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CENTRIFUGAL PUMP PRIMER

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FIG. 2

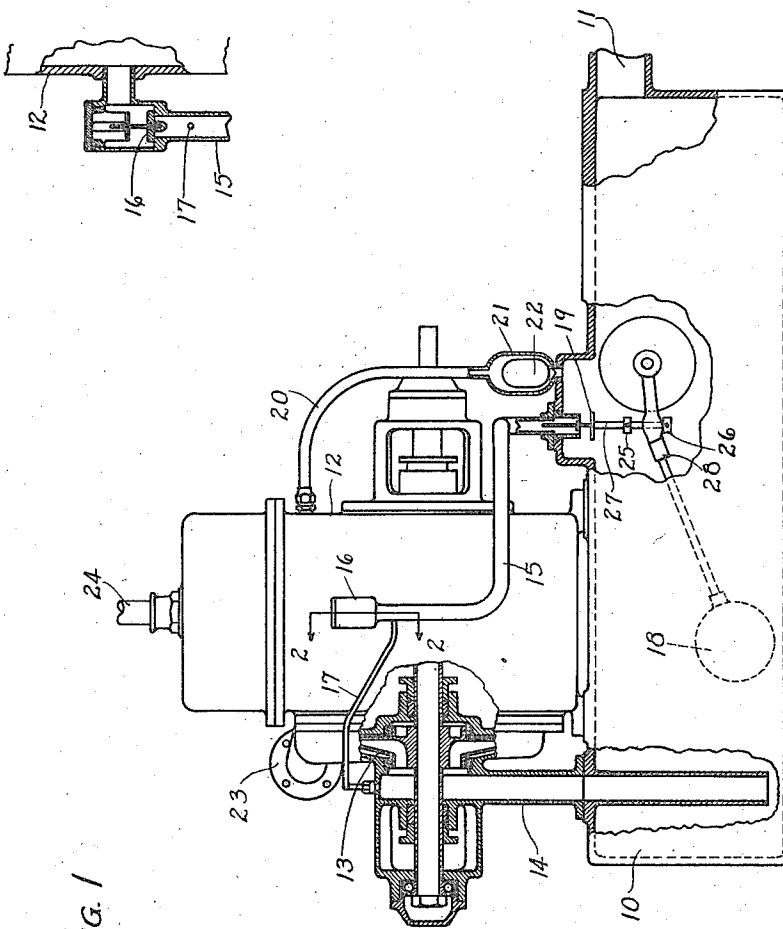


Fig. 1

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CENTRIFUGAL PUMP PRIMER

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7 Claims. (Cl. 103—113)

This invention relates to improvements in centrifugal pump primer, and one of the objects of the same is to provide improved means whereby a centrifugal pump may be primed by removing the air from the pump casing and suction pipe by means of a vacuum producing apparatus.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawing illustrating this invention, and in which

Figure 1 is a view partly in elevation, partly in section, and with parts broken away, showing the application of the invention to a typical vacuum and boiler feed unit as used in vacuum steam heating systems.

Figure 2 is a detail vertical sectional view taken on line 2—2, Figure 1,

While in the drawing there is illustrated a unit where the vacuum and boiler feed pump are mounted upon an accumulator tank to which the return lines run from the heating system, it is to be understood that the unit may be arranged in any other suitable manner.

Referring more particularly to the drawing, the numeral 10 designates an accumulator or receiving tank of any desired size and configuration, and into which tank the return line 11 from the system discharges.

Supported by the tank is a vacuum pump 12 which may be of the well known construction, and the numeral 13 designates a centrifugal pump.

A suction pipe 14 extending into the tank 10 for any desired distance, but preferably terminating adjacent the bottom of the tank, leads to the centrifugal pump 13, and a suction pipe 15 from the vacuum pump 12 has communication with the tank 10 at the upper part thereof.

Arranged within the suction pipe 15 is a check valve 16 of any desired or suitable construction, and leading from the suction line preferably from the pipe 15 to the top of the suction pipe 14 of the centrifugal pump, is a pipe 17, of a comparatively small diameter.

Within the tank 10 is a float 18 which operates with the rise and fall of the water level in the tank, and this float 18 during its rising and falling movements, will control a stopping and starting switch for the unit (not shown). The float 18 also controls a valve 19.

This valve 19 is arranged adjacent the inlet of the pipe 15 and may be of any desired or suit-

able construction which will operate when the float rises to close or partially close the inlet of the pipe 15, and when the float is lowered, the valve 19 will open the inlet of the pipe 15 which leads to the vacuum pump from the tank.

An overflow 20 is also provided leading from the casing of the vacuum pump 12 to the tank 10, so as to allow water to escape from the pump casing 12 to be delivered into the tank 10.

Within the pipe 20 is arranged a trap 21, in which a float 22 operates. This float 22 will operate to permit water to pass, but will close to prevent air from flowing therethrough.

The numeral 23 designates the discharge outlet of the centrifugal pump and 24 designates the discharge outlet of the vacuum pump.

Any form of connection may be provided between the float 18 and the valve 19, but there is preferably provided spaced collars 25—26 secured to the stem 27 of the valve and the stem passes through the arm 28 to which the float 18 is secured. Obviously the collars may be adjusted to any desired extent so as to vary the time in the cycle of operation in which the float will operate the valve, according to the liquid level that it is desired to establish in the tank 10.

In operation and when water accumulates in the tank 10 to a predetermined height (regardless of the degree of vacuum in the tank and return lines) the float 18 will actuate the float controlled switch (not shown) and which latter controls the motor, to start the pump.

The valve 19 will then be closed, causing a higher vacuum to be created in the pipe 15 than in the tank 10, which will result in the air being drawn through the pipe 17 from the casing of the centrifugal pump 13 and the suction pipe 14, being displaced with water drawn up from the tank 10, thus priming the centrifugal pump 13.

When the centrifugal pump is once primed, it will continue to operate until the water line in the tank 10 lowers sufficiently to uncover the lower end of the suction pipe 14. When the suction pipe 14 is uncovered, the centrifugal pump will of course lose its priming.

As soon as the centrifugal pump starts to operate, the water line in the tank 10 will lower quickly, causing the float 18 to drop, with the result that the valve 19 will be opened, thereby allowing the vacuum pump 12 to withdraw air and vapor from the tank 10 through the pipe 15. It is only necessary that the valve 19 shall partially close the inlet end of the pipe 15 sufficiently to cause difference in vacuum to raise the water from the

tank 10 through the pipe 14 to prime the centrifugal pump.

Just before the centrifugal pump is supplied with its full prime, a small quantity of water will be drawn through the pipe 17 by the vacuum pump, thus insuring its necessary operating water.

Should an excess of water be drawn into the vacuum pump, it will flow through the overflow pipe 20 to the tank 10, the trap 21 and float 22 operating to allow only water to pass into the tank 10 from the pipe 20.

While the preferred form of the invention has been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. In combination with a vacuum and boiler feed unit embodying a water pump and an air pump, an accumulator tank adapted to be placed under vacuum, an air pipe leading from the tank to the air pump, a suction pipe leading from said tank to the water pump, means embodying a valve for controlling the flow of air to the air pump, a float within the tank for controlling said valve and also for controlling the starting and stopping of the unit, the said control of the flow of air to the air pump operating to cause a higher degree of suction to be manifested in the water pump and said suction pipe than in said tank, thereby causing water to flow through said suction pipe to prime the water pump, a water overflow pipe leading from the air pump to said tank, and means for controlling the flow of fluid through said overflow pipe.

2. In combination with a vacuum and boiler feed unit embodying a water pump and an air pump, an accumulator tank adapted to be placed under vacuum, an air pipe leading from the tank to the air pump, a suction pipe leading from said tank to the water pump, means embodying a valve, and a float located within the accumulator tank for controlling the operation of the valve to restrict the flow of air to the air pump, means whereby the restriction of said flow of air to the air pump will cause a higher degree of suction to be manifested in the water pump and said suction pipe than in said tank, thereby causing water to flow through said suction pipe to prime the water pump, a water overflow pipe leading from the air pump to the tank, a trap in the overflow pipe, and a float in the trap operating automatically to permit only water to pass to the tank.

3. In combination with a vacuum and boiler feed unit embodying a water pump and an air pump, an accumulator tank adapted to be placed under vacuum, an air pipe leading from the tank to the air pump, a water supply suction pipe leading from the tank to the water pump, a float controlled valve for controlling the supply of air from the tank to the air pump, a restricted communication between the water pump and said air pipe whereby when the supply of air to the air pump is restricted the degree of vacuum in the air pipe will be increased above the vacuum in said tank to cause water to be drawn from said tank through said suction pipe to prime the water pump, an overflow pipe leading from the air pump to the tank, and a float trap in the overflow pipe and operating to permit only water to flow to the tank.

4. In combination with a vacuum and boiler feed unit embodying a water pump and an air pump, an accumulator tank adapted to be placed under vacuum, an air pipe leading from the tank to the air pump, a water supply suction pipe leading from the tank to the water pump, a float controlled valve for controlling the supply of air from the tank to the air pump, a restricted communication between the water pump and said air pipe, and a check valve in the air pipe between the point of connection of the said restricted communication therewith and the air pump, said restricted communication operating when the supply of air to the air pump is restricted in the said air pipe, to cause the suction in the air pipe to be increased above the vacuum in said tank to cause water to be drawn from said tank through said water suction pipe to prime the water pump.

5. In combination with a vacuum and boiler feed unit embodying a water pump and an air pump, an accumulator tank adapted to be placed under vacuum, an air pipe leading from the tank to the air pump, a water supply suction pipe leading from the tank to the water pump, a float controlled valve for controlling the supply of air from the tank to the air pump, a restricted communication between the water pump and said air pipe whereby when the supply of air to the air pump is restricted the degree of vacuum in the air pipe will be increased above the vacuum in said tank to cause water to be drawn from said tank through said suction pipe to prime the water pump, means for supplying make up water to the air pump, an overflow pipe leading from the air pump to the tank, and a float trap in the overflow pipe and operating to permit only water to flow to the tank.

6. In combination with a vacuum and boiler feed unit embodying a water pump and an air pump, an accumulator tank adapted to be placed under vacuum, an air pipe leading from the tank to the air pump, a water supply suction pipe leading from the tank to the water pump, a float controlled valve for controlling the supply of air to the air pump, a restricted communication between the water pump and said air pipe, a check valve in the air pipe between the point of connection of said restricted communication therewith and the air pump, said restricted communication operating when the supply of air to the air pump is restricted in said air pipe, to cause the suction in the air pipe to be increased above the vacuum in said tank to cause water to be drawn from said tank through said water suction pipe to prime the pump, and means for supplying make up water to the pump.

7. In combination with a vacuum and boiler feed unit embodying a water pump and an air pump, an accumulator tank adapted to be placed under vacuum, an air pipe leading from the tank to the air pump, a suction pipe leading from the said tank to the water pump, means embodying a valve for controlling the flow of air to the air pump, a float within the tank for controlling said valve and for also controlling the stopping and starting of the unit, the said control of the flow of air to the air pump operating to cause a higher degree of suction to be manifested in the water pump and said suction pipe than in the tank, thereby causing water to flow through said suction pipe to prime the water pump, and an overflow pipe leading from the air pump to said tank.