

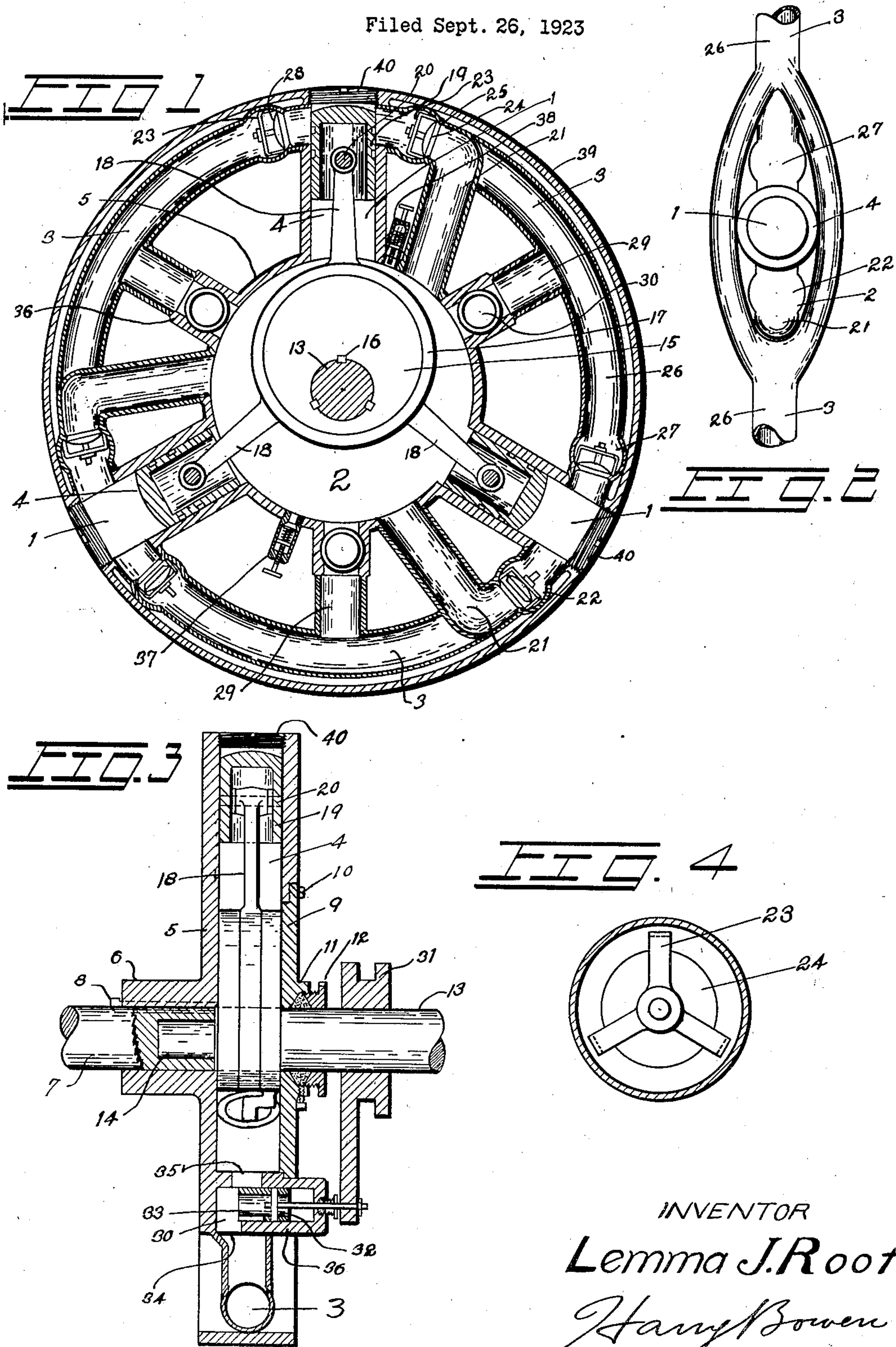
Sept. 4, 1928.

1,683,054

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HYDRAULIC OR VACUUM CLUTCH

Filed Sept. 26, 1923



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HYDRAULIC OR VACUUM CLUTCH.

Application filed September 26, 1923. Serial No. 664,982.

The invention is a device for retarding or checking the rotating movement of an object or for transmitting power from a driving element to a driven element in which the relative speed of the two elements can be regulated.

The invention is an improvement over my prior patents having the Serial Nos. 344,231 and 351,972, filed December 11, 1919 and January 16, 1920, and allowed April 3, 1923 and August 29, 1921 respectively. The patent with the Serial No. 351,972 was abandoned and the patent with the Serial No. 344,231 was issued Oct. 23, 1923 with the No. 1,471,921.

The improvements are in the position of the supply and compression chambers, the arrangement of the valves, the general arrangement which makes it possible to obtain a perfectly balanced wheel, and the addition of compression and vacuum relief valves.

These improvements are necessary for the reason that the drawings in said patent fail to show the real and full intent of the inventor.

The object of the invention is to provide a mechanism wherein the clutching action or holding power may be increased or decreased to retard or accelerate the rotation of a shaft or other rotating elements between the maximum full speed and the minimum or to effect a complete stop.

Another object of the invention is to provide a device to effect the transmission of power between a drive and a driven shaft and easily regulate their relative speed to one another to any desired point while in full motion and under full load.

A further object of the invention is to provide a device to effect a clutching action without coincident shock as in devices used at present.

And a further object of the invention is to provide a device in which frictional wear has been reduced to a minimum.

And a still further object of the invention is to provide a device in which the rotary motion causes the valves to have a tendency to seat without the use of springs.

With these and other ends in view the invention embodies a casing having a plurality of pumps, an eccentric in the center for operating the pumps, supply and compression chambers with suitable valves connecting them to the pump cylinders, and suitable regulating valves between the supply and

compression chambers through which the holding power of the device may be regulated.

Other features and advantages of the invention will be seen from the following description taken in connection with the drawings, wherein:—

Figure 1 is a sectional view through the center of the device.

Figure 2 is a side view with parts omitted showing the method of connecting the compression chambers around the pistons.

Figure 3 is a longitudinal section.

Figure 4 is a view showing the spider for holding the valves in the chambers.

In the drawings I have shown my device as it could be constructed wherein numeral 1 indicates the pumps, numeral 2 the supply chamber, and numeral 3 the compression chamber which extends all the way around the clutch.

The pumps 1 are formed with cylinders 4 projecting from a drum shaped casing 5 which may have a hub 6 on one side that is keyed to a drive shaft 7 by a key 8 as shown in Figure 3. A plate 9 may be held to the opposite side by screws 10 and this plate may be provided with a hub 11 in which a sleeve 12 may be screwed to form a stuffing box that may be held by a set screw. Another shaft 13 is rotatably mounted in an opening 14 in the end of the drive shaft 7 as shown in Figure 3, and this shaft may have an eccentric 15 keyed to it by keys 16.

Sliding rings 17 may be placed around the eccentric 15 and these rings may be provided with projections 18 which form piston rods and are pivotally attached to the pistons 19 by the pins 20. In operation it will be seen that as the casing is rotated with the eccentric held, or the eccentric rotated with the casing held, the pistons 19 will move in and out of the cylinders 4 thus forming pumps.

The supply or circulating chamber 2 is formed on the interior of the casing 5 and connected through passages 21 to the outer ends of the cylinders 4. These passages are provided with enlarged portions 22 in which spiders 23 may be placed to hold valves 24 which rest upon the seats 25 when in the closed position or when the pistons 19 are moving outward. It will be seen that as soon as the pistons start inward the valves 24 will move away from their seats 25 so that a substance may pass from the supply chamber to the cylinders.

The compression chamber 3 is formed by passages 26 connecting the outer ends of the cylinders and having enlarged portions 27 with valves 28 in them similar to the valves hereinbefore described for the supply chamber. These valves operate in a similar manner to those in the supply chamber and in the same circumferential direction, but open as the pistons move outward and close as they move inward. It will be observed that the valves 24 and 28 rest freely in the spiders 23 and are seated without springs to hold them against the seats and as the casing rotates in one direction, they would be thrown away from the seats and as it rotates in the opposite direction they would be forced against the seats. The compression chamber is connected by passages 29 to the supply chamber 2 and these passages are provided with sliding valves 30 which are connected to a sliding collar 31 so that as the collar is moved backward and forward by any suitable means the valves may be opened or closed or the openings in them set to any desired size. The valves 30 are formed by cylindrical shaped casings 32 having openings 33 in them which correspond with openings 34 and 35 through a cylinder 36 formed in the exterior of the casing 5. The interior of the valve is always open to the compression chamber 3 so that the pressure will be equalized which will make it possible to move the valve at all times.

When air or any gaseous substance is used in the device, inlet and outlet valves as indicated by the numerals 37 and 38, may be placed in the casing 5, one of which will admit air to the chamber 2 when the vacuum in the chamber reaches a predetermined pressure and the other of which will permit air or gas to escape when the pressure of the air or gas in the chamber reaches a predetermined pressure. These valves are not utilized when a liquid medium is used as the clutch fluid.

A ring 39 may be placed around the outside and connected to the ends of the cylinders to form a cover and also so that the device may be used as a fly wheel. The outer ends of the cylinders 4 may be provided with plugs 40 so that the cylinders may readily be machined.

It will be understood that changes may be made in the construction without departing from the spirit of the invention.

The construction will be readily understood from the foregoing description. To use the device it may be installed as a clutch or shaft connection as shown in Figure 3, as a brake by attaching the casing to the car frame and the eccentric to the propeller shaft, or can also be used as a wheel brake, or it may be attached to any suitable device in which it is desired to retard or check

a revolving motion. It will be seen that if the shaft 7 were rotated with the valves 30 open and the shaft 13 held stationary the oil that may be used in the clutch will be free to pass from one chamber to another and the casing may rotate freely. However, if the valves 30 were partly closed by moving the collar 31 the pistons will pump the substance into the compression chamber faster than it can move back into the supply chamber so that the motion will be retarded and therefore the shaft 13 will rotate slowly. As the valves 30 are completely closed it will be impossible to continue to pump the substance into the compression chamber, and therefore, the pistons will be locked and the device will hold rigidly so that the shaft 13 will rotate with the shaft 7. It will be seen that any degree of holding power may be attained by regulating the valves 30. It will also be seen that a clutching action will be obtained which may be increased or decreased to accelerate or retard the rotation of the shaft or the like between the maximum full speed or a complete stop. And furthermore, it will be seen that this holding power may be applied without any possibility of jerky movements or shocks and as there are no linings or springs the wearing parts are practically eliminated. As the device is perfectly balanced by the centrifugal motion throwing the substance against the outer wall of the compression chamber, it will also act as a fly wheel.

If the substance in the supply chamber becomes exhausted a vacuum will exist in the supply chamber, the power of which may be regulated by the relief valve and the vacuum will hold on the under side of the pistons and cause a retarding or holding action, which will have as great or even greater holding power than that developed when compressing a substance.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a device of the class described, a circular casing, a drive shaft extending into the said casing, means for securing the said drive shaft to the said casing, a driven shaft extending into the said casing from the opposite side and abutting the said drive shaft, radially extending cylinders in the said casing, pistons in the said cylinders, an eccentric for operating the said pistons keyed to the said driven shaft, individual rings on the said eccentric for each of the said pistons, suitable connecting rods between the said rings and the said pistons, said eccentric operating in a circular opening in the center of the said circular casing, tubes connecting the said circular opening with the outer ends of the said cylinders, said tubes being formed to permit portions thereof to lie in an arc described from the center of

the said casing, valves in the latter portions of the said tubes, another passage extending completely around the periphery of the said casing and connected to the outer ends of the said cylinders, valves in the said latter passage adjacent the said cylinders, other tubes connecting the said peripheral passage to the circular opening in the center of the said casing between each of the said cylinders, valves in the said latter connecting tubes operatable from the exterior of the said casing, and suitable relief valves extending into the said circular opening in the center of the casing to be used when air is used as the operating medium.

2. In a holding device, a circular casing, cylinders radially disposed in the said casing, pistons in the said cylinders, an eccentric in the said casing, individual operating means on the said eccentric to operate the said pistons, a drive shaft extending into the said casing and rigidly attached to the said casing, a driven shaft extending into the said casing abutting the said drive shaft and upon which the said eccentric is mounted, means for connecting the outer ends of the said cylinders to a chamber in the center of the said casing, valves in the said connecting means, said valves being arranged to close by the rotary motion of the said casing, other

means for connecting the outer ends of the said cylinders, valves also seated by the rotary motion in the said latter connecting means, other means connecting the said latter connecting means to the chamber at the center of the casing, and suitable valves operatable from the exterior of the casing in the said connections to the chamber at the center of the said casing.

3. In a holding device, a plurality of radially disposed cylinders, a drum shaped casing for supporting the said cylinders, pistons in the said cylinders, an eccentric in the said casing, means for individually operating the said pistons by the said eccentric, means for connecting the outer ends of the said cylinders to a chamber at the center of the said casing, check valves in the said connecting means which are normally held closed by the rotary motion of the said casing, a peripheral chamber connecting the outer ends of the said cylinders, check valves in the said peripheral chamber also held closed by the rotary motion of the casing, suitable connections between the said peripheral chamber and the said central chamber, and valves operatable from a remote point in the said latter connections.

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