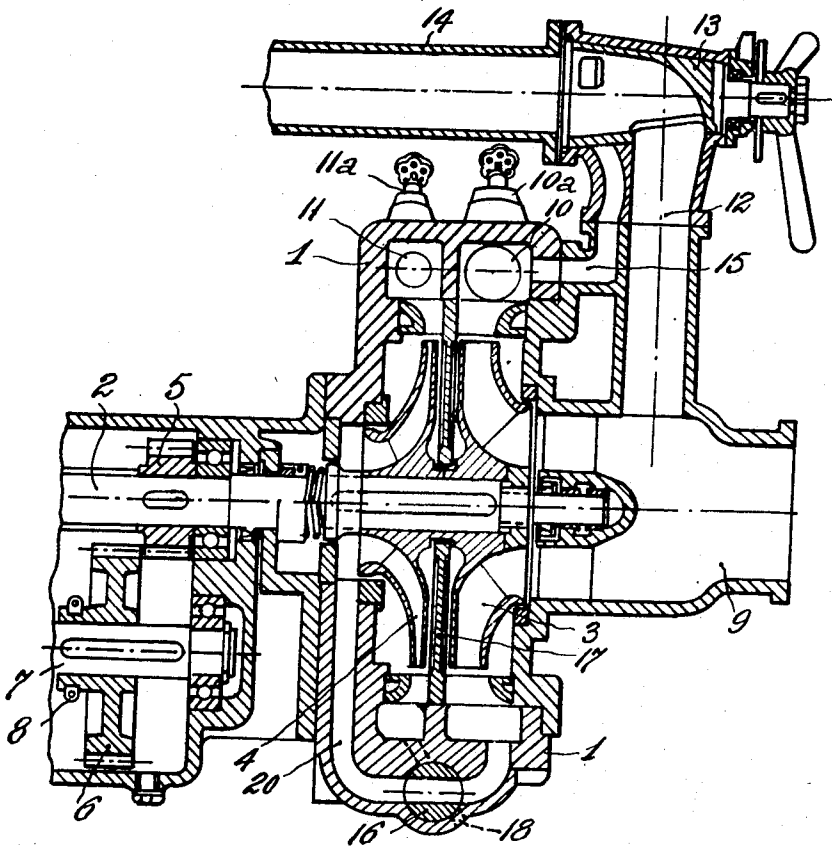


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MULTISTAGE CENTRIFUGAL PUMP

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MULTISTAGE CENTRIFUGAL PUMP

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2 Claims. (Cl. 103—106)

This invention relates to multi-stage centrifugal pumps and in particular to pumps for use on fire-fighting appliances especially those including a tank.

In general, fire fighting appliances must be so constructed that they are more or less independent of a water supply. This requirement has led to the use of the so-called tanker fire-engine.

When a fire breaks out, and this usually occurs inside a building, prompt and effective measures are demanded. The best method is to discharge the extinguishing medium in the form of a very fine spray in the endangered room. To produce such a spray, which causes a substantial and rapid fall in the temperature in the burning room, it is most convenient to employ a high pressure pump. Such a pump is known per se. If, however, the fire cannot be brought under control, or can only be partially contained by the use of the spray, more vigorous action must be taken, and large quantities of the extinguishing medium must be discharged. This is done by having a low-pressure stage arranged in the pump. Such devices are also known.

Multi-stage centrifugal pumps are also known, in which a high-pressure stage and a low pressure stage are provided in one and the same pump. In these known centrifugal pumps, however, only one pressure connecting-piece is provided, and the high pressure stage and the low pressure stage are each sealed by a safety valve. Furthermore, the two pump chambers are connected to each other. The communicating pipe is located over the safety valves and consequently serves merely to connect the high pressure chamber with the pressure-connecting piece. With such pumps, either the high pressure or the low pressure can be used, but it is impossible to operate with both the high pressure and the low pressure stages simultaneously.

In contradistinction thereto, the pump according to the present invention can operate at will at high pressure and/or low pressure from the suction pipe and/or from the tank since the high pressure pump and the low pressure pump are separated from each other by a partition and are connected together by a pipe which can be opened or closed by means of a valve.

Preferably the high pressure pump and the low pressure pump each have their own connecting piece for the attachment of the hose-pipes.

The arrangement of the pump is such that during operation at low pressure, the water in the high pressure pump may be discharged to a low pressure space, such as the atmosphere, over a reversing valve, and particularly over the valve arranged in the connection pipe between the high and the low pressure pumps; so that the high pressure pump may run unloaded.

The tank can be filled by the low pressure pump through a branch pipe.

This new method of construction offers a substantial extension in the mode of working as compared with known centrifugal pumps and, with regard to construction, offers a substantial simplification of known types.

A specific embodiment of the invention is illustrated by way of example in the accompanying drawing, in which the single figure shows a vertical section through a centrifugal pump constructed according to the invention.

In the casing 1 the impellers 3 and 4 of the pump are mounted on the overhung shaft 2. The impeller 3 represents the low pressure pump and the impeller 4 the high pressure pump. The widths and the diameters of

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the impellers 3, 4 may be in any desired ratio, for example, 1:2, 1:3 or 1:4, as a consequence of which the outputs of the pumps will be in the same ratio. Of course, instead of the single impellers 3 and 4, groups of impellers may be provided. The impeller shaft 2 is driven from the motor shaft 7 through gearing 5, 6 and 8.

Attached to the pump casing are the suction connecting piece 9, the high pressure connection 11 provided with a control valve 11a and the low pressure connection 10 provided with a control valve 10a. A pipe 12 leading to the reversing valve 13 opens into suction connection 9. From the reversing valve 13 a pipe 14 runs to a tank, not shown, so that water can also be drawn from the tank. A pipe 15 runs from the low pressure pump to the valve 13 so that the tank can be refilled from the pump, the arrangement being preferably such that when the valve 13 is closed to the pipe 12, the pipe 15 is made to communicate with the pipe 14. The low pressure pump is connected to the high pressure pump by a by-pass pipe 20 in which a rotary slide valve 16 is located. A partition wall 17 separates the high pressure pump from the low pressure pump.

A discharge passage or pipe 18 runs from the high pressure pump to the atmosphere through the body of the rotary sliding valve 16. Thus in accordance with the position of this valve, one may connect together the high pressure and the low pressure pumps or isolate the pumps from each other, or also place the high pressure pump in communication with the atmosphere.

Since interior fires are generally to be dealt with, when the fire-fighting apparatus is first brought into action the high pressure pump is used to reduce the ambient temperature by syringing thus using only small quantities of the extinguishing medium. So that the apparatus can be brought into rapid operation the extinguishing medium is drawn from the tank of the fire engine. For this purpose the valve 16 is set so that the low pressure pump and the high pressure pump are in communication with each other. The water then flows from the tank through the pipe 14, valve 13, pipe 12 and suction connection 9 into the low pressure pump 3 and from there through the valve 16 and pipe 20 into the high pressure pump 4 from where it passes through the connecting pipe 11 into the steel-plated hose-pipe mounted on the fire engine. Operation with high pressure from the tank which naturally depends upon the capacity of said tank can under usual conditions be maintained for up to about twenty-five minutes.

Meanwhile the pipes to the hydrants, the containers, the river or the sea can be connected up so that if the fire is still unextinguished or is spreading the operation can be carried on with masses of water, that is at low pressure. For this purpose the valve 13 is so adjusted that the tank is cut out and the water is sucked in through the suction connection 9. The rotary sliding valve 16 is also adjusted so that the connection between the high pressure pump and the low pressure pump is cut. The water now comes from the hydrant into the suction connection 9 and from thence into the low pressure pump from whence it passes through the connecting pipe 10 into the hose-pipe or pipes.

So that the high pressure pump should not run under load, a discharge pipe 18 is provided through which the water contained in the high pressure pump flows through the valve 16. Provided that there is an ample supply of water, water can also be taken simultaneously through the two connecting pipes 10 and 11, and additional water can also be taken at any time from the water tank.

It frequently occurs that in accordance with prevailing conditions, for example when a spray at high pressure and a full jet of water at low pressure is to be produced, water must be drawn from the connecting pipe 11 and the connecting pipe 10 at the same time. In this case the valve 16 must be brought into the position shown in the drawing.

I claim:

1. A multi-stage centrifugal pump comprising a pump body, a partition in said body forming two compartments

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therein, a single suction pipe in open and permanent communication with a first compartment; a low-pressure pump rotor in said first compartment, a high-pressure pump rotor in the second compartment, a common driving shaft for said pump rotors, a communication passage within said pump body connecting the two compartments, a valve housing formed in said passage, an outlet from the pressure portion of each compartment and operable valve means for opening and closing each of said outlets, a discharge passage from the second compartment to the exterior, a section of said discharge passage extending from the said second compartment to the said valve housing and a section of said discharge passage extending from the said valve housing to the exterior, and an operable valve in the said valve housing for opening and closing the communication passage between the compartments and at the same time closing and opening, respectively, the said discharge passage.

2. A multi-stage centrifugal pump as in claim 1, comprising a rotary valve having a transverse passage for opening and closing the communication passage between the two compartments, said transverse passage forming a section of the said communication passage in one op-

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erating position of the valve and forming a section of the said discharge passage from the second compartment in another operating position of the valve.

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