A. C. PAULSMEIER.

PUMP.

APPLICATION FILED OCT. 11, 1915.

1,259,437. Patented Mar. 12, 1918.

Fig. 2.

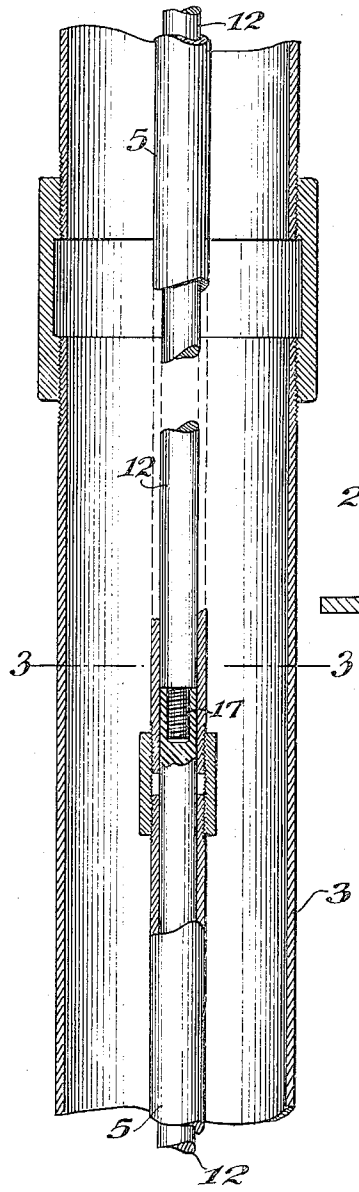


Fig. 1

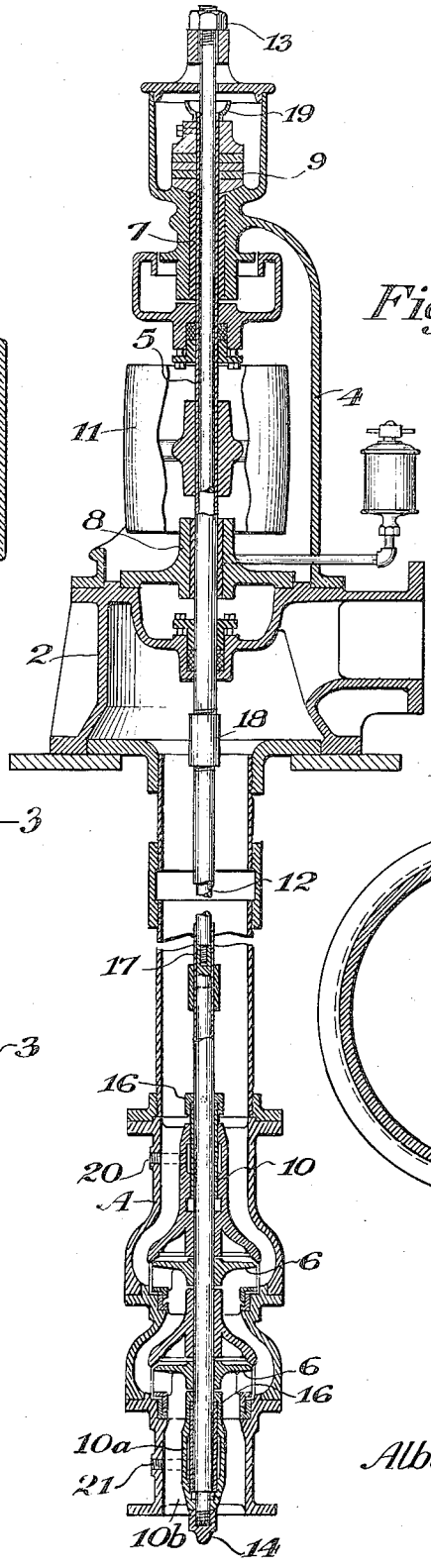
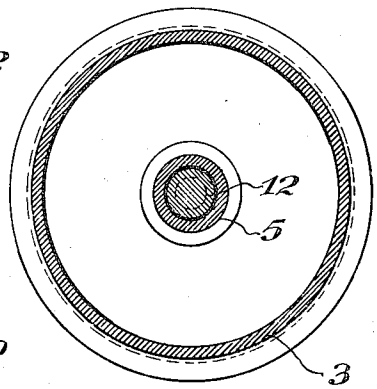


Fig. 3.



WITNESSES:

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PUMP.

1,259,437. Specification of Letters Patent. Patented Mar. 12, 1918.

Application filed October 11, 1915. Serial No. 55,206.

To all whom it may concern:

Be it known that I, ALBERT C. PAULSMEIER, a citizen of the United States, residing at Alameda, in the county of Alameda and State of California, have invented new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to deep well pumps and particularly to a novel form of drive and support for the same.

In the operation of deep well pumps of the turbine centrifugal type, it has been common practice to inclose or surround the impeller shaft and bearings, with a stationary tube in an effort to protect the shaft bearings against the entrance of water, grit, etc., but without practical success, as these substances in all instances can readily enter the protecting tube at least during certain periods and the purposes of the so-called protective tube are not really accomplished. In the present invention, a hollow drive shaft is provided without the need of any protecting outer tube, the shaft being guided on the outside only at the surface and at the extreme lower end where it enters the pump proper, no intermediate bearings or blocks being necessary. This hollow shaft and the impellers are entirely supported from the surface by a suitable roller thrust bearing, while the pump case is partly supported on an internal stationary suspension rod, which forms an inside guide and bearing for the hollow shaft. The shaft at all times is exposed directly to and surrounded by the water in the well, yet its bearings are fully protected. The hollow shaft together with the interior suspension rod may be of any length within the limits of successful well-pumping. The shaft is held in tension by its own weight and that of the impellers, as well as the water pressure on top of the impellers. The guide rod within the shaft supports a portion of the stationary part of the whole apparatus from the surface frame, including the pump proper the weight of the column of water and the discharge pipe, the balance of the weight being taken by the discharge pipe. Adjusting nuts are provided to give the right tension, so as to add sufficient stiffness to the rod to prevent whipping of the surrounding hollow shaft.

The invention consists of the parts and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a central, vertical section of a deep well pump, showing the application of the invention.

Fig. 2 is an enlarged vertical section of the discharge column, pump shaft and guide rod.

Fig. 3 is a cross section on line 3—3, Fig. 2.

Referring to the drawings in detail, A indicates the case of a deep well pump of the centrifugal or turbine type suspended from the pump head 2 by the discharge pipe or column 3; 4 is the pulley frame and 5 a hollow shaft, which carries and drives the impellers 6 in the pump case A.

This shaft is in the present instance, guided at its upper end by bearings 7 and 8, formed in the pulley frame 4 and is suspended from and supported by a roller thrust bearing 9 of suitable construction. The main length of the shaft extends through the discharge column and the lower end is journaled in bearings 10 and 10^a, formed in the stationary pump casing, all intermediate bearings being entirely eliminated. The lower bearing 10^a of shaft 5 is arranged in the pump intake and is supported by spiders 10^a from the walls of the surrounding pump case. The hollow shaft provided in the present instance, may be driven in any suitable manner and from any convenient source of power. In the present instance, I have shown a drive pulley 11 for belt drive.

For the purpose of supporting the weight of the pump structure, that is the pump housing and discharge column, and also for the purpose of providing a guide for the hollow shaft 5, a centrally disposed tensioning or suspension rod 12 is provided. This rod extends through the hollow shaft and is held in the pulley frame at its upper end by suitable means as a nut 13 and its lower end extends through the pump housing and lower spider 10^b and is secured thereto by suitable means as the nut 14. The upper nut 13 may be adjusted to give the rod sufficient tension to support the pump housing and discharge column, and also to give the rod sufficient stiffness to prevent whipping or buckling of the hollow shaft which surrounds it.

Water is excluded from the shaft through

the medium of oil and grease under pressure maintained in the space between the shaft and rod 12.

The bearings 10 and 10ª are provided with sandcaps 16 which maintain the bearings 10 and 10ª watertight. The shaft 5 or rod 12 may be of any length within the limits of successful well pumping, being held in tension or against whipping movement by the weight of itself and impellers, as well as the water pressure on top of the impellers, in conjunction with the internal guide and bearing rod 12. It, therefore, tends to remain perfectly straight and will, therefore, require no intermediate bearings, as is usually employed in most forms of pumps now in use.

The guide and supporting rod may be made in sections, said sections being secured together, as indicated at 17. The hollow shaft surrounding same may also be of sectional construction, said sections being secured together by suitable means, as the couplings 18.

In actual practice, approximately one-sixteenth of an inch clearance is formed between the shaft and the rod; this gives excellent results and also permits the admission of a lubricant through an oiling flange, indicated at 19, secured on the upper end of the hollow shaft. The oil draining down between the rod and shaft lubricates the parts thoroughly. Bearings 10 10ª are lubricated through 20, 21 connected with pipes (not shown) leading to the surface. The device as a whole, is simple in construction and easily assembled when installed.

The central rod 12 in addition to forming a support for the pump case and stationary parts of the apparatus, also constitutes a convenient and economical means for centering the shaft and the impeller or runner in the pump case without respect to the imperfections and unevennesses in the well casing or wall or the discharge column.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a pump mechanism, a pump head having a discharge opening, a discharge pipe suspended from the head and having free and unobstructed communication with the discharge opening thereof, a rotary pump at the lower end of the discharge pipe, a hollow shaft for driving the pump journaled in the latter and in the head and supported only at its ends whereby the discharge pipe is unobstructed between the pump and the discharge opening of the head, and a stationary guide and supporting rod extending entirely through the hollow shaft and fixed at one end to the pump and at its opposite end to the head, the diameter of said guide and supporting rod being substantially the same as the bore of the hollow shaft to hold the latter from bowing between its ends through centrifugal action.

2. In a deep well pump of the rotary type, a pump head, a discharge pipe depending therefrom, a pump case on the lower end of the pipe, a rotary impeller in the pump case, a hollow shaft carrying the impeller and extending upwardly through the pipe and receiving support from the head, and a sectional guide and supporting rod fixed to the head and case and extending through the hollow shaft, said rod being of substantially the same diameter throughout as the bore of the hollow shaft and being composed of sections connected by a joint having a diameter the same as that of the rod whereby the hollow shaft may closely fit its guide and supporting rod through its entire length.

3. In a deep well pump, a pump head, a superposed frame thereon, a discharge pipe depending from the head, a pump case on the lower end of the pipe, a rotary impeller in the pump case, a hollow shaft for driving the impeller extending upwardly through the pipe and pump head and supported for rotary movement by the frame, an oiling flange on the upper end of the shaft for directing an oil into the latter, and a fixed guiding and supporting rod extending through the rod and oiling flange and secured to the frame and pump case, said rod being substantially of the same diameter as the bore of the shaft.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALBERT C. PAULSMEIER.

Witnesses:
B. T. HARMON,
F. O. BERTELSEN.