March 20, 1928. 1,663,226

J. A. WINTROATH

NONREVERSING MEANS FOR PUMP HEADS

Filed May 11, 1926 2 Sheets-Sheet 1

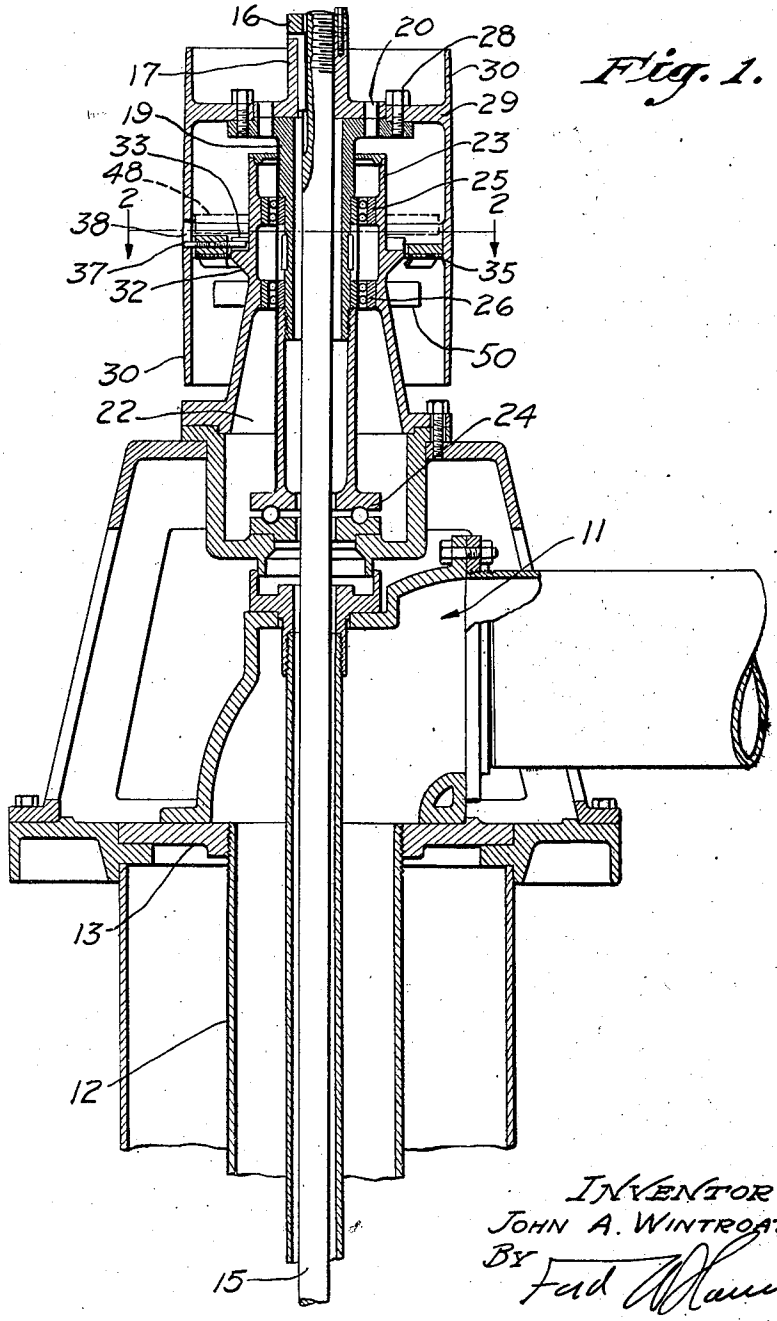

Fig. 1.

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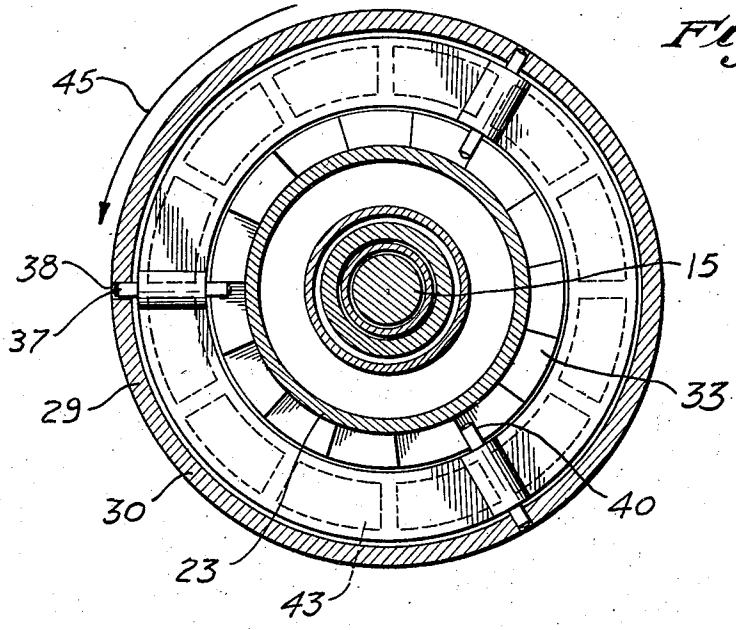
Fig. 2.



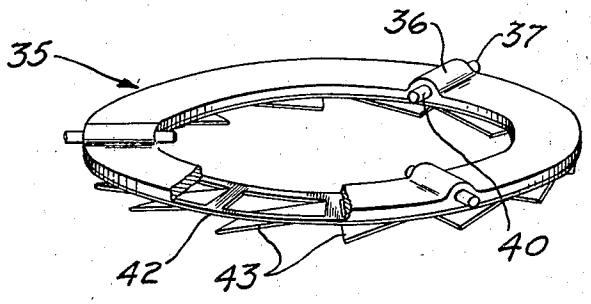


Fig. 3.

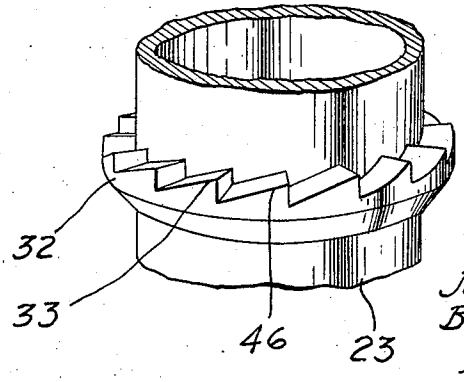


Fig. 4.

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Patented Mar. 20, 1928. 1,663,226

UNITED STATES PATENT OFFICE.

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NONREVERSING MEANS FOR PUMP HEADS.

Application filed May 11, 1926. Serial No. 108,280.

This invention relates to pump heads for turbine irrigation pumps.

A common form of turbine irrigation pump consists of a pump section which is situated near the lower end of a well and from which a column pipe extends upwardly. Connected to the column pipe at the surface of the ground is a pump head. This pump head includes a pulley which is driven through a belt by a motor placed a short distance from the pump head. The pulley is connected to a pump shaft which extends downwardly through the column pipe and is attached to impellers in the pump section of the pump. When the pulley is properly rotated the impellers are rotated and water is elevated to the surface of the ground through the column pipe. When the pump is shut down the column pipe is filled with with water and this water will gravitate to the lower end of the well. In so doing, the water acts upon the impellers on the same principle as a reaction turbine and will revolve the pump in a reverse direction. This oftentimes runs the belt off of the pulley and onto the stationary portion of the pump head or may run the motor driving the pump at such an excessive speed that it is greatly damaged. In many cases the belt is damaged.

It is an object of this invention to provide a pump head having means for preventing the pump from being moved in an opposite direction.

It is another object of this invention to provide a non-reversing means for a pump head, which non-reversing means is operated by windage.

Other objects and advantages of this invention will be made evident hereinafter.

Referring to the drawings in which I illustrate this invention,

Fig. 1 is a vertical section through a pump head construction embodying the non-reversing means of my invention.

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1.

Fig. 3 is a view in perspective of a riser plate of the invention.

Fig. 4 is a view in perspective of an engageable member or annular ratchet of the invention.

Referring to the drawings, 11 represents a pump head which is ordinarily situated at the surface of the ground. Extending downwardly from the pump head 11 is a column pipe 12 which is secured to a column flange 13 of the head. According to pump engineering practice, this column pipe 12 extends downwardly through the well and has a pump section (not shown) attached at the lower end thereof, which pump section carries impellers by means of which water is forced upwardly through the column pipe 12 to the surface of the ground. Extending through the column pipe 12 is a pump shaft 15, the lower end of this pump shaft being connected to the impellers of the pump section. The upper end of the pump shaft 15 extends through the pump head 11 and the upper end thereof has a nut 16 screwed thereonto. Surrounding the pump shaft 15 below the nut 16 is a thrust block 17, the upper end of which is engaged by the nut 16. The lower end of the thrust block 17 is secured to the upper end of a pulley hub 19 by means of dowel pins 20. The pulley hub 19 extends into an oil chamber 22 of a bearing housing 23. The pulley hub is supported by a thrust bearing 24, and the upper part thereof is centralized by radial bearings 25 and 26. Secured to the pulley hub 19 by cap screws 28 is a pulley 29 having a rim 30 which wholly surrounds the bearing housing 23.

As shown best in Figs. 2 and 4 the bearing housing 23 is provided with an engageable member in the form of an annular ratchet 32 having ratchet teeth 33. Surrounding the annular ratchet 32 inside the rim 30 of the pulley 29 is a riser plate 35 which is shown in detail in Fig. 3. This riser plate 35 has radially extending bosses 36 and projecting outwardly from these bosses 36 are guide pins 37. The guide pins 37, as illustrated best in Figs. 1 and 2, extend into vertically elongated slots 38 formed in the rim 30 of the pulley 29. The riser ring 35 is supported in lower position by engagement of the guide pins 37 with the bottom of the slots 38. Projecting inwardly from the radial bosses 36 are engagers in the form of engager pins 40. These engager pins 40 extend inwardly in positions to engage the teeth 33 of the annular ratchet 32 when the riser plate 35 is in the position shown by full lines in Fig. 1 and in Fig. 2. Secured to the lower

face of the riser plate 35 is a disc 42 which is provided with diagonally downwardly extending blades 43.

When the pump head 11 is at rest, the riser plate 35 occupies the position shown by full lines in the drawings. The engager pins 40 at this time are in engagement with the teeth 33 of the annular ratchet 32 and absolutely prevent the pulley 30 from rotating in a clockwise direction, the proper rotating direction of the pulley 30 being anti-clockwise. When the pump head is set into operation, the pulley 30 is revolved in an anti-clockwise direction as indicated by the arrow 45 in Fig. 2. The engager pins 40 at this time ride upwardly on the back faces 46 of the teeth 33 of the annular ratchet 32. As the pulley 30 gains speed, the blades 43 situated on the lower side of the riser plate 35 react upon the air and the riser plate 35 is forced further upwardly. This reaction of the blades 43 on the air, due to the rotation of the riser plate 35, is what is ordinarily termed "windage". The riser plate is therefore first moved upwardly by the inclined back of the teeth 46 and then moved up into a still higher position, indicated by dotted lines 48 of Fig. 1, by windage.

When the riser plate 35 is in the position shown by dotted lines 48 in Fig. 1, the engager pins 40 occupy positions above the teeth 33 of the annular ratchet 32 and there is no engagement between these parts. When the pump head is slowed down and stopped, the windage on the riser plate 35 ceases and the riser plate will gradually lower into full line position, as shown in the drawings, and the engager pins 40 will move into engagement with the teeth 33 and again lock the pump head from rotation in a reverse direction.

I have found that by providing stationary vanes 50, as illustrated in Fig. 1, windage sufficient to lift the riser plate 35 becomes effective at a lower rotational speed of the pulley 30 and is therefore desirable. These vanes are formed on the bearing housing 23 and their function is to prevent a swirling of the air between the pulley housing 23 and the rim 30 of the pulley 29.

I am aware of the fact that inventors have heretofore provided non-reversing arrangements for pump heads. However, to my knowledge they have all employed centrifugal force for disengaging the parts of their mechanism. My invention is different from these prior inventions inasmuch as I do not employ centrifugal force for disengaging the engager pins 40 from the annular ratchet 33, but utilize windage for this purpose. In the following claims I employ the terms "stationary part" which refers to that part of the pump which does not rotate, "rotatable part" which refers to that part of the pump head which rotates, "engageable member" which refers to the annular ratchet 32 and "engager" which refers to the engager pins 40.

I claim as my invention:

1. In a pump head, the combination of: a stationary part; a rotatable part supported by said stationary part; an engageable member carried by said stationary part; an engager adapted to engage said engageable member to prevent a reverse rotation of said rotatable part; and means operated by windage when said rotatable part is rotated in a proper direction, for disengaging said engager from said engageable member.

2. In a pump head, the combination of: a stationary part; a rotatable part supported by said stationary part; an engageable member carried by said stationary part; an engager adapted to engage said engageable member to prevent a reverse rotation of said rotatable part; and means carried by said rotatable part and operated by windage when said rotatable part is rotated in a proper direction, for disengaging said engager from said engageable member.

3. In a pump head, the combination of: a stationary part; a rotatable part supported by said stationary part; an engageable member in the form of a ratchet carried by said stationary part; an engager adapted to engage said engageable member to prevent a reverse rotation of said rotatable part; and means operated by windage when said rotatable part is rotated in a proper direction, for disengaging said engager from said engageable member.

4. In a pump head, the combination of: a stationary part; a rotatable part supported by said stationary part; an engageable member in the form of a ratchet carried by said stationary part; an engager adapted to engage said engageable member to prevent a reverse rotation of said rotatable part; and means carried by said rotatable part and operated by windage when said rotatable part is rotated in a proper direction, for disengaging said engager from said engageable member.

5. In a pump head, the combination of: a stationary part; a rotatable part supported by said stationary part; an engageable member carried by said stationary part; an engager adapted to engage said engageable member to prevent a reverse rotation of said rotatable part; and a riser plate carried by said rotatable part and operated by windage when said rotatable part is rotated in a proper direction, for disengaging said engager from said engageable member.

6. In a pump head, the combination of: a stationary part; a rotatable part supported by said stationary part; an engageable member in the form of a ratchet carried by said stationary part; an engager adapted to engage said engageable member to prevent a

reverse rotation of said rotatable part; and a riser plate carried by said rotatable part and operated by windage when said rotatable part is rotated in a proper direction, for disengaging said engager from said engageable member.

7. In a pump head, the combination of: a stationary part; an annular ratchet carried by said stationary part; a rotatable part having a pulley surrounding said annular ratchet; a riser plate carried between said pulley and said annular ratchet, said riser plate being adapted to rotate with said pulley and to be lifted by windage; and an engager carried by said riser plate adapted to engage said annular ratchet and to prevent a reverse rotation of said rotatable part, said engager being disengaged when said riser plate is lifted.

8. In a pump head, the combination of: a stationary part; a rotatable part; an engageable member carried by said stationary part; an engager adapted to engage said engageable member to prevent a reverse rotation of said rotatable part; and means operated by windage when said rotatable part is rotated in a proper direction, for disengaging said engager from said engageable member.

9. In a pump head, the combination of: a stationary part; a rotatable part; an engager adapted to prevent a reverse movement of said rotatable part relative to said stationary part; and windage operated means for moving said engager into a non-operative position when said rotatable part is rotated in a proper direction.

10. In a pump head, the combination of: a stationary part; a rotatable part; engaging means for preventing a reverse movement of said rotatable part; and windage operated means for moving said engaging means into non-operative position.

11. In a pump head, the combination of: a stationary part; a rotatable part; a riser normally engaging said stationary part and said rotatable part; and means operated by windage for disengaging said riser and said stationary part when said rotatable part is rotated in a correct direction.

12. In a pump head, the combination of: a stationary part; a rotatable part supported by said stationary part; and engageable member carried by said stationary part; an engager adapted to engage said engageable member to prevent a reverse rotation of said rotatable part; means operated by windage when said rotatable part is rotated in a proper direction, for disengaging said engager from said engageable member; and means for making said windage means operate at a slow speed of said rotatable part.

13. In a pump head, the combination of: a stationary part; a rotatable part; an engager adapted to prevent a reverse movement of said rotatable part relative to said stationary part; windage operated means for moving said engager into a non-operative position when said rotatable part is rotated in a proper direction; and means for making said windage means operate at a slow speed of said rotatable part.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 29 day of April, 1926.

JOHN A. WINTROATH.