Aug. 29, 1933. D. M. PEARSON 1,924,412

ELECTRICALLY OPERATED PUMPING APPARATUS

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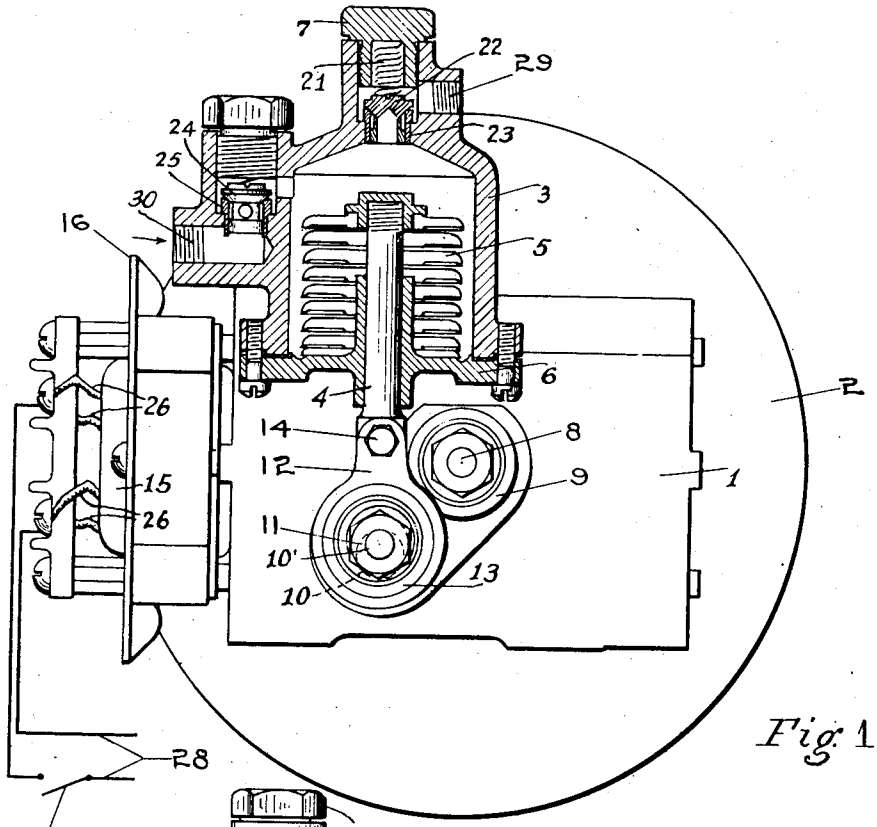


Fig. 1

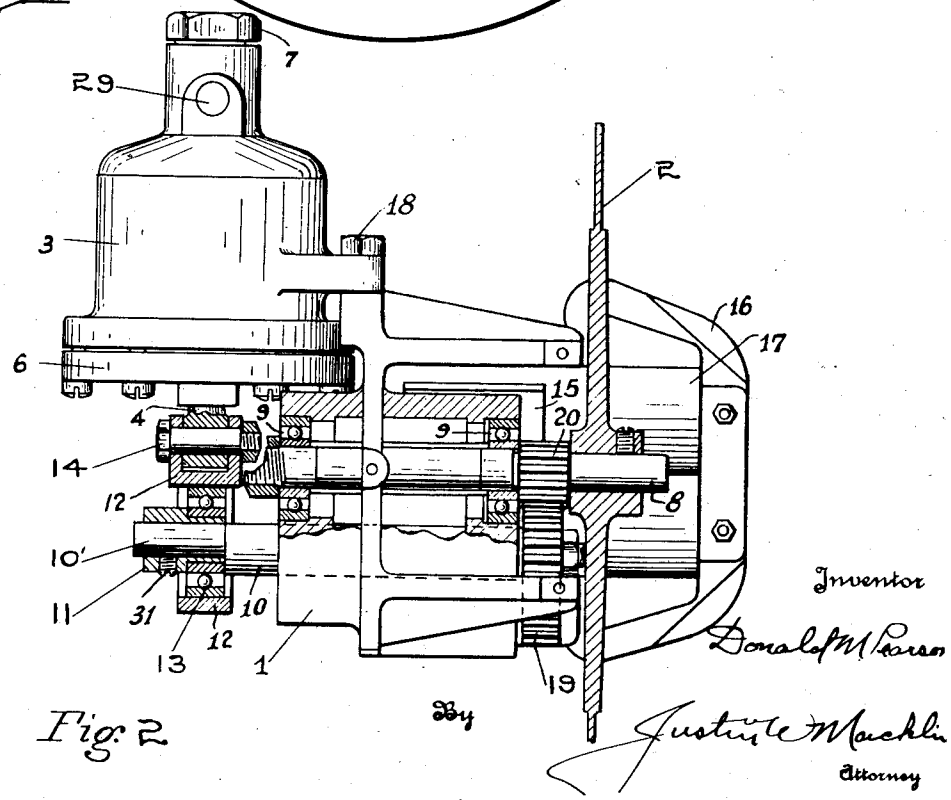


Fig. 2

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ELECTRICALLY OPERATED PUMPING APPARATUS

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1 Claim. (Cl. 103—38)

The present invention relates to improved electrically operated pumping apparatus such as are employed with oil burners.

In certain classes of apparatus it is desirable to start and stop and to regulate the rate of movement of a pump, dependent on the rise or fall of the pressure of the fluid pumped, and this has been, in the majority of applications, controlled by switch means or by a bypass valve set at the desired pressure.

The principal object of the present invention is to provide an electrically operated pump having a mechanism which operates to automatically interrupt or retard the pump operation upon rising of pressure in the pump to a given amount. Furthermore, this mechanism becomes inoperative upon such rising of pressure without the attendant danger of overheating. In addition to this, the starting and stopping operation of the pump is entirely automatic and is dependent upon the building up or relieving of pressure in the pump. The operation of the electrical mechanism employed in connection with the present invention is effected without the necessity of utilizing switches or other circuit controlling devices.

Another object is to provide a pump actuating mechanism which consumes but little electricity, is noiseless and sufficiently powerful for the work intended. It also has the feature of slow-moving parts which require little attention to lubrication and can be used in devices which receive very infrequent attention.

With the foregoing and other objects in view the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawing and pointed out in the claim hereto appended, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claim may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawing:

Figure 1 is vertical elevation of a preferred form of my invention showing in particular a cross-section of the pump cylinder.

Figure 2 is a vertical elevation of the invention showing in cross-section the motor disk, the gears, the bearings and the eccentric driving mechanism designed to cause the pump to operate.

Referring particularly to the drawing, 1 indicates a suitable frame having bosses cast thereon to support shaft bearings 9 and having a shaft 8 rotatable mounted therein, said shaft carrying a relatively thin motor disk 2. The periphery of the disk passes between spaced magnets 17 and 15 carried by the frame 16 and fastened to the frame 1. The magnets are supplied with alternating electric current through the conductors 26. This structure constitutes an alternating current disk induction motor. The disk 2 will rotate as long as current is supplied to the magnets 17 and 15 and the retardation load placed thereon is not too great. The rate of movement of the disk will depend on the current supplied through the conductors 26 and the total resistance, pump load, to the disk rotation. In my device the current supply is maintained constant and the resistance to disk movement is pump load which varies with the fluid pumped. The rate of disk movement will, therefore, be fast or slow depending on whether the pump load, rate of fluid pumped, at any given pressure is reduced or increased; and if the fluid discharge is shut off as at a fuel nozzle the disk will stop and so remain until the discharge is opened when the pump will again deliver.

During the stop period there will be no burning out or other injury to the pump or coils, operation will be merely interrupted or will proceed at the proper rate to give the predetermined pumped fluid delivery. When the retardation or brake load on the shaft 8 is sufficient to overcome the induction force of the magnets 15 and 17 the rotation of the shaft will cease until the pressure or force is relieved.

Shaft 8 carries a gear 20 which meshes with a gear 19 of a larger diameter on a shaft 10, the latter being rotatable in bearings (not shown) in the frame 1. Shaft 10 has an eccentric 10′ on one end surrounded by a second eccentric 11 rotatably mounted thereon and having a set screw 31 therein. Rotation of the eccentric 11 about the eccentric 10′ on the shaft 10 has the effect of changing the eccentricity of the eccentric 10′ and thereby lengthens or shortens the stroke of the pump. When the desired length of stroke is obtained the screw 31 is tightened, clamping the two eccentrics together. Superimposed about the eccentric 11 is the eccentric bearing 13 and the eccentric strap 12 connected by the pin 14 to the piston rod 4 which in turn passes through the guide plate 6 and connects to a metal bellows 5 which is shown in cross-section in Figure 1. The metal bellows is a stock element, purchasable in the open market. The motion of the eccentric 11 causes the piston rod 4 to expand and contract the bellows 5 giving in effect a piston pump but

without the usual friction and undesirable packing glands. However, other types of pumps such as an ordinary piston pump can be used if desired.

The bellows 5 is suitably secured to the guide plate 6 and the guide plate 6 is in turn secured to the pump and cylinder 3 by means of screws or the like. An inlet port is shown at 30. This port is provided with a valve 24 having a seat 25 upon which there is adapted to seat a valve member 24. A discharge port is shown at 29 and this port is provided with a seat 23 having a valve member 22 associated therewith. The action of the valve members 24 and 22 is substantially the same as in any conventional pump, the inlet valve 24 opening when the bellows is contracted and closing when it expands, and the discharge valve 22 operating conversely.

Should the pressure on the outlet 29 build up sufficiently high to overcome the ability of the magnets 15 and 17 to rotate the disk, the disk will stop rotating until such time as the pressure is relieved.

It will be observed that the starting, stopping and regulating the rate of movement of the disk is accomplished without switches, governors or bypass valves and that the power source remains connected to the magnets at all times. When it is intended to positively interrupt the operation of the motor regardless of the fluid pressure, a switch 27 in the circuit may be pulled, thus disconnecting the conventional source of power supply 28.

I claim:

The combination with a disk type induction motor having a shaft, said motor being continuously connected in a closed electrical circuit and adapted to stall under a predetermined torque and to remain stalled under full voltage of circuit without overheating, of a fluid pump comprising a cylinder and a piston reciprocable therein, a driven shaft connected in driven relation with said motor shaft, an eccentric on said driven shaft, a second eccentric rotatably mounted on said first mentioned eccentric, means for locking said eccentrics with respect to each other in any desired angular position to vary the eccentricity of said second eccentric with respect to said driven shaft, a connecting rod for said piston connected to said second mentioned eccentric, said pump being arranged to pump liquid fuel from a source of supply to an outlet, whereby adjustment of said eccentrics relative to each other will increase or decrease the load on the motor to permit stalling of the motor when the predetermined torque has been reached.

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