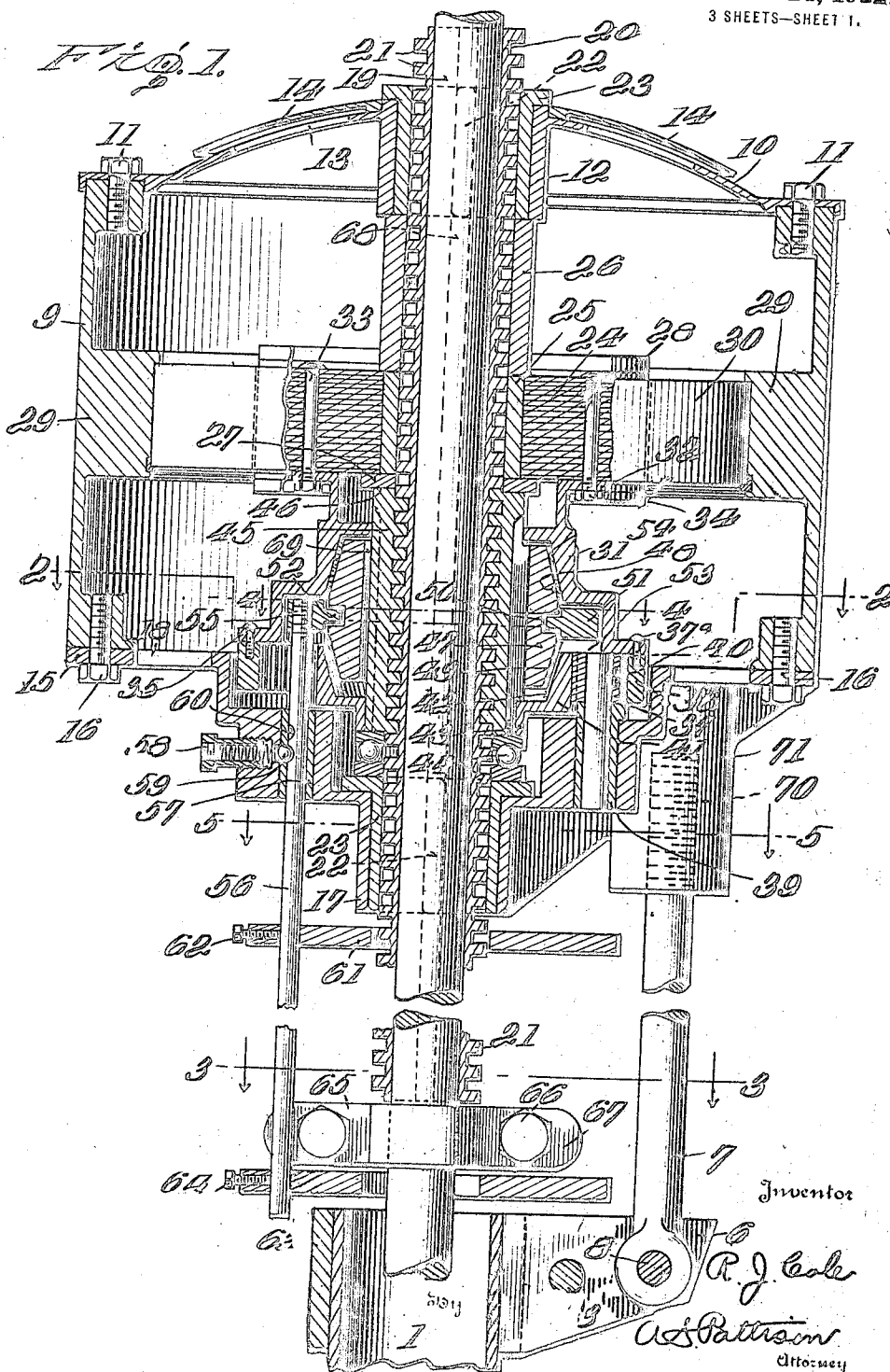


R. J. COLE.
PUMPING HEAD FOR WELLS.
APPLICATION FILED AUG. 22, 1921.

1,435,892.

Patented Nov. 14, 1922.
3 SHEETS—SHEET 1.



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Fig. 2.

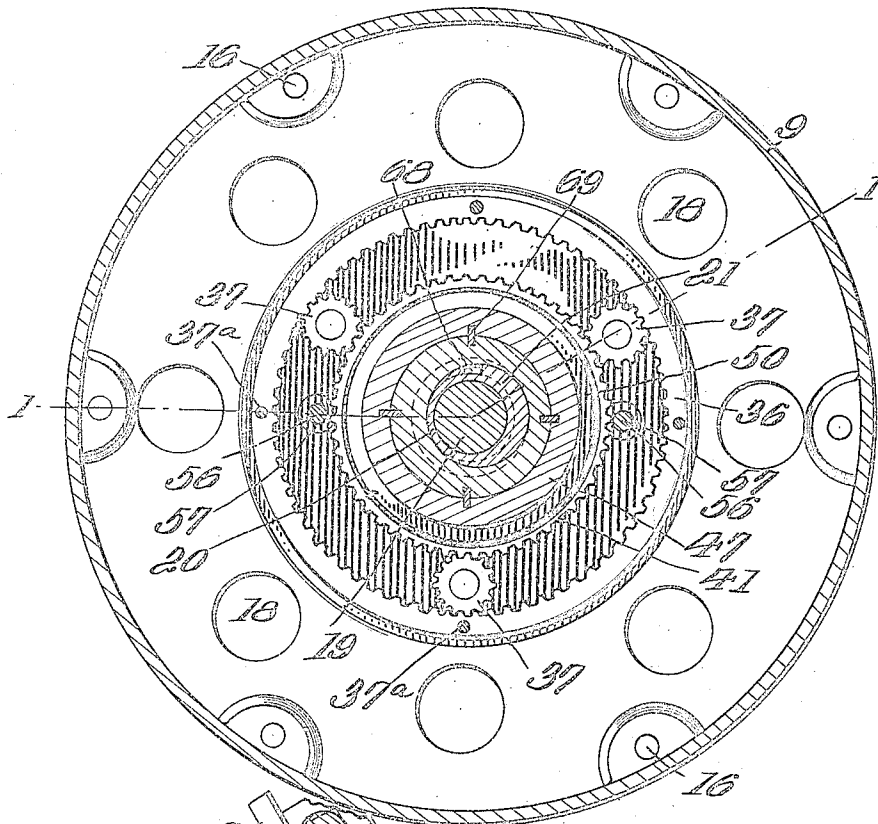
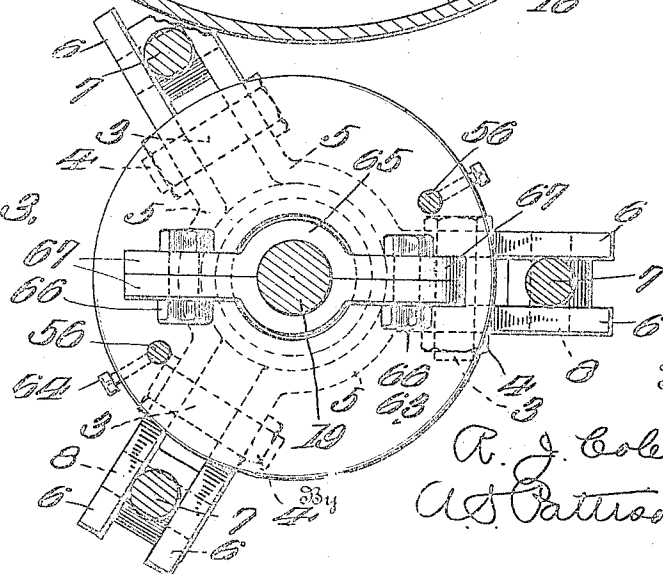


Fig. 3.



Inventor

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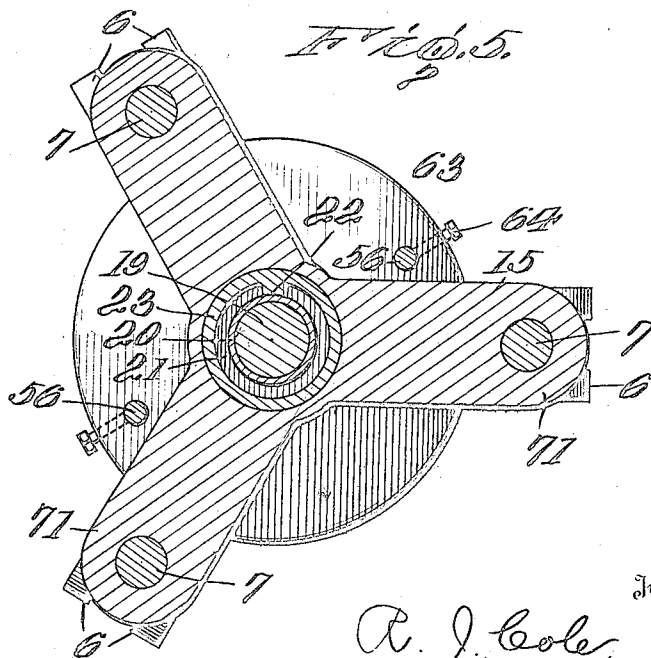
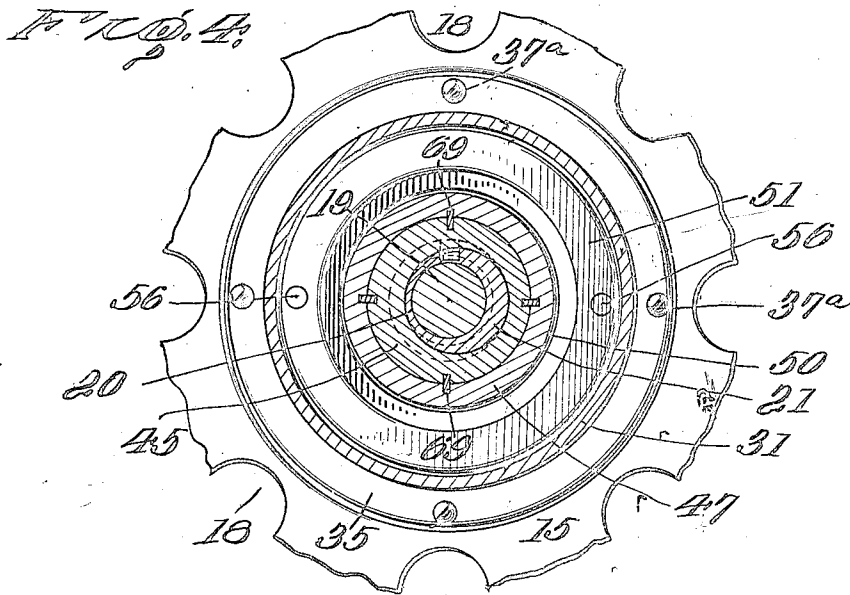
Attorney

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Inventor

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UNITED STATES PATENT OFFICE.

RAYMOND J. COLE, OF BRADFORD, PENNSYLVANIA.

PUMPING HEAD FOR WELLS.

Application filed August 22, 1921. Serial No. 494,221.

To all whom it may concern:

Be it known that I, RAYMOND J. COLE, a citizen of the United States, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful improvements in Pumping Heads for Wells, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in pumping heads for wells and more particularly to an electrically driven pumping head supported on the upper end of the well tubing.

The primary object of the invention is to provide a pumping head whereby a smaller amount of energy is required to operate the pump rod than is required by the present known methods.

A further object of the present invention is to provide a pumping head for wells which is more economical and efficient in operation than the pumping heads now known and in use.

A still further object of my invention is to provide a pumping head for wells having a novel construction of reversing means for reversing the movement of the pumping rod.

Other further objects and improved results of my present invention will appear in the following specification and accompanying drawings.

In the drawings: Figure 1 is a vertical sectional view through an improved pumping head as it is applied to the outer end of a well tubing, the section being taken on the line 1—1 of Figure 2 and looking in the direction indicated by arrow.

Figure 3 is a transverse sectional view taken on the line 2—2 of Figure 1 looking in the direction indicated by arrow.

Figure 4 is a transverse sectional view taken on the line 3—3 of Figure 1 looking in the direction indicated by arrows and showing the construction of the clamp for fastening the pumping head to the well tubing.

Figure 5 is a transverse sectional view taken on the line 4—4 of Figure 1 looking in the direction indicated by arrow.

Figure 6 is a transverse sectional view taken on the line 5—5 of Figure 1 looking in the direction indicated by arrow.

Referring now to the drawings in which

like parts are designated throughout the description and drawings by similar reference numerals. 1 designates the upper or outer end of a well casing or tube around which are clamped by means of the bolts 3 and nuts 4 the casing clamp members 5 which have the outwardly extending arms 6 in separated parallel relation, as clearly shown in Fig. 3, between which are mounted the pumping head supporting rods 7 on the transverse pins or rods 8.

The pumping head casting consists of the hollow open ended cylindrical case 9 the upper end of which is provided with a cover 10, the outer edge or periphery of which is fastened to the top edge of the casing 9 by means of bolts 11. The cover 10 is provided with an opening in its center which has the integrally formed bearing yoke 12 and the cover 10 is further provided with breather or ventilating openings 13 having dust or weather caps 14.

The open bottom of the casing 9 is provided with a closure member 15 having its outer periphery fastened to the lower edge of the casing 9 by means of the bolts 16, and provided with a central opening having a surrounding bearing yoke 17 and breather or ventilating openings 18.

Extending vertically through the center of the casing 9 and the openings in the members 10 and 15 thereof, is the pump rod 19 surrounded by the power screw 20, provided throughout its length with screw threads or worm gear teeth 21. The power screw is keyed, as at 22, to the bearing bushings 23 which surround it and fit within the bearing yokes 12 and 17, before referred to.

A laminated rotor 24 is carried upon the brass bushing 25 surrounding the power screw 20 and is held from upward movement by the thrust bushing 26 and at its lower side is supported by thrust washer 27. This rotor is provided with the usual short-circuiting bars 28.

The open ended cylindrical case 9 is provided on its inner side with boss casings 29 which support the stator laminations 30, which laminations extend inwardly and whose inner edge is in close proximity with the outer periphery of the laminated rotor.

It will be understood that the rotor and stator will be provided with current in any suitable manner and comprise the driving

means of the pump. 31 designates a clutch member whose upper end 32 is fastened to the rotor in any suitable manner such as by the bolts 33 and nuts 34. The lower end 35 of the clutch member carries the internal gear 36 by means of the screw bolt 37 or some suitable similar connection.

Meshing with the internal gear teeth of the internal gear 36 are the pinion gears 37 which are carried on the pinion shafts 39 and fastened thereto by means of the keys 40.

Meshing with the opposite side of the pinion gear 37 from the internal gear 36 is an external gear 41 having an inner beveled face 42 and its lower end 43 in engagement with the ball thrust bearing 44.

As clearly appears in Figure 1 of the drawings a nut 45, which I term the main power nut, surrounds and engages the power screw 20 and has its upper end 46 in engagement with the thrust washer 27 and its lower end in engagement with the roller thrust bearing 44. As also clearly appears in the drawings, the reversing member 47 surrounds the main power nut 45 and lies between it and the clutch member 31. The reversing member 47 is provided with oppositely beveled faces 48 and 49 and is provided with a circumferential groove 50. A slip yoke 51 surrounds the reversing clutch member 47 and has an extending portion 52 which extends into the circumferential groove 50 of the reversing clutch member.

The arrangement of the parts thus far described are such that there is an opening 53 between the clutch member 31 and the pinion gear 37 and external gear 41. It is further to be noted that the clutch member 31 has an inner beveled face 54 for engagement with the beveled face 47 of the reversing clutch member, the more particular cooperation of which will be described later.

It will be further noted that the bearing bushing 23 carried in the lower surrounding yoke 17 supports the roller thrust bearing 44 which in turn supports the main power nut 45 and the external gear 41.

Screw threadedly attached as at 55 or by some similar means, are the downwardly extending reversing rods 56 which pass through the bottom closure 15 of the casing 9 as at 57. A spring ball tension assembly 58 is carried by the bottom closure 15 at a point adjacent the passage of the reversing rod 56 through this closure and the ball 59 of the assembly 58 is adapted to seat alternately in the pockets 60 of the reversing rods, as will hereafter be more fully described.

At a point adjacent the bottom closure 15 of the casing 9 is a reversing stop 61 fastened to and carried by the reversing rods 56 by means of the screw bolts 62 while at a point adjacent the top of the well tubing 1,

is a reversing stop 63 fastened to and carried by the reversing rods 56 by means of the screw bolts 64.

Fastened to the pump rod 19 between the bottom of the casing 9 and the top of the well tubing 1 is a clamp 65 held in position on the pump rod 19 by means of the bolts 66. The ends 67 of the clamp 65 extend considerably out from the pump rod 19 as clearly appears in the drawings, and is intended to alternately strike the reversing stops 61 and 63 as the pump rod is raised and lowered, as will hereafter be more particularly described.

The clamping construction 65 will be duplicated at a point above the power screw 20 to limit the downward movement of the pump rod and to provide a lifting means for the pump rod as the power screw 20 arises and comes in contact with it. No further description of this element is considered necessary inasmuch as it is a mere duplication of parts and construction which has heretofore been described and is shown in Fig. 1 of the drawings.

To compensate for the wear between the beveled faces 48 and 49 of the reversing clutch 47 and the beveled face 42 of the external gear 41 and the beveled face 54 of the clutch member 31 the beveled faces of the reversing clutch member can be provided with a friction lining attached by means of counter-sunk screws, if desired.

Attention is directed to the fact that the power screw 20 has throughout its length a key-way 68 which key-way engages the keys 22 in the bushings 23 as the power screw 20 is raised and lowered to prevent it from rotating. It will be also noted that the main power nut 45 is provided with a key 69 which fastens it to insure rotation with the reversing clutch member 47 and the inner face of 47 is provided with a key-way so that it will slide on the key 69 of the main power nut.

To insure rigidity of the support of the pump and its housing on the well tubing, I have provided a plurality of the supporting rods 7 whose upper ends are secured throughout as at 70 in the boss projections 71 of the closure member 15.

Before describing the operation of my device I wish to state that my pumping head can be provided with no voltage release and an under-load coil. An external switch will be provided for starting and stopping the pumping head. The under-load coil will give an automatic stop arrangement for the well when it is pumped off. The electric current will be induced through windings and laminations of the stator 80 which will revolve the rotor 24.

The operation of my device is as follows: As stated, the electric current will be carried to the stator laminations in any well

known manner and this current will revolve the rotor 24 about the brass bushing 25. The rotation of the rotor 24 will in turn rotate the clutch member 31 which is attached to it by bolts and will also rotate the internal gear 36 which is bolted to the end of the clutch member 31. As the clutch member and internal gear rotate with the rotor the teeth of the internal gear will engage the teeth of the pinion gears 37 and rotate them, which gears will in turn rotate the external gears 41.

With the parts in the position shown in Figure 1, the reversing clutch member 47 has its beveled face 48 in engagement with the beveled inner face of the clutch member 31 and as the clutch member 31 is revolved in clock-wise rotation it will likewise drive the reversing clutch member in a similar direction and this will in turn revolve the main power nut 45 with it in the same direction because of the key connection 69 between them.

As the parts thus revolve in clock-wise rotation the main power nut 45 will force the power screw 20 and the pump rod 19 downward as the power screw is held against rotation because of the keys 22 co-operating with the key-way 33 and the bushings 23, while the main power nut will be held against upward movement by the bushings at its ends.

As the pump rod and power screw travel downward they carry with them the clamp 65 and when the pump rod has traveled to a downward position of sufficient distance this clamp 65 will engage the reversing stop 63 and a continued downward movement of the pump rod will cause the reversing stop 63 to pull upon the reversing rod 53 which through its connection with the reversing clutch member 47 will slide that member downward so that its beveled face 49 will engage the inner beveled face of the external gear 41.

Because of the intermediate pinion gear between the external gear 41 and the internal gear 36 the external gear is revolving in a counter-clock-wise rotation and as the reversing clutch member engages the external gear this member, together with the main power nut, will be given a rotation in a counter-clock-wise direction. This counter-clock-wise rotation of the main power nut will, through its engagement with the power screw 20, act to raise the pump rod and the pump rod will continue upward until the clamp 65 engages the reversing stop 61. The continued upward movement of the pump rod and clamp against the reversing stop 61 will cause this stop to act through the reversing rod 53 and its co-operating yoke 51 to slide the reversing clutch member 47 back into the position shown in Figure 1. When the reversing clutch mem-

ber assumes this position it is again in engagement directly with the clutch member 31 and will assume a clock-wise rotation which will push the pump rod 19 downward.

It will be apparent of course that the operation thus far described will then be repeated indefinitely until the pumping head is stopped manually or by reason of the under-load coil causing an automatic stop when the well has been pumped off.

Although no structure in the way of a pump plunger has been described it will be readily understood that a construction of suitable design will be attached to the lower end of the pump rod 19 to draw the liquid upwardly through the pump well tubing 1.

It is further pointed out and probably readily apparent that the clamp 65 carried by the pump rod above the power screw 20, as described, is also for the purpose of limiting the downward movement of the pump rod and to guard against any possibility of the pump rod passing downwardly through the power screw and into the well tubing and lost.

What I claim is:

1. A pumping head for wells or the like comprising a pump rod, means for raising or lowering said rod, and a clutch surrounding the pump rod for automatically changing the direction of the movement of the pump rod.
2. A pumping head for wells or the like comprising a pump rod, an electric driving means, a driving means for raising and lowering the pump rod, a connection between the two said driving means, and a clutch surrounding the pump rod for automatically reversing the direction of the movement of the pump rod.
3. A pumping head for wells or the like comprising a pump rod, a toothed member surrounding and in engagement with the pump rod, a reversing clutch member in operative engagement with the said toothed member, means for rotating the said reversing member to raise and lower the pump rod, and means for moving the reversing member whereby the direction of movement of the pump rod is changed.
4. A pumping head for wells or the like comprising a pump rod, means for raising and lowering said pump rod and a reversing clutch surrounding the pump rod in operative connection with said pump rod and controlled by the movement of the same whereby the direction of the movement of the rod may be reversed at a predetermined time.
5. A pumping head for wells or the like comprising a casing, a pump rod extending through the said casing, a driving member surrounding the pump rod for raising

and lowering the same, a reversing member surrounding the pump rod and within the said surrounding driving means, and means carried by the pump rod for operating the reversing member to change the direction of movement of the pump rod.

6. A pumping head for wells or the like comprising a casing, a pump rod extending through the casing, means within the casing for raising and lowering said rod, a reversing member comprising a clutch surrounding the pump rod within said casing, means for automatically operating the reversing member to change the direction of the movement of the pump rod, and means carried by the casing for supporting the pumping head upon a well tubing.

7. A pumping head for wells or the like comprising a pump rod, a driving means for raising and lowering said pump rod, a reversing member comprising a clutch surrounding the pump rod for changing the direction of the movement of said pump rod, and means in operative connection with the reversing member and the pump rod for alternately operating the reversing member to change the direction of the movement of the pump rod.

8. A pumping head for wells or the like supported upon a well tubing, comprising a pump rod, a driving means surrounding said pump rod for raising and lowering the same, a reversing member surrounding the pump rod and in operative arrangement with the same, a yoke for operating the reversing member, and an operative connection between the said yoke and the pump rod to alternately move the reversing member to change the direction of the movement of the pump rod.

9. A pumping head for wells or the like, comprising a pump rod, a driving means for the pump rod for raising and lowering the same, a reversing member, the driving means comprising a clutch member and a driven external gear, an operative means between the reversing member and the pump rod whereby the reversing member is alternately put into engagement with the clutch member and the external gear for changing the direction of the movement of the pump rod.

10. A pumping head for wells or the like comprising a pump rod, means including a

clutch which surrounds the pump rod for raising and lowering said rod, and means to operate the clutch to reverse the direction of the pump rod movement.

11. A pumping head for wells or the like comprising a pump rod, a driving means for raising and lowering the pump rod, a clutch which surrounds the pump rod intermediate the drive and the pump rod, and means for automatically operating the clutch to reverse the direction of the pump rod movement.

12. A pumping head for wells or the like comprising a pump rod, a reversing clutch member surrounding the pump rod and in operative engagement with said rod to raise and lower the same, and means for moving the reversing member whereby the direction of the pump rod movement is reversed.

13. A pumping head for wells or the like comprising a pump rod, means including a clutch which surrounds the pump rod for raising and lowering said rod, and means to automatically operate the clutch to reverse the direction of the pump rod movement at a predetermined time.

14. A pumping head for wells or the like comprising a pump rod, a toothed member carried by said rod, a reversing member comprising a clutch surrounding the pump rod and in engagement with said toothed member, means for rotating said reversing member to raise and lower the pump rod, and means for operating the reversing member to reverse the direction of the pump rod movement.

15. A pumping head for wells or the like comprising a pump rod, a driving means for raising and lowering said rod, a reversing member comprising a clutch surrounding the pump rod and in operative engagement with the pump rod, and means carried by the pump rod for operating the reversing member to change the direction of the pump rod movement.

16. A pumping head for wells or the like comprising a pump rod, means for raising and lowering said rod, and a reversing clutch surrounding said rod and controlled by the movement of the pump rod whereby the direction of the pump rod is reversed.

In testimony whereof I hereunto affix my signature.

RAYMOND J. COLE.