

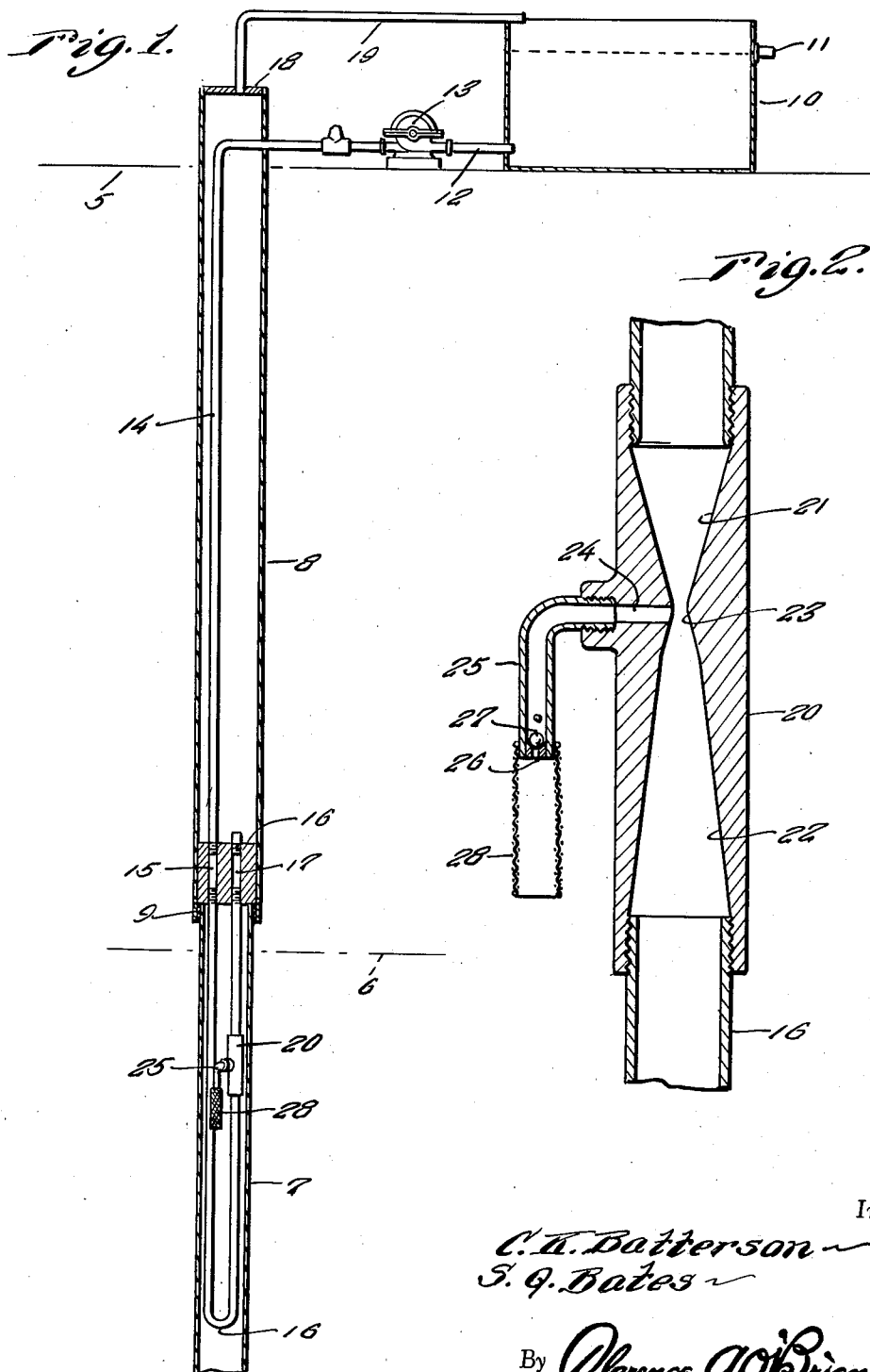
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INJECTION PUMP

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INJECTION PUMP

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3 Claims. (Cl. 103—260)

This invention relates to pumps having particular reference to well pumps and more particularly the invention consists in certain new and useful improvements on the injection pump forming the subject matter of our co-pending application for patent Serial No. 684,894 filed August 12, 1933 for an injector pump but now abandoned.

An important object of the present invention is to provide a pump of the character above mentioned whereby in the pumping or flowing of a well through use of a statically balanced column of liquid or gas provision is made for employing a section of the well casing as a column thus reducing the amount of tubing required in the pump forming the subject matter of our hereinbefore identified application for patent; and also in the provision of a Venturi tube construction forming part of the pump and so characterized as to provide for a reduction of pressure due to columns of liquid to pressures lower than well pressure and for conducting the well liquid into the lower pressure created.

The invention will be best understood from a study of the following description taken in connection with the accompanying drawing wherein:

Figure 1 is a view illustrating the application of the invention, certain parts being shown in section and

Figure 2 is an enlarged sectional elevational view illustrating certain details of the Venturi tube construction to be hereinafter more fully referred to.

Referring to the drawing by reference numerals it will be seen that 5 indicates generally ground level, 6 the liquid level in a well, 7 a lower section of well casing, 8 an upper section of well casing the lower end of which telescopically receives the upper end of the section 7 and is joined thereto by cement as at 9, and in a manner conventional.

In accordance with the pump forming the subject matter of our hereinbefore referred to application for patent there is provided a suitable service tank 10 having adjacent the top thereof, and at one side an inlet to which is connected a service or lead line 11. At the side thereof opposite to the line 11 adjacent the bottom of the tank, said tank is provided with an outlet 12 connected to the inlet side of a suitable pump 13. To the outlet side of the pump 13 is connected the upper end of a pipe or tubing 14 which as shown extends through a lateral opening in the end of the well casing 8 that projects above ground level 5, the free end of the pipe 14 extending vertically downwardly through the casing 8 as shown. At its lower end the pipe 14 is threaded into the upper end of an opening 15 provided in a plug 16 fitting snugly within the lower end of the well casing section 8.

In accordance with the present invention a substantially U-shaped pipe 16 has one end thereof threadedly engaged in the other end of the opening 15 provided in plug 16', and its other end threadedly engaged in an opening 17 also provided in the plug 16. By this arrangement it will be seen that the casing section 8 will serve in the same capacity as the tube or column 15 referred to in our hereinbefore identified application for patent, namely as a column for conducting the fluid from the well upwardly there-through for discharge into the tank 8. In this connection it will be further noted that the upper end of the well section 8 is provided with a cap or plug 18 and a pipe 19 is connected at one end with the plug 18 and extends laterally to empty into the tank 10.

Further in accordance with the present invention the pipe 16 between the bend therein and the end thereof threaded in the opening 17 of the plug 16' is transversely divided and has the ends formed by said division screwed into the ends of a Venturi tube 20.

The tube 20 differs somewhat from the one forming part of the subject matter of our co-pending but now abandoned application Serial No. 684,894 and in accordance with the present invention the Venturi tube 20 is provided at its upper end with a short substantially conical bore 21, and at its lower end with a longer substantially conical bore 22 which bores 21, 22 at their meeting or smaller ends are connected by a throat 23 of materially small diameter providing a constricted passage communicating the bores 21, 22. At the throat 23 the Venturi tube 20 is provided with a lateral passage 24, and at the outer end of the passage is provided with a threaded boss into which is screwed one end of a substantially L-shaped pipe 25 that at its free end is provided with an apertured valve seat 26 upon which is normally seated a ball check valve 27. Also suitably associated with the lower or free end of the pipe 25 is a strainer or screen 28.

In operation liquid is pumped from the service tank 10 through the pipe or column 14, the passage or bore 15, through the pipe 16, the venturi 20 associated with the pipe 16 passing into the casing 8 through the passage 17 in the plug 16'. The liquid will flow through the Venturi tube 20 at a high velocity sufficient to create a

vacuum for causing the check valve 27 to move to an open position so that the well liquid will be drawn from the well casing section 7 passing through the screen 28, the pipe 25 and into the venturi 20 through the passage 24 and intermingle with the stream of liquid flowing through the venturi 21, to be carried thereby upwardly through the casing section 8 and the pipe 19 into the tank 10. It will thus be seen that with this pump, as with the pump described in our hereinbefore identified copending application, provision is made for the use of two columns of liquid or their equivalent for raising the water or other fluid from the well, the velocity of the liquid or fluid pumped being sufficient to entrain the well liquid for raising the latter.

In accordance with the present invention it will be noted that due to the particular structure of the Venturi tube 20 the velocity of the liquid flowing therethrough, at the throat 23 will be greatly increased with a resultant proportional reduction in the pressure of the flowing liquid providing a low pressure area in the region of the passage 24 to insure efficient operation of the valve 27 and a drawing of the liquid from the well through the valve and into the Venturi tube in suitable volume.

Having thus described the invention, what is claimed as new is:

1. In a jet pump for wells, the combination with joined sections of a well casing, of a plug fitted within one of said sections at the joint, and provided with a pair of spaced openings extending therethrough, a pump, a pipe connected at one end with the pump and extending therefrom downwardly within said one section of the well casing and having its lower end fitted within one of the openings in said plug, a U-shaped pipe arranged within the second section of the well casing and having its ends respectively fitted within the openings of said plug, a Venturi tube arranged in said U-shaped pipe between the bend thereof and that end of said U-shaped pipe fitting

within the second named opening in the plug, said Venturi tube at the throat thereof having a lateral opening and an inwardly opening valve controlling said opening.

2. In a device of the character described, and in combination, a pair of joined well casing sections, a plug in the upper one of said sections at the joint between said sections, said plug having a pair of spaced openings extending vertically therethrough, a conduit tube for liquid under pressure having a major portion thereof arranged vertically in the upper well casing section with the lower end of said tube fitted within one of the openings in said plug, a U-shaped pipe arranged vertically in the lower casing section and having its respective ends fitted within the openings in said plug for conducting the fluid under pressure from the first conduit through said lower well casing and upwardly into the upper well casing section, a Venturi tube arranged in said U-shaped conduit so as to cause liquid forced under pressure through said conduit to be forced at a high rate of speed therethrough as it approaches the end of said U-shaped pipe discharging through the plug into the upper well casing section, and inwardly opening lateral valve means connected with the Venturi tube for permitting entrance of liquid into said tube upon suction or vacuum therein.

3. A pump for deep wells including a casing, a partition across said casing, a pipe for liquid extending down into said casing and through said partition, a U-tube below said partition connected on one of its arms with said pipe, and having its other arm extending through said partition, a Venturi passage in said tube below said partition, a downwardly extending inlet tube connecting said passage with the liquid to be lifted, a check valve in said inlet tube, and means to force liquid through said pipe and said passage.

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