July 14, 1925. 1,545,905

A. L. KINS

ROTARY PUMP

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FIG. 1.

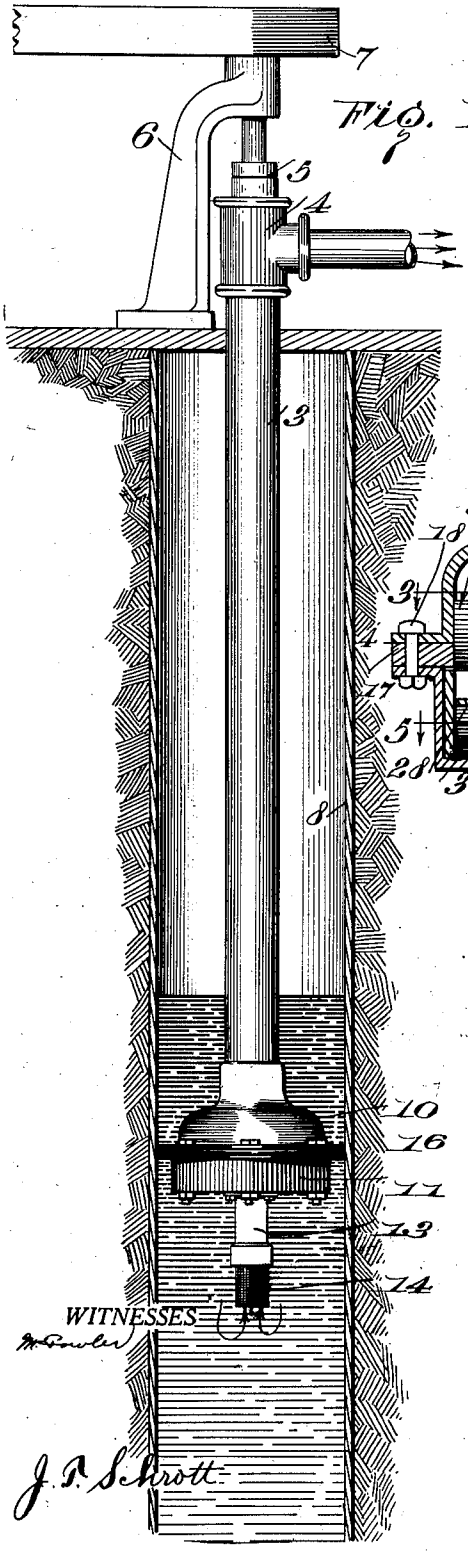
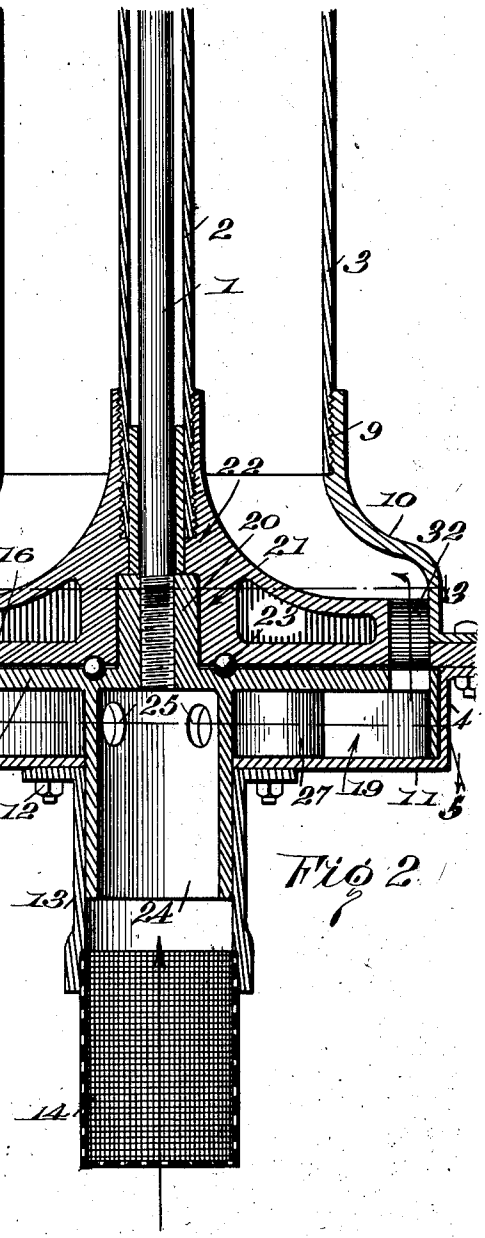



FIG 2.




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ROTARY PUMP

Filed Sept. 12, 1923 3 Sheets-Sheet 2

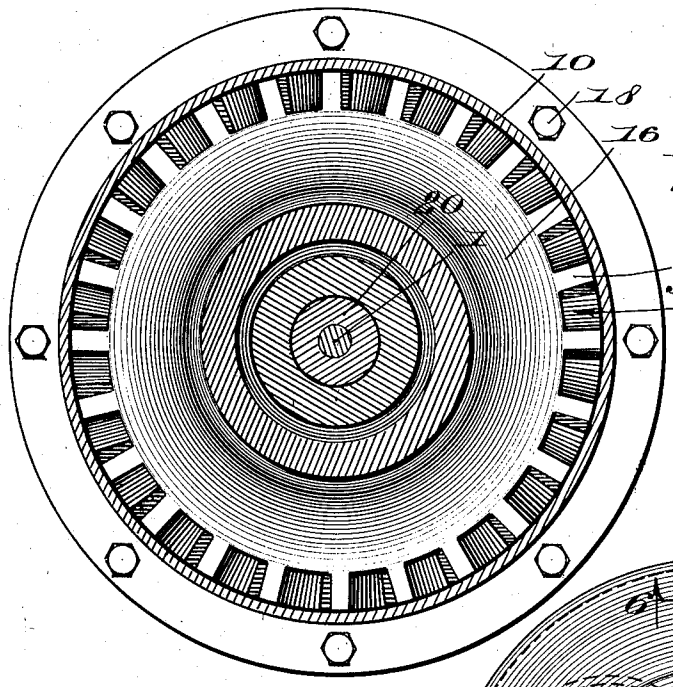



Fig. 3.

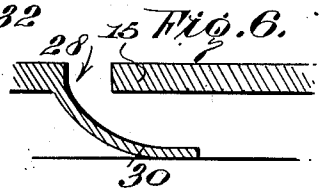



Fig. 6.

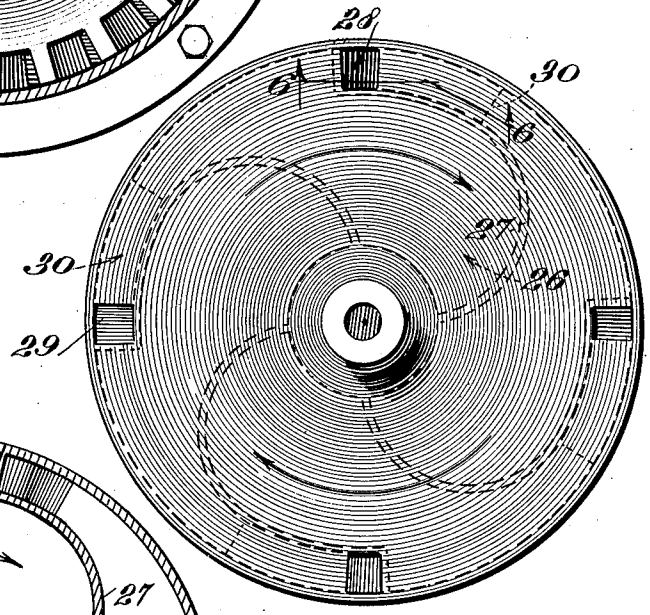



Fig. 4.

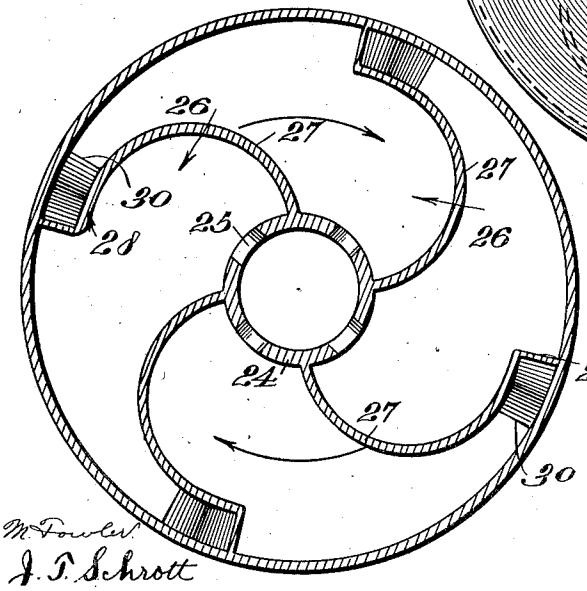



Fig. 5.

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Fig. 7.

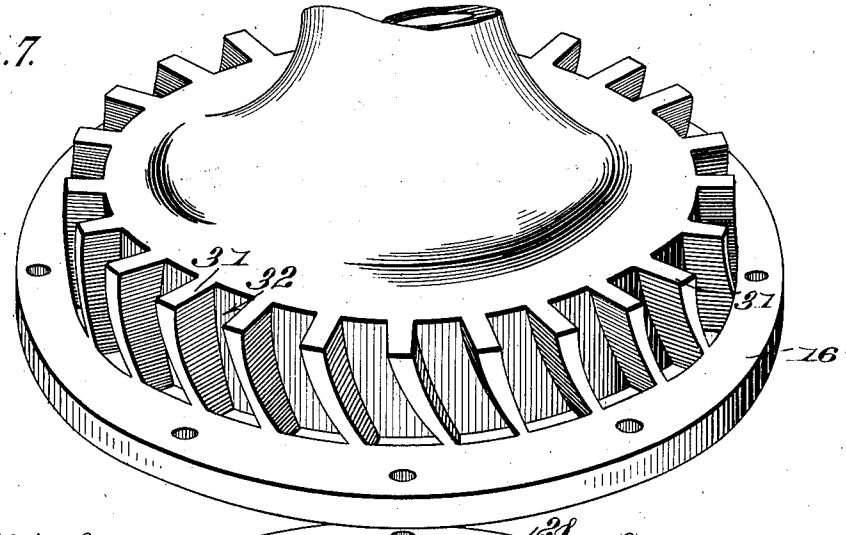



Fig. 8.

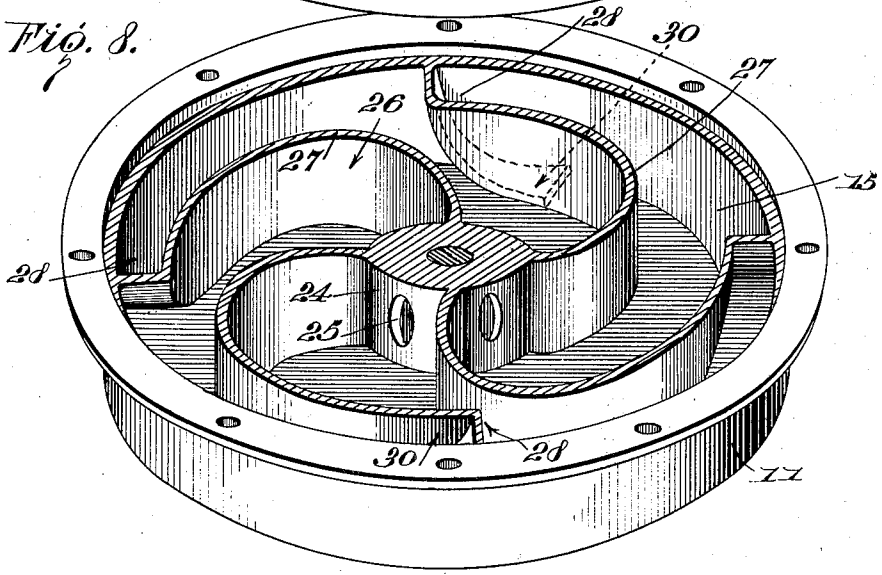
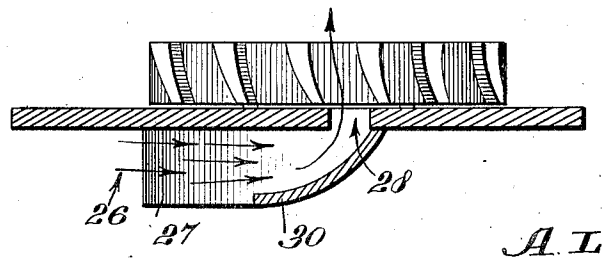



Fig. 9.




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# UNITED STATES PATENT OFFICE.

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## ROTARY PUMP.

Application filed September 12, 1923. Serial No. 662,302.

*To all whom it may concern:*

Be it known that I, ALBERT L. KINS, a citizen of the United States, and a resident of Stockton, in the county of San Joaquin and State of California, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification.

My invention relates to improvements in rotary pumps and it consists of the constructions, combinations and arrangements herein described and claimed.

An object of the invention is to provide an improved rotary pump adapted more particularly for use in deep wells, one of the features of the pump being an arrangement for sustaining the column of water in the discharge pipe so that the runner is not unnecessarily burdened.

Another object of the invention is to provide a deep well pump in which the runner operates beneath a stationary nozzle plate, the water being forced through said nozzles by the runner and sustained by said plates to thereby relieve the runner of the burden of the column of water in the discharge pipe.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawings, in which:

Fig. 1 is a longitudinal section of a well showing the improved pump suspended therein,

Fig. 2 is a section of the runner casing illustrating both the runner and the stationary nozzle plate,

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 2,

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 2,

Fig. 5 is a horizontal section taken on the line 5—5 of Fig. 2,

Fig. 6 is a detail cross section taken on the line 6—6 of Fig. 4, and showing the construction of one of the runner nozzles,

Fig. 7 is a detail perspective view of the stationary nozzle plate,

Fig. 8 is a sectional perspective view of the runner showing it in place in the lower half of the casing, and

Fig. 9 is a development of a portion of the periphery of both the nozzle plate and the runner, illustrating the action of the nozzles.

The general construction of a rotary pump comprises a line shaft 1 which is housed in a shaft casing 2 for the purpose of protecting the shaft from the corrosive action of the water and also preventing the entrance of the water in the various bearings which assist in supporting the shaft.

Both the line shaft and shaft casing are situated in the center of the discharge pipe 3 which extends to the surface where it has connection with a common T 4 from which the water discharges. The stuffing box 5 (Fig. 1), frame 6, driving pulley 7 and well casing 8 are all parts which are very familiar to those acquainted with deep well pumps.

Suitably secured at 9 to the bottom of the discharge pipe 3 is a runner casing which is made in upper and lower sections 10 and 11 respectively. Attached at 12 to the bottom of the lower section 11 is an intake pipe 13 which may have the customary screen tubing 14 for the purpose of keeping out the larger particles of sand. All these parts are well known in the art.

The invention consists of both the improvement of the runner 15 and the provision of a peculiar nozzle plate 16 with which the runner is adapted to cooperate. It is to be observed that the nozzle plate 16 includes a flange 17 which is bolted in place at 18 between the flanges of the sections 10 and 11, so that the plate 16 is rigidly held in place and to all intents and purposes forms a part of the runner casing. It is also to be observed that the nozzle plate 16 provides a cover or roof for the lower section 11, thereby defining a chamber 19 in which the runner 15 rotates.

The runner 15 includes a sleeve 20 which extends into a correspondingly shaped bore 21 in the base portion 22 of the stationary nozzle plate. The line shaft 1 extends into the sleeve 20 and is rigidly connected therewith so that the rotation of the line shaft will turn the runner in the chamber 19. A thrust bearing 23 is placed between the runner 15 and plate 16 so as to take care of any upward thrust of the runner.

Depending from the runner 15 is a tube 24. This tube is long enough to extend well

into the inlet pipe 13. Arranged at the upper end of the tube is a plurality of intake orifices 25 through which water discharges into the chamber 19 in the operation of the pump. It is to be observed, particularly in Figs. 4, 5 and 8, that these orifices discharge into spaces which may well be termed water cells 26. These cells are defined by curved vanes 27 which originate at the tube 24 and terminate in nozzles 28 at the periphery of the runner. Regarding the runner to be turning in a clockwise direction (Fig. 5) the reader can readily see that there will be a tendency to discharge the water in the cells 26 through the nozzles 28, and as the water is discharged at the nozzles more is run in through the inlet 13 at the bottom.

Each nozzle opens at 29 on top of the runner 15. Only that portion of each nozzle adjoining the opening 29 is closed underneath at 30. The rest of the runner is open underneath, the bottom of the section 11, however, providing the necessary closure for the chamber 19. The chamber 19 and water cells 26 may be regarded as one and the same part, it being merely desired to distinguish between the two in Figs. 2 and 5.

Attention is now directed to the nozzle plate 16. The periphery of this plate is formed into a plurality of radial blades 31 which define passages or nozzles 32 through which the water from the runner nozzle outlet 29 passes into the pressure compartment or upper section 10. The outer sides of the nozzles 32 are open as shown in Fig. 7, but when the nozzle plate 16 is inserted into the upper section 10, these outer sides are closed, as can readily be seen in Fig. 2. The blades 31 and consequently the nozzles 32, are disposed at an angle to the rotating nozzles of the runner. The degree of this angle is dependent on the desired pressure at which the water is to be forced through the rotating nozzles of the runner. It is sufficient to say that the angle is rather sharp, and this sharp or acute angle is adapted for an important purpose:

It is a principle of hydraulics that when water is forced through a passage at a predetermined acute angle, none of it can slip back. It is the adoption of this principle in the stationary nozzle plate 16 that makes it possible to sustain the weight of the head of water in the discharge pipe 3 entirely independent of the runner 15 so that the churning, friction, additional power required, etc., attending upon permitting the head of water to rest on the impeller, is entirely done away with.

The operation may be readily understood from the foregoing description. The plate 16 with its blades 31 and nozzles 32 (Figs. 3 and 7) is held stationary by virtue of being bolted in place at 18 (Fig. 2) between the flanges of the upper and lower runner casing sections 10 and 11. The runner 15, on the other hand, is freely rotatable in the chamber 19 beneath the nozzle plate. It is the line shaft 1 that rotates the runner.

The reader may assume the water cells 26 (Fig. 5) to be filled with water. Upon turning the runner in the clockwise direction indicated by the arrow, the water will be forced toward the narrow peripheral portion of each of the water cells and upwardly into the nozzle 28 and through the openings 29 which appear on the top of the runner. These openings are immediately below the nozzles 32 which, of necessity, have openings in communication with the chamber 19. These openings are to be clearly seen in Fig. 7 and their presence is also indicated in Fig. 2.

The walls of the blades 31 are arranged at acute angles to the vertical. According to a well-known principle in hydraulics, water forced through passages of the nature afforded by the nozzles 32 will be compelled to stay up and will not be permitted to slip back, especially when the pump is in operation. Therefore, all of the water raised by the runner 15 is forced into the pressure chamber 10 and the weight of the column of water is sustained on top of the plate 16 and not by the runner 15, which would be the case were the nature of the outlets of the runner different. The operation of the runner causes a friction of water in the inlet or intake pipe 13, which water discharges through the orifices 25 into the chamber 19 and consequently into the water cells 26, which parts may be regarded as the same.

While the construction and arrangement of the improved deep well pump as herein described and claimed, is that of a generally preferred form, obviously modifications and changes may be made without departing from the spirit of the invention or the scope of the claims.

I claim:—

1. A pump comprising upper and lower sections, a plate stationarily secured between said sections constituting a substantial cover for and defining a chamber in the lower section, nozzles formed in the cover plate, a runner operable beneath the cover plate and occupying said chamber, a central tube on the runner having intake orifices discharging into the chamber, nozzles on said runner discharging into the plate nozzles, and vanes in the runner connecting the runner nozzles and tube defining cells common to each nozzle and intake orifice.

2. In a pump, a stationary plate having a level portion, nozzles formed therein, a runner revoluble beneath said stationary plate and having a corresponding level portion, a tube depending from said runner plate having intake orifices discharging into the space beneath said runner, nozzles on the runner

causing a flow through said orifices upon rotation of the runner, and means segregating the runner nozzles and orifices into cells.

3. In a pump, a runner having a plurality of nozzles, a tube having intake openings equal in number to the nozzles, and vanes connecting the tube with the nozzles and defining individual cells of which each is occupied by a nozzle and orifice.

4. In a pump, a revoluble runner consisting of a plate provided with openings having leading and trailing edges, a depending flange, a tube having intake orifices, vanes extending from the tube to said flange and partially surrounding said openings, and closures extending from the trailing edge of the openings between the flange and vanes for a predetermined distance producing nozzles.

5. In combination with the bottom section and inlet of a pump, a runner operable in said section having a plate spaced from the bottom of the section defining a chamber, nozzles on said runner creating a suction in said inlet and chamber, and a tube extending from said plate into the inlet having intake orifices located in said chamber.

ALBERT L. KINS.