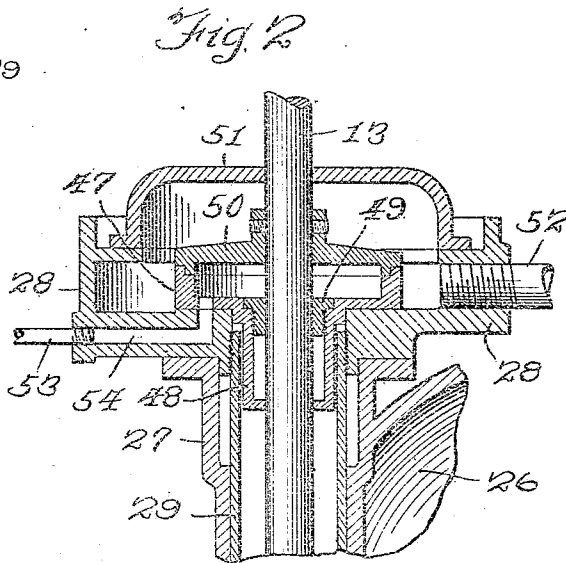
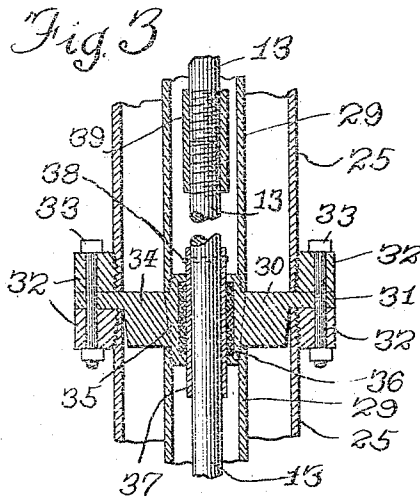
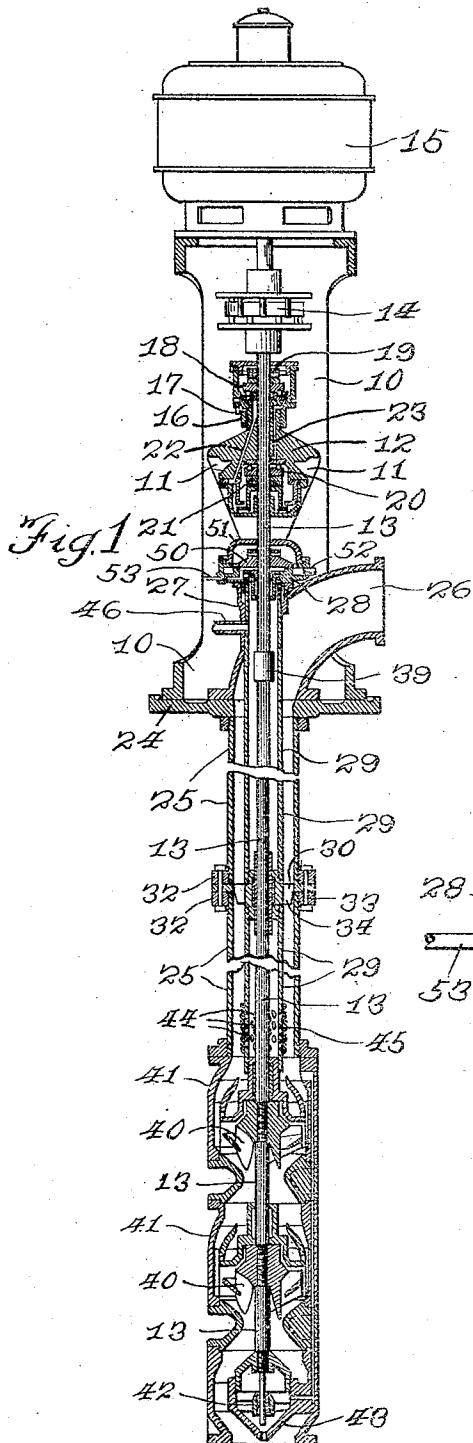


M. T. AND M. C. CHAPMAN.
DEEP WELL PUMP.
APPLICATION FILED JULY 6, 1915.

1,348,980.

Patented Aug. 10, 1920.



Inventors.
Matthew J. Chapman;
Mark C. Chapman,
By Adams, Jackson,
Att'ys.

UNITED STATES PATENT OFFICE.

MATTHEW T. CHAPMAN AND MARK C. CHAPMAN, OF AURORA, ILLINOIS, ASSIGNORS
TO THE AMERICAN WELL WORKS, OF AURORA, ILLINOIS, A CORPORATION OF
ILLINOIS.

DEEP-WELL PUMP.

1,348,980.

Specification of Letters Patent. Patented Aug. 10, 1920.

Original application filed March 10, 1909, Serial No. 482,517. Divided and this application filed July 6, 1915. Serial No. 38,254.

To all whom it may concern:

Be it known that we, MATTHEW T. CHAPMAN and MARK C. CHAPMAN, citizens of the United States, residing at Aurora, in the county of Kane, State of Illinois, have invented certain new and useful Improvements in Deep-Well Pumps, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to pumps for raising water from deep wells, being a division of our application, 482,517, which was filed on March 10, 1909, upon which application Patent No. 1,149,633 was granted on August 15, 1915. It is one of the objects of our invention to provide a liquid balancing means in connection with the shaft of a rotary deep well pump by which the shaft is adapted to be raised off of its auxiliary bearings and rotatably sustained upon a film of liquid escaping between oppositely-disposed parts of our balancing mechanism. It is another object of our invention to provide an improved form of balancing mechanism in which the parts between which the sustaining film of water escapes have a flat butting engagement whereby any wear which may result in use can be compensated for by a suitable adjustment of the parts. It is another object of our invention to provide a new and improved form of coupling devices by which the several sections of the well tube and shaft casing are connected together, and suitable bearings are provided for the shaft. It is another object of our invention to provide a new and improved arrangement of well tube, shaft casing, shaft, runner, and auxiliary anti-friction bearing for the upper end of the shaft by which the shaft may be tightened and straightened relative to the shaft casing and the well tube. It is another object of our invention to improve devices of this type in sundry details hereinafter pointed out. The preferred means by which we have accomplished our several objects are illustrated in the accompanying drawings and are hereinafter specifically described. That which we believe to be new and desire to cover by this application is set forth in the claims.

In the drawings:

Figure 1 is a view, mostly in vertical section, showing a pumping mechanism embodying our improvements;

Fig. 2 is an enlarged detail illustrating the liquid balancing means; and

Fig. 3 is an enlarged detail illustrating our improved coupling mechanism.

Referring to the several figures of the drawings in which corresponding parts are indicated by the same reference characters,—

10 indicates a standard having laterally-projecting lugs 11 on which rests a casting 12 which carries the auxiliary bearing means hereinafter described for supporting the shaft 13, together with means for lubricating such bearings. The upper end of the shaft 13 is connected by means of a coupling device 14 of any suitable type with a motor 15 supported by the standard 10. The auxiliary bearings comprise a casing 16 mounted by means of screw-threads upon the upper end of the casting 12, a set-screw 17 being provided for locking the casing 16 in the desired adjusted position relative to the casting 12. The casing 16 supports an anti-friction bearing 18 of any suitable type, which underlies a collar 19 adjustably fixed by means of set-screws upon the shaft 13. An anti-friction bearing 20 is mounted upon the shaft 13 below the casting 12, a collar 21 being adjustably mounted upon the shaft 13 in engagement with the bearing 20, the arrangement being such that the bearing 20 is adapted to receive any upward thrust upon the shaft 13. The construction comprises ducts 22—23 leading from one to the other of the bearings 18—20, together with means for causing a circulation of a suitable lubricant therethrough, but inasmuch as such lubricating means forms no part of our present invention it is not believed to be necessary to describe it in detail herein.

24 indicates a base-plate from which the standard 10 rises, such base-plate being provided with a central opening. The upper section 25 of the well tube is secured in any suitable manner to the base-plate 24 below the central opening therethrough, and an elbow discharge-member 26 is connected in any suitable manner above the plate 24 so as to form a continuation of the well tube 25. The elbow outlet-member 26 is provided with an upwardly-extending sleeve upon which is mounted in any suitable manner the lower member 28 of a casing hereinafter more particularly described. To the

casing member 28 is connected by means of screw-threads or in any other suitable manner the upper end of the uppermost shaft casing section 29 which extends downward through the sleeve 27 and through the well tube 25 about the shaft 13.

Our improved coupling means for coupling together the several sections of the well tubing and the shaft casing comprises a spider 30 provided with an annular ring portion 31 extending between the adjacent ends of the well tube sections 25. Each section 25 of the well tube is provided with a collar 32 mounted thereon by means of screw-threads, the collars 32 and the ring 31 of the spider 30 being tightly connected together by means of a plurality of bolts 33. The spider 30 also comprises arms 34 extending from the annular portion 31 to the hub portion 35, the outer ends of the arms 34 being beveled as shown in Fig. 3 so as to guide the spider into centered position relative to the lowermost one of the two connected well tube sections 25. The hub 35 of the spider is provided with a lining 36 of Babbitt metal, or other suitable material, forming a bearing for the bearing sleeve 37 mounted upon the shaft 13, the sleeve 37 being held in position upon the shaft 13 by means of a pin 38. The adjacent sections of shafting 13 are connected together by means of a coupling 39 of any suitable type.

Mounted upon the lower end of the shaft 13 is a plurality of runners or propellers 40 of any suitable type adapted to operate in suitable pump casings 41, also of any suitable type. Below the lowermost runner 40 there is provided a bearing 42 adapted to hold the shaft 13 against lateral movement, such bearing being inclosed in a suitable housing 43. The shaft casing 29 is provided with a number of openings 44 therein at its lower end covered by a wire netting 45. Inasmuch as the runners, the pump casings, the bearing and the lower end of the lowermost section of casing 29 are formed and operate in precisely the manner set forth in the Patent, No. 1,149,633, above referred to, it is believed to be unnecessary to further describe them herein. A pipe 46 is provided communicating with the uppermost section of shaft casing 29 for the purpose of supplying water to the shaft casing for lubricating the bearings of the shaft before starting the pump in operation, as is set forth in our said patent.

Our improved liquid balancing means comprises a casing member 47 supported by the casing member 28, the casing member 47 being provided with a downward extension 48 adapted to have suitable packing means placed therein about the shaft 13, such packing to be held in position by an adjustable gland 49. A plate 50 adjustably

fixed upon the shaft 13 overlies the upper edge of the casing 47, having a stepped engagement with the said casing. A casing member 51 cooperates with the casing member 28 to inclose the plate 50 and the casing member 47. An outlet pipe 52 leads from one side of the casing 28—51. An inlet pipe 53 communicates with a duct 54 formed in the wall of the casing member 28 communicating through a suitable opening in the bottom of the casing 47. The arrangement is such that water under pressure admitted through the pipe 53 from any suitable source of supply presses upward on the plate or piston 50. When the pressure within the casing 47 reaches a certain maximum, the plate or piston 50 with the connected shaft 13 will be raised slightly so as to permit a film of water to escape between the upper edge of the casing 47 and the engaging face of the said plate or piston, the pump shaft being caused thus to rotate on a film of water, materially reducing the friction and improving the operation of the pump.

What we claim as our invention and desire to cover by Letters Patent, is:

1. In a deep well pumping mechanism, the combination of a pump casing located beneath the surface of the earth, a rotary impeller in said casing, a long power shaft driven from above and extending downward to said impeller, said power shaft being adapted to transmit power to said impeller, a fluid operated bearing located substantially at the top of said power shaft for supporting said shaft and impeller on a fluid surface, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, and auxiliary bearing means for sustaining any resultant downward thrust of said power shaft.

2. In a deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said casing, of a long downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said long shaft, auxiliary bearing means for sustaining any resultant downward thrust on said shaft, said fluid operated bearing and said auxiliary bearing means both being located substantially at the top of said power shaft so that the long shaft depends therefrom and by its own weight tends to draw itself into a substantially straight vertical line, and means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means.

3. In deep well pumping mechanism, the combination with pump means including a pump casing located beneath the surface of the earth and rotary impeller means in said

casing, of a downwardly extending power shaft driven from above and adapted to drive said impeller means, a fluid operated bearing cooperating to support said shaft, said fluid operated bearing being located substantially at the top of said shaft so that the shaft depends from the fluid bearing and by its own weight tends to draw itself into a substantially straight vertical line, means for supplying fluid under pressure to said fluid bearing independently of the action of the pump means, auxiliary bearing means for sustaining any resultant downward thrust of said power shaft and auxiliary bearing means for sustaining any resultant upward thrust of said power shaft.

4. In a deep well pumping mechanism, the combination of a well tube, a shaft extending downward in said well tube, a runner adapted to be rotated by said shaft for forcing liquid upward through said well tube, and a liquid balancing means adapted to receive the downward thrust of the shaft, said liquid balancing means comprising an annular casing member surrounding said shaft, means for supplying liquid under pressure to said casing, and a plate fixed on said shaft having a stepped bearing edge overlying the upper edge of said casing whereby the shaft is adapted to rotate on a film of liquid escaping between the edge of the casing and the stepped edge of the plate as the plate and shaft are raised relative to the casing by the pressure of the liquid in said casing.

5. In a deep-well pump, the combination of a well-tube composed of a plurality of sections, a rotary shaft extending longitudinally of said well tube, a plurality of sleeve sections inclosing said shaft, and a coupling device coupling the several sections of the well tube and said sleeve sections, said coupling device comprising a spider upon which

said sleeves are screwed, said spider projecting between the adjacent ends of adjoining sections of the well-tube, and coupling-rings outside of the well tube and secured to the spider at opposite sides of the projecting portion thereof for securing the sections of the well tube thereto.

6. In a deep well pump, the combination of a well tube composed of a plurality of sections, a rotary shaft extending longitudinally of said well tube, a plurality of sleeve sections inclosing said shaft, a coupling device coupling the several sections of the well tube and said sleeve sections, said coupling device comprising a spider having a screw-threaded connection with said sleeves, said spider projecting between the adjacent ends of adjoining sections of the well tube, coupling-rings screwed upon the outside of the sections of well tube respectively, means for securing said coupling-rings to the annular projecting portion of said spider, and a bearing carried by said spider for said shaft.

7. In a deep well pump, the combination of a well tube composed of a plurality of sections, a rotary shaft extending longitudinally of said well tube, a plurality of sleeve sections inclosing said shaft, and a coupling device coupling the several sections of the well tube and said sleeve sections, said coupling devices comprising a spider having a tapered centering seat upon one of said sections of well-tube, said sleeves being screwed upon said spider, said spider projecting between the adjacent ends of adjoining sections of the well tube, coupling-rings screwed upon the outside of the sections of well tube respectively, and means for securing said coupling-rings to the annular projecting portion of said spider.

MATTHEW T. CHAPMAN.
MARK C. CHAPMAN.