pressure fluid cylinder for moving said levers.

10. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including a plurality of levers, each pivoted to one of said brake shoes and pressing against the other of said brake shoes, said pivot and pressure points for the levers being substantially diametrally opposite and means for moving said levers.

11. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including a plurality of levers, each pivoted to one of said brake shoes and pressing against the other of said brake shoes, said pivot and pressure points for the levers being substantially diametrally opposite and a pressure fluid cylinder for moving said levers.

12. A dual wheel assembly including in combination a pair of side-by-side dual wheels mounted for independent rotation, a pair of flat annular brake members, one connected to each wheel, a pair of flat annular brake shoes between said brake members and means for moving said brake shoes to apply pressure to said brake members, said means including resilient means acting to press said brake shoes together and a plurality of levers, each pivoted to one of said brake shoes and pressing against the other of said brake shoes, said pivot and pressure points for the levers being substantially diametrally opposite and means for moving said levers.

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