Dec. 23, 1941. C. S. ASH 2,267,362

DUAL WHEEL ASSEMBLY

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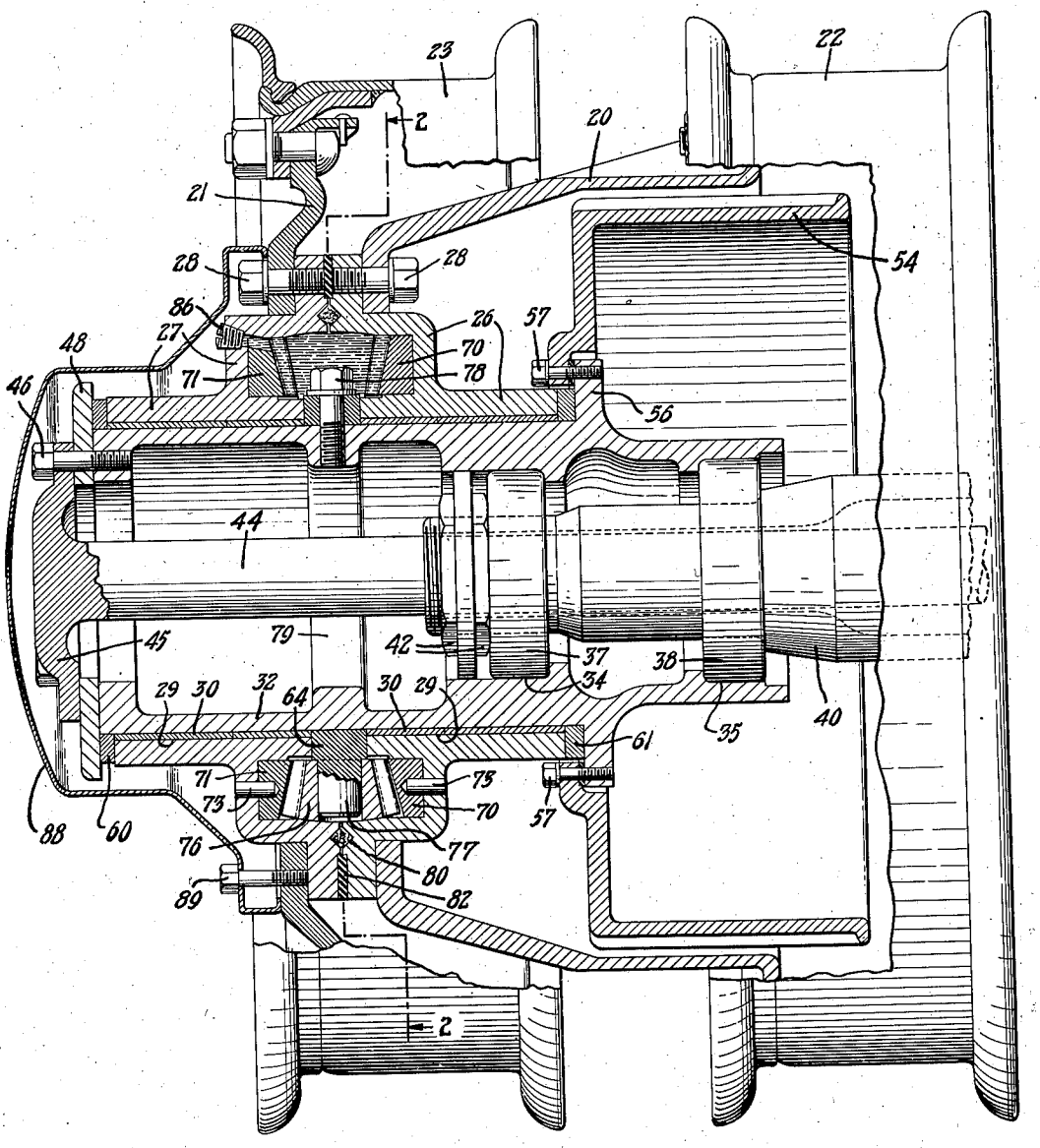

Fig 1

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DUAL WHEEL ASSEMBLY

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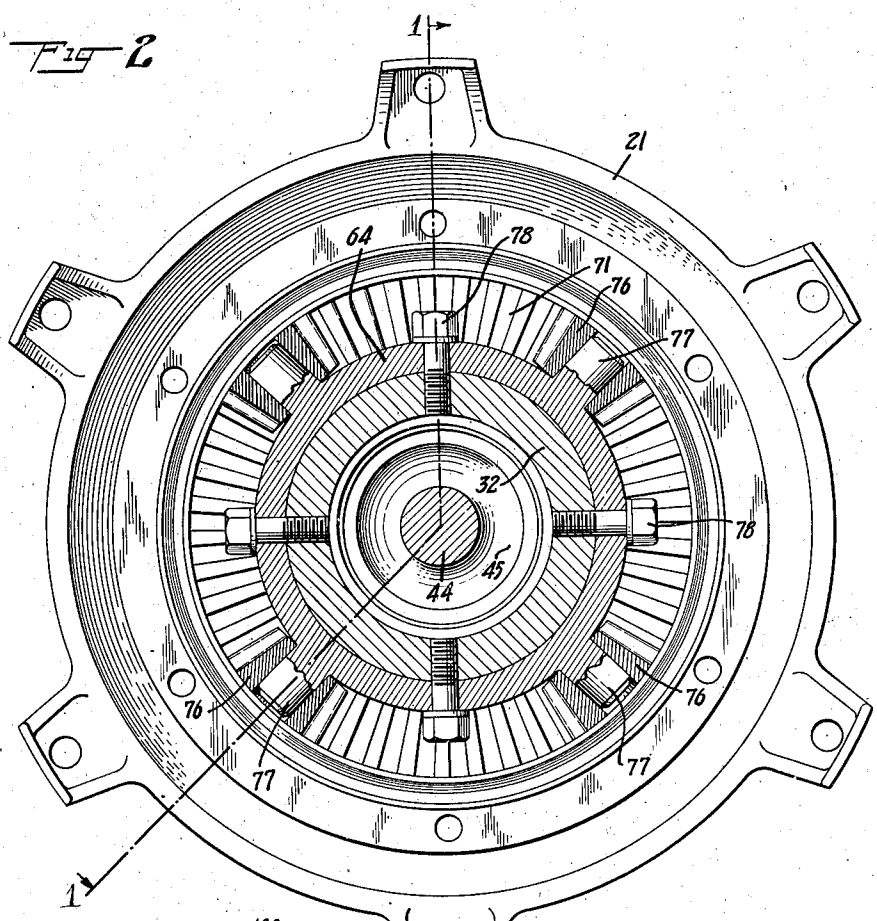
Fig 2



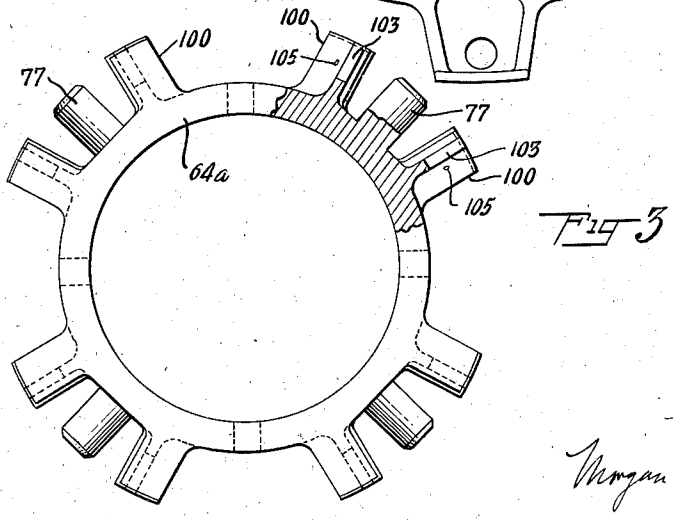


Fig 3

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DUAL WHEEL ASSEMBLY

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Fig 4

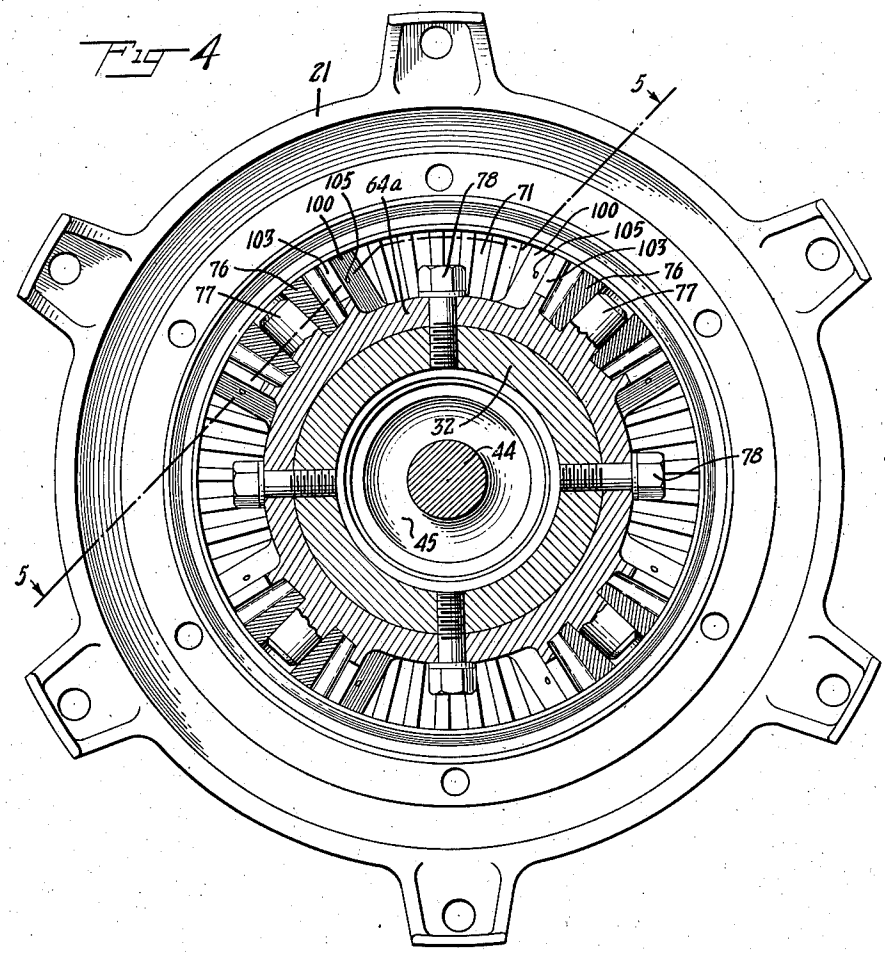
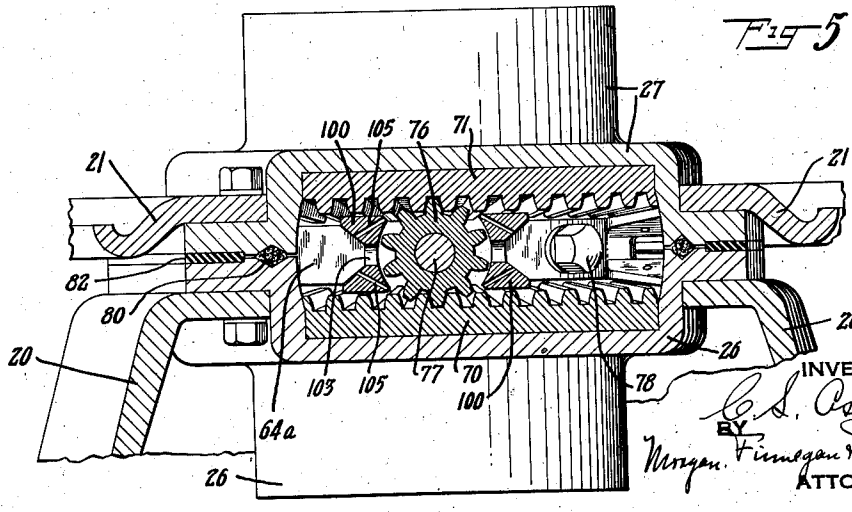


Fig 5



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Dec. 23, 1941. C. S. ASH 2,267,362

DUAL WHEEL ASSEMBLY

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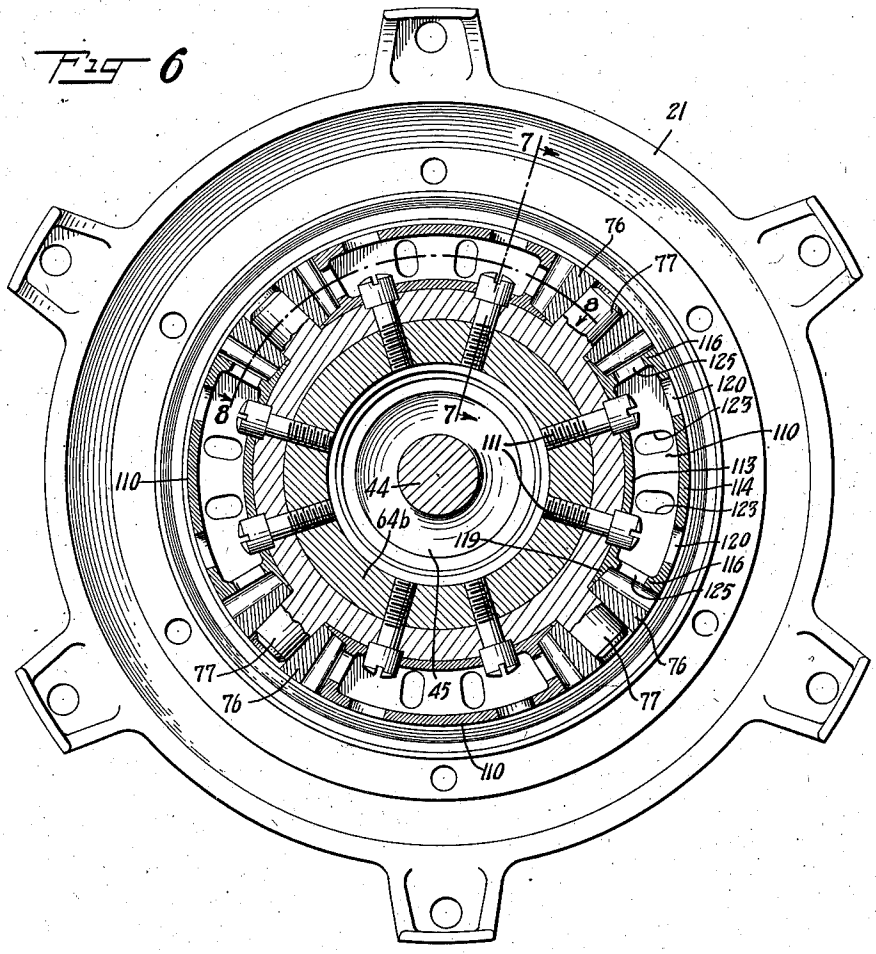
Fig 6



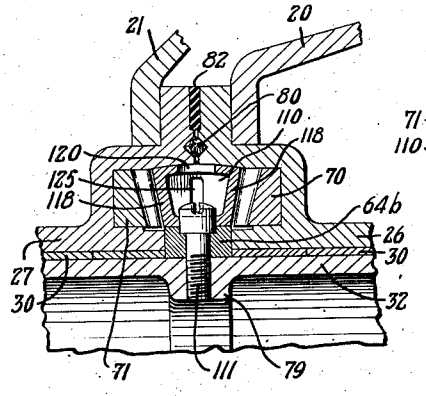
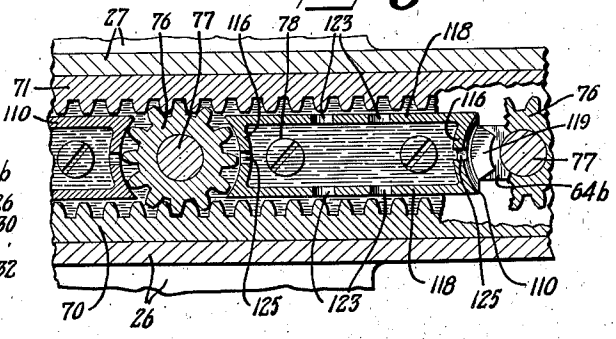


Fig 7

Fig 8



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Dec. 23, 1941. C. S. ASH 2,267,362

DUAL WHEEL ASSEMBLY

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Fig 9

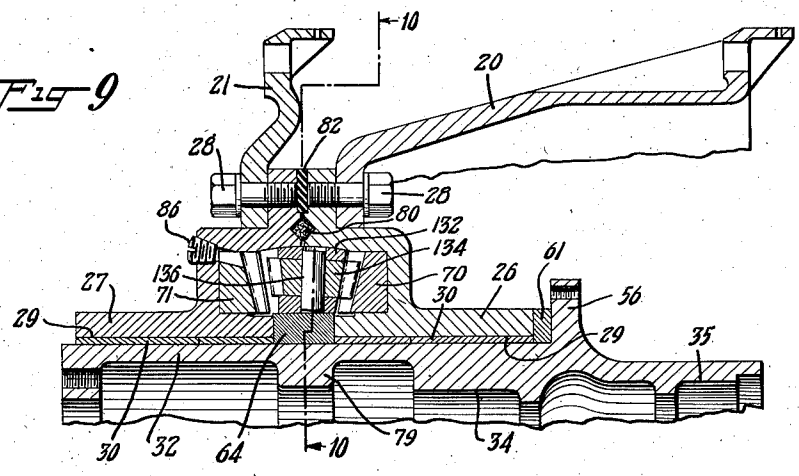
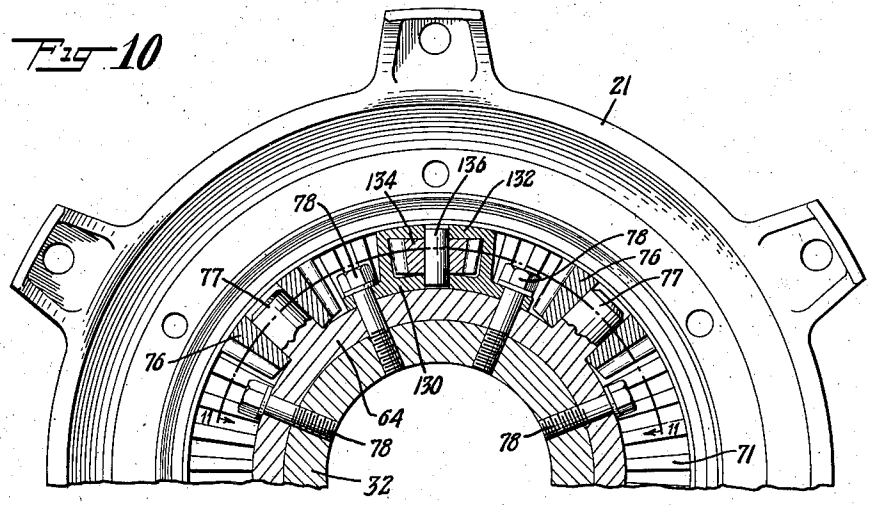


Fig 10



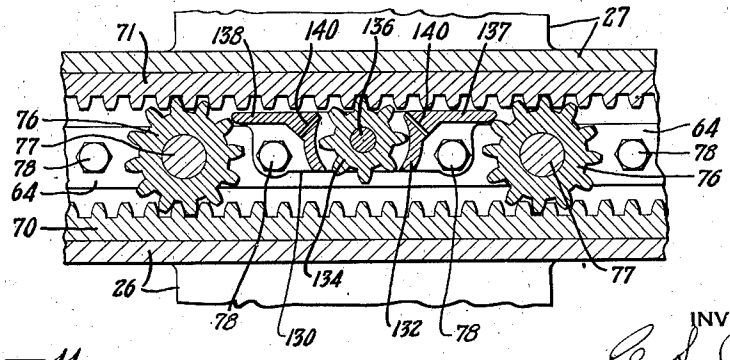


Fig 11

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Patented Dec. 23, 1941 2,267,362

UNITED STATES PATENT OFFICE

2,267,362

DUAL WHEEL ASSEMBLY

Charles S. Ash, Milford, Mich.

Application June 8, 1940, Serial No. 339,420

14 Claims. (Cl. 301—5)

The present invention relates to new and useful improvements in dual wheel assemblies for use with automotive road vehicles.

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:

Figure 1 is an end elevation of a typical and illustrative embodiment of the present invention as applied to a pair of dual wheels for an automotive road vehicle, with means provided for driving and for braking the dual wheels, certain of the parts being broken away and other parts being shown as a section taken on the line 1—1 of Figure 2;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a detailed side elevation of one of the parts of a modified illustrative embodiment of the present invention, with certain of its parts broken away;

Figure 4 is a central and vertical sectional view of the modification of the present invention employing the means of Figure 3, said sectional view corresponding to the section shown in Figure 2;

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

Figure 6 is a central vertical sectional view showing a further modification of the present invention;

Figure 7 is a fragmentary sectional view taken on the line 7—7 of Figure 6;

Figure 8 is an arcuate section taken on the line 8—8 of Figure 6;

Figure 9 shows still another modification of the present invention and is a fragmentary radial section;

Figure 10 is a fragmentary sectional view taken on the line 10—10 of Figure 9; and

Figure 11 is a fragmentary arcuate section taken on the line 11—11 of Figure 10.

The present invention has for its object the provision of a novel and improved dual wheel assembly for automotive road vehicles having independently rotatable, side by side wheels which may be driven or braked with equal torque and are held against excessive relative rotation. A further object of the invention is the provision of a driving and/or braking means acting upon a pair of independently rotatable side by side dual wheels through a differential gearing which substantially prevents opposite rotation of the wheels. Still another object of the invention is the provision of an improved bearing construction for independently rotatable dual wheels. The invention also provides a driving or braking means acting upon both of the independently rotatable dual wheels through a differential gearing in which a hydraulic fluid acts directly upon the differential gearing to prevent spinning of either of the wheels independently of the other.

In accordance with the illustrative embodiments of the present invention, there are provided a pair of independently rotatable, side by side dual wheels mounted for rotation on or about a common axis and drivingly connected to a common drive shaft and/or a common braking means. Associated with the two wheels and the driving or braking means is a differential gear, one element of which is connected to the other wheel, while the other element is connected to the driving and/or braking means. For restraining excessive independent rotation of the dual wheels, as power or braking force is applied to both of them through the differential, and to prevent the spinning of one wheel relatively to the other as might occur when the wheels have unequal driving or braking engagement with the road, hydraulic means directly associated with the differential gearing is provided, and preferably these hydraulic means employ a lubricant as the hydraulic medium so that the gears are constantly provided with a sufficient supply of lubricant and no separate hydraulic fluid is required.

According to one form of the invention, one of the differential sun gears is connected to one of the wheels, the other sun gear is connected to the other wheel, and the two wheels are formed with adjacent annular cavities which cooperate to form a closed hydraulic chamber, while the planet pinions meshing with both sun gears revolve with the wheels as the wheels are driven, braked, or as they coast. This hydraulic chamber is provided with a supply of viscous fluid such as a heavy oil or grease which is displaced and moved circumferentially within the chamber as the planets rotate during the independent rota-

tion of the wheels. The force required for the flow of this viscous fluid is developed solely by the rotation of the differential planets, and the independent rotation of the wheels is further obstructed by the shearing action of the sun gears on the grease or heavy oil between them, and while this offers only a slight resistance to the independent rotation when one of the wheels is rotating slowly with reference to the other, a much greater force, which is rapidly increased, is offered to this independent rotation as the speed of one wheel increases with reference to the other. The outer adjacent faces of the hydraulic chamber are preferably provided with registering grooves into which an oil sealing member is introduced to prevent leakage from the chamber, and these adjacent faces are also preferably finished to receive an annular thrust bearing between them. The pair of dual wheels are preferably mounted side by side on a hub which is rotatably mounted upon an axle or axle housing, and in the illustrative embodiments a drive shaft is connected to this hub to transmit power to it and the brake drum is also connected to the hub for braking the dual wheels. This hub may also serve as the support for the spider on which the differential planets are mounted, and conveniently the entire differential gearing is positioned between the hub portions of the side by side dual wheels.

In accordance with a modified embodiment of the invention, the differential planets are utilized as the impeller of a gear pump, and the space circumferentially between adjacent planets is provided with apertured obstructing members or baffles through which the grease or other viscous fluid is forced by the gears as the gears rotate due to the independent rotation of the wheels.

While the invention is illustratively shown as applied to driven dual wheels, it is applicable to driven front or dirigible dual wheels in which the king pin is positioned between the two tires as in my prior Patent No. 1,979,598, dated November 6, 1934, and many features of the present invention are applicable to braked, undriven dual wheels such as are employed for trailing axles.

It will be understood that the foregoing general description and the following detailed description as well, are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the illustrative embodiment of the invention shown in Figures 1 and 2 of the accompanying drawings, the invention is applied to a pair of side by side wheels **20**, **21** provided with conventional tire rims **22** and **23**, and these wheels are demountably secured to their respective hubs **26** and **27** by means of the wheel mounting cap screws **28**. Hubs **26** and **27** are preferably formed with a cylindrical interior forming a relatively long bearing surface **29** within which are seated the bushings **30** by which the hubs **26** and **27** are rotatably journalled on a cylindrical sleeve **32**. At its inner portion sleeve **32** is provided with bearing seats **34** and **35** in which are seated the tapered roller bearings **37** and **38** which serve to freely rotatably support the sleeve **32** on the end of axle housing **40**, and these bearings are held against axial movement by means of the usual bearing shoulders and lock nuts **42**.

Means are provided for applying a driving force or torque to the sleeve member **32**, and for this purpose a full floating axle shaft **44** driven in the usual manner from the motor of the automotive vehicle projects outwardly beyond the end of the axle housing **40**, and is provided with an integral flange **45** which is bolted to the end of sleeve **32** by screws **46**, at the same time securing the interposed flange or washer **48**.

Other means are provided for applying a braking force to the sleeve **32** and for this purpose a brake drum **54** of conventional form and adapted to cooperate with conventional brake shoes which are not shown, is bolted to the inner radial flange **56** of the sleeve **32** by cap screws **57**.

Thrust bearings are provided to permit free rotation of the wheel hubs **26** and **27** on the sleeve **32**, and for this purpose a thrust washer **60** is provided between the outer end of the hub **27** and the inner radial face of flange **48**, and a similar thrust washer **61** is provided between the inner end of the hub **26** and the outer radial face of flange **56**, while the hubs **26** and **27** are spaced apart by means of the parallel radial faces of the differential spider **64** which abuts the inner faces of the hubs **26** and **27**.

A differential gearing is provided between the sleeve **32** and the wheel hubs **26** and **27**, and as illustratively embodied this differential gearing comprises a pair of sun gears **70** and **71**, pinned by pins **73** to hubs **26** and **27**, respectively, and a plurality of planetary bevel pinions **76** mounted on studs or dowels **77** which project radially from the annular portion of spider **64**, pinion **76** meshing with the sun gears **70** and **71**. Spider **64** is securely anchored to the sleeve **32** by means of cap screws **78** which project through it into tapped holes in the inner web **79** of sleeve **32**, and thus prevent movement of the studs **77** with respect to sleeve **32**, axle shaft **44** and brake drum **54**.

In order to provide for the lubrication of the differential gearing, and to provide the hydraulic checking means which restrains the wheels against rapid relative rotation as they are driven or braked, the sun gears **70** and **71** are each preferably mounted within facing annular recesses formed as an integral part of the wheel hubs **26** and **27**. Radially beyond this hydraulic chamber formed by the recesses, the adjacent faces of hubs **26** and **27** are radial and in substantial contact with each other and are provided with cooperating registering circumferential grooves into which is compressed a felt sealing ring **80** serving to prevent leakage of fluid from the chamber. Beyond the sealing ring **80**, the radial faces of the hubs **26** and **27** are slightly recessed to provide bearing surfaces between which is received the ring-like thrust washer **82** of synthetic rubber or other suitable material which takes up the thrust between the two wheel members and provides a further fluid seal. Means are provided for introducing lubricant into the fluid chamber **84** so that the supply therein may be maintained in the desired amount, and for this purpose one of the hubs is provided with a threaded hole into which is fitted a filler plug **86**. A suitable dust cap **88** is provided over the outer end of the wheel hub **27**, sleeve **32** and axle shaft flange **45** and may be retained on the wheel by means of cap screws **89**.

The hydraulic chamber is preferably of a size to fit close to the outer peripheries of the sun gears **70**, **71** and the convex outer face of pinions **76**, thereby providing an annular cavity which minimizes the amount of lubricant required for both lubricating and checking the differential action of the pinions **76**. The pinions bear against

the outer periphery of the annular cavity which acts as a thrust surface holding the pinions against radial movement on their shafts.

In the operation of the illustrative embodiment, power is applied through the axle shaft 44 to the sleeve 32 to rotate it on its bearings 37 and 38 and thereby drive the ring 64 and the dowels or studs 77 carrying the planetary pinions 76 so as to drive ring gears 70 and 71 and thereby rotate the wheels 20 and 21. During normal straight ahead driving, the planets 76 revolve without rotating on their studs 77, but in turning or if unequal resistance is encountered by either wheel, then one wheel is driven faster than the other and planets 76 revolve and rotate correspondingly. Normally, the body of viscous oil or grease in the hydraulic chamber moves with the gears 70 and 71 and the planets 76 and remains in a quiescent state, but as the planets revolve and rotate, the wheels move relatively to each other and the planets move forwardly with respect to one wheel and rearwardly with respect to the other wheel, thereby displacing the entire body of lubricant and causing it to circulate within its chamber. This action resists relative rotation of the wheels and the faster this relative rotation the greater the resistance. In this way, spinning of either wheel is prevented and it is impossible for the vehicle to become stalled by reason of one wheel being in mud or off the road as in all such cases a considerable amount of torque can always be applied to both wheels of each pair.

Similarly, in braking, the force is applied from the brake to sleeve 32 and through the differential to the wheels, and even if one wheel is off the ground or on an icy surface sufficient braking effort may be applied to the other wheel of the pair.

In the embodiment shown in Figures 3, 4 and 5, the construction is generally similar to that shown in Figures 1 and 2, except that positive means are provided preventing the free flow of oil or grease within the hydraulic chamber of the differential, thereby increasing the resistance to relative rapid independent rotation of the dual wheels.

As embodied, the spider 64*a*, carrying the planetary pinion stud 77 in the same manner as shown in Figures 1 and 2, is provided with radially extending baffles 100 having concave arcuate faces closely fitted to the cone generated by the rotation of the planetary gears 76, and a pair of these baffles are provided on each side of each pinion 76 substantially filling the space between the bevel sun gears 70 and 71 and extending to the outer peripheral surface of the hydraulic chamber. Between the pair of baffles 100 on each side of each pinion 76, is provided a relatively wide radially extending aperture 103 which allows the heavy oil or grease to flow into the space between the pinion teeth, as the pinion 76 rotates. Each of the baffles 100 is formed with a relatively small metering hole 105 which leads from the space between the baffles 100 on one side of one pinion 76 and the baffles 100 on the opposite side of an adjacent pinion and communicates with a point on the other side of the baffle which is closely adjacent to the point where the pinion teeth initially (or finally) engage with the teeth of the ring gear 70 or 71. These metering apertures serve to restrict the flow of lubricant so that only a small quantity of lubricant can be passed with a small force and a much greater force is required to pass even a slightly larger amount of lubricant. Thus, normal independent rotation of the wheels is substantially unimpeded while faster independent rotation or spinning of one wheel is almost impossible.

In the operation of the embodiment shown in Figures 3 to 5, assuming a clockwise rotation of the pinion 76 in Figure 5 which would correspond to the movement of the ring gear 71 to the right while the ring gear 70 is moving to the left or is being held still: Lubricant is delivered to the space between the teeth of pinion 76 through each of the two channels 103, and this lubricant is moved clockwise by the movement of the pinion 76. As the teeth of pinion 76 mesh with the ring gears 70 and 71, the lubricant is displaced from between the teeth, it cannot escape to the left on gear 71 due to the fact that the gear teeth of gear 71 are also filled with lubricant, and there is only a minimum clearance between the teeth of gear 71 and the adjacent face of the upper left baffle 100. Likewise, the lubricant cannot move counterclockwise over the face of the teeth of pinion 76 due to the small clearance between these teeth and the adjacent concave surface 101. The only discharge port available for the lubricant is the metering aperture 105 and the lubricant escapes through this aperture into the main portion of the hydraulic chamber. The action of the metering aperture 105 in the lower right-hand baffle is exactly similar.

When the rotation of planet 76 is reversed, the action is similar but with the metering apertures 105 in the upper right and lower left-hand baffles 100.

Figures 6 to 8 of the drawings illustrate a modification according to the present invention in which the space between adjacent planetary pinions 76 is baffled and is provided with arcuate box-like chambers which contain the lubricant.

In this embodiment the wheels and gearing may be substantially duplicates of those described above, but instead of the baffles 100 as shown in Figures 3 to 5, the space between the planets 76 and the gears 70 and 71 is filled by arcuate, hollow box-like members 110 which are substantially trapezoidal in cross-section. The annular portion of spider 64*b* is secured to the sleeve member 32 by means of the screws 111 which are provided with projecting and slotted round heads.

The box-like members 110 are hollow and provided with spaced parti-cylindrical walls 113 and 114, wall 113 being closely fitted to the outer surface of the spider 64*b* while the outer surface of the outer wall 114 is closely fitted to the surface of the hydraulic chamber. At its end each box-like member 110 is formed with concave walls 116 which are closely fitted to the conical surface generated by the teeth of the planetary pinion 76, and the remaining sides of the members 110 comprise walls 118 which are closely fitted to the teeth of ring gears 70 and 71. Projecting slightly beyond the ends of the box-like members 110 are circumferentially extending beveled plates 119 which underlie the base of the bevel pinions 76.

The hollow box-like members 110 are provided with apertures to receive the heads of screws 111, and with radially alined apertures 120 through which the screws 111 may be inserted and tightened, and these members 110 are securely held in position due to the divergence in screws 111. Apertures 123 are provided in the side walls 118 so that the lubricant may pass

from the space between the teeth of gears 70 and 71 to the hollow interior of the members 110, or vice versa, and other apertures 125 are provided centrally of the concave end walls 116 to communicate with the space between the teeth of pinion 76 and the hollow interior.

The degree of checking of the independent rotation of the wheels is determined by the clearance between the concave face 116 and the teeth of planetary pinion 76, as well as the clearance between the side walls 118 and the teeth of ring gears 70 and 71.

In the operation of the embodiment of Figures 6 to 8, and assuming a clockwise rotation of the planetary pinions 76 in Figure 8 corresponding to the relative movement of gear 71 to the right, lubricant is fed through the apertures 125 into the space between the teeth of pinions 76, and this lubricant is carried down on the right-hand side and up on the left-hand side of planetary pinion 76 into the mesh between the gears 70, 71 and pinion 76, and at the same time lubricant is supplied to the teeth of gears 70, 71 through the apertures 123. The lubricant displaced by the meshing of gears 70 and 71 with the pinion 76 must escape, and this flow is accomplished through the space between the gears 70 and 71 and the side walls 118, as well as through the space between the end wall 116 and the teeth of pinion 76.

In the embodiment shown in Figures 9 to 11, the construction is generally similar to that shown in Figs. 1 and 2 of the drawings, except that the checking action on the independent rotation of the wheels is increased both by the use of baffles and by a supplementary gear pump actuated by the independent rotation of the wheels. As embodied, gear pump and baffle assembly is mounted in the intervening space between one or more pairs of planetary pinions 76, and this assembly comprises an arcuate base 130 curved to fit the spider 64 and secured thereto by the spider mounting screws 78.

Formed integrally with the base 130 is a pump body 132 in which is rotatably mounted a gear 134 meshing with one of the ring gears 70 or 71 and freely rotatable on stud 136. Extending circumferentially from each end of the pump body 132 are baffle plates 137 and 138 which are closely fitted to the teeth of the ring gear and extend up to and almost contact with the teeth of the adjacent pinions 76. The pump body 132 is open on both sides so that the teeth of the pump pinion 134 extend beyond it, thereby permitting the pinion 134 to mesh with the ring gear on one side and to communicate with the supply of lubricant in the hydraulic chamber on the other side. Metering apertures 140 are formed in the pump body to allow the discharge of lubricant under the pressure developed by the pump as the pinion 134 rotates in either direction.

In this embodiment the independent rotation of the dual wheels is checked not only by the viscosity of the lubricant within the chamber as it is caused to flow by the normal action of the differential pinions 76, but the independent rotation is also checked by the metering action of the ends of plates 137 and 138, where they abut the planetary pinions 76, and also the metering action of the apertures 140 as they restrict the flow of lubricant away from the mesh of pinion 134 and ring gears 70 and 71, and by properly proportioning the clearances as well as the size of the apertures 140, and by a suitable choice of lubricant, any degree of checking may be obtained.

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. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels, having adjacent circularly extending cavities cooperating to form a sealed hydraulic chamber and containing a viscous lubricant, a pair of sun gears, one secured to each wheel, spaced from each other and within said chamber, a sleeve about which the wheels are rotatable, a plurality of differential planetary pinions secured to said sleeve, meshing with said sun gears and displacing viscous lubricant within said chamber as they revolve, said chamber being closely fitted to the outer surfaces of the sun gears and pinions.

2. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels having adjacent circularly extending cavities with adjacent engaging faces of considerable area cooperating to form a sealed hydraulic chamber and containing a viscous lubricant, a pair of sun gears, one secured to each wheel, spaced from each other and within said chamber, a sleeve about which the wheels are rotatable, a plurality of differential planetary pinions secured to said sleeve, meshing with said sun gears and displacing viscous lubricant within said chamber as they revolve.

3. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels having adjacent circularly extending cavities with adjacent engaging faces of considerable area cooperating to form a sealed hydraulic chamber and containing a viscous lubricant, sealing means between said faces to prevent leakage from said chamber and a thrust bearing between said faces, a pair of sun gears, one secured to each wheel, spaced from each other and within said chamber, a sleeve about which the wheels are rotatable, a plurality of differential planetary pinions secured to said sleeve, meshing with said sun gears and displacing viscous lubricant within said chamber as they revolve.

4. In a dual wheel assembly, a pair of side by side independently rotatable dual wheels, a sleeve on which the wheels are journalled, a circular member carried by the sleeve and spacing the wheels from each other, said wheels being formed with facing annular cavities adjacent said circular member to form an annular hydraulic chamber to contain a lubricant, a pair of sun gears, one within each cavity, a plurality of differential planetary pinions rotatably mounted on said circular member and meshing with said sun gears to displace lubricant as they rotate whereby differential action of the gears is resisted and means for sealing said hydraulic chamber to prevent leakage therefrom.

5. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels, a sleeve on which the wheels are journalled, a circular member carried by the sleeve and spacing the wheels from each other, said wheels having adjacent engaging faces of considerable area and being formed with facing annular cavities adjacent said circular member to form an an-

nular hydraulic chamber to contain a lubricant, a pair of sun gears, one within each cavity, a plurality of differential planetary pinions rotatably mounted on said circular member and meshing with said sun gears to displace lubricant as they rotate whereby differential action of the gears is resisted and means for sealing said hydraulic chamber to prevent leakage therefrom.

6. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels, a sleeve on which the wheels are journalled, a circular member carried by the sleeve and spacing the wheels from each other, said wheels having adjacent engaging faces of considerable area and provided with a thrust bearing between them and being formed with facing annular cavities adjacent said circular member to form an annular hydraulic chamber to contain a lubricant, a pair of sun gears, one within each cavity, a plurality of differential planetary pinions rotatably mounted on said circular member and meshing with said sun gears to displace lubricant as they rotate whereby differential action of the gears is resisted and means for sealing said hydraulic chamber to prevent leakage therefrom.

7. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels having adjacent circularly extending cavities cooperating to form a sealed hydraulic chamber to contain a viscous lubricant, a pair of sun gears, one secured to each wheel, spaced from each other and within said chamber, a sleeve about which the wheels are rotatable, a plurality of differential planetary pinions secured to said sleeve, meshing with said sun gears and displacing viscous lubricant within said chamber as they revolve, and means adjacent the mesh of the pinions and gears for restricting the flow of lubricant to restrain independent rotation, said chamber being closely fitted to the outer surfaces of the sun gears and pinions.

8. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels having adjacent circularly extending cavities with adjacent engaging faces of considerable area cooperating to form a sealed hydraulic chamber to contain a viscous lubricant, sealing means between said faces to prevent leakage from said chamber and a thrust bearing between said faces, a pair of sun gears, one secured to each wheel, spaced from each other and within said chamber, a sleeve about which the wheels are rotatable, a plurality of differential planetary pinions secured to said sleeve, meshing with said sun gears and displacing viscous lubricant within said chamber as they revolve, and means adjacent the mesh of the pinions and gears for restricting the flow of lubricant to restrain independent rotation.

9. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels having adjacent circularly extending cavities with adjacent engaging faces of considerable area cooperating to form a sealed hydraulic chamber to contain a viscous lubricant, sealing means between said faces to prevent leakage from said chamber and a thrust bearing between said faces, a pair of sun gears, one secured to each wheel, spaced from each other and within said chamber, a sleeve about which the wheels are rotatable, a plurality of differential planetary pinions secured to said sleeve, meshing with said sun gears and displacing viscous lubricant within said chamber as they revolve, and baffle means extending along the surface of the pinions and gears and apertured to restrict the flow of lubricant induced by rotation of the pinions.

10. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels, a sleeve on which the wheels are journalled, a circular member carried by the sleeve and spacing the wheels from each other, said wheels being formed with facing annular cavities adjacent said circular member to form an annular hydraulic chamber to contain a lubricant, a pair of sun gears, one within each cavity, a plurality of differential planetary pinions rotatably mounted on said circular member and meshing with said sun gears to displace lubricant as they rotate whereby differential action of the gears is resisted, means for sealing said hydraulic chamber to prevent leakage therefrom, and a hollow box-like member substantially filling the chamber between adjacent planetary pinions and provided with apertures to allow lubricant to flow to the gears and pinions and to restrict flow of lubricant away from the gears and pinions.

11. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels, a sleeve on which the wheels are journalled, a circular member carried by the sleeve and spacing the wheels from each other, said wheels having adjacent engaging faces of considerable area and being formed with facing annular cavities adjacent said circular member to form an annular hydraulic chamber to contain a lubricant, a pair of sun gears, one within each cavity, a plurality of differential planetary pinions rotatably mounted on said circular member and meshing with said sun gears to displace lubricant as they rotate whereby differential action of the gears is resisted, means for sealing said hydraulic chamber to prevent leakage therefrom, and a hollow box-like member substantially filling the chamber between adjacent planetary pinions and provided with apertures to allow lubricant to flow to the gears and pinions and to restrict flow of lubricant away from the gears and pinions.

12. In a dual wheeled assembly, a pair of side by side independently rotatable dual wheels, a sleeve on which the wheels are journalled, a circular member carried by the sleeve and spacing the wheels from each other, said wheels having adjacent engaging faces of considerable area and provided with a thrust bearing between them and being formed with facing annular cavities adjacent said circular member to form an annular hydraulic chamber to contain a lubricant, a pair of sun gears, one within each cavity, a plurality of differential planetary pinions rotatably mounted on said circular member and meshing with said sun gears to displace lubricant as they rotate whereby differential action of the gears is resisted, means for sealing said hydraulic chamber to prevent leakage therefrom, and a hollow box-like member substantially filling the chamber between adjacent planetary pinions and provided with apertures to allow lubricant to flow to the gears and pinions and to restrict flow of lubricant away from the gears and pinions.

13. In a dual wheeled assembly, the combination of a pair of independently rotatable dual wheel hubs having adjacent circularly extending cavities cooperating to form a sealed annular hydraulic chamber and containing a viscous lubricant, a pair of sun gears, one secured to each wheel hub, spaced from each other and within said chamber, a sleeve about which the

wheel hubs are rotatable, and having radially extending studs between the wheel hubs, differential planetary pinions rotatable on the studs and meshing with the sun gears, said pinions having their outer faces bearing against the annular surface of the wheel hubs whereby the pinions are restrained against radial movement with respect to the sleeve.

14. In a dual wheeled assembly, the combination of a pair of independently rotatable dual wheel hubs, having adjacent circularly extending cavities cooperating to form a sealed hydraulic chamber having an annular periphery and containing viscous lubricant, sun gears, one secured to each wheel hub, and within said chamber, a sleeve about which the wheel hubs are rotatable and having radial studs between the wheels and in said chamber, pinions on said studs meshing with the sun gears and bearing against the annular periphery of the chamber, said pinions displacing the viscous lubricant within the chamber as they revolve.

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