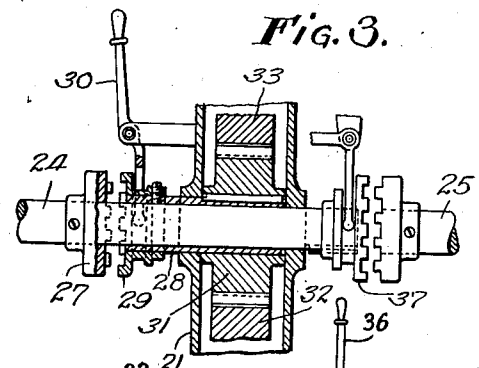
Feb. 8, 1938. C. H. FOX 2,107,694

PARALLEL SERIES CENTRIFUGAL PUMP

Filed May 9 1934

Fig. 3.



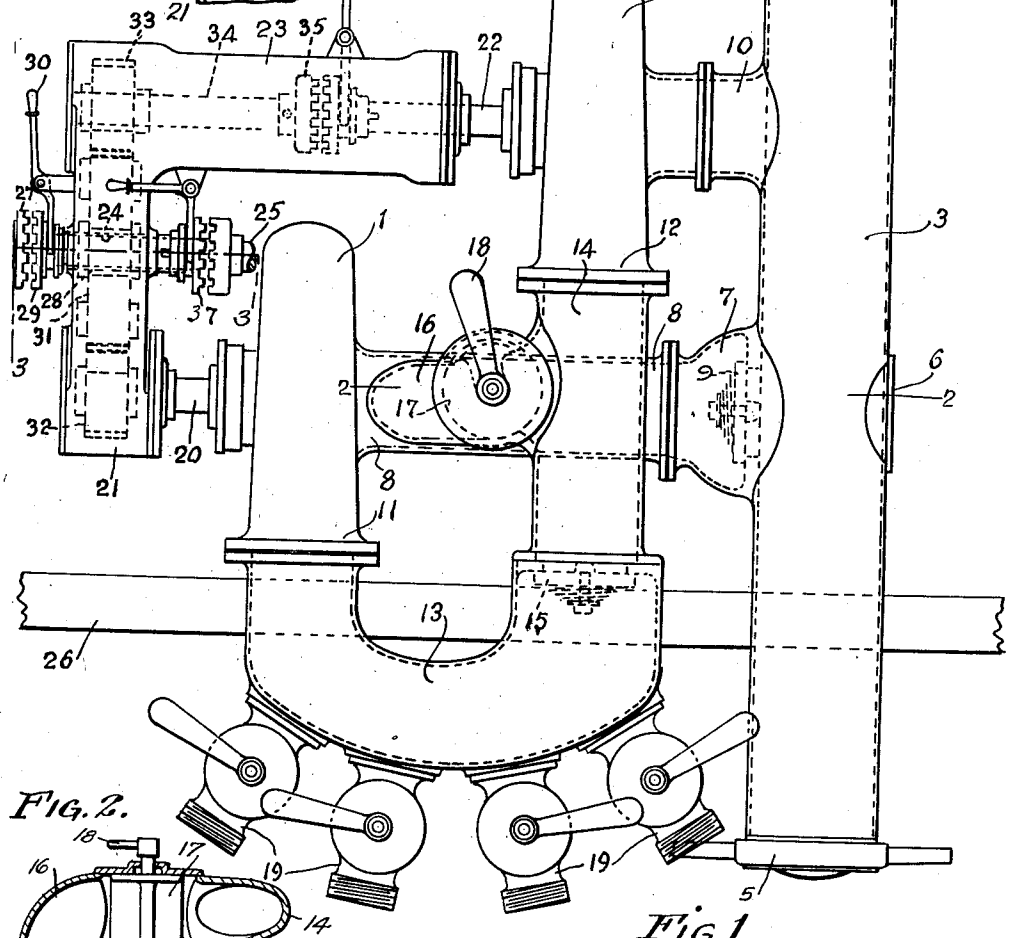
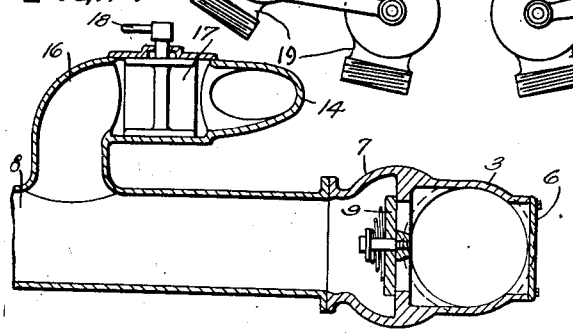


Fig. 1.

Fig. 2.



Inventor
CHARLES H. FOX,
By Toulmin & Toulmin
Attorneys

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PARALLEL SERIES CENTRIFUGAL PUMP

Charles H. Fox, Cincinnati, Ohio, assignor to The Ahrens-Fox Fire Engine Company, Cincinnati, Ohio, a corporation of Ohio

Application May 9, 1934, Serial No. 724,751

1 Claim. (Cl. 103—106)

This invention relates to improvements in pumps, and has for its object to provide a pump adapted to be used in connection with fire trucks and constructed so that water may be taken into the pumps from either side of the truck and discharged from one side.

It is an object of this invention to provide a pump mechanism in which there is a plurality of pumps mounted on a frame in staggered formation, and connected to a power source so that a single pump may be operated or all of the pumps operated in conjunction.

It is an object of the invention to provide, in connection with a truck frame having a pair of pumps thereon, a source of power and a driven shaft, means to connect the source of power to either or both pumps or to connect the source of power to the driven shaft.

It is also an object to provide, in connection with a truck, a plurality of pumps, one a primary pump and the other a secondary pump, connected to a source of water supply so that the two pumps may operate in parallel or they may operate in series, the water passing through the secondary pump into the primary pump for discharging purposes.

These and other advantages will appear from the following description taken in connection with the drawing.

Referring to the drawing:

Figure 1 is a plan view of the pump mechanism and a part of the truck structure to which the pump mechanism is attached, and by which it is supported.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1, showing connections between the driving shaft and the pump gearing and the driven shaft connected with the axle and wheels.

In the present pump structure there are two centrifugal pumps shown supported transversely of a frame, which constitutes part of a fire truck. One of these pumps is a primary pump 1 and the other is a secondary pump 2, each having its inlet connected to an inlet header 3. This inlet header has ports or inlets 4 and 5 for suction hose. Intermediate its ends this inlet header has provision, as indicated by the numeral 6, for an additional tubular intake.

Intermediate its ends the intake header is provided with a take-off 7, which is connected to the intake of the primary pump by means of a pipe 8. In the take-off 7 there is a self-seating valve 9, which is spring-pressed and opens by movement in the direction of the inlet to the primary pump 1. Extending from the inlet header to the inlet of the secondary pump is a take-off 10. The outlet 11 of the primary pump is connected to one end of an arcuate discharge header 13, while the outlet 12 of the secondary pump 2 is connected to the other end of the discharge header by means of a tubular connection 14.

At the point where the tubular connection 14 connects with the discharge header there is a sealing valve 15, which is spring-pressed and adapted to open under pressure of the water flowing from the secondary pump through the tubular connection 14, into the discharge header. Extending from the tubular connection to the pipe 8 is an arcuate pipe 16, which has therein a valve 17 operated by means of a handle 18. This pipe 16 opens into the pipe 8 adjacent the inlet to the primary pump 1. The discharge header is provided with a plurality of discharge gates, such as 19, to which hose may be attached for discharging water from the header.

The pump 1 is operated by means of a shaft 20 which extends into a transmission case 21. The secondary pump 2 is operated by means of a shaft 22 which extends into a clutch casing 23, and by means of a clutch in the casing is adapted to be connected through transmission in the casing 21 to a power shaft 24 connected to a source of power for propelling the truck to which the pumping mechanism is attached. In line with the power shaft is a traction shaft 25 adapted to be connected to the traction element of the truck. The pumping mechanism is supported by the truck frame 26.

When the valve 17 is in a position to close the pipe 16 and both pumps are operating, they act in parallel and both supply water to the discharge header for discharge through the discharge gates. When the pumps are operating in parallel a large supply of water is provided without so much pressure. If the secondary pump is not operating and the primary pump is operating the volume of water and the pressure fall to about one-half the capacity of the two pumps when operating in parallel. When the valve 17 is shifted so that the pipe 16 is open the two pumps will operate in series, thereby producing a greater pressure with a lesser volume.

When the two pumps are operating in series the water passes from the header 3, through the take-off 10 into the secondary pump 2, from the secondary pump, through the pipe 16 into the primary pump, and from the primary pump

into the discharge header. When the pumps are acting in series the springs, acting against the valves 9 and 15, prevent the water from passing from the header 3 into the primary pump, and from the tubular connection 14 into the discharge header 13.

On the power shaft 24 is a clutch element 27 adapted to be engaged by a clutch element 29, slidably but non-rotatably mounted upon a sleeve 28, which is rotatably mounted on the power shaft and supported by the transmission case 21. The clutch element 29 is slidable upon the sleeve by means of a clutch operating lever 30, suitably pivoted to the transmission case 21. The sleeve 28 carries thereon a gear 31, which meshes with a gear 32 on the shaft 20 and a gear 33 mounted upon a shaft 34 adapted to be connected with the shaft 22 by means of a clutch 35 within the clutch casing 23. This clutch is operated by means of a clutch lever 36 suitably supported on the clutch casing. For the purpose of connecting the power shaft 24 to the traction shaft 25 a clutch 37 is provided.

I include by this new arrangement, means to increase the effectiveness of centrifugal pumping mechanism over the wide variations of volume and pressure demanded by fire service.

It will be obvious that my invention permits the attachment of the hose to any one or more of the gates regardless of the manner in which the pumps are being operated so that the hose lines need not be disturbed when transitions from parallel to series, or vice versa, are effected and therefore I can secure, without detachment of the hose lines, either a parallel arrangement when the demand is for greater volume at lesser pressures, or a series arrangement when the demand is for greater pressure at lesser volume. The primary pump can be operated at such times only when the demand for volume and pressure falls approximately within one-half of the capacity of both pumps.

It will be understood that I desire to comprehend within my invention such modifications as come within the scope of my claim and my invention.

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

In combination in a pumping mechanism, an inlet header, a plurality of diverging outlets, a plurality of pumping mechanisms connected thereto and in parallelism with said header, valve means for selectively arranging said pumping mechanisms in parallel or in series, a common outlet header attached to the outlets of said pumping mechanisms, and a common power means for selectively driving from a single source of power one or both of said pumping mechanisms, said valve means comprising a manually operated valve and automatically closing valves, one interposed between one pump and the inlet header and the other pump and the outlet header, said pumps being arranged in such relationship with respect to one another so that the pump shafts are out of axial alignment with one another.

CHARLES H. FOX.