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B. WALKER

1,948,951

HYDRAULIC POWER UNIT

Filed Aug. 21, 1929

Fig. 1.

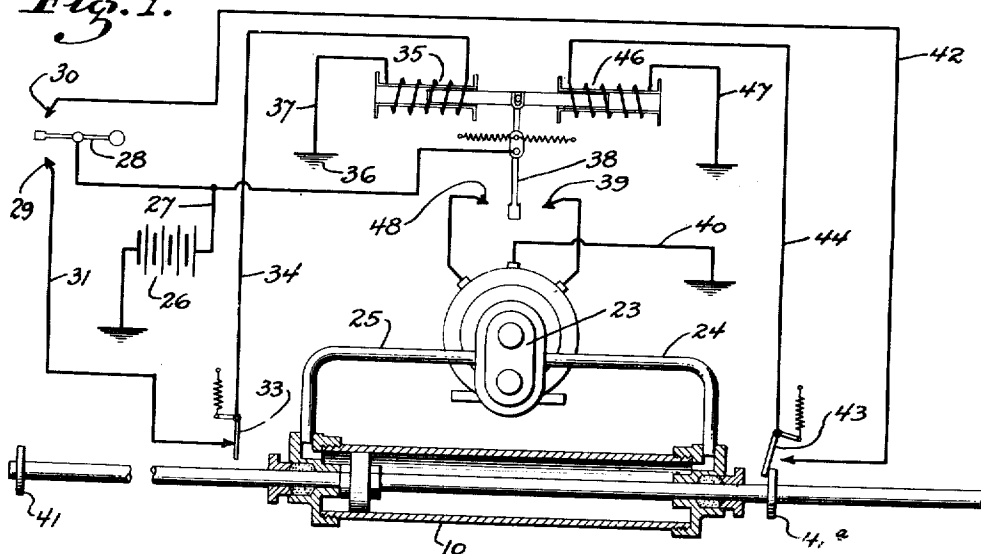
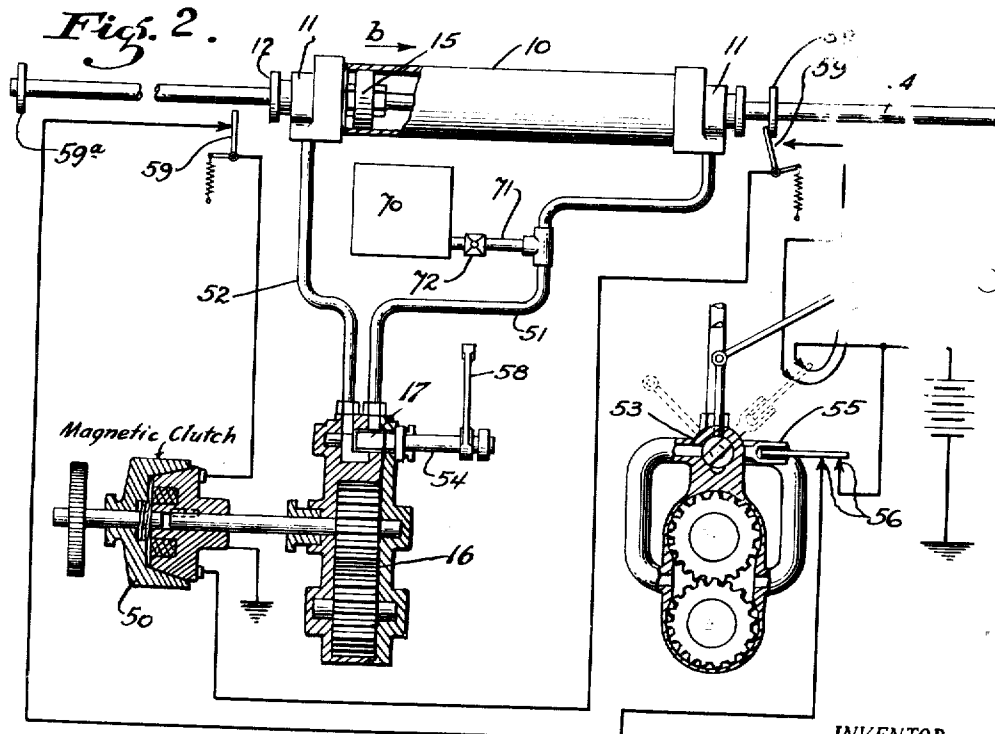


Fig. 2.



Magnetic Clutch

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UNITED STATES PATENT OFFICE

1,948,951

HYDRAULIC POWER UNIT

Brooks Walker, Piedmont, Calif.

Application August 21, 1929. Serial No. 387,392

3 Claims. (Cl. 60—52)

This invention relates to hydraulic operating units for operating parking devices such as disclosed in my United States Letters Patent No. 1,693,288 issued November 27th, 1928.

In this prior patent I have disclosed a parking mechanism operative to elevate the end of a vehicle and then shift the vehicle laterally. To operate this mechanism I provide a hydraulic power unit including a pump and a hydraulic cylinder within the latter of which is a piston connected to the parking device so that reciprocation of the piston will raise or lower the parking device. The stroke of the piston is predetermined and movement thereof is automatically discontinued at the end of each stroke.

It is the principal object of the present invention to provide improved apparatus for reciprocating an operating member by hydraulic pressure, which mechanism maintains the opposite strokes of said member equal and automatically discontinues its movement at the end of each stroke, to provide a single motion control for a clutch and reversing valve that can be located remote from the actuating cylinder.

In the present instance I have shown three forms of apparatus for accomplishing my object. These mechanisms all include a cylinder with a double acting piston which is to be reciprocated by hydraulic pressure. The piston of course is connected with the device to be operated. The pressure in the cylinder is provided by a pump operating in a closed fluid circuit so that it exhausts at one end of the piston while injecting at the other end of the piston. An automatic control is provided which renders the pump ineffective in operating the piston at the end of each piston stroke.

The apparatus disclosed herein is primarily intended for operating vehicle parking devices such as previously referred to, but I am aware that it is susceptible of other uses, such as operating elevator doors and like devices.

The invention is exemplified in the following description and illustrated by way of example in the accompanying drawing, in which:

Figure 1 is a diagrammatic view of a hydraulic power unit which is electrically controlled,

Figure 2 is a view of a hydraulic power unit in which the pump is electrically controlled through the medium of a magnetic clutch.

Referring more particularly to the accompanying drawing; in Figure 1 I have shown an electrical gear pump which is automatically controlled so that when the circuit through the gear pump is established the unit will be placed in operation and will operate the piston. When the piston reaches the end of its stroke the circuit through the gear pump is automatically broken so as to discontinue the operation of the pump.

Referring to this figure, 23 indicates a gear pump of any preferred design which is motor operated. This gear pump is connected by means of pipes 24 and 25 to the opposite ends of the cylinder 10. The circuit for this gear pump includes a battery 26 which is connected by means of a conductor 27 to one terminal of a switch 28. This switch is of the double throw type as it is adapted to cooperate with contacts 29 and 30.

A conductor 31 connects the contact 29 to the terminal of a switch 33. The switch arm 33 is connected by means of the conductor 34 to a solenoid magnet 35 and thence to the ground 36 by a conductor 37. Thus when the switch 33 is closed a circuit will be established to energize the magnet 35. The core of this magnet is connected with a double throw switch 38. The switch 38 is pivoted at its center and resiliently held in the center position as shown by the centering springs attached thereto. As the magnet is energized this switch will be placed in contact with a terminal 39 electrically connected to the motor of the gear pump 23, the other terminal of the motor being connected by means of a conductor 40 to the ground. The motor will then operate until the piston has moved to the full length of its stroke. Upon reaching the end of its stroke, a switch actuator 41 on the end of the piston rod will engage the switch 33 and open it, thus opening the circuit through the motor of the gear pump and discontinue its operation.

To again place the cylinder in operation to actuate and move said piston through its return stroke, the switch 28 is operated and placed in contact with the contact 30 which causes the current from the battery to flow through the conductor 27 through a conductor 42 to a switch 43 which is similar to the switch 33. A conductor 44 is connected with the switch 43 and with one side of a solenoid magnet 46, the other side of which is connected by a conductor 47 to the ground. This latter magnet 46 is arranged coaxially with the magnet 35 and they are provided with a common core, which is as previously described connected to the double throw switch 38. When the magnet 46 is energized the switch arm 38 is placed in contact with the contact 48 which is connected to the motor of the pump 23. This flow of the current through the second circuit will cause the motor of the gear pump

23 to reverse and drive the latter in the opposite direction which reverses the fluid circuit and causes the piston to return to the opposite end of its stroke. Upon reaching the end of its stroke a circuit breaker 41a on the piston rod opens the switch 43 which disengages the solenoid 46, which in turn allows the centering spring on the switch arm to open the contact between 38 and 48 of the circuit of the motor of the gear pump so as to discontinue its operation.

In Figure 1 the piston is shown at one end of its stroke with the switch 33 closed and the switch 38 open, when the piston is at the opposite end of its travel the switch 33 is opened to terminate the piston travel in that direction.

In Figure 2 the gear pump 16 is connected with a power source through the medium of a magnetic clutch 50. The cylinder 10 is closed by ends 11 which carry stuffing glands 12 to seal the piston rod 14 which carries the piston 15 and is connected by means of pipes 51 and 52 to the ports of the pump valve. These ports are controlled by a valve 53 so that although the pump is driven in the same direction all the time the valve alternately changes the direction of the flow of fluid through the pipes 51 and 52.

The valve 53 is provided with a shaft 54 carrying a switch arm 55 adapted to cooperate with contact points 56 and 57. The valve shaft 54 is revolved through the medium of a hand lever 58. When the contact arm 55 is in position shown in full lines in Figure 2 a circuit will be established through the battery and through the magnetic clutch one side of its winding being grounded causing the clutch to engage as long as the circuit is complete through the switch 59. As the piston reaches the end of its stroke indicated by the arrow (b) the circuit breaker 59a will open the switch 59 opening the circuit and disengaging the magnetic clutch 50.

To move the piston in the opposite direction the lever 58 is manipulated so that the switch arm 55 will be in the position shown in the dotted lines closing the contact between the contact points 57. This movement of the lever 58 will operate the valve to reverse the direction of flow of fluid through the pipes 51 and 52 and at the same time connect the contact points 57 through the medium of the switch arm 55 so as to establish a circuit from the battery through the switch 59b thence through the magnetic clutch 50 to the ground. When this circuit is established the magnetic clutch will be engaged causing the gear pump to operate and exhaust fluid from one end of the cylinder while injecting it into the other. When the piston has reached the end of its stroke the circuit breaker 59c will open the switch 59b opening the circuit and causing the clutch 50 to disengage and discontinue the operation of the gear pump.

To compensate for any leakage, I may desire to provide a fluid reservoir 70 which is connected to the pipe 51 by means of a pipe 71. This pipe 71 includes an interposed check valve 72 which permits fluid to be withdrawn from the reser-

voir 70 into the fluid circuit but prevents fluid from the circuit from being returned to the reservoir.

From the foregoing it is obvious that I have provided a hydraulic power unit which is positive in operation and which will take opposite strokes of equal length, and the operation of which will be automatically discontinued at the end of each stroke, and which can be controlled by a single motion control at a distance from the actuating cylinder.

While I have shown the preferred embodiment of my invention and the preferred application thereof, it is to be understood that various changes may be made in the construction of the apparatus and that the apparatus may be put to uses other than those described without departing from the spirit of the invention as defined in the appended claims.

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

1. A hydraulic power unit including a piston and a cylinder, a fluid pump for actuating said piston, said pump having an associated reversing valve for reversing the fluid flow to said cylinder, a power driven shaft for operating said pump, an electromagnetically actuated clutch for forming a connection between said pump and said power shaft, an electrical circuit for controlling said electromagnet including a switch which is actuated by the piston travel, and a second switch controlled by the valve mechanism, both switches acting to cause said clutch to only engage during one complete stroke for each position of said reversing valve.

2. A hydraulic power unit including a piston and a cylinder, a fluid pump for actuating said piston, a valve for reversing the flow from said pump to said cylinder, a power driven shaft for operating said pump, an electromagnetically actuated clutch for forming a connection between said pump and said power shaft, an electrical circuit for controlling said electromagnet including switch means actuated by the piston travel, and switch means associated with said reversing valve, both switches acting to control said clutch to engage during a single power stroke of the piston in one direction only and to disengage at the termination of said stroke during one position of said valve.

3. A hydraulic operated unit including a cylinder, a piston reciprocally mounted therein, a fluid pump, a reversing valve between said pump and said cylinder, a shaft driven in one direction only, an electromagnetically actuated clutch connecting said pump to said shaft when the clutch is energized, an electric circuit for controlling said clutch including switch mechanism operated by the piston travel to open said circuit at the end of the piston travel in either direction, and switch mechanism operated by the valve mechanism in said circuit, said second mentioned switch determining which direction of piston travel will disconnect said clutch.

BROOKS WALKER.

Granted February 27, 1934

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The above entitled patent was extended July 24, 1951, under the provisions of the act of June 30, 1950, for 6 years and 214 days from the expiration of the original term thereof.

Commissioner of Patents.

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2. A hydraulic power unit including a piston and a cylinder, a fluid pump for actuating said piston, a valve for reversing the flow from said pump to said cylinder, a power driven shaft for operating said pump, an electromagnetically actuated clutch for forming a connection between said pump and said power shaft, an electrical circuit for controlling said electromagnet including switch means actuated by the piston travel, and switch means associated with said reversing valve, both switches acting to control said clutch to engage during a single power stroke of the piston in one direction only and to disengage at the termination of said stroke during one position of said valve.

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