March 25, 1958 K. R. LUNG 2,827,912

HOT AND COLD WATER UNIT WITH JET PUMP

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FIG-1

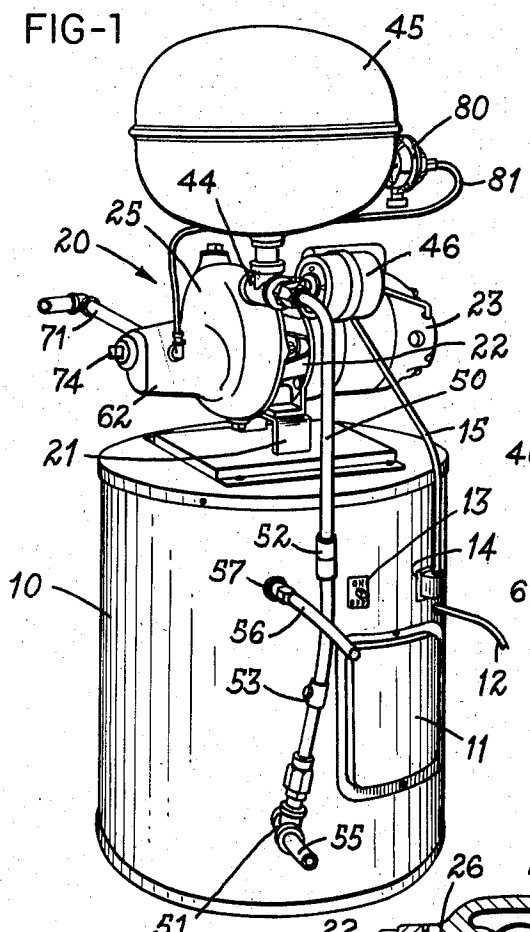


FIG-3

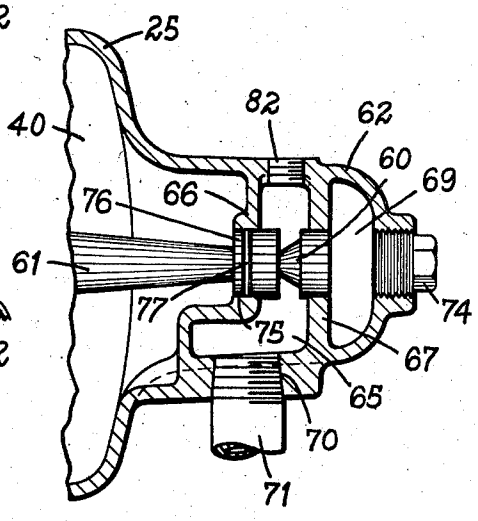
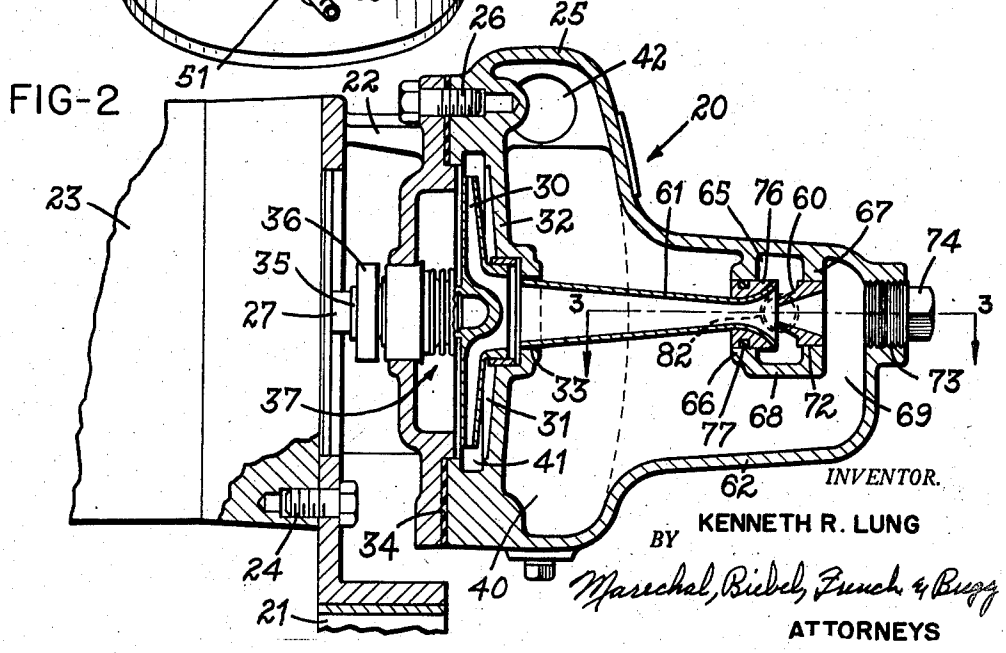


FIG-2



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HOT AND COLD WATER UNIT WITH JET PUMP

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4 Claims. (Cl. 137—209)

This invention relates to pumps, and more particularly to a centrifugal and jet pump unit and to a complete hot and cold water system embodying a centrifugal jet pump unit.

It is a primary object of the invention to provide a complete hot and cold water system in the form of a single unit embodying a hot water heater and tank together with a pump and automatic controls for maintaining the desired pressure in the system and thereby automatically replenishing the supply of water in the hot water tank.

A specific object of the invention is to provide such a water system in which the hot water tank forms the main base of the unit on which the pump and its drive motor and controls are mounted for maximum compactness and convenience of installation and maintenance.

An additional object of the invention is to provide a centrifugal and jet pump unit which is especially adapted for use in a complete hot and cold water system as outlined above and in which the jet portion of the unit is mounted within a centrifugal pump casing of improved and simplified novel construction.

It is also an object of the invention to provide a casing construction for a centrifugal pump which incorporates an improved and simplified jet pump nozzle and venturi tube assembly and in which specific provision is made for proper supply of liquid to the jet pump nozzle for proper operating efficiency of the jet pump.

Further objects and advantages of the invention will be apparent from the following description, the accompanying drawing and the appended claims.

In the drawing—

Fig. 1 is a perspective view showing a complete hot and cold water pumping system in accordance with the present invention;

Fig. 2 is an enlarged partial view in vertical section showing details of the pump construction of Fig. 1; and

Fig. 3 is a fragmentary section on the line 3—3 of Fig. 2.

Referring to the drawing, which illustrates a preferred embodiment of the invention, Fig. 1 shows a complete hot and cold water system wherein the main base is provided by a storage tank including an outer casing 10 which also houses suitable electric heater means of conventional type to which access for maintenance is available by way of the front cover plate 11. The electric cord for operation of the heater and the pump motor is indicated at 12. A control switch 13 is shown as mounted at a convenient location on the front of the casing 10, and a receptacle 14 is similarly provided on the casing for supplying operating current to the pump drive motor through the cord 15.

The pump unit is indicated generally at 20, and it is mounted on top of the casing 10 by a bracket 21 to which the mounting bracket 22 of the pump is bolted as shown. The electric drive motor 23 is bolted to the

bracket 22 at 24, and the main pump casing 25 is similarly bolted to the bracket 22 at 26. The motor shaft 27 supports a centrifugal impeller 30 which rotates in a chamber 31 formed by a wall 32 within the rearward end of the casing 25 and having a centrally located inlet aperture 33 to the pumping chamber and impeller. The chamber 31 is closed by a cooperating wall portion of the mounting bracket 22 and a suitable gasket 34. The connection between the impeller 30 and the drive shaft 27 includes a sleeve 35 integrally formed on the impeller, a collar 36 and a rotary seal indicated generally at 37, reference being made in this connection to my copending application Serial No. 482,605, filed January 18, 1955, and assigned to the same assignee as this application.

The pumping chamber 31 communicates with the main discharge chamber 40 in casing 25 by means of suitable tapering diffuser passages 41 in conventional manner. The main discharge port 42 from the chamber 40 is shown as provided with a T-fitting 44 on which is mounted a pressure tank 45, and the fitting 44 also provides a pressure connection to a pressure switch 46 for automatic control of motor 23 in response to changes in the pressure conditions within pressure tank 45. A line 50 conducts cold water from the port 42 and fitting 44 to a T-fitting 51 connected with the lower end of the hot water tank in casing 10, and this line 50 may be provided as shown with a check valve 52 and relief valve 53 if desired. A line 55 leads from the fitting 51 to provide cold water service, and the hot water line 56 leads from an outlet 57 from the top of the hot water tank.

The pump casing 25 also houses the jet nozzle 60 and venturi tube 61 which form the main operating parts of the jet pump. As best seen in Figs. 2 and 3, the casing 25 is generally bell shaped, but its forward portion 62 is not symmetrically arranged, since it is of more or less oblong section and has the major part thereof located below the axis of the motor shaft and impeller. Within the upper part of the casing portion 62 is a supplemental chamber 65 defined by a pair of walls 66 and 67 extending across the discharge chamber and connected at their lower edges by a wall 68 spaced above the bottom wall of the casing portion 62 to provide free communication to the L-shaped space 69 below wall 68 and between the wall 67 and the forward end of the pump casing. The top wall of the chamber 65 is formed by the adjacent portion of the casing wall 62.

The chamber 65 is the suction chamber for the jet pump, and it has a suction port 70 connected with a suction line 71 leading to the well. The rear wall 67 of chamber 65 has a centrally located bore 72 in which the jet nozzle 60 is press fitted through a port 73 in the outer end of the casing, this port being subsequently sealed by a suitable plug 74. The front wall 66 of chamber 65 has a similar bore 75 aligned with the bore 71 and the inlet opening 33 to the impeller chamber. The venturi tube 61 is mounted in these two openings 33 and 75, the larger end of the venturi tube being press fitted in the inlet opening 33, and its smaller end, which includes a collar 76, being received and sealed in the bore 75 by means of a sealing ring 77 carried by a circumferential groove in the outer surface of the collar 76. Mounting of the venturi tube in this manner is readily accomplished before the pump casing is secured to the bracket 22. Fig. 1 also shows an automatic injecting unit 80 of conventional type mounted on the pressure tank 45 and connected by a tube 81 to a port 82 at the opposite side of the suction chamber 65 from the suction port 70 for operation in the usual way to assure the presence of an adequate air cushion in pressure tank 45.

In operation, the pressure switch 46 will respond to a drop in pressure within pressure tank 45 caused by with-

drawal of either hot or cold water and will actuate the pump motor 23 until the desired pressure is restored. The pump motor will drive the impeller 30, and the discharge pressure of the impeller will be supplied to the jet pump to develop the desired suction in the port 70 and line 71. The water will be supplied to the jet nozzle 60 from discharge chamber 40 by upward flow through the space 69 to minimize possible entraining in the jet flow of sand or grit which may have reached the discharge chamber, with resulting improved service in addition to the other advantages of simplicity and compactness of construction provided by the invention.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A combined pumping and hot and cold water system comprising a storage tank for hot water having an electric heater in heat exchanging relation therewith and forming the main base of said system, a pump mounted on said tank and having suction and discharge ports, a drive motor mounted on said tank in driving relation with said pump, means for connecting a suction line with said suction port, a pressure tank mounted on said pump separate from said storage tank and connected with said discharge port to receive water therefrom, a water line leading from said discharge port to said storage tank, means forming an outlet for hot water from said storage tank, and means forming an outlet for cold water from said pressure tank independently of said storage tank.

2. A combined pumping and hot and cold water system comprising a storage tank for hot water having an electric heater in heat exchanging relation therewith and forming the main base of said system, a pump mounted on said tank and having suction and discharge ports, a drive motor mounted on said tank in driving relation with said pump, means for connecting a suction line with said suction port, a pressure tank mounted on said pump separate from said storage tank and connected with said discharge port to receive water therefrom, pressure response control switch means mounted on said pump, operating connections from said switch means to said drive motor and said pressure tank respectively, a water line leading from said discharge port to said storage tank, means forming an outlet for hot water from said storage tank, and means forming an outlet for cold water from said pressure tank independently of said storage tank.

3. A combined pumping and hot and cold water system comprising a storage tank for hot water having an electric heater in heat exchanging relation therewith and forming the main base of said system, a pump casing mounted on said tank and having suction and discharge ports, a centrifugal impeller in said casing, a drive motor mounted on said tank in driving relation with said impeller, means for connecting a suction line with said suction port, a venturi tube mounted within said casing and forming the liquid conducting connection from said suction port to said impeller, a jet nozzle mounted in said

casing with the inlet end thereof communicating with the discharge side of said impeller and the outlet end thereof communicating with said venturi tube for cooperation therewith to apply suction to said suction port, a pressure tank mounted on said pump casing separate from said storage tank and connected with said discharge port to receive water therefrom, a water line leading from said discharge port to said storage tank, means forming an outlet for hot water from said storage tank, and means forming an outlet for cold water from said pressure tank independently of said storage tank.

4. A combined pumping and hot and cold water system comprising a storage tank for hot water having an electric heater in heat exchanging relation therewith and forming the main base of said system, a pump casing mounted on said tank and enclosing a discharge chamber having a discharge port, a first wall within the back of said casing defining a pumping chamber and having therein a centrally located inlet aperture to said pumping chamber, an impeller supported in said pumping chamber with the inlet thereof registering with said inlet aperture, a drive motor mounted on said tank in driving relation with said impeller, a pair of second and third walls extending across said smaller end of said discharge chamber in depending relation with the upper wall thereof and terminating in upwardly spaced relation with the bottom wall thereof and in rearwardly spaced relation with the forward end of said discharge chamber to provide a generally L-shaped space in said discharge chamber below and forwardly of said pair of walls, a fourth wall connecting the lower ends of said pair of walls and cooperating therewith to define a suction chamber, means defining a suction port leading directly into said suction chamber from outside said casing for connection with a suction line, said second and third walls each having therein an aperture aligned with said first wall aperture, a venturi tube having the discharge end thereof mounted in said inlet aperture and having the inlet end thereof received in sealing engagement with said second wall aperture to conduct liquid directly from said suction port to said impeller inlet, a jet nozzle mounted in said third wall aperture with the inlet end thereof in liquid-receiving communication with the interior of said discharge chamber by way of said L-shaped space below said fourth wall to receive liquid from below for delivery to said venturi tube, a pressure tank mounted on said pump separate from said storage tank and connected with said discharge port to receive water therefrom, a line leading from said discharge port to said storage tank, means forming an outlet for hot water from said storage tank, and means forming an outlet for cold water from said pressure tank independently of said storage tank.

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