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HYDRAULIC WATER AND OIL PUMP

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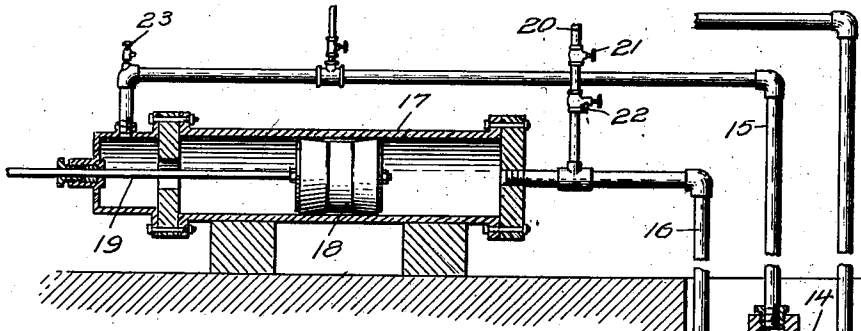

Fig. 1.

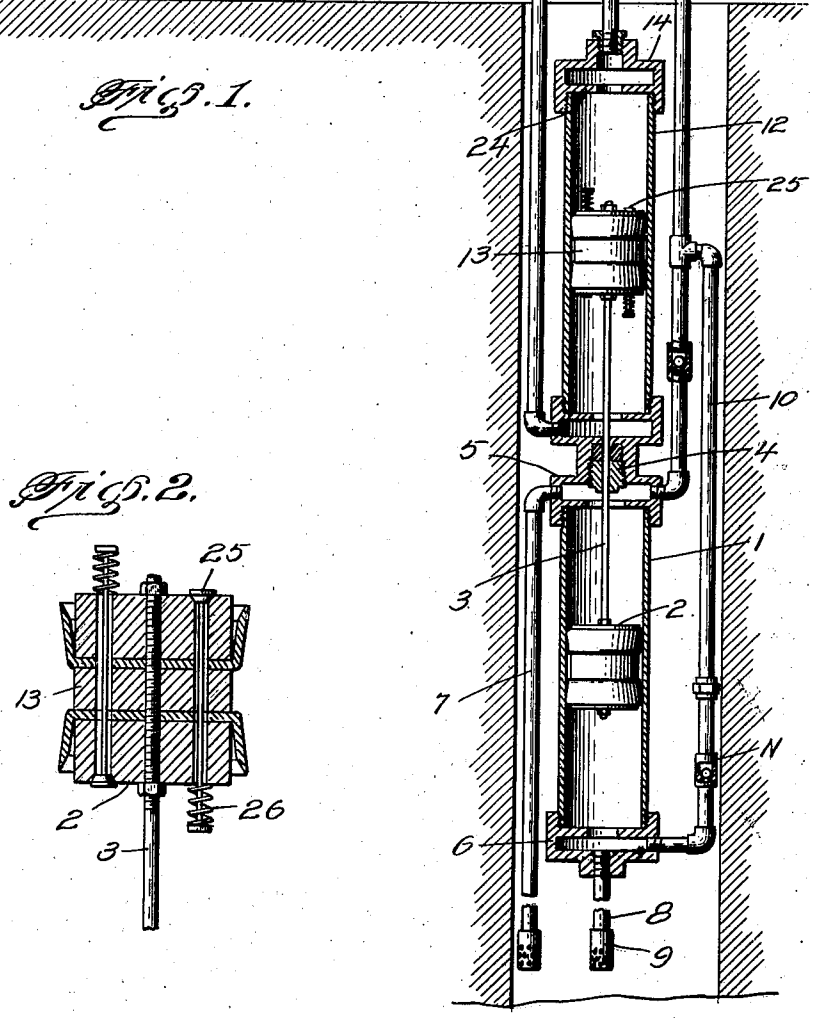

Fig. 2.

David W. Richards and
David C. Richards, INVENTOR
BY Victor J. Evans & Co.
ATTORNEYS

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HYDRAULIC WATER AND OIL PUMP

David W. Richards and David C. Richards,
Richlandtown, Pa.

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1 Claim. (Cl. 103—44)

This invention relates to deep well pumps and more particularly to a drive means therefor and has for the primary object the provision of a hydraulic pump jack element driven by any suitable power and which will actuate the pump with a minimum loss of power and also will permit the power cylinder and piston thereof to be remotely located with respect to the well while the driven piston and cylinder thereof will be located in the well and in close proximity to the pump cylinder and the piston thereof permitting a direct connection to be had between the piston of the pump and the driven piston, the latter being valved to permit equalization of the liquid on each side thereof during the operation of the device.

With these and other objects in view, this invention consists in certain novel features of construction, combination and arrangement of parts to be hereinafter more fully described and claimed.

For a complete understanding of our invention, reference is to be had to the following description and accompanying drawing, in which

Figure 1 is a fragmentary vertical sectional view showing our invention associated with a well.

Figure 2 is a fragmentary vertical sectional view illustrating the valves of the driven piston.

Referring in detail to the drawing, the numeral 1 indicates a pump cylinder adapted to be located in a well adjacent the bottom thereof and has reciprocally mounted therein a piston 2, the stem 3 of which extends through a packing gland 4 carried by a head 5 of the pump cylinder. The pump cylinder also is provided with a head 6. Connected to the heads 5 and 6 are standpipes 7 and 8 each including a combined stand valve and strainer 9. The standpipes 7 and 8 being connected to the opposite ends of the pump cylinder permits the latter to be double acting during the reciprocation of the piston 2. Connected outlet pipes 10 are connected with the heads 5 and 6 and lead out of the well, as shown in Figure 1, and each has a check valve 11 therein. The piston 2 is of the double cup type with a spacer therebetween, the cups being reversely arranged.

The head 5 is of the double type for the purpose of connecting to the cylinder 1 a cylinder 12 and permitting the piston stem 3 to enter said cylinder 12. A piston 13 operates in the cylinder 12 and is connected to the piston stem 3. The cylinder 12 is located directly above the pump cylinder 1 and the upper end is equipped with a head 14. A fluid pipe 15 is connected to the head 14 and a fluid pipe 16 is connected to the double head 5 and in communication with the lower end of the cylinder 12. The pipes 15 and 16 are connected to opposite ends of a power cylinder 17 remotely located with respect to the well and in which operates a power piston 18 constructed similar to the piston 2, the stem of which is indicated by the character 19 and is extended outwardly of the power cylinder and adapted for connection with any suitable power source for imparting reciprocation to the piston 18. The cylinders 12, 17, and pipes 16 and 15 are completely filled with liquid which is non-compressible so that when the piston 18 is reciprocated by the power source (not shown) the piston 13 will be caused to reciprocate correspondingly. The reciprocation of the piston 13 drives the piston 2 in the pump cylinder causing the fluid of the well to be taken in said pump cylinder and expelled therefrom by way of the connected outlet pipes 10 to some receiving medium (not shown). Connected to the fluid pipes 15 and 16 are fluid supply pipes 20 each having a control valve 21 and one having a bleed valve 22 and a similar bleed valve 23 is connected to the pipe 15. The purpose of the bleed valves is to permit air trapped in the system to be bled when necessary for the successful operation of this invention. The heads on the cylinder 12 have abutments 24 and the piston 13 has passages therethrough controlled by oppositely arranged valves 25 normally held closed by springs 26. When the piston 19 reaches substantially the end of its stroke in one direction one of the abutments unseats the valves, allowing liquid to pass through said piston 13 and when the latter substantially completes its stroke in an opposite direction the other valve is unseated by the other abutment, permitting liquid to pass through the piston 13. The valves act to maintain equal liquid pressure upon the opposite sides of the piston 13 and to compensate for variance in the distance traveled between the pistons 18 and 13, for instance, the piston 18 may have a longer stroke than the piston 13, and if so the piston 13 will reach the end of its stroke prior to the piston 18 reaching the end of its stroke, therefore, one of the valves of the piston 13 will be opened by one of the abutments and allow liquid to pass through the piston 13 while the piston 18 is completing its stroke.

A device of the character described will successfully operate a pump piston by a minimum amount of power and with a minimum loss of power due to friction and will permit the power cylinder and piston as well as the power source

to be located remotely to the well and further will permit the pump cylinder and its piston to be successfully operated in wells of various depths and also permits the driven piston to be connected directly to the pump piston with the cylinder thereof closely related to the pump cylinder.

What is claimed is:

A device of the character set forth comprising a pump cylinder to be located in a well and including means for the inlet and outlet of well liquid therefrom and for the conveyance of said liquid outwardly of the well, a piston operable in said pump cylinder, a second cylinder supported by the pump cylinder, a piston operable in the second cylinder and connected directly with the piston of the pump cylinder, a power cylinder remotely located to said well, a power driven power piston operating in the power cylinder, fluid pipes connecting the opposite ends of the power cylinder with opposite ends of the second named cylinder whereby movement of fluid by the reciprocation of the power piston imparts reciprocation to the second named piston and the latter in turn reciprocates the pump piston, valved fluid supply pipes connected to the pipes connecting said power cylinder with the second named cylinder, said piston of the second named cylinder having passages therethrough, spring seated valves for controlling said passages, and abutments in the second named cylinder to unseat said valves on the second named piston substantially reaching the ends of its strokes.

DAVID W. RICHARDS.
DAVID C. RICHARDS.