No. 735,690. PATENTED AUG. 11, 1903.

J. W. ALVORD.

MEANS FOR ALINING PUMP SHAFTS IN WELL CASINGS.

APPLICATION FILED NOV. 17, 1902.

2 SHEETS—SHEET 1.

NO MODEL.

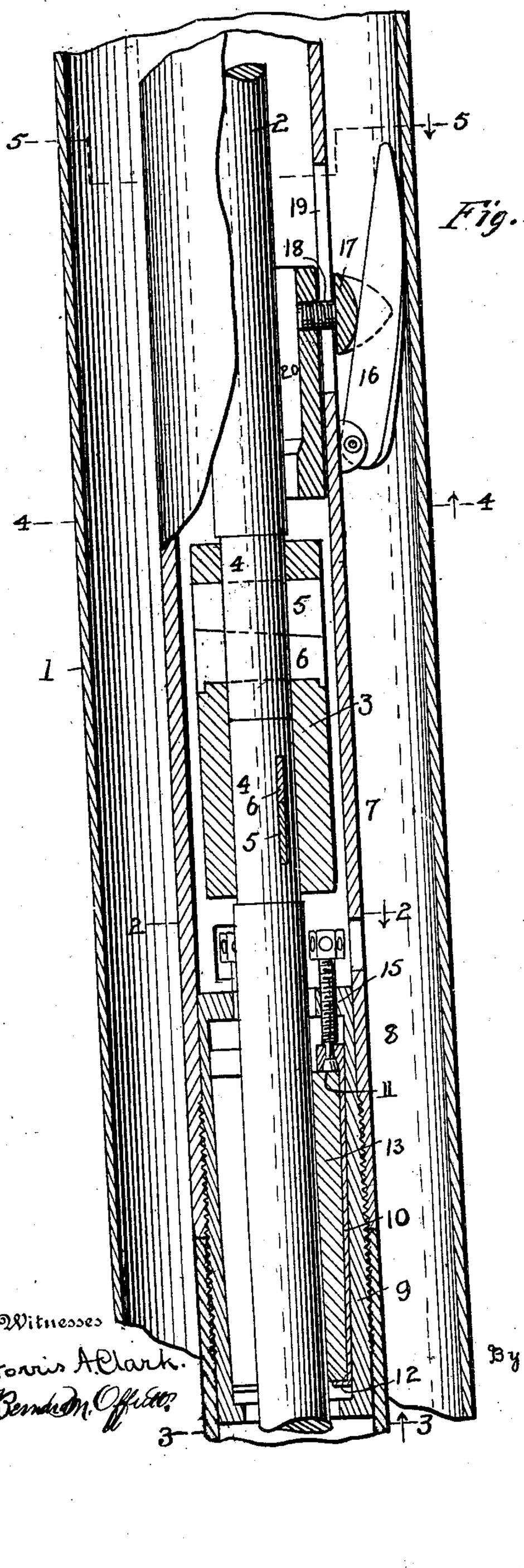


Fig. 1.

Fig. 2.

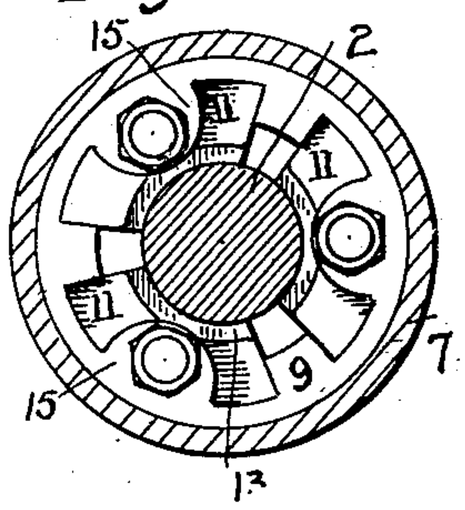
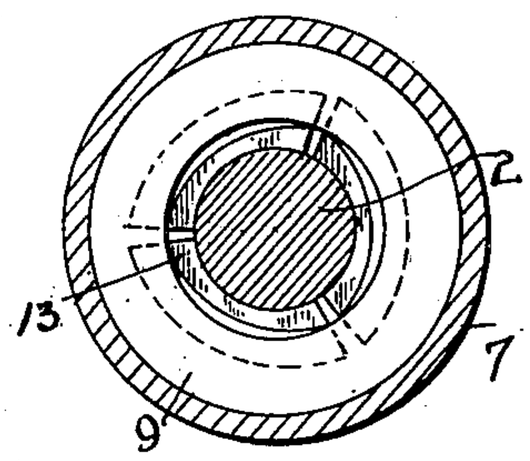


Fig. 3.



Witnesses
Norris A. Clark.
Bernice M. Offield.

Inventor
John W. Alvord

By
Attorney

No. 735,690. PATENTED AUG. 11, 1903.

J. W. ALVORD.

MEANS FOR ALINING PUMP SHAFTS IN WELL CASINGS.

APPLICATION FILED NOV. 17, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4.

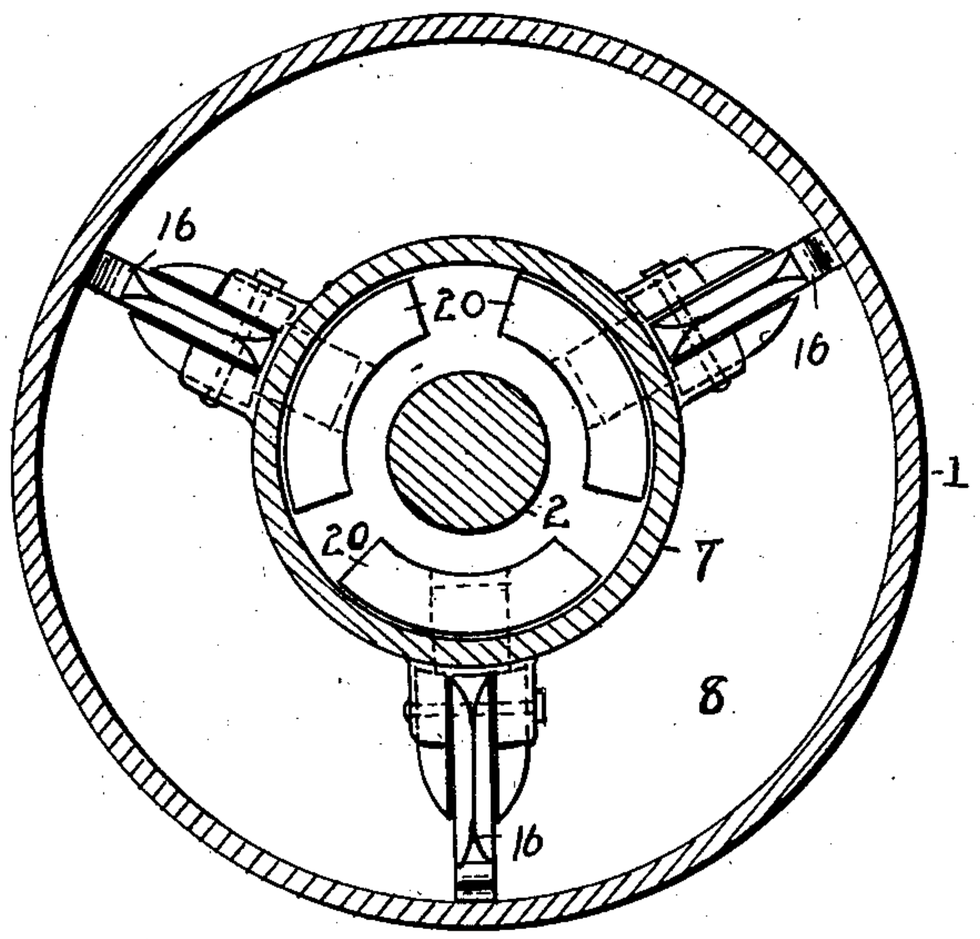
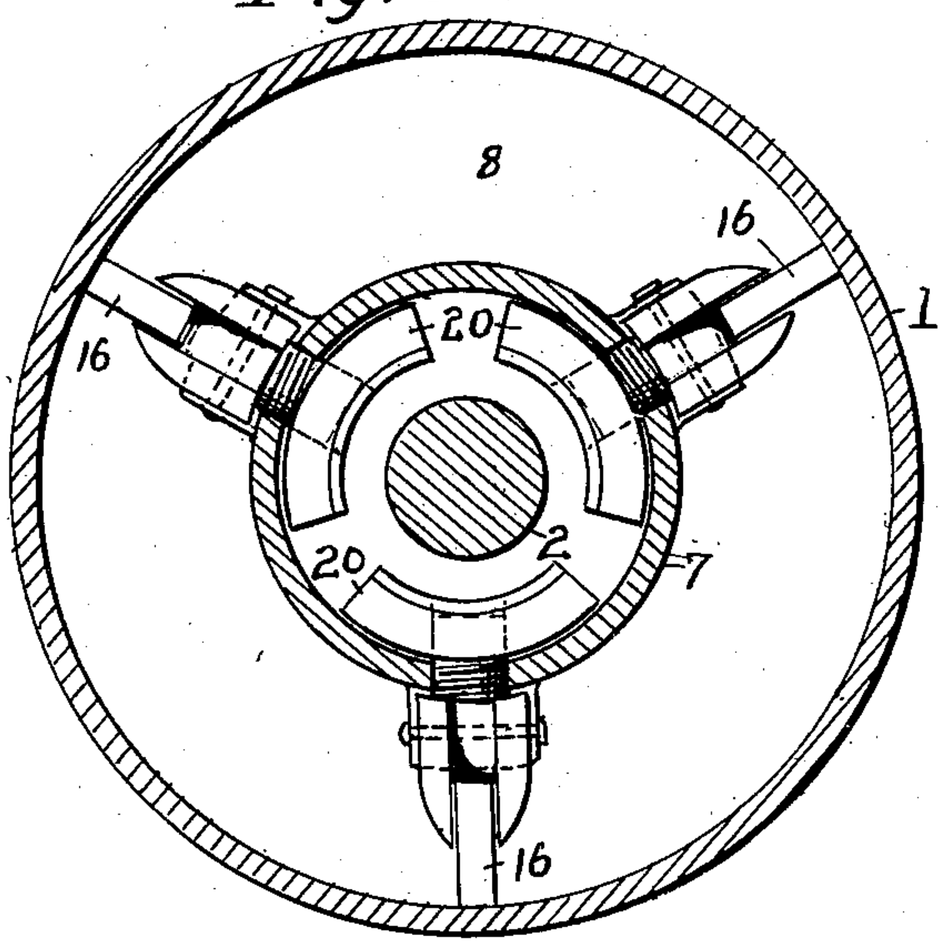


Fig. 5.



Inventor

John W. Alvord,

By Jos. P. Whitesey

Attorney

Witnesses

Norris A. Clark.

Bernard M. Offutt.

No. 735,690. Patented August 11, 1903.

UNITED STATES PATENT OFFICE.

JOHN WATSON ALVORD, OF CHICAGO, ILLINOIS.

MEANS FOR ALINING PUMP-SHAFTS IN WELL-CASINGS.

SPECIFICATION forming part of Letters Patent No. 735,690, dated August 11, 1903.

Application filed November 17, 1902. Serial No. 131,663. (No model.)

To all whom it may concern:

Be it known that I, JOHN WATSON ALVORD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Means for Alining Pump-Shafts in Well-Casings; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to rotary pumps for deep wells; and its object is to provide means for automatically alining the pump-shaft.

The casing of a deep well, by which I mean a well having a depth of one hundred feet or more, is usually slightly crooked or sinuous, so that the shaft of a rotary pump located at or near the bottom of the well will not be equidistant from the casing throughout its entire length, but will be nearer to one side of the casing or the other at different points. It is of course necessary for the shaft to be absolutely straight in order to reduce the friction of the bearings to a minimum. My invention aims to keep the shaft perfectly straight, and yet support it rigidly in the casing by automatic alining devices.

In the accompanying drawings, Figure 1 is a longitudinal section of a portion of a well-casing, pump-shaft, and shaft-tube, with a shaft-bearing and a self-alining support for the tube. Figs. 2 and 3 are cross-sections at the lines 2 2 3 3, respectively, on a slightly larger scale. Fig. 4 is a cross-section at the line 4 4 on a still larger scale and showing the tube eccentric to the casing. Fig. 5 is a cross-section on the same scale at the line 5 5, showing the tube and casing concentric.

The well-casing 1 is a metal pipe of suitable diameter and circular in cross-section. It may or may not be perfectly straight throughout its entire length. The rotary pump (not shown) is located at the bottom of the well and is driven by a vertical shaft 2, rotated by any suitable means. (Not shown.) The shaft is made in suitable lengths united by rigid couplings, comprising, preferably, a sleeve 3, fitting the reduced ends 4 of the shaft-sections, and fastened by the transverse keys 5 and cotters 6. The shaft is inclosed in a shaft-tube 7, made in suitable lengths coupled together and considerably less in diameter than the well-casing, so as to leave an annular space 8 between them for the water to flow up through. At suitable points in the tube are bearings for the shaft, consisting, preferably, of a bushing 9, rigidly secured in the tube, as by the screw-threads shown, and slightly tapered internally. Segmental carriers 10 are placed in the bushing, having flanges 11 12 at each end to confine the segmental bearing-blocks 13, which are preferably made of lignum-vitæ and fit the shaft closely. Adjusting-screws 14 are swiveled in the flanges 11 and mesh with tapped holes in lugs 15 on the adjacent end of the bushing, so by turning the screws the carriers and their blocks can be slid lengthwise in the tapering bushing, and thus be set in or out to fit the shaft. The heads of the screws are accessible through holes in the tube.

Hinged to the outside of the shaft-tube, at points adjacent to the upper end of the sleeve 3, are a plurality of braces 16, preferably sharpened along their under edges to reduce the resistance to the rising column of water. The braces extend upwardly, and as each brace is independently hinged it will naturally fall outward in a radial plane until its end rests against the inside of the well-casing. If the shaft-tube happens to be eccentric to the casing at that point, as shown in Fig. 4, the braces will stand at different angles. Means are provided for locking each brace independently in whatsoever position it assumes, so that the tube will be rigidly supported in the casing whether it is concentric or eccentric therewith. The locking device which I prefer consists of a wedge or chock 17, preferably forked and fitting against the outside of the shaft-tube and having a shank 18 sliding in a longitudinal slot 19 in said tube behind the brace. Inside the tube is a segmental weight 20, fastened to the shank and causing the chock to drop until it wedges in the angular space between the tube and the back of the brace. In this position of the chock the brace is rigidly held against inward movement, and the coöperation of the several braces supports the tube firmly

against any lateral displacement. To release the braces when the tube is to be raised or lowered in the casing, the shaft is so constructed and arranged as to be capable of an upward lengthwise movement sufficient to bring the upper end of the sleeve 3 against the lower ends of the segmental weights 20 and lift them and the chocks, thus unlocking the braces and leaving them free to move in and out as they slide up or down in the casing with the tube. When said tube has been relocated, the shaft is dropped, and the chocks again fall into place and lock the braces in whatsoever position they may happen to be. It is thus evident that my invention provides means for automatically alining a pump-shaft in a well-casing whether the latter is straight or crooked.

It will be understood that a plurality of alining devices and locking and unlocking means will be provided, according to the length of the shaft.

Having thus described my invention, what I claim is—

1. The combination with a well-casing, of a straight rotary pump-shaft therein, and a plurality of independent, automatic adjusting devices located between the shaft and the casing, whereby said shaft is automatically braced in proper alinement irrespective of any deviation of said casing from a straight line.

2. The combination with a well-casing, of a straight rotary pump-shaft therein, bearings for said shaft, and a plurality of automatic, independently-adjustable devices serving to brace said bearings automatically in proper alinement in said casing, irrespective of any deviation of said casing from a straight line.

3. The combination with a well-casing, of a straight rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, and a plurality of automatic, independently-adjustable devices between said tube and casing, whereby the former is automatically braced in proper alinement irrespective of any deviations of the latter from a straight line.

4. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces between said tube and casing, and means for adjusting said braces independently of each other.

5. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces between said tube and casing, and means for adjusting and locking each brace independently.

6. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings for said shaft, braces between said tube and casing, means for locking each brace independently, and means for unlocking said braces simultaneously.

7. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, and means for locking said braces.

8. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, and a chock for wedging each brace.

9. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, a chock for wedging each brace, and means for lifting said chocks.

10. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, and a chock for each brace having a shank projecting into said tube and adapted to be lifted by an upward movement of the pump-shaft.

11. The combination with a well-casing, of a rotary pump-shaft therein, a tube inclosing said shaft, bearings in said tube, braces hinged to said tube, a chock for wedging each brace having a shank projecting into said tube, and a weight secured to said shank.

12. The combination with a well-casing, of a rotary pump-shaft therein having a sleeve thereon, a tube inclosing said shaft and having longitudinal slots therein, braces hinged to said tube, a chock for wedging each brace having a shank projecting through a slot, and a weight secured to said shank inside said tube and adapted to be lifted by said sleeve when said shaft is lifted.

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

JOHN WATSON ALVORD.

Witnesses:

ROBERT O. HARPER,

FRED G. WILBER.