

No. 819,986.

PATENTED MAY 8, 1906.

A. N. ELLIS.  
PUMP FOR WELLS.  
APPLICATION FILED JUNE 2, 1905.

2 SHEETS—SHEET 1.

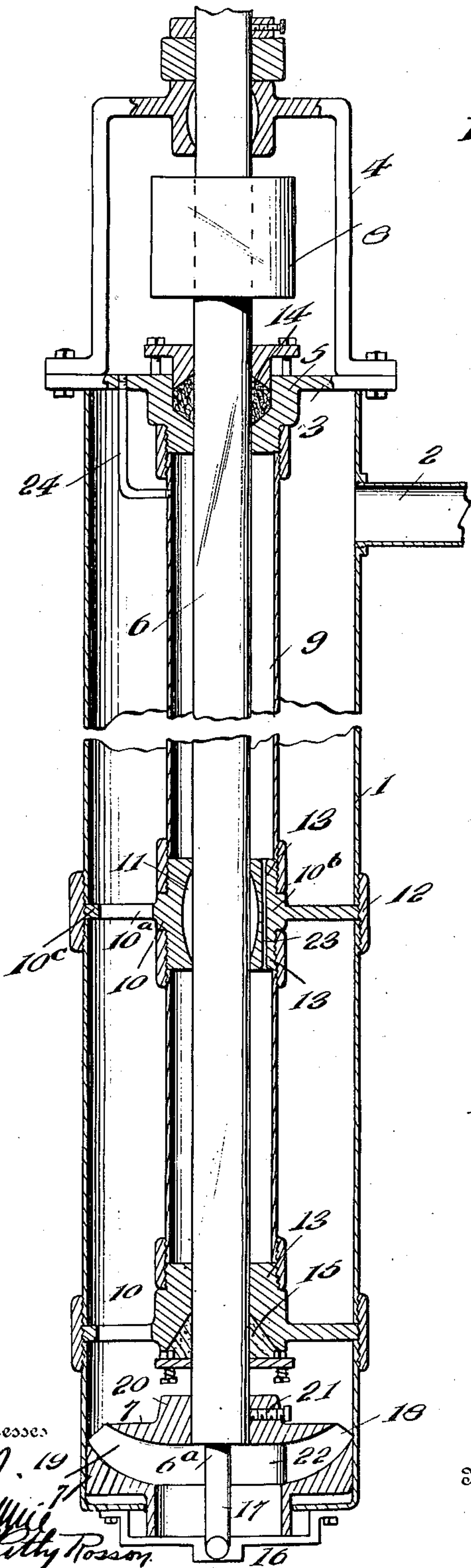


Fig. 1.

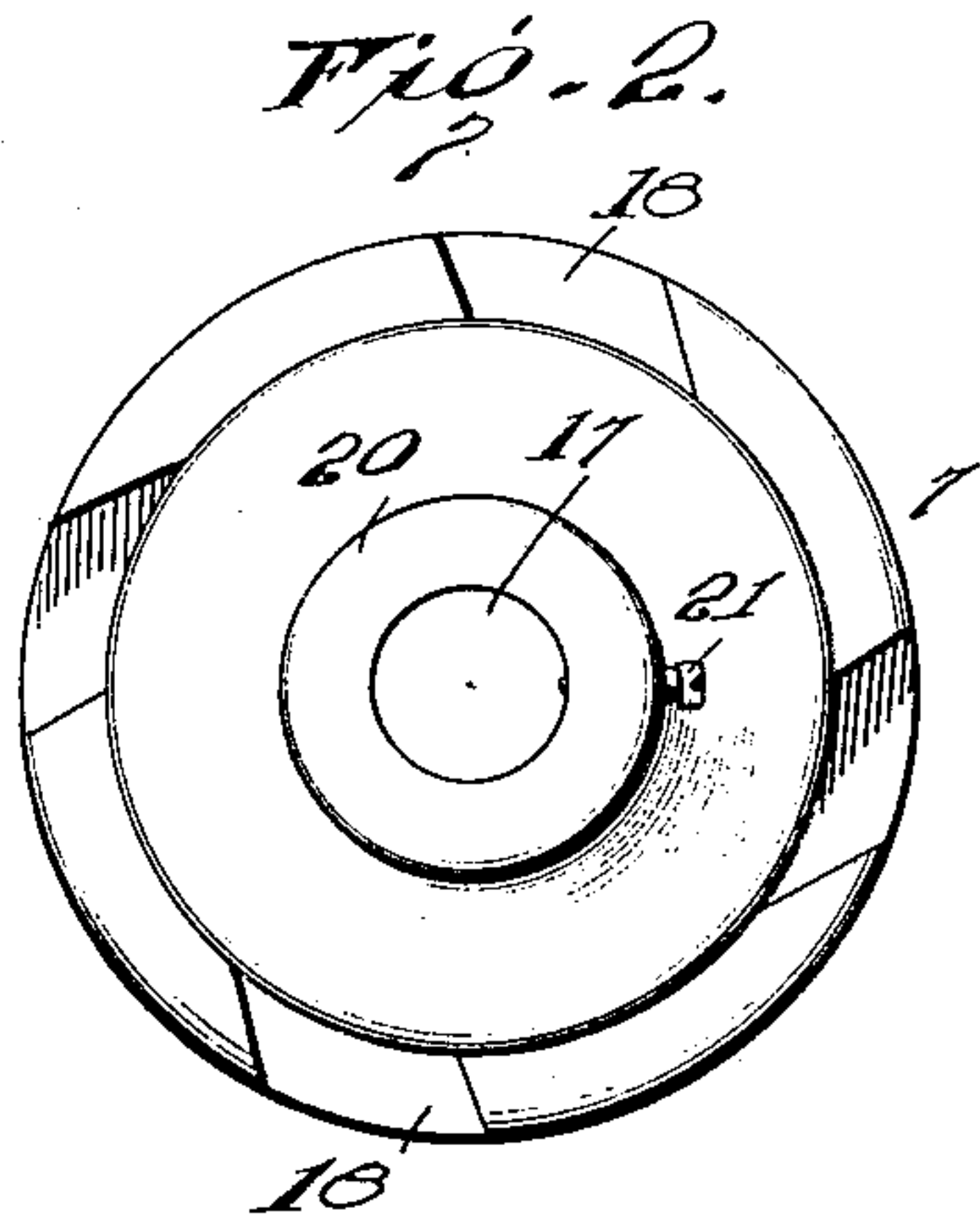


Fig. 2.

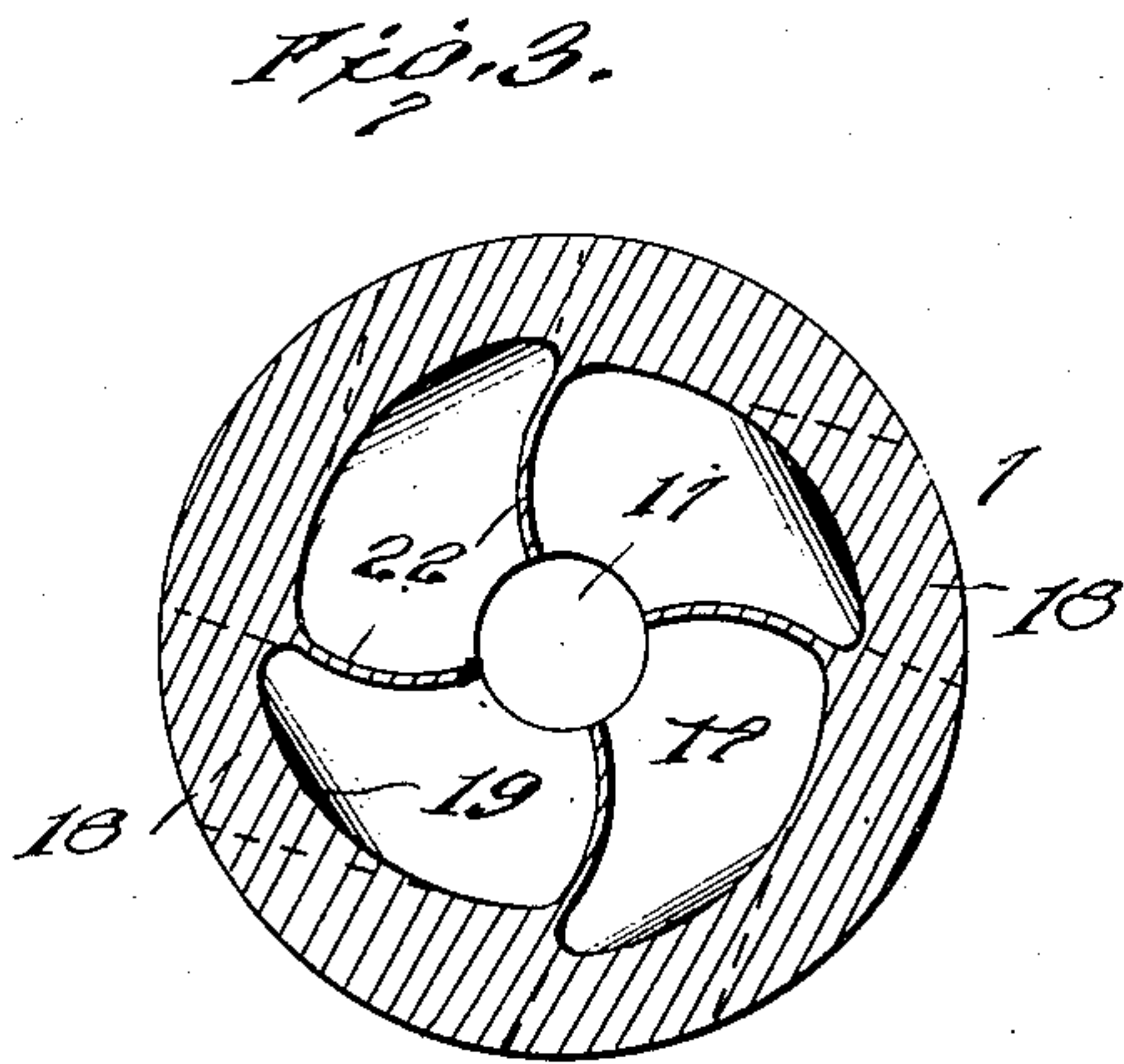


Fig. 3.

Witnesses  
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A. N. Ellis.

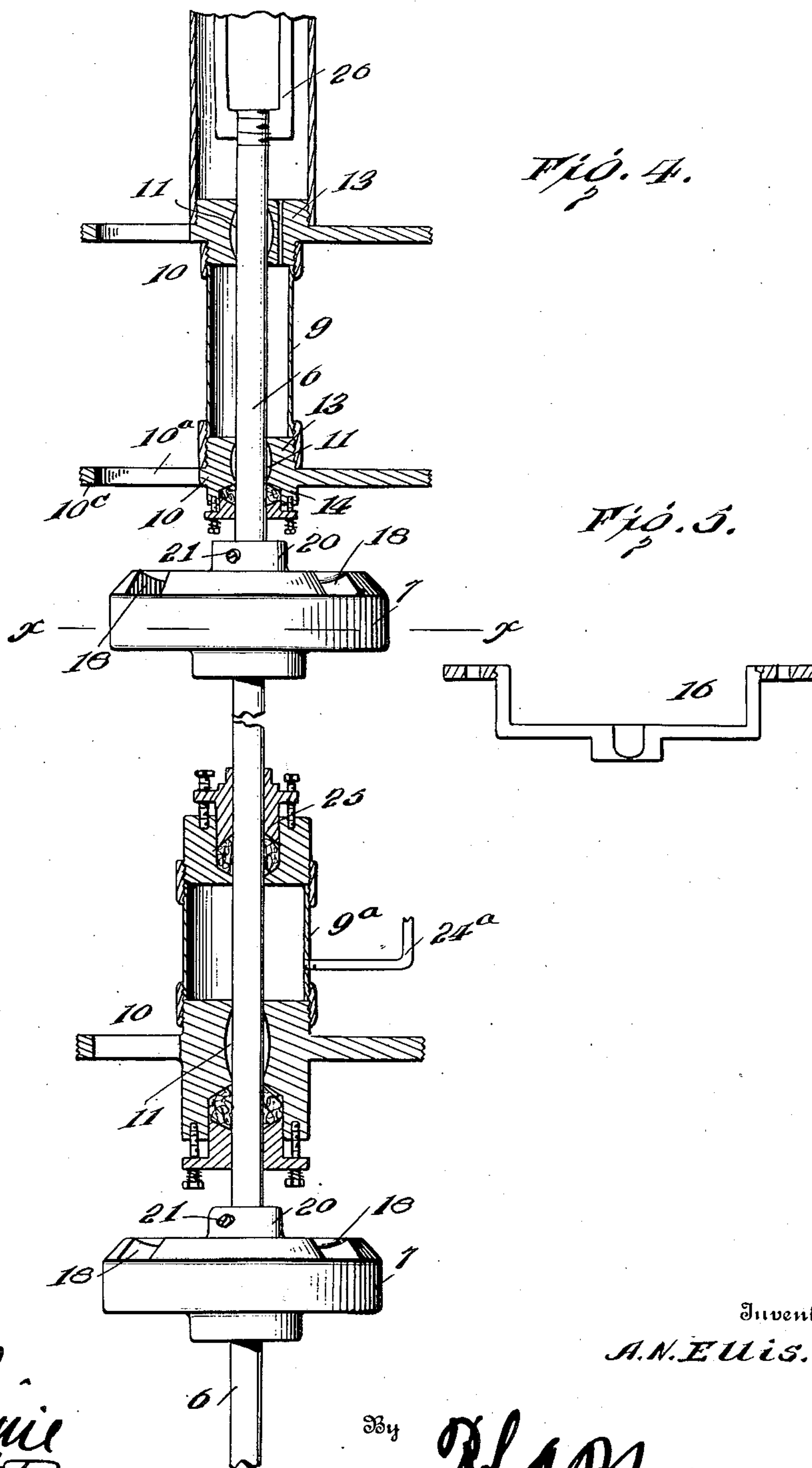
By *R. H. H. H.* Attorneys

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# UNITED STATES PATENT OFFICE.

ARTHUR N. ELLIS, OF SAN BERNARDINO, CALIFORNIA.

## PUMP FOR WELLS.

No. 819,986.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed June 2, 1905. Serial No. 263,462.

*To all whom it may concern:*

Be it known that I, ARTHUR N. ELLIS, a citizen of Great Britain, residing at San Bernardino, in the county of San Bernardino and State of California, have invented certain new and useful Improvements in Pumps for Wells, of which the following is a specification.

This invention involves improvements in that type of pumps designed particularly for elevating liquids in oil or like wells and embodying a single or plurality of water wheels or propellers for discharging liquid from the well.

The invention embodies, primarily, a novel form of propeller, a single one or a number of which are carried by a suitable drive-shaft arranged in the well-tubing, and, further, the invention resides in special means for lubricating the drive-shaft, in special bearings therefor, and in the provision of means for protecting the bearings from sand, grit or similar foreign matter which would otherwise grind out the bearings for the shaft, giving rise to disadvantages which will be obvious to those versed in the art to which the invention appertains.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and accompanying drawings, in which—

Figure 1 is a vertical sectional view of a pump embodying one adaptation of the invention, the mechanism being shown arranged in the well-tubing in operating order. Fig. 2 is a top plan view of one of the propellers disposed in the well. Fig. 3 is a horizontal sectional view taken on the line X X of Fig. 4 looking upwardly, bringing out clearly the arrangement of the blades of the propeller. Fig. 4 is a vertical sectional view showing a modified adaptation of the invention, the pump barrel or well-tubing being omitted. Fig. 5 is a side elevation of the bearing member receiving the lower extremity of the shaft of the pump mechanism.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The use of the invention obviates the necessity for digging a pit, as will be apparent, and in carrying out the invention it is designed that the pump mechanism be ar-

anged in the well-tubing 1 in the casing of the well, said tubing forming virtually the barrel of the pump in the practical working of the invention. The tubing 1 is provided at its upper end with a suitable lateral discharge 2 for the liquid forced upwardly therein, and the upper extremity of the tubing is closed by a suitable plate 3, above which is a casing 4. The plate 3 is formed with a suitable bearing 5, through which passes the drive-shaft 6, the latter extending the entire length of the tubing 1 and having the propeller or propellers 7 substantially attached thereto. The shaft 6 will be driven by a pulley 8 or like means operably connected with a suitable motor, and this pulley 8 is preferably arranged in the casing 4 in the construction illustrated in the drawings.

In Fig. 1 of the drawings a single propeller 7 is carried by the drive-shaft 6 at the lower extremity of the latter, and in this construction it is designed that the drive-shaft 6 be protected throughout its length from the action of the sand or any foreign matter carried upwardly in the well under the force of the liquid being elevated. For the above purpose it is designed to provide located in the well-tubing 1 a pipe 9, which surrounds or incloses the shaft 6, and this pipe 9 will of course be made in a suitable number of sections, dependent upon the depth of the well and the length of the tubing 1. It is necessary to provide said shaft 6 with suitable bearings at intervals in the length of the tubing 1, and for this purpose a number of bearing-brackets, such as indicated at 10, are employed, these brackets embodying a plurality of arms 10<sup>a</sup>, projecting from a hub portion 10<sup>b</sup>, the latter having an opening 11 there-through, forming the bearing for the shaft 6. The bearing-brackets 10 are preferably of somewhat circular form, having rim portions 10<sup>c</sup> externally threaded, so as to be readily connected with the coupling-thimbles 12, by which the various sections of the tubing 1 are secured together, the members 10 being clamped between adjacent ends of the sections of said tubing. The hub portion 10<sup>b</sup> of each coupling-bracket is formed with oppositely-extending threaded portions 13, and the ends of the sections of the inner pipe 9 are directly attached to the extended portions 13 aforesaid. The pipe 9 within the tubing 1, which surrounds the shaft 6, is designed to receive a suitable lubricant, such as oil or hard grease, so that the bearing-hub



portions 10<sup>b</sup> of the various brackets 10<sup>a</sup> will be thoroughly lubricated and such portions of course protected fully from the action of the liquid passing upwardly through the space between the pipes 9 and 1, above described. The shaft 6 passes through a suitable stuffing-box 14 on the plate 3 at the upper end of the well-tubing 1, and the said shaft also passes through another stuffing-box 15 at the lowermost of the brackets 10, the lower extremity of the shaft 6 passing through the stuffing-box 15 a sufficient distance to admit of ready attachment of the propeller 7 thereto. The lower extremity of the shaft 6 is reduced, as shown at 6<sup>a</sup>, and received in a transverse bearing member 16, suitably supported at the lowermost end of the tubing 1.

The propeller 7 is made of special construction and comprises a hollow body of disk-like formation, said body being provided with a central opening 17 in its under side to receive the water or other liquid and with a plurality of outlet openings or passages 18, extending from the hollow portion 19 to the upper side of the body of the propeller, as shown most clearly in the drawings. It will of course be understood that the inlet-opening 17 of each propeller carried by the shaft 6 is larger than said shaft, so that the propellers at intervals in the length of this shaft will readily receive the liquid as it is being elevated and propel such liquid upwardly. The propeller is thus adapted to receive the water at the bottom thereof and discharge the same at the top, and this is of no small advantage, in that it obviates the necessity for the provision of the bottom casting on the pump, a common cap doing the work effectively. The body of the propeller is formed with a tubular extension 20 at its upper portion, and a set-screw 21, threaded transversely into this extension, is adapted to engage the drive-shaft 6 in order to secure the propeller thereto. The openings or passages 18, leading from the hollow portion 19 of the body of each propeller, curve upwardly and radially thereof, so that the liquid propelled upwardly by each of the members 7 will be given a swirling motion, so as to increase the effectiveness of the pump to a maximum. Arranged in the hollow portion of the propeller 7 are a plurality of curved blades 22, a blade being provided for each of the outlet passages or openings 18 and curved to conform somewhat with the curvature of its adjacent passage, as shown clearly in Fig. 3 of the drawings. The blades 22 forcibly propel and discharge the liquid through the passages 18 upwardly into the space between the pipe 9 and the outer tubing 1 of the mechanism.

It will be noted that the hub portions 10<sup>b</sup> of the bearing-brackets 10 are interposed between various sections of the pipe 9, which will be termed the "oil-pipe," for the purposes of this description. In order that a lu-

bricant may be fed into the uppermost section of the pipe 9 and pass downwardly into the lowermost sections, it is designed that the hub portions 10<sup>b</sup> of the various brackets 10 be formed with vertical oil-passages 23, and thus oil supplied to the space between the uppermost section of the pipe 9 and the shaft 6 by means of the oil-pipe 24, leading through the uppermost section of the pipe 9, will pass downwardly into the lower sections of the pipe, supplying the lubricant to the shaft-bearings throughout the length of the shaft 6.

Fig. 4, which illustrates a modification of the invention, shows a construction of the mechanism designed to be used where a plurality of propellers 7 are necessary in very deep wells in order to elevate the liquid. In this construction the shaft 6 is not surrounded throughout its length by an oil-pipe, as shown in Fig. 1; but the various bearing-brackets 10 in the length of the tubing 1 will be individually supplied with a lubricant and protected from the action of the sand and grit in the liquid by means of short oil-pipes 9<sup>a</sup>, one of said pipes being located between the adjacent propellers about five feet apart. The lower ends of the short pipes 9<sup>a</sup> connect with the hub portions of brackets 10 in a manner similar to that described with reference to the construction in Fig. 1, and the upper portions of the short pipes 9<sup>a</sup> will be closed by suitable stuffing-boxes 25, preventing injury to the bearings for the shaft by the foreign matter carried upwardly by the water or liquid. It will be noted, as shown in Fig. 4, that at points where the couplings 26 are used to connect with sections of the shaft 6 the inclosing oil-pipe section will be enlarged to connect with an enlarged extended hub portion 13<sup>a</sup> of the adjacent bearing-bracket 10. It will be understood that in the construction of Fig. 4 the various short oil-pipes 9<sup>a</sup> will be supplied by branch pipes of the main oil-supply pipe 24<sup>a</sup>, leading from the upper end of the well to the lowermost portion thereof.

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

1. In a pump for wells of the type described, the combination of a well tubing or pipe, a shaft arranged therein, a propeller or propellers carried by said shaft, bearing-brackets for the shaft in the length of the well-tubing, and oil-pipes surrounding the shaft in the length thereof.

2. In a pump for wells of the type described, the combination of a well tubing or pipe, a shaft arranged therein, a propeller or propellers carried by said shaft, bearing-brackets for the shaft in the length of the well-tubing, and oil-pipes surrounding the shaft in the length thereof, and connected with the bearing-brackets therefor.

3. In a pump for wells of the type described, a well-tubing, a shaft arranged there-



in, a propeller carried by the shaft, bearing-  
brackets within the tubing and provided  
with bearings for the shaft, a lubricant-re-  
ceiving pipe surrounding the shaft and com-  
prising sections connected with the bearing-  
brackets to protect the bearings thereof from  
the action of foreign matter elevated with the  
liquid discharge from the well, the bearing-  
brackets being provided with oil-passages

therethrough whereby the lubricant in the 10  
lubricant-pipe may pass to the various brack-  
ets in the length of the shaft.

In testimony whereof I affix my signature  
in presence of two witnesses.

ARTHUR N. ELLIS. [L. s.]

Witnesses:

J. L. MACK,

HATTIE L. BARKELEW.