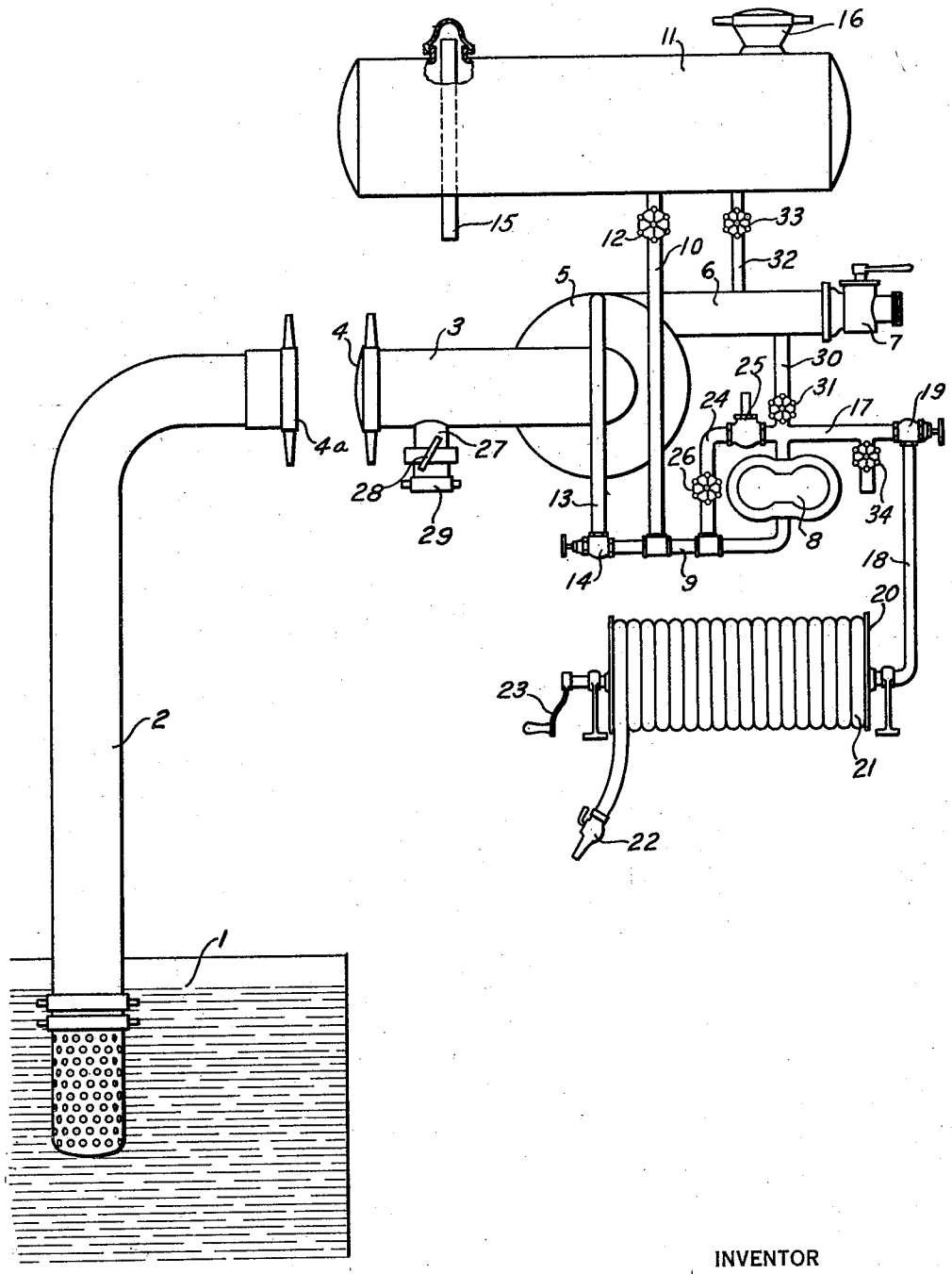
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COMBINED BOOSTER AND FIRE PUMP

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COMBINED BOOSTER AND FIRE PUMP

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This invention relates to a combination booster and fire pump primer designed to facilitate the starting of pumping operations in situations where pumps are required to raise liquids from depths below the point where the pump is situated.

This invention has for its object to provide a supplemental attachment, preferably in the form of a smaller mechanically driven pumping unit of the positive displacement type, which in addition to the exhausting pumping action shall be capable of sustained operation, handling its quota of fluid after the exhausting action is complete.

It is particularly the object of this invention to provide, in connection with a fire pump of the centrifugal type, an auxiliary booster and exhauster pump adapted to prime a main or major pump, and to deliver water for five extinguishing purposes either from a booster tank or from the supply from which the major pump receives water.

This invention deals in part with auxiliary drafting devices designed to facilitate the starting of pumping operations in situations where pumps are required to raise liquids from depths below the point where the pump is stationed. The objective involves the use of a supplemental attachment, preferably in the form of a smaller mechanically driven pumping unit of the positive displacement type and which in addition to the primary function above indicated, shall be capable of sustained operation, handling its quota of liquid—after the exhaustion is complete—and delivering same under pressure at the points and for the purposes as hereinafter set forth.

The vertical height of the lift or the distance through which the fluid is drafted will in any case be proportional to the weight of the liquid; the atmospheric pressure attending and the degree of vacuum which the auxiliary exhausting device is capable of creating.

It is well known that displacement pumps—such as the piston and rotary types—normally are capable of preexhausting the entrained air. On the other hand, however, pumps of the "centrifugal" type—to be effective at draft—must be fitted with a supplemental exhauster which is foreign to and not essentially a part of the pump itself. More directly aimed to serve with pumps of the centrifugal type, the invention nevertheless is not limited to pumps in that class; it is applicable for use in other types and is particularly intended and adapted for fire pumps and more especially for fire engines where the service is variable and where at times the water supply must be drafted from exceptionally low levels.

Complementary to the foregoing, the preexhausting device is to serve as a source and means for supplying the lesser volume of water—at adequate pressures—which is necessary to make effective the smaller fire streams now so universally used for extinguishing small fires. This secondary function, in combination with certain valves, tubular connections and features associated with present day fire engine practice is intended to relieve the principal fire pumps from the minor duty outlined, thus introducing a new feature which has an especial value in its relation to the operation of fire pumps of the centrifugal type.

In this connection, it should be understood, that the customary "small jet"—used on incipient fires—does not call for more than from 30 to 50 gallons of water per minute. The pressure effective at the point of discharge may not exceed from 40 to 60 pounds pressure. Nevertheless, there must be taken into account the fact that because of the greater friction in the smaller fire hose used and because these streams frequently must be carried aloft in burning buildings, it often may be necessary to carry pump pressures which are quite high.

In fire pumps of the centrifugal type, it is known that pressure is a function of the speed at which the pump is driven and it follows therefore—for example—in the case of a 1,000 gallon centrifugal pumper, the pumping unit must be driven at a high rate of speed in order to deliver even five per cent of its rated capacity at pressures consistent with making these small jets effective. The effect resultant is undue heating of the pump and a

highly disproportionate amount of wear and tear upon the parts.

It is therefore seen that the invention has two advantages:

First, serving to raise the water from a lower level up and into the principal fire pump unit.

Second, the utilization of the same priming or air exhausting device for providing and maintaining the action of the lesser or so-called "booster" fire streams at such times when the situation does not call for bringing the major fire pump into action.

Further advantages will appear from the following description taken in connection with the drawing.

In the drawing there is shown a booster and exhauster pump used in connection with a major or main pump for fire extinguishing purposes. The apparatus shown in this figure may be used in connection with a source of water located beneath the pumps, from which the water has to be taken by suction, or it may be used in connection with hydrant water in which there is a certain amount of pressure.

In this figure the numeral 1 is used to designate a supply of water, such as a reservoir, tank or other water supply, located at a point beneath the pumping apparatus. Extending upwardly from the water supply is a hose 2 adapted to be connected to a suction pipe 3 of the major pump. As shown in this figure the suction pipe has its free end closed by means of a sealing cap 4, and may be connected to the hose 2 by removing the cap and inserting in its place a suitable connection 4*a*.

The numeral 5 is used to designate the major pump, of which the pipe 3 is the suction pipe and a pipe 6 is the discharge pipe from the pump, which has at its end a discharge valve or gate 7. The auxiliary pump is indicated by the numeral 8, and is of the rotary or positive displacement type, while the major pump is of the centrifugal type, or a non-lifting pump. The auxiliary pump has an inlet suction pipe 9, which has one branch 10 connected to a tank 11 and controlled by a valve 12.

The suction pipe 9 has a second branch 13 connected to the major centrifugal pump for creating suction therein on the operation of the auxiliary pump 8. The point of junction between the suction pipe 9 and its branch 13 has a valve therein 14, by which the branch 13 may be cut off from the suction pipe 9.

Suitably connected to the booster tank is an overflow pipe 15. This tank is also provided with a filling spud 16. The auxiliary booster pump has an outlet 17, which is connected to a pipe 18 by means of a valve coupling 19. The pipe 18 extends into the axis of a reel 20, which has suitably connected thereto one end of a reel hose 21 adapted to be supported on the reel for carrying purposes, and removed therefrom for water applying purposes.

On the end of this hose, remote from its attachment to the reel axis, is a nozzle 22. For the purpose of rotating the reel a crank 23 is provided. Extending around one side of the auxiliary pump, from the outlet 17 to the inlet or suction pipe 9, is a relief pipe 24, which has therein an automatic relief valve 25 and a relief nullifying valve 26. When the valve 26 is open fluid from the outlet side of the auxiliary pump may circulate through the auxiliary valve back to the intake side of this pump, but when the valve 26 is closed no such recirculation can take place.

Extending downwardly from the suction pipe 3 is a branch 27 adapted to be closed by a valve 28 of the gate type. When this branch is not being used a cap 29 fits over the end thereof for securely closing the branch. When it is desired to use this branch for drawing in water or other fluid the cap 29 is removed and a hose or some suitable connection is made with the branch 27 and the source of water supply. A passageway through the branch is then opened by means of the valve 28.

Extending from the outlet pipe 17 to the discharge pipe 6 is a pipe 30 adapted to be closed by means of a valve 31. When this pipe 30 is open a part of the water passing out through the discharge pipe 6 may be bypassed and discharged through the booster hose 21. Extending upwardly from the discharge pipe 6 to the booster tank 11 is a pipe 32, which has therein a valve 33. This pipe is used to refill the tank. When it is desired to refill the tank the valve 33 is open so that water may pass from the major pump up through this pipe, into the booster tank.

There is also provided, in connection with the outlet pipe 17, an air vent valve 34. When the apparatus is not in operation all the valves are closed. For the purpose of operating the apparatus a suitable connection is made between the pumps and the power mechanism of a fire engine truck. After the proper connection has been made the pumps are connected for operation, the valves 14 and 34 are opened. The operation of the pump 8 causes a suction through the major pump 5 and the inlet to this pump, whereby water is drawn up from the source into the pump.

When water has been drawn into the pumps it will pass out through the valve 34, thereby indicating that the pump 5 is ready for operation because of the water being therein. The valve 34 is then closed and the valve 7 is open for the purpose of applying water by means of the major pump for the extinguishing of fires. However, the booster pump may be used independently of the major pump. In that event the valves 12 and 19 are opened so that water from the booster tank passes through the booster pump, and out through the booster

hose 21 for extinguishing small fires, or for use until the main pump can be brought into operation.

In the event that the suction side of the major pump is connected to a source of water pressure, as for instance, a city hydrant, the booster pump is unnecessary to create a proper suction within the major pump. When the liquid or water has been exhausted from the booster tank it may be refilled from the major pump by opening the valve 33 and closing the valve 12. By this means the water in the booster tank is replenished, and when it escapes through the pipe 15 the valves may be closed so that no further water is forced into the booster tank.

In the event the booster pump has been in operation and delivering water from the booster tank, which is about to be exhausted, a connection may be made by opening the valve 14 to the major pump, thereby creating sufficient suction in this pipe to cause the water from the source to be drawn into the pump, which on operation of the pump, is discharged through the outlet or discharge pipe 6.

When the major pump is operating and it is desired to shut off the auxiliary pump an auxiliary discharge of water may be effected through pipes 30, 17 and 18, and out through the hose 21. This accomplished by opening the valve 31 so that direct connection is made between the discharge 6 and the booster hose 21.

I desire to comprehend within my invention such modifications as may be embraced within my claims and the scope of my invention.

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

1. In a fire engine pump, in combination, a major pump having an outlet, and a booster pump having an inlet connected to the major pump and an outlet connected to the major pump outlet.

2. In a fire engine pump, in combination, a major pump having an outlet, a booster pump having an inlet connected to the major pump and an outlet having a connection with the major pump outlet, and means to shut off said connection.

3. In a fire engine pump, in combination, a booster tank, a major pump having an outlet, and a booster pump having an inlet connected to the major pump and to the booster tank and an outlet having a connection with the major pump outlet.

4. In a fire engine pump, in combination, a booster tank, a major pump having an outlet, a booster pump having an inlet connected to the major pump and to the boster tank and an outlet having a connection with the major pump outlet, and means to shut off said connection.

5. In a fire engine pump, in combination, a booster tank, a major pump having an outlet, a connection between the tank and the outlet, a booster pump having an inlet connected to the major pump and to the booster tank, and an outlet having a connection with the major pump outlet, and means to shut off each connection.

6. In a fire engine pump, in combination, a booster tank, a major pump of the centrifugal type having an inlet connection with a source of water supply and an outlet, and an exhauster pump having an inlet connected to the major pump for priming it and to the tank.

7. In a fire engine pump, in combination, a major pump of the centrifugal type having an inlet connection with a source of water supply and an outlet, and an exhauster and booster pump having an inlet connected to the major pump for priming it and an outlet connected to the major pump outlet whereby the major pump may act as a booster pump.

8. In a fire engine pump, in combination, a major pump of the centrifugal type having an inlet connection with a source of water supply and an outlet, an exhauster and booster pump having an inlet connected to the major pump for priming it and an outlet having a connection to the major pump outlet, whereby the major pump may act as a booster pump, and means to cut off the last-named connection.

9. In a fire engine pump, in combination, a major pump of the centrifugal type having an inlet connection with a source of water supply and an outlet, an exhauster and booster pump having an inlet connected to the major pump for priming it and an outlet having a connection to the major pump outlet, whereby the major pump may act as a booster pump, means to cut off the last-named connection, and pressure relief means between the booster pump outlet and the booster pump inlet.

10. In a fire engine pump, in combination, a major pump of the centrifugal type having an inlet connection with a source of water supply and an outlet, an exhauster and booster pump having an inlet connected to the major pump for priming it and an outlet having a connection to the major pump outlet, whereby the major pump may act as a booster pump, means to cut off the last-named connection, and pressure relief means between the booster pump outlet and the booster pump inlet, said relief means comprising a pipe having therein a relief valve.

11. In a fire engine pump, in combination, a major pump of the centrifugal type having an inlet connection with a source of water supply and an outlet, an exhauster and booster pump having an inlet connected to the major pump for priming it and an out-

let having a connection to the major pump outlet, whereby the major pump may act as a booster pump, means to cut off the last-named connection, and pressure relief means between the booster pump outlet and the booster pump inlet, said relief means comprising a pipe having therein a relief valve and a stop valve.

12. In a fire engine pump, in combination, a major pump of the centrifugal type having an inlet connected to a source of water supply and an outlet, a booster tank, means connected to the major pump for refilling the tank, and an exhauster and booster pump connected to the major pump and the outlet thereof.

13. In a fire engine pump, in combination, a major pump of the centrifugal type having an inlet connected to a source of water supply and an outlet, a booster tank, means connected to the major pump for refilling the tank, an exhauster and booster pump having an inlet connected to the major pump and to the tank and an outlet and means for making a connection between the two outlets.

14. In a fire engine pump, in combination with a major pump having a suction pipe and a discharge pipe, and a booster tank, and an auxiliary pump having an inlet connected to the major pump and to the booster tank and an outlet connected to the discharge pipe.

15. In a fire engine pump, in combination with a booster tank and a major pump having a discharge pipe, an auxiliary pump having an inlet connected to the major pump and to the booster tank, and an outlet having a connection with the discharge pipe and means to close said connection.

16. In a fire engine pump, in combination with a booster tank and a major pump having a discharge pipe, an auxiliary pump having an inlet with a connection to the major pump and with a connection to the booster tank and an outlet having a connection to the discharge pipe, and means to close each connection.

17. In a fire engine pump, in combination with a booster tank and a major pump having a discharge pipe, a connection between the discharge pipe and the booster tank, an auxiliary pump having an inlet with a connection to the major pump and with a connection to the booster tank and an outlet having a connection to the discharge pipe, and means to close each connection.

18. In a fire engine pump, in combination with a booster tank and a major pump having a discharge pipe, a connection between the discharge pipe and the booster tank, an auxiliary pump having an inlet with a connection to the major pump and with a connection to the booster tank and an outlet having a connection to the discharge pipe, means to close each connection, and by-pass means between the inlet and the outlet of the auxiliary pump.

19. In a fire engine pump, in combination with a booster tank and a major pump having a discharge pipe, a connection between the discharge pipe and the booster tank, an auxiliary pump having an inlet with a connection to the major pump and with a connection to the booster tank and an outlet having a connection to the discharge pipe, means to close each connection, and by-pass means between the inlet and the outlet of the auxiliary pump, said by-pass means including a pipe having a relief valve therein.

20. In a fire engine pump, in combination with a booster tank and a major pump having a discharge pipe, a connection between the discharge pipe and the booster tank, an auxiliary pump having an inlet with a connection to the major pump and with a connection to the booster tank and an outlet having a connection to the discharge pipe, means to close each connection, and by-pass means between the inlet and the outlet of the auxiliary pump, said by-pass means comprising a pipe having therein a relief valve and a manually operated valve.

21. In combination, a booster tank, a rotary pump connected to a source of fluid below said pump, a booster pump, and means connecting the inlet of the booster pump to the rotary pump to cause the priming of the rotary pump and to the tank.

22. In combination, a rotary pump connected to a source of fluid below said pump, a booster pump, means connecting the booster pump to the rotary pump to cause the priming of the rotary pump, a supplemental source of supply for the booster pump, and a common source of supply for the rotary pump and for the booster pump to enable the booster pump to restore its source of supply.

23. In a method of operating pumping mechanism, injecting fluid from a supplemental source of supply into a master pump, inducing thereby the flow of liquid from a master source of supply into and through the master pump, thereafter starting up the master pump and cutting off the first-mentioned pump.

24. In combination, a master pump connected to a source of fluid below it, a supplemental pump connected on one side to the master pump and on the other side to the outlet of the master pump, and means of connecting the supplemental pump intermediate its connection to the master pump to a source of gravity fluid supply, whereby the operation of the supplemental pump will cause the flow of fluid from the lower source of supply in conjunction with the flow of fluid of the gravity source of supply and the master pump would be thereby primed and operated.

25. In combination, a master pump connected to a source of fluid below it, a supplemental pump connected on one side to the master pump and on the other side to the outlet of the master pump, means of connecting the supplemental pump intermediate its connection to the master pump to a source of gravity fluid supply, whereby the operation of the supplemental pump will cause the flow of fluid from the lower source of supply in conjunction with the flow of fluid of the gravity source of supply and the master pump would be thereby primed and operated, and means for cutting off the supplemental pump from the master pump to utilize the supplemental pump to discharge fluid independently of the master pump from the gravity supply while the master pump is discharging fluid from the lower supply.

In testimony whereof, I affix my signature.

CHARLES H. FOX.