June 23, 1931. F. Y. McKENNEY 1,811,019

HYDRAULIC BRAKE MECHANISM

Filed May 1, 1929 2 Sheets-Sheet 1

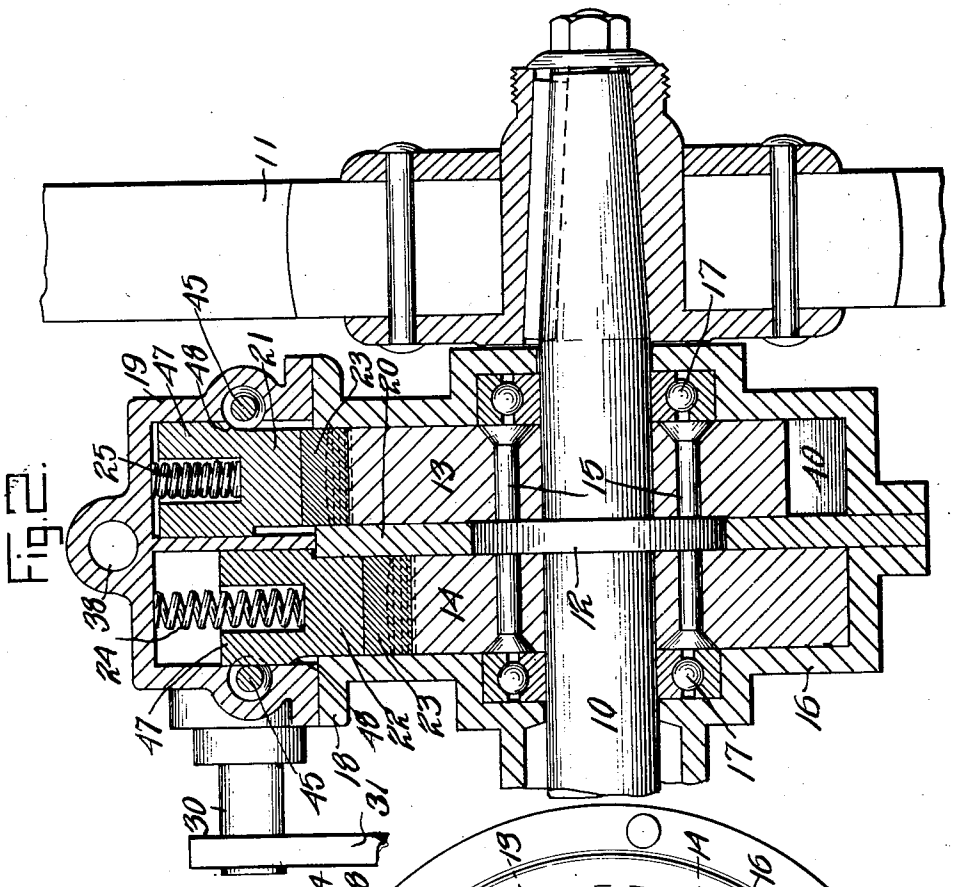

Fig. 2.

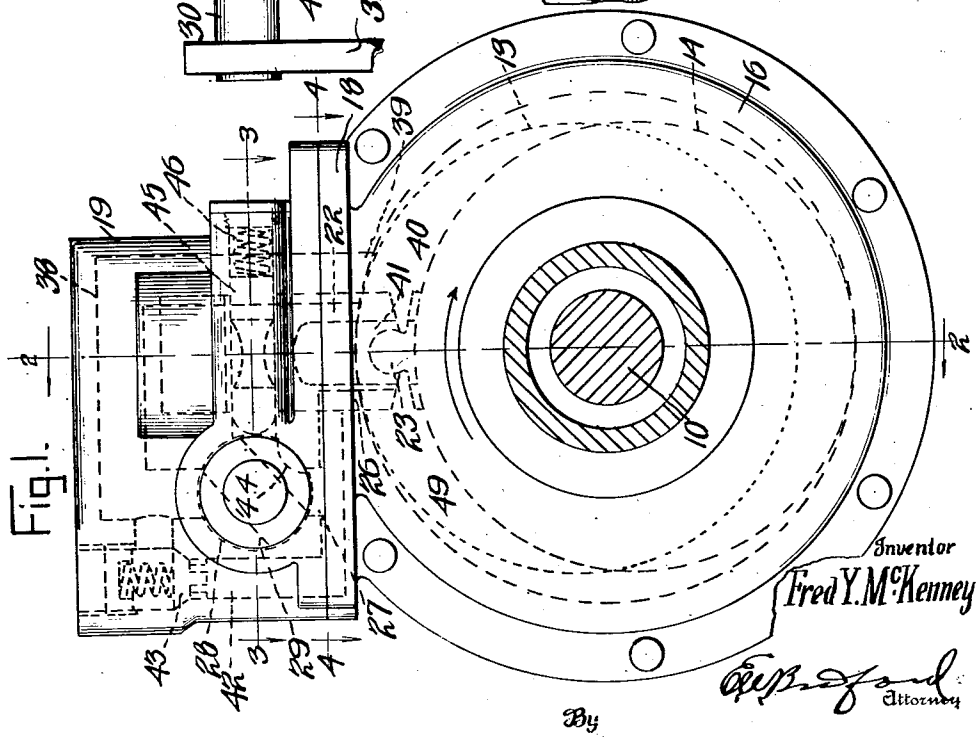

Fig. 1.

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Filed May 1, 1929 2 Sheets-Sheet 2

Fig. 4.

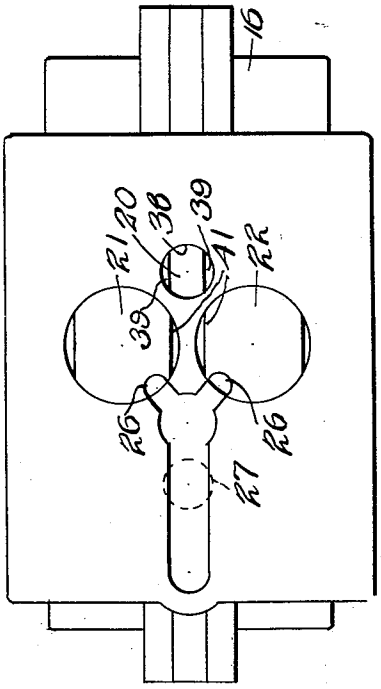


Fig. 5.

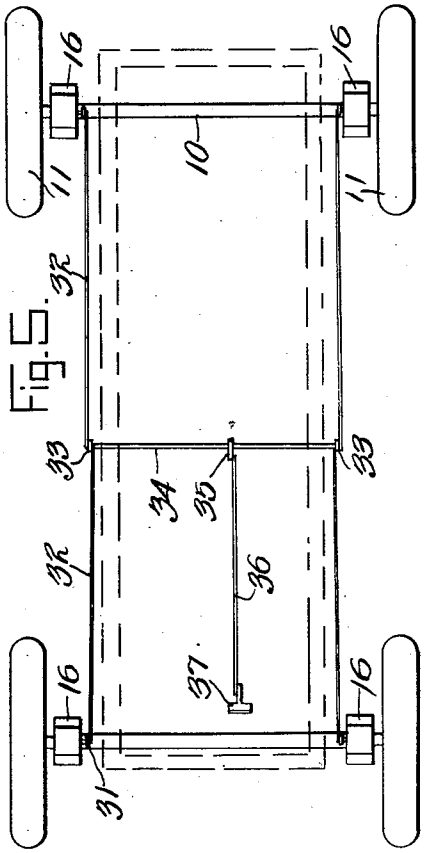
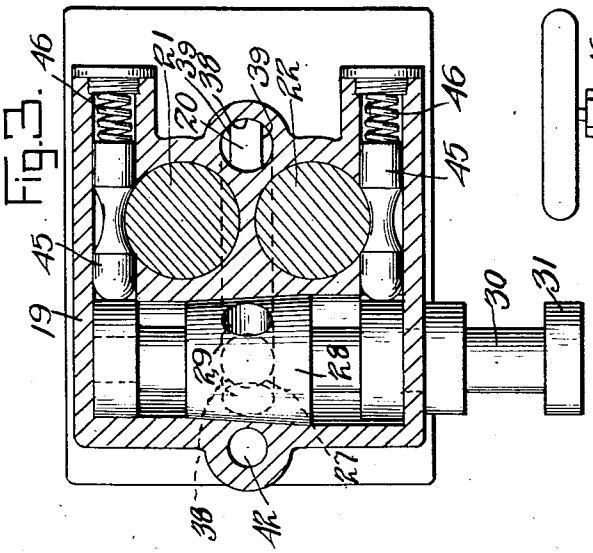


Fig. 3.



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Patented June 23, 1931

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UNITED STATES PATENT OFFICE

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HYDRAULIC BRAKE MECHANISM

Application filed May 1, 1929. Serial No. 359,654.

This invention relates to pumps, and particularly to means associated with the pump whereby it may be adapted for use as a brake mechanism.

An object of the invention is to provide pump and brake mechanism especially adapted for use on motor vehicles.

Referring to the accompanying drawings, which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a side elevation of the device showing the valve in closed position,

Figure 2 is a section on line 2—2 of Fig. 1,

Figure 3 is a section on line 3—3 of Fig. 1,

Figure 4 is a section on line 4—4 of Fig. 1, and

Figure 5 is a plan view of a motor vehicle showing my device attached thereto as braking units.

In the drawings numeral 10 indicates the shaft of a motor vehicle carrying the ground wheel 11. The shaft has a flange 12 secured upon or made integral with it. Pump pistons 13 and 14 are secured upon the flange 12 by means of bolts 15. The pump pistons 13 and 14 are eccentrically mounted upon the shaft and are preferably mounted with the eccentricity 180 degrees apart. 16 denotes a housing for the rotors which housing is secured upon the frame-work of the automobile. This may be secured in any suitable way, as for example, upon or as a part of the casing of the automobile shaft. The shaft is supported in suitable bearing elements 17, within the casing. The casing 16 is preferably flanged at its top at 18 and has a cover cap 19 secured upon the flange in any suitable way. A plate 20 serves as a partition between the pistons 13 and 14. This partition fits around the flange 12. Sliding abutments 21 and 22 have on their inner end shoes 23 which fit against the periphery of the pistons 13 and 14 to form a sealing contact with the periphery of the pistons. These shoes preferably have a cylindrical face cut to conform to the periphery of the pistons and have a cylindrical socket portion for engaging in a suitable elongated groove in the end of the abutments so that the shoes may have rocking engagement to allow them to conform at all times to the surface of the pistons. Abutments 21 and 22 have their sides flattened at 41. The abutments are urged in the direction of the pistons by means of springs 24 and 25. The abutments are each cut out at opposite sides to provide ports 26 for the fluid pumped by the pistons. The ports 26 deliver into port 27 formed in the cap 19. Positioned in a cylindrical chamber in the cap 19 is a valve 28 having a radial passage 29 therethrough. A valve stem 30 extends to the outside of the casing 19 and has a rock arm 31 secured thereon, to which may be attached a rod 32 connected by means of a rock arm 33 to a shaft 34. A rock arm 35 upon the shaft 34 has connected thereto a link 36 connected in turn to a pedal 37, by means of which the shaft 30 may be rotated to operate the valve. A passage 38 on the opposite side of the valve casing passes through the cap 19 to ports 39 which connect with the pump inlet chamber 40. A passage 42 connected with the passage 27 is closed by means of a spring pressed valve 43. This valve provides a safety by-pass for fluid from the discharge to the inlet side of the pump. The valve 28 has on one side a groove 44 dished out to provide a seat for a plunger 45 which plunger is urged toward the valve by means of a spring 46. The plunger 45 has its central portion cut out so that the stem will fit normally around the upper cylindrical portion 47 of the abutments 21 and 22. On the upper large portion 47 of the abutment is provided a shoulder 48. When the abutments are in their uppermost position and the valve 28 is turned so that the port 29 registers with the passage 27, the cylindrical end of the plunger 45 will be pressed to seat within the groove 44. This plunger however cannot be moved into its seating position until the abutments are raised to their uppermost position so that the plunger 45 may move until the edge rests against the shoulder 48 on the enlarged portion of the plunger. The purpose of the structure just defined is to hold the shoe 23 in its elevated position in order to permit

fluid in the pump to be circulated directly from the pumping chamber 49 to the pumping chamber 40 without requiring it to pass through the control valve. This of course greatly relieves the load on the pump.

The operation of the mechanism so far described is as follows: The pump chambers are first filled with liquid, preferably oil. The pistons 13 and 14 which are secured upon the shaft 10 of the automobile are driven in the direction of the arrow shown in Figure 1. Oil is drawn in through the passage 38 into the pumping chamber 40 and delivered from the pumping chamber 49 through the ports 26 to the passage 27, and when the valve is in position shown in Fig. 1 passage of the fluid therethrough is either restricted or shut off entirely. When the fluid is shut off entirely the pumping pistons are loaded to lock the wheels. When the passage 29 registers slightly with the ports 27 and 37 and 38 fluid may pass through the port, but its passage is so restricted that it puts a load upon the pistons and serves as a brake to the shaft 10. In order to prevent rupture of any of the parts in case the valve 29 is too suddenly closed, the relief valve 43 is provided to permit the fluid to pass therethrough into the passage 38 to relieve the load on the pump and to prevent rupture of the oil ports or passages, and if desired to prevent locking the wheels. When the vehicle is operating with the brakes off the valve 28 will be turned so that the ports 27 and 38 are in register with the passage 29. Fluid may therefore flow unrestricted from the discharge side of the pump through the valve to the intake of the pump. In order to relieve the load somewhat more when the valve 28 is turned to open position the plungers 45 may slide to the left as just described so as to hold the abutments out of contact with the rotor, to permit fluid to pass directly from pumping chamber 49 to inlet chamber 40 of the pump. If the vehicle is driven in the reverse direction 40 becomes the pumping chamber and 49 the inlet chamber, and the fluid is delivered directly through the passages 39, 38, 29, 27 and 26 to the intake chamber 49, and if the valve 28 is turned to restrict the flow of fluid in the direction just described the back pressure of fluid from the discharge side serves as a braking medium in the same way that it does when the pump is operating in the forward direction.

It will be obvious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention, and I, therefore, do not limit myself to what is shown in the drawings and described in the specification, but only as set forth in the appended claims.

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

1. A casing, a shaft mounted in said casing, eccentric pistons mounted upon said shaft, abutments slidably mounted in said casing having their inner ends in engagement with the pistons, ports to the chambers formed at each side of the said abutments, a valve controlling the said ports, and means controlled by the said valve for holding the abutments out of engagement with the pistons when the valve is opened, substantially as set forth.

2. A braking mechanism comprising a casing, a shaft mounted in said casing, a piston mounted eccentrically upon said shaft, the said casing providing pumping chambers having inlet and outlet ports, a channel connecting the outlet with the inlet ports, a valve operable to control the rate of flow of fluid through said channel, and a pressure controlled by-pass around said valve, substantially as set forth.

3. A braking mechanism comprising a casing, a shaft mounted in said casing having pump rotors secured thereon, inlet and outlet ports to said casing, means for throttling the outlet port, and a by-pass passage around said throttling means said by-pass having a pressure responsive valve therein, substantially as set forth.

4. A pump comprising a casing, a shaft mounted in said casing, pistons mounted on said shaft said pistons having their suction and pumping strokes alternating, inlet and outlet ports to said casing, a valve in the outlet port for controlling the rate of discharge of fluid by the pump to increase the load on the pump, and a by-pass around said valve said by-pass having a relief valve therein, substantially as set forth.

5. In combination, a casing providing a pumping chamber, a piston movable in said chamber, inlet and outlet ports to said chamber, a conduit connecting the outlet with the inlet port, a valve in said conduit movable to restrict the flow of fluid from the outlet to the inlet port, a by-pass passage around said valve, and a pressure responsive relief valve in said by-pass, substantially as set forth.

In witness whereof, I have hereunto set my hand at Chattanooga, Tennessee, this 27th day of April, A. D. nineteen hundred and twenty-nine.

FRED Y. McKENNEY.