C. E. LORD.

FLUID PRESSURE SYSTEM.

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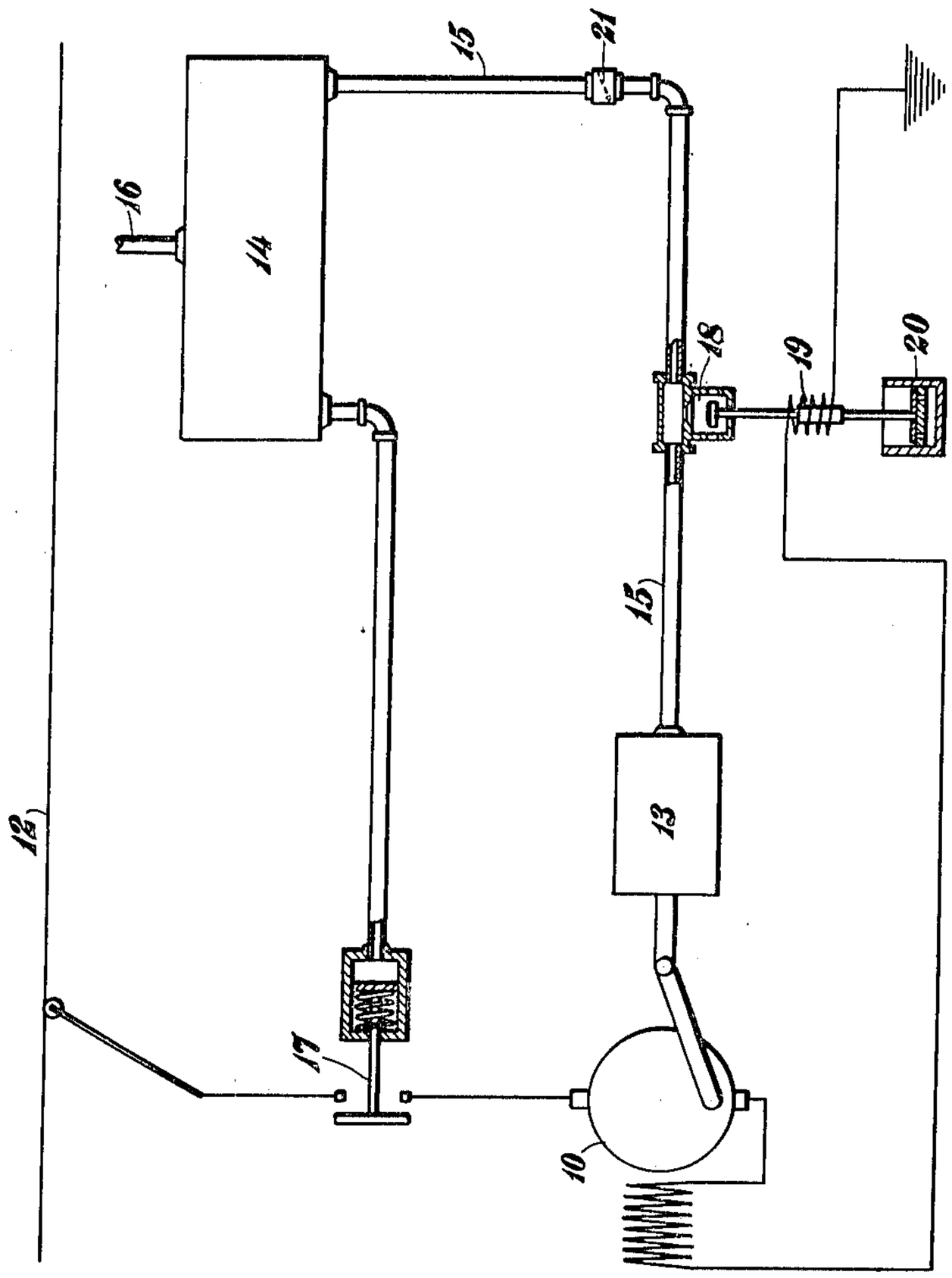
969,788. **Patented Sept. 13, 1910.**



Witnesses

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FLUID-PRESSURE SYSTEM.

969,788. Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed September 24, 1906. Serial No. 336,023.

To all whom it may concern:

Be it known that I, CHARLES E. LORD, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Fluid-Pressure Systems, of which the following is a full, clear, and exact specification.

My invention relates to motor-driven fluid pumps and especially to unloading means therefor.

In starting fluid pumps such as air compressors a heavy load is placed on the driving motor unless some special means is used for preventing it.

My present invention has for its object the production of an unloading means for electrically driven pumps which shall be simple and inexpensive but withal reliable.

To this end my invention comprises the combination of a motor-driven pump, means for normally unloading said pump, and means for gradually rendering said unloading means inoperative after the pump is started.

Other features of my invention will appear hereinafter.

The single figure of the drawing shows one embodiment of my invention.

The motor 10 which may be of any desired type is supplied from any source of current such as a trolley wire 12, as my invention is particularly applicable to air compressors for air-brake systems. The motor 10 drives an air-compressor or other fluid pump 13 which supplies a reservoir 14 through a pipe 15. From the reservoir 14 the compressed air or other fluid may be drawn through a pipe 16 for any desired purpose. A pressure switch 17 is connected to the reservoir 14 and is arranged to close the motor circuit upon decrease of pressure and open it upon increase of pressure. This pressure switch *per se* forms no part of my present invention and may be of any desired form.

In the pipe 15 is a relief valve 18 which is normally open and connects the pipe 15 to the atmosphere or other source of fluid supply. This relief valve 18 is arranged to be closed by a solenoid 19 in the motor circuit and energized when the motor circuit is completed. A dash-pot 20 retards the closing movement only of the relief valve 18. In the pipe 15 between the reservoir 14 and the relief valve 18 is a check valve 21 to prevent the backward flow of the fluid from the reservoir 14. This is especially necessary when the valve 18 is open.

The operation of the system is as follows: When the pressure of the reservoir decreases below normal the pressure switch 17 closes and completes the circuit of the motor 10 and the solenoid 19. The motor immediately starts and drives the compressor 13, but the compressor carries no load as it discharges to the atmosphere or other source of fluid supply through the open valve 18. The solenoid 19 is also energized and at once begins to close the relief valve 18, but is retarded in this by the dash-pot 20. The opening of the valve 18 through which the compressor 13 discharges to the atmosphere is thus gradually reduced and finally closed. This causes the compressor to discharge a gradually increasing amount of air into the reservoir 14 and gradually increases the load on the compressor 13. The dash-pot 20 may be so constructed that the closing of the valve 18 does not take place until the motor 10 has reached practically its full speed. The compressor continues to supply air to the reservoir until the pressure in the reservoir 14 has again reached or slightly exceeded the normal, when the switch 17 is opened and the circuits of the motor 10 and solenoid 19 are broken. This allows the motor to stop and the valve 18 to open quickly. The check valve 21 prevents the reservoir 14 from discharging to the atmosphere through the valve 18. As the air from the reservoir 14 is drawn out through the pipe 16 or otherwise, the above cycle is repeated and maintains the pressure in the reservoir 13 constant within the limits for which the switch 17 is set.

Various modifications in the structure herein set forth may be made without departing from the spirit and scope of my invention and all such I aim to cover in the appended claims.

What I claim is:—

1. A fluid pressure system, comprising a pump, an electric motor for driving said pump, a pressure switch controlling the motor circuit, a reservoir supplied by the

pump, a valve between the pump and the reservoir normally open to the source of fluid supply, an electromagnet for closing said valve, and means for retarding such closure.

2. A fluid pressure system, comprising a pump, an electric motor for driving said pump, a reservoir supplied by the pump, a switch controlling the motor circuit in response to variations in pressure of the fluid in the reservoir, and a slow-closing valve between the reservoir and the pump which is normally open to the source of fluid supply.

3. A fluid pressure system, comprising a motor-driven pump, a reservoir supplied by the pump, a normally open relief valve between the pump and the reservoir, and means for closing said valve gradually.

4. A fluid pressure system comprising a reservoir, a motor-driven air compressor supplying the reservoir, a switch in the motor circuit responsive to the pressure in the reservoir, a slow-closing relief valve between the compressor and the reservoir, and an electromagnet controlled by said switch for closing said relief valve.

5. A fluid pressure system comprising a reservoir, a motor-driven air compressor supplying the reservoir, a relief valve between the compressor and the reservoir, a solenoid for closing said valve, and a dash-pot for retarding such closure.

6. A fluid pressure system comprising a reservoir, a motor-driven air compressor supplying the reservoir, a relief valve between the compressor and the reservoir, an electromagnet for closing said valve, a dash-pot for retarding such closure, and a check valve for preventing the discharge of the reservoir when the relief valve is open.

7. In combination, a motor driven pump, means for normally unloading said pump, and means for gradually rendering said unloading means inoperative after the pump has started.

8. In combination, a reservoir, a motor-driven air compressor supplying the reservoir, a normally open relief valve between the compressor and the reservoir, and means for slowly closing said relief valve.

9. An unloading device for air compressors comprising a normally open valve, an electromagnet for closing said valve, and a dash-pot for retarding such closure.

10. An unloading device for air compressors, comprising a normally open valve, means for closing said valve, and means for retarding such closure.

11. A fluid pressure system comprising a reservoir, a pump supplying said reservoir, an electric motor for driving said pump, a switch in the circuit of said motor, said switch being controlled in response to variations in pressure of the fluid in the reservoir, a normally open valve between the reservoir and the pump, an electromagnet for closing said valve, said magnet being energized whenever the switch in the motor circuit is closed, and means for retarding the closing of said valve.

12. A fluid pressure system comprising a reservoir, an air compressor supplying said reservoir, an electric motor for driving said air compressor, a switch in a motor circuit, a slow-closing relief valve between the compressor and the reservoir, and an electromagnet for closing said relief valve, said electromagnet being energized whenever the switch in the motor circuit is closed.

In testimony whereof I affix my signature, in the presence of two witnesses.

CHARLES E. LORD.

Witnesses:

GEO. B. SCHLEY,

FRED. J. KINSEY.