No. 696,654.

Patented Apr. 1, 1902.

W. G. PRICE.

BRAKE FOR VEHICLES.

(Application filed July 26, 1901.

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

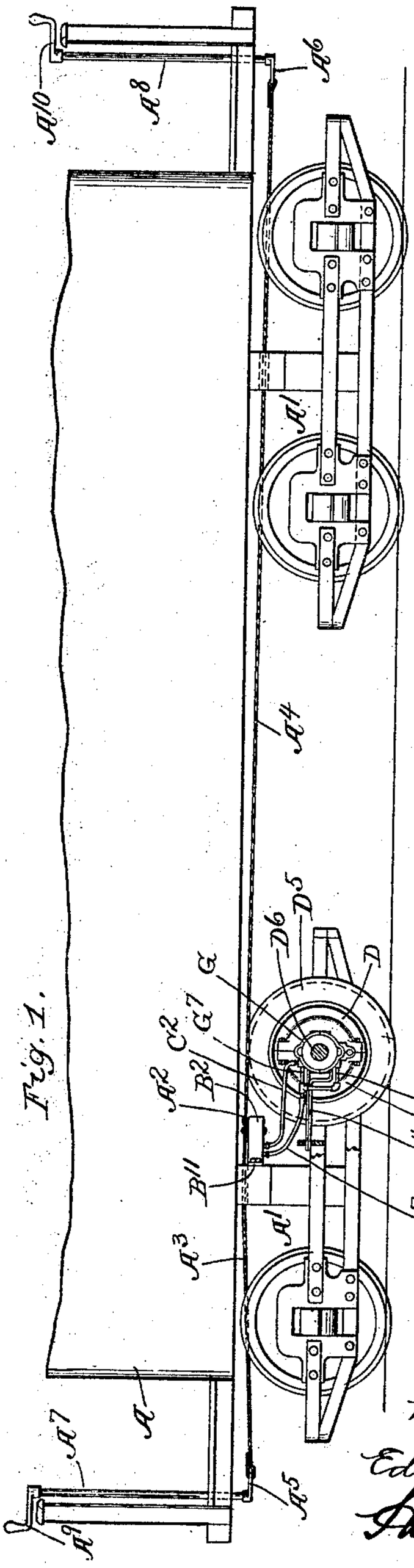

Fig. 2.

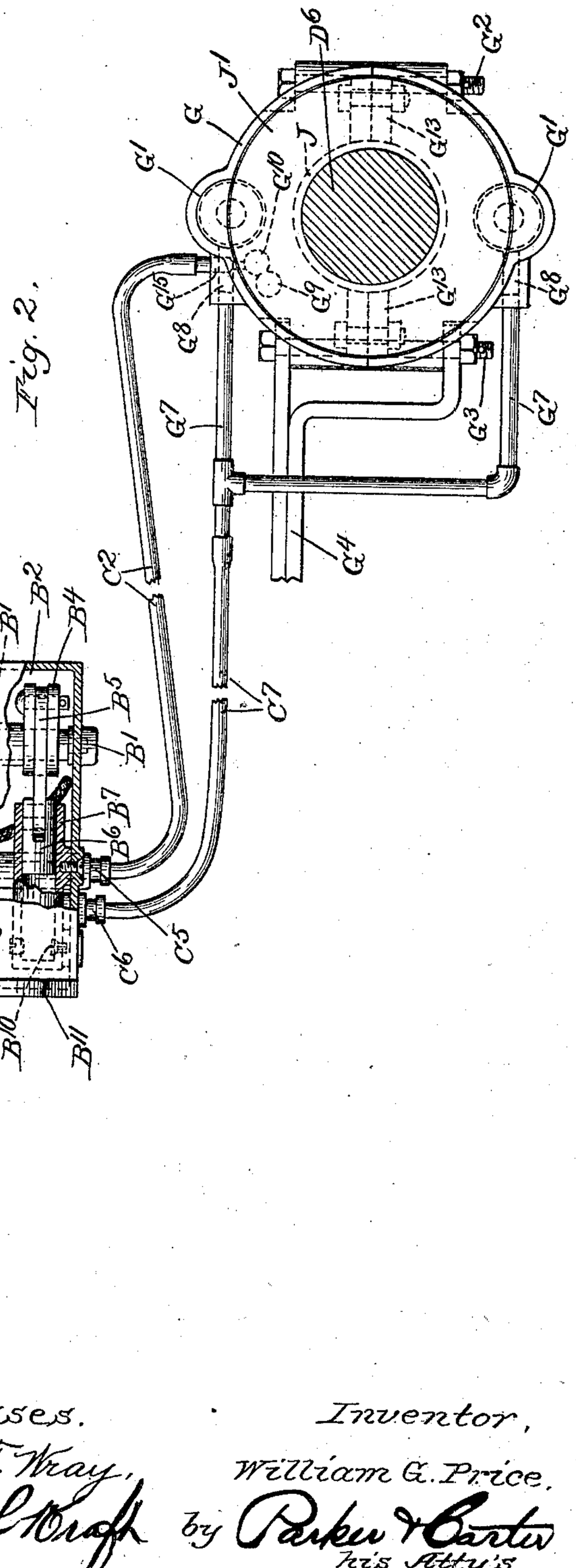

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Fig. 5.

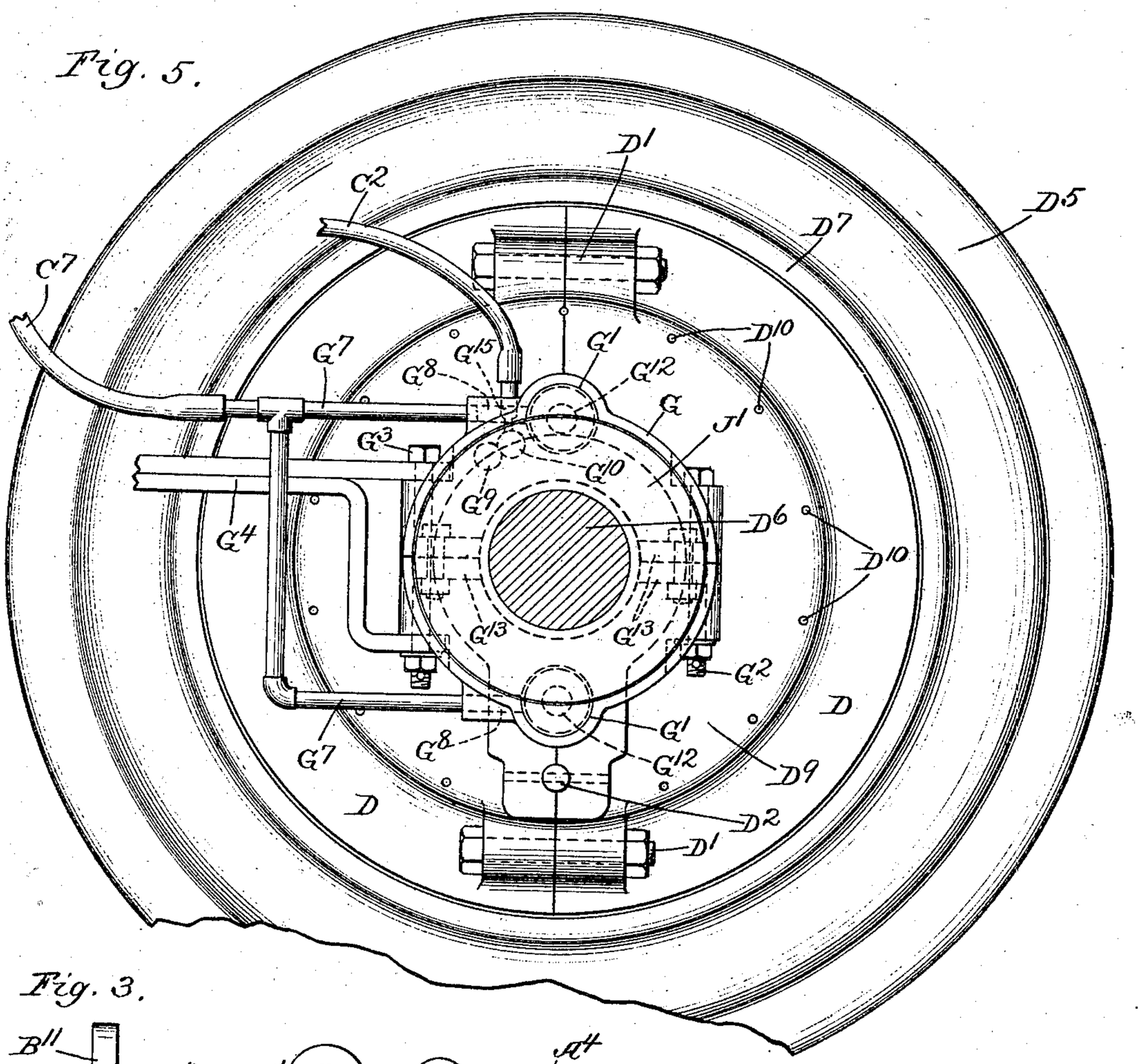
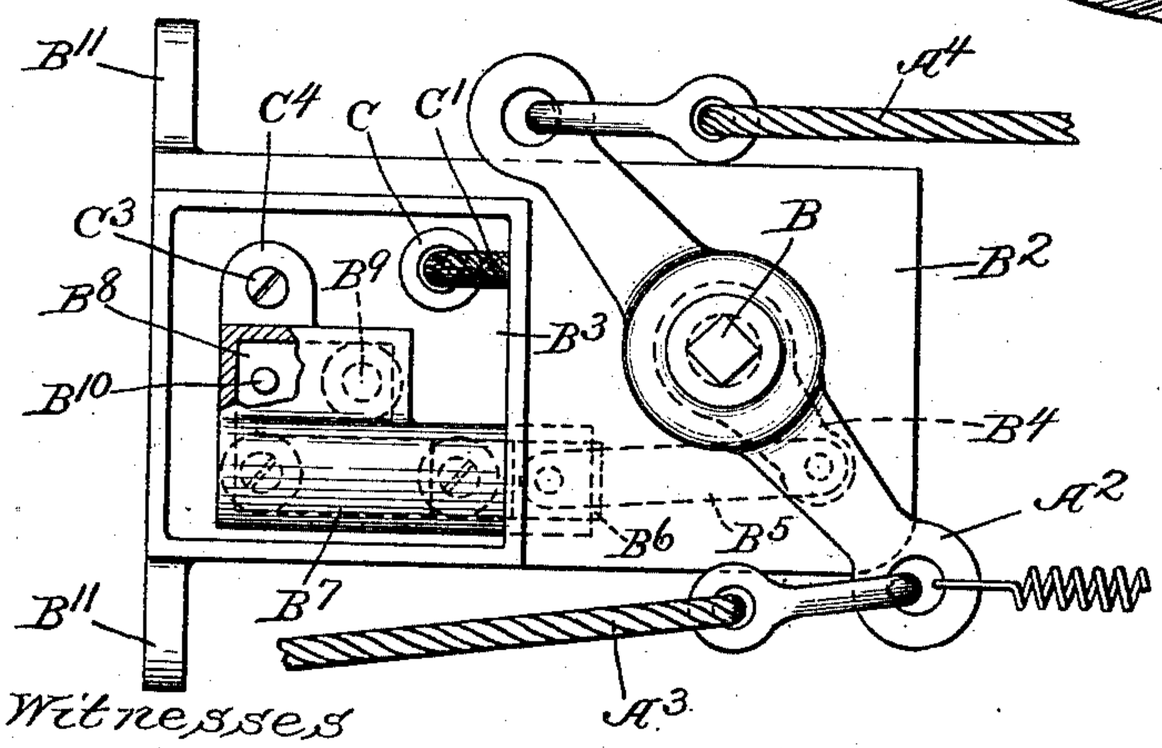


Fig. 3.



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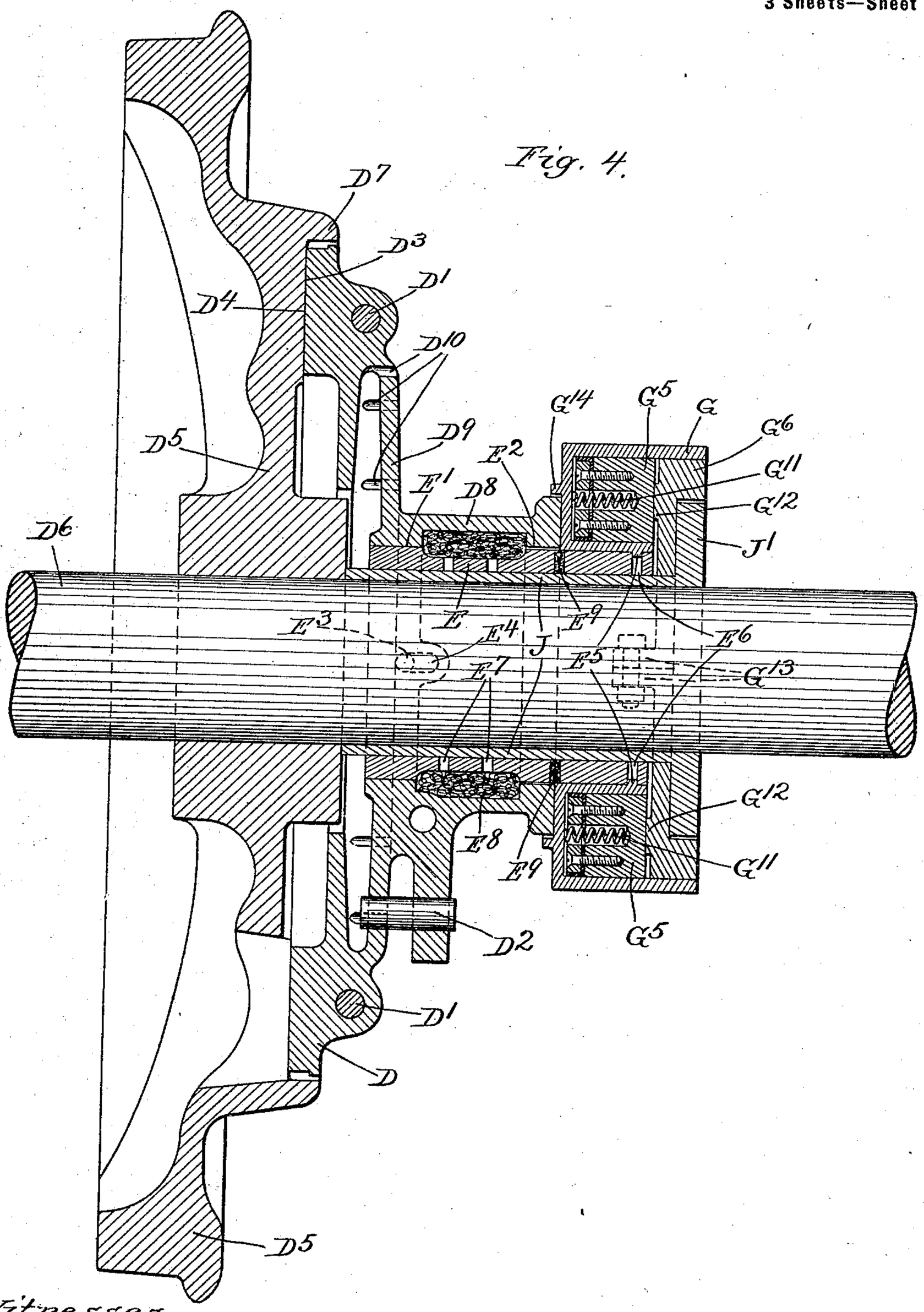
3 Sheets—Sheet 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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BRAKE FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 696,654, dated April 1, 1902.

Application filed July 26, 1901. Serial No. 69,760. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. PRICE, a citizen of the United States, residing at Kingston, in the county of Ulster and State of New York, have invented a certain new and useful Improvement in Brakes for Vehicles, of which the following is a specification.

My invention relates to vehicle-brakes, particularly to brakes for cars adapted to run on rails.

It relates particularly to friction-brakes or brakes adapted to be set by the frictional contact of certain surfaces.

It relates also to means for setting such friction-surfaces by or through fluid-pressure.

It has reference also to devices for lubricating the several parts.

It has relation also to numerous minor devices and combinations of parts whereby to produce an efficient brake.

My improvements are illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of a part of a car, showing the general relations of the several parts of my invention. Fig. 2 is an enlarged side elevation, with parts broken away, of the power-supplying apparatus. Fig. 3 is a plan view of the same with the cover removed. Fig. 4 is a cross-section through the wheel, friction parts, and pressure-applying device. Fig. 5 is an end elevation of the pressure-applying device looking toward the car-wheel.

Like parts are indicated by the same letters in all the figures.

A is a portion of the body of the car, A′ the truck, and A^2 a cross-arm lever having attached to one end the chain or rope A^3 and to the other end the chain or rope A^4. These chains are connected, respectively, with the arms A^5 A^6 on the dashboard-staffs A^7 A^8, which are controlled, respectively, by the hand-levers A^9 A^{10}. Thus by operating either of these hand-levers the cross-arm may be turned on its pivot. Associated with this cross-arm, so as to be rotated thereby, is the vertical shaft B. This shaft is supported in suitable bearings B′ B′ in the projection B^2 from the box or case B^3. At the lower end of the shaft within the box projection is a crank-arm B^4, from which passes forwardly a pitman B^5, secured to the piston B^6, which slides in the cylinder B^7, which opens into the compartment B^8, where are two apertures, one the open discharge-aperture B^9, the other a supply-aperture controlled by the check-valve B^{10}. The box B^3 is bolted or secured to the car-body or car-floor by any desired means—as, for example, by means of the lugs B^{11} B^{11}. Within the box is a pipe C, secured to the bottom of the box and extending up into the same and open at the top. A proper wick is placed within this pipe and in the box, the lower end of the wick passing down into the pipe below the bottom of the box. This wick is indicated by the letter C′. The wick is preferably composed of threads of wool yarn. A flexible tube C^2 leads from the lower end of the pipe C to the pressure-applying device for lubricating purposes. The box or case B^3 is filled with oil, and the top may be removed for that purpose, as shown in Fig. 3. The cylinder is preferably supported on the bottom of the box, being held in that position in any desired manner—as, for example, by the screw C^3 in the lug C^4 and by the coupling C^5 of the pipe C^2, which may screw up into the cylinder. The opening B^9 is connected with the coupling C^6, whence leads the pressure-supply pipe C^7. The supply-aperture is controlled by the check-valve B^{10} and serves to permit oil from the box to flow into the cylinder, but does not allow it to return. It is placed near the bottom of the cylinder or near the bottom of the oil box or tank. The operation of these parts of my improvement will be readily understood. By operating the cross-arm from either end of the car it may be turned so as to move the piston in either direction. When the piston is drawn outwardly in its cylinder, oil is drawn in from the oil reservoir or box B^3 into the cylinder through the check-valve B^{10}. When the arm is moved in the opposite direction, the check-valve is instantly seated, and the whole force of the action tends to compress the oil in the cylinder B^7 and space B^8 or, in other words, to force it out through the aperture B^9, coupling C^6, and pressure-supply pipe C^7 to the pressure-applying device. At all times the action of lubrication is as follows: The oil in the oil reservoir or box B^3 is drawn up by capillary attraction through the wick or wool

yarn into the top of the pipe C, thence down through the same, through the coupling C^5, and into the oil-supply pipe C^2, whence it is carried to the parts to be lubricated. The piston is long and nicely fitted, so as to need no stuffing; but it can of course be provided with a suitable stuffing-box, if desired. The box can be filled with a sufficient quantity of oil to last for any desired period, this being determined, of course, by the size of the box and the rapidity with which the oil-supply is consumed.

This device so far described I have alluded to as the "power-supplying apparatus." It is also the lubricant-supplying apparatus. The pipes C^2 and C^7 are preferably flexible and of any desired construction, so that the power and the lubricant can be carried down to the points where they are needed.

D D are the two parts of the friction-disk, held together by lugs and bolts at D′ D′. This friction-disk is preferably of cast-iron. The brake-chain is attached at D^2, such chain being of the ordinary type and leading and applying pressure to the brakes in any desired manner. I have not shown this part of the mechanism, for it is of the ordinary type and may be of any desired type. The friction-surface D^3 is opposed to a friction-surface D^4 on the car-wheel D^5, placed on the axle D^6. These friction-surfaces may be arranged and shaped and formed in any desired manner; but I prefer to have a flange D^7 on the wheel overhang these friction-surfaces. The friction-disk is provided with a hub D^8, which is supported on the sleeve E, of brass or other suitable material. The friction-disk hub D^8 forms part of the plate D^9, provided with the ventilating-apertures D^{10}, and to this plate the friction-disk proper is attached. The disk-hub D^8 is bored to fit the brass sleeve E somewhat snugly at E′; but at E^2 it is bored so as to fit loosely. This permits the friction-disk to rock slightly on its bearing at E′ and fit itself to the friction-surface on the car-wheel, even when the planes of the friction-surfaces are not turned, so as to be normal to or exactly at right angles to the axis of the axle. This arrangement corrects a defect which exists in many brakes. In the ordinary brakes often when worn and even when new they make a chattering noise as the result of vibration. This vibration is exceedingly rapid and powerful and takes place sometimes when the clutch-levers are entirely released. At such times the vibration takes place in the narrow space found in the close adjustment of the clutch-levers and sometimes causes the disk to turn around with the car-wheel and set the brakes automatically and release them again when the car comes to a stop. In the arrangement here shown this action does not take place and the vibrating and chattering are prevented.

The brass sleeve E is in two parts, and each is held in place in the hub of the friction-disk by a dowel-pin E^3. It is necessary in order to assemble these parts to slot the holes E^4 for the dowel-pins E^3. In order to permit the parts to be assembled on the axle and to prevent the brass sleeve E from slipping out of place on the axle, which it might do in view of the use of these slotted holes, the annular projection E^5 is provided on the inner portion of the case G, and it is let into a corresponding groove E^6 in the brass sleeve. The brass sleeve is provided with holes E^7 in connection with the annular cavity E^8 on the inner side of the hub of the friction-disk. This annular cavity is preferably filled with waste to hold oil, and this oil passes through the apertures E^7 to the collar J on the axle. Apertures provided with wicks extend through the hub portions from the cavity E^8 to the bearing-surfaces where the hub and the part G are in contact. These apertures, which are thus to be filled with wicks, are indicated by the letters E^9 E^9. Thus the oil-supply to these bearing-surfaces can be carried to the cavity E^8 and thence to the bearing-surfaces between the sleeve E and the collar J. The collar J is integral with the flange J′, and these two are shrunk upon or secured to the axle in any desired manner. This flange J′ forms the fixed stop. It may be arranged to be adjustable along the axle; but for the purposes of the operation of the brake it is to be considered as fixed upon the axle.

The part G is a kind of cylinder having at diametrically opposite points the lesser cylinders G′ G′. This cylinder G is composed of two parts bolted together at G^2 G^3, and from the latter bolt extends the arm G^4, which is attached to any suitable part of the truck-frame and prevents the cylinder G and its associated parts from rotating with the axle. In each of the lesser cylinders is a piston G^5. Each bears against a washer G^6, which in turn presses against the fixed stop, and the cylinder G presses against the hub of the friction-disk. Oil is forced down the flexible pipe C^7 from the power-supplying apparatus into these two lesser cylinders back of their respective pistons by means of the branch pipes G^7 G^7, which lead through apertures G^8 G^8, formed in lugs on the cylinder G of the lesser cylinders. In the body of the cylinder G, at some distance from the lesser cylinders, are two holes G^9 G^{10}, longitudinal to the axle. The oil for lubricating is carried from the reservoir down through the pipe to the holes G^9 G^{10}, with which the pipe C^2 connects and in which is disposed wicking. These wicks project out, one against the fixed stop or flange J′ and the other against the bearing-surface of the hub of the friction-disk. The pistons G^5 G^5 are, as stated, inclosed in the lesser cylinders G′ G′ and each has a spring G^{11} G^{11}. Each piston bears against a boss G^{12} on the washer G^6. The bosses are placed so that the pistons bear centrally against the washer. This washer is made in two parts, having lugs G^{13} G^{13} bolted together. This washer lies entirely within the cylinder G, as shown in Fig. 4, and the

cylinder is provided with an annular projection G^{14}, which covers also a portion of the hub. The lubricating-pipe is attached at the aperture G^{15}, which projects into the hole G^{10}. The hole G^{10} is in turn connected with the hole G^9. As previously stated, these two holes are drilled into the body of the cylinder G, one from one side and the other from the other side, but neither extending clear through.

The use and operation of the invention, so far as it has not already been made clear, may now be further alluded to. The lubricating of the parts is accomplished by the devices just described. The lubricating material is carried up by the wick in the reservoir or tank into the pipe C, thence down through the same into the pipe C^2 to the hole G^{15}, whence it passes into the hole G^{10} and thence to the hole G^9. In both of these holes it is absorbed into a wicking or packing, through which it passes outwardly in each direction. The wicking is pressed by spiral springs against the fixed stop J'. Thus these two bearing-surfaces are lubricated—that is to say, the bearing-surface between the brass washer G^6 and the flange J' and the bearing-surface between the cylinder G and the hub of the friction-disk. The lubricating material at this last point is carried off through the wicks in the apertures E^9 into the cavity E^8, whence it passes through the holes E^7 to lubricate the bearing-surfaces between the brass sleeve E and the collar J. The power to apply the brakes is transmitted by means of oil through the pipes C^7, branch pipes G^7, and apertures G^8 to the lesser cylinders G' G' behind the pistons G^5 G^5, and they are therefore forced outwardly, thus applying pressure to the friction-disk and causing it to bring the friction-surfaces D^3 and D^4 tightly together and by means of the connection D^2 causing the winding of the brake-chain. As the surfaces of the friction-disk wear away the pistons G^5 G^5 will move out in their cylinders and oil will flow in to take up the space, so that the adjustment of the clutch to take up the wear of the parts is made automatically by a flow of oil. The pistons cannot be forced back into their cylinders by a movement of the friction-disk hub on the axle, as the check-valve B^{10} will not permit the oil to escape. The springs in the pistons keep them pushed out, so as to always hold the friction-surfaces lightly in contact when the brake is released. If it is desired, these springs can be left out, and the brake will still be successfully operated; but the slack of the brake-chain will not be taken up while the brake is released.

Some of the advantages of this form of friction-brake are these: It permits an automatic adjustment to take up the wear. In a purely mechanical friction-brake the adjustment of the clutch-levers must be nicely made, and as soon as a little wear of the parts takes place the adjustment has to be again made, and much trouble is caused by the workmen failing to properly adjust the brakes. All such brakes require oil in all of their bearing parts except the friction-surfaces, and the failure to oil these brakes at frequent and regular intervals causes them to wear out rapidly. By providing an automatic system of oiling this trouble is eliminated, and the brake will be well oiled as long as there is any oil in the tank, and if the brake fails to operate the motorman has nothing to do but fill up the tank. By using but one tank the lubricating of the brake is insured. By using this fluid-pressure system the connection between the parts on the car-body and the parts on the axle can be made by flexible hose, either rubber or steel, and enough slack can be given to the hose to allow for the swiveling of the trucks. If desired, the pressure-pipe can be extended to each end of the car and a separate oil-pressure piston and lever can be placed on each platform at each end of the car and be connected to the pressure-pipe to operate the brake. This, however, will necessitate the use of a valve in the pressure-pipe near each platform, so that the pipe connection with one end of the car could be shut off when the brake was operated from the other. By using two pistons of the same size located at diametrically opposite points on the axle and equidistant from it an equal pressure will be given to all parts of the annular bearing-surface.

I claim—

1. In a brake for vehicles, the combination of a friction device on the axle, with setting devices carried on the axle and adapted to be operated by a liquid under pressure, a liquid-supply device carried on the vehicle-body, a liquid-compressing device associated therewith, a liquid-transmitting device from the liquid-supply device to the friction device to operate the same responsive to the motion of the liquid-compressing device, and a separate connection from the liquid-storage to the friction device for the transmission of the liquid for lubricating the parts.

2. In a brake for vehicles, the combination of a friction device on the axle, with setting devices carried on the axle and adapted to be operated by a liquid under pressure, a lubricating-liquid-supply device carried on the vehicle-body, a liquid-compressing device associated therewith, a liquid-transmitting device from the liquid-supply device to the friction device to operate the same responsive to the motion of the liquid-compressing device, and a separate connection from the lubricating-liquid-supply device to the friction device to transmit a portion of the liquid for lubricating purposes.

3. In a brake for vehicles, the combination of a friction device on the axle, with setting devices carried on the axle and adapted to be operated by a liquid under pressure, a liquid-supply device carried on the vehicle-body, a liquid-compressing device associated therewith, a liquid-transmitting device from the

liquid-supply device to the friction device to operate the same responsive to the motion of the liquid-compressing device, and a separate connection from the liquid-storage to the friction device for the transmission of the liquid for lubricating the parts, the fluid-transmitting device leading from the liquid-supply on the vehicle-body to the friction device on the axle being flexible.

4. In a brake for vehicles, the combination of a friction device on the axle, with setting devices carried on the axle and adapted to be operated by a liquid under pressure, a lubricating-liquid-supply device carried on the vehicle-body, a liquid-compressing device associated therewith, a liquid-transmitting device from the liquid-supply device to the friction device to operate the same responsive to the motion of the liquid-compressing device, and a separate connection from the lubricating-liquid-supply device to the friction device to transmit a portion of the liquid for lubricating purposes, the fluid-transmitting device leading from the liquid-supply on the vehicle-body to the friction device on the axle being flexible.

5. In a brake for vehicles, a friction device on an axle, or other rotating part, which is operated by a hydraulic device; the hydraulic device being operated by a pump which is carried by the vehicle-body and a capillary lubricating device, the hydraulic pump and capillary lubricating devices being placed in tanks carried by the vehicle-body.

6. In a brake for vehicles, a friction device on an axle or other rotating part, a hydraulic device carried by the rotating part, a pump in a tank containing a liquid which operates the hydraulic device through a flexible pipe connection.

7. In a brake for vehicles, a friction device on a rotating part, a hydraulic device which is carried by the rotating part, a pump in a tank of liquid which operates the hydraulic device, a lever which operates the pump and connections from the pump-lever to hand-levers at each end of the car.

8. In a brake for vehicles, the combination of a brake-setting device with a power-supplying device, a connection between the same, whereby power is transmitted from the power-supplying device to the brake-setting device to set the brakes, and a lubricant-transmitter connected with the brake-setting device at one end and with the power-supplying device at the other, and a lubricant-supply associated with the power-supply.

9. In a brake, the combination of a friction-clutch device with a power-supplying device, a connection from one to the other, said power-supplying device adapted to supply power to the friction-clutch by means of lubricating fluid, and a separate lubricating connection from the power-supplying device to the friction-clutch.

10. In a brake for vehicles, a friction device carried by an axle which has a fixed part and a loose part, the axle-bearing of the loose part being taper-bored.

11. In a brake for vehicles, a friction device carried by an axle which has a fixed part and a loose part, the loose part having a bearing at each end of its hub, one bearing being larger than the other so that the loose part is free to wabble on its bearings.

12. In a brake for vehicles, a friction device on an axle which is operated by a hydraulic device, the hydraulic device being operated by a pump which is carried by the vehicle-body, and a capillary lubricating device, the capillary lubricating device being placed in a tank carried by the vehicle-body.

13. In a brake for vehicles, a friction device carried by an axle having a fixed and loose disk, the bearing of the loose disk being taper-bored.

14. In a brake for vehicles, a friction device on an axle, which has a fixed part and a loose part, the loose part having a bearing at each end of its hub, one bearing being larger than the other, so the loose part is free to wabble on its bearings, the loose part carrying a chain which is operatively connected to the brake-shoes.

15. In a brake for vehicles, a fixed friction-disk and a loose friction-disk on an axle, the loose friction-disk carrying a chain which is operatively connected to the brake-shoes, the loose friction-disk having a bearing at each end of its hub, one bearing being larger than the other, so the loose friction-disk can wabble on its bearings.

16. In a brake for vehicles, a friction device on an axle, which is operated by a liquid-pressure, a pump device which is used to produce the liquid-pressure, a reservoir containing liquid which supplies the pump, the pump and reservoir being so associated that the liquid which leaks past the pump-piston returns by gravity to the reservoir.

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