Dec. 24, 1940. H. CRULL 2,226,461

ELECTRIC WATER PUMP

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Fig. 7.

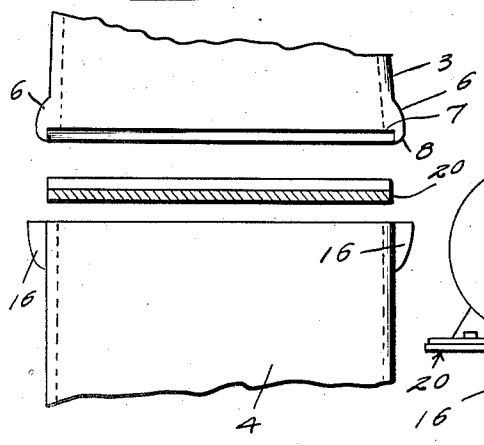


Fig. 1.

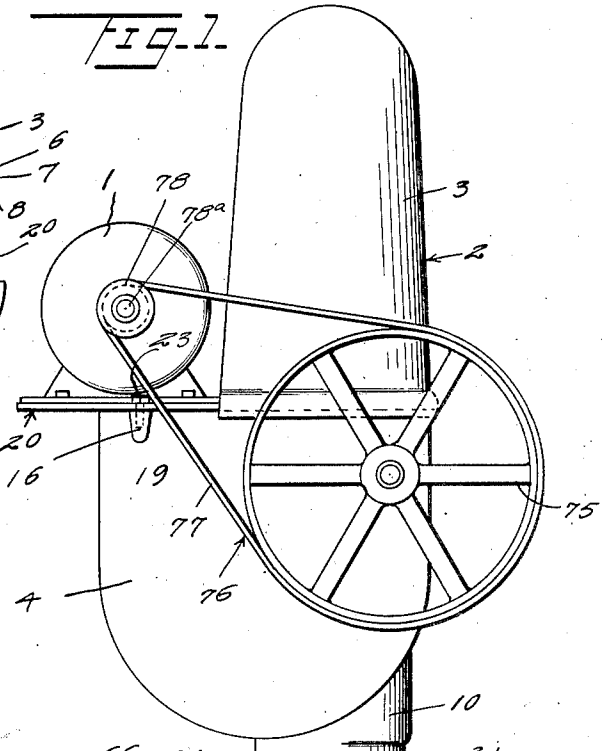


Fig. 5.

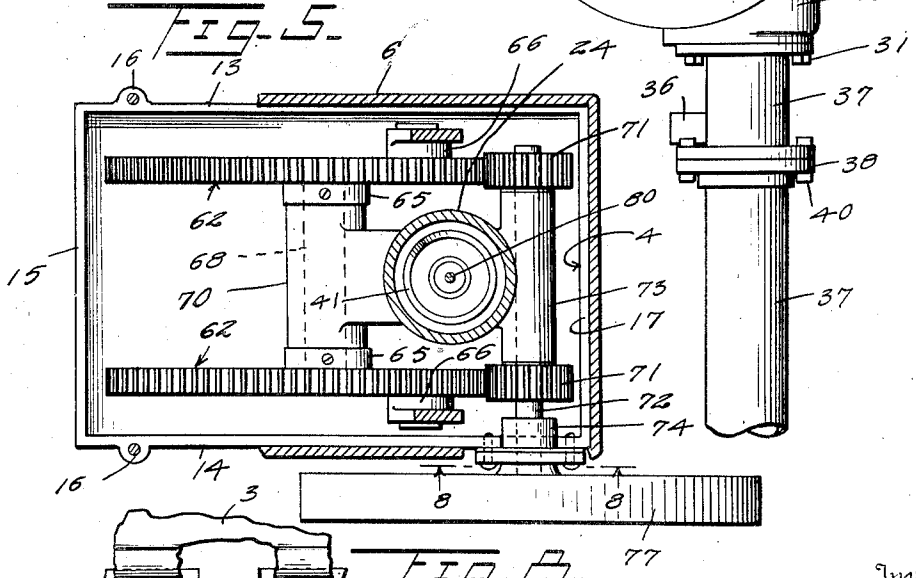
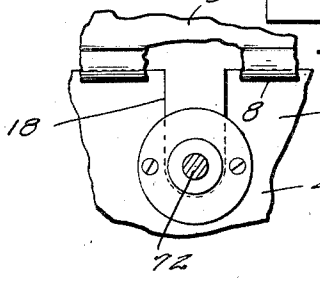


Fig. 6.



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Fig. 2.

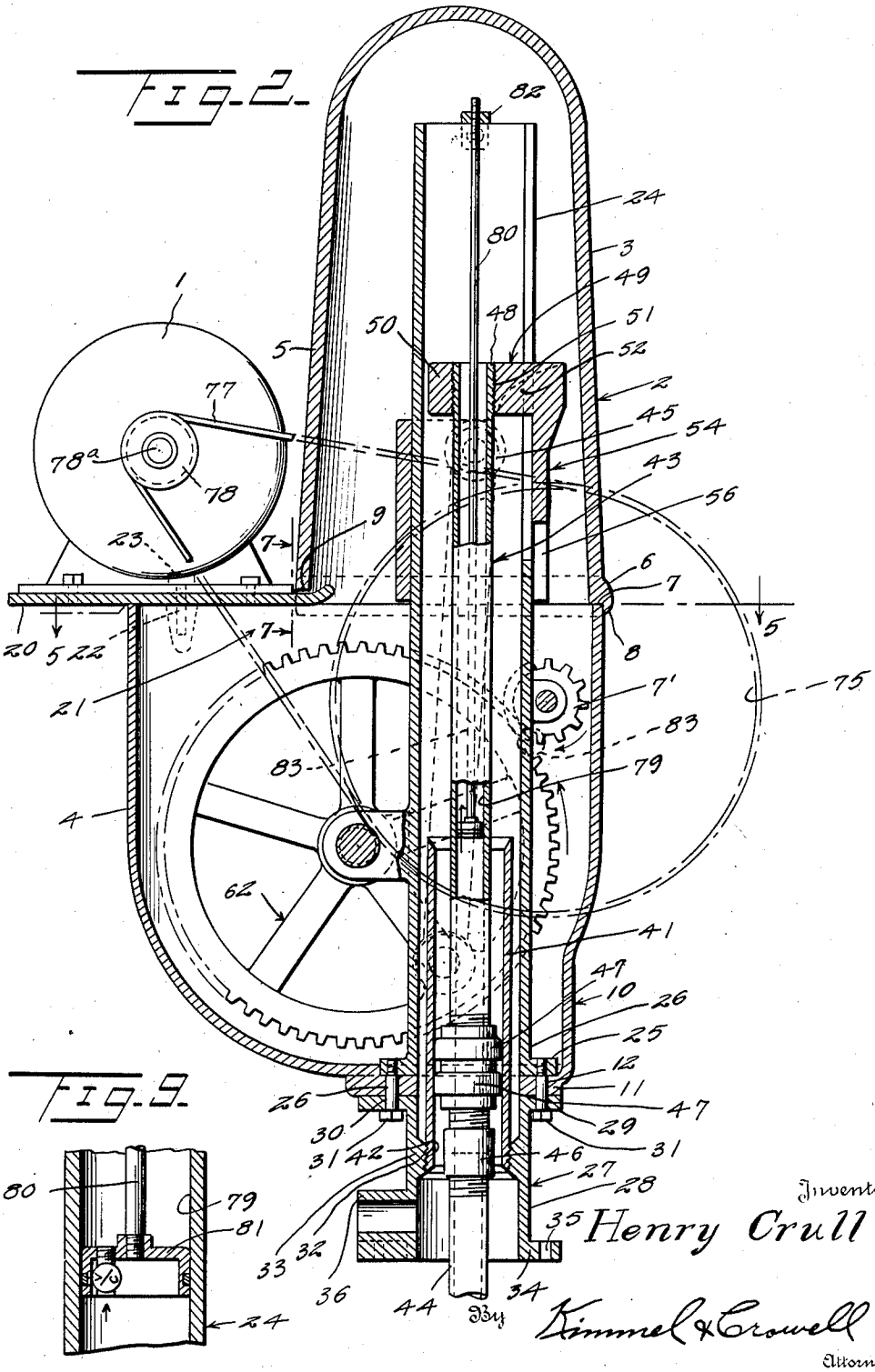


Fig. 9.

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ELECTRIC WATER PUMP

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Fig. 3.

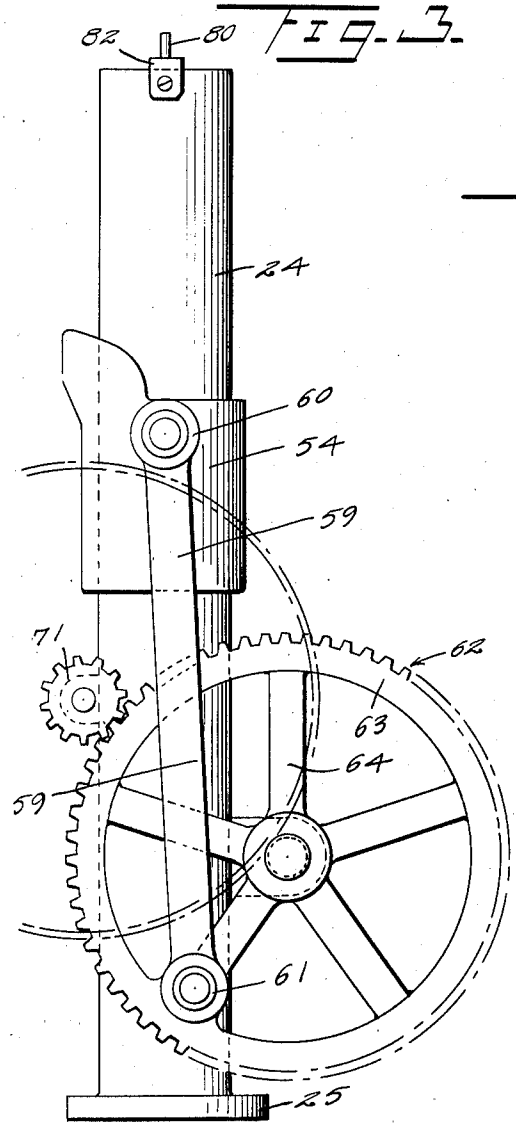
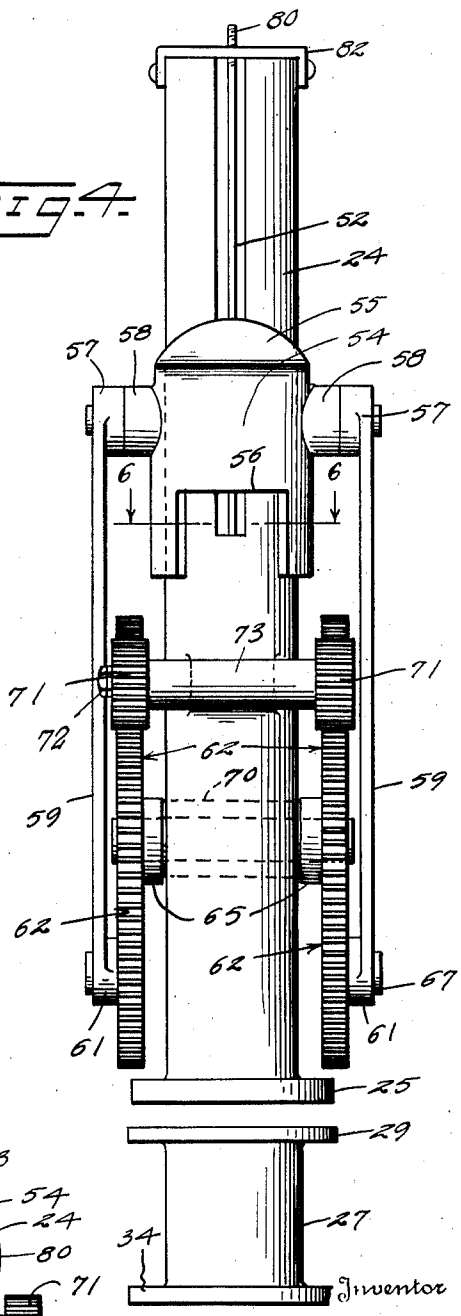


Fig. 4.



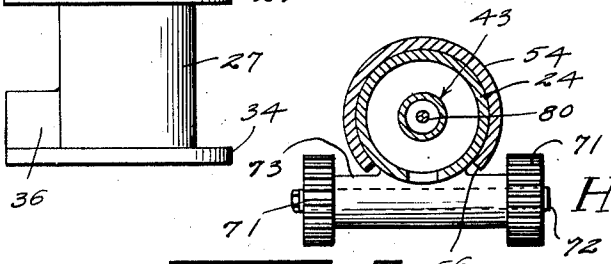


Fig. 5.

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UNITED STATES PATENT OFFICE

2,226,461

ELECTRIC WATER PUMP

Henry Crull, Huntington, Ind.

Application November 20, 1939, Serial No. 305,394

9 Claims. (Cl. 103—8)

This invention relates to an electric water pump designed primarily for pumping water from a well, but it is to be understood that a pump, in accordance with this invention is for employment in any connection for which it may be found applicable.

The invention aims to provide, in a manner as hereinafter set forth, a pump of such class having a direct pull on the water.

The invention further aims to provide an electric water pump including a sucker rod capable of being conveniently removed when occasion requires.

The invention further aims to provide a pump of the class referred to including a cross head to which a sucker rod is attached and with the connection between the cross head and rod being such as to enable the convenient disconnection of one from the other when desired whereby the rod may readily be withdrawn from the interior of the pump body.

The invention further aims to provide an electric pump including driven parts, stationary parts and a housing for said parts and with the driven parts so related to the stationary parts and to the housing to permit of the said stationary and driven parts being conveniently bodily removable in unison from the housing when desired and the movable parts capable of being expeditiously disconnected from the stationary parts when removed from the housing.

The invention further aims to provide, in a manner as hereinafter set forth, a water pump which is simple in its construction and arrangement, strong, durable, compact, thoroughly efficient in its use, readily assembled and disassembled when desired, conveniently installed relative to a water source, such as mounting on the top of a well, having the elements thereof so disposed in connected relation whereby when one of the elements becomes impaired a new one may be substituted therefor without discarding the other of the elements, and comparatively inexpensive to manufacture.

Embodying the aims aforesaid and others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be hereinafter more specifically referred to and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a front elevation of the pump,

Figure 2 is a vertical longitudinal sectional view thereof,

Figure 3 is a view in front elevation of the pump structure with the pump housing removed and with the water outlet member disconnected from the pump column,

Figure 4 is a view similar to and disposed at right angles to the structure shown by Figure 3,

Figure 5 is a section on line 5—5 Figure 2,

Figure 6 is a section on line 6—6 Figure 4,

Figure 7 is a fragmentary exploded view of the pump housing on line 7—7 Figure 2,

Figure 8 is a section on line 8—8 Figure 5, and

Figure 9 is a fragmentary view in lengthwise section of the air pump.

The movable elements of the pump will be operated from any suitable driving means, which preferably will be in the form of an electric motor mounted on the pump housing. It is to be understood, however, that any suitable driving means for the movable elements of the pump, other than the electric motor 1 shown, may be employed.

The pump includes a housing 2 formed of upper and lower hollow sections 3, 4 disposed in superimposed relation. The section 3 is substantially of semi-ovoidal contour closed at its upper and open at its lower end. The section 3 constitutes what may be termed a hood and tapers from its lower to its upper end. The side walls of section 3 are of greater cross sectional length than the front and rear walls thereof. The inner side wall 5 of section 3 is of less height than the other walls thereof. The lower end portion of the front, rear and outer side walls of the section 3 is enlarged, as at 6 and such enlargement is of a form to provide a seat 7 and a flange 8 depending from the outer side of said seat. The latter is arranged below the bottom edge 9 of wall 5. The section 4 is of substantially semi-ovoidal contour, open at its upper end and has its horizontal cross sectional length greater than the horizontal cross sectional length of the section 3. The section 4 is formed with a depending annular extension 10 open at its upper and lower ends. The upper end of the extension 10 communicates with the interior of the section 4 through the bottom of the latter. The lower end of the extension 10 is formed with an inwardly extending annular flange 11 provided with spaced vertical openings 12 preferably four in number. The extension 10 is ec-

centrically disposed with respect to the bottom of section 4. The section 4 constitutes what may be termed an open top container and also functions as a support and a part of a lubricant or oil well. The front and rear walls 13, 14 of section 4, in proximity to the side wall 15 of such section have their outer faces formed with vertically disposed enlargements 16 flush at their upper ends with the top edges of the walls 13, 14 and formed with threaded sockets opening at the upper end of the enlargements 16. The wall 14 in its upper portion and in proximity to the wall 17 of section 4 is formed with a vertical cutout 18 opening at the top edge of section 4.

The section 3 when arranged in superimposed relation to section 4 has its shoulder 7 seat on the upper edges of the walls 13, 14, 15 of section 4, its depending flange 8 bearing against the upper marginal portions of the outer faces of the said walls 13, 14, 15 and the bottom edge of wall 5 extending transversely of section 4 and spaced from the upper edges of said walls 13, 14. The flange 8 may be detachably connected to the section 4 if desired and it acts to arrest the shifting of section 3 transversely of section 4, as well as the shifting of the section 3 towards the said wall 17. The horizontal cross sectional length of the section 3 is such as to dispose the wall 5 substantially at the transverse median of the upper end of section 4. When section 3 is disposed in superimposed relation with respect to the section 4 it closes a portion of the open top of the latter whereby the remaining portion 19 of the open top of section 4 will extend laterally from the said wall 5. The upper edge of the portion 19 constitutes a support for the base 20 of the motor 1. The base 20 is in the form of a plate mounted on the said portion 19, has a tapered inner part extending under the bottom edge of wall 5 and has an upturned inner end part 21 arranged within the lower portion of section 3. The base extends outwardly from wall 15 of section 4 and its outer part is of a width to seat on the enlargements 16. The base includes vertical openings 22 aligning with the mouth of the threaded sockets formed in the enlargements 16. Extending through the openings 22 and engaging with the threaded sockets aforesaid are holdfast means 23 for detachably securing the base 20 to the section 4. The base 20 constitutes a closure for the open top of the portion 19 of the section 4.

The pump includes a vertical hollow column 24 in the form of a pipe open at each end and of a length to extend from the flange 12 of extension 10 up into the section 3 of the housing when the sections of the latter are disposed in superimposed relation. The lower end of the column 24 is formed with an outwardly directed annular flange 25 for seating on the upper face of the flange 11 of the extension 10. The flange 25 is formed with spaced vertically disposed threaded openings 26 which register with the openings 12 in flange 11. The column 24 constitutes a guide.

The pump includes a water outlet member 27 including an upstanding cylindrical body part 28 having the major portion of its inner face corresponding in diameter to the inner diameter of column 24. The body part 28 has the major portion of its outer face corresponding in diameter to the outer diameter of column 24. The said body part 28 has its upper end arranged in spaced endwise alignment with the lower end of the column 24. The upper end of body part 28 is formed with an outwardly directed annular flange 29 which abuts the lower face of flange 10. The flange 29 is formed with openings 30 which align with the openings 12 and 26. Extending upwardly through the openings 30, 12 and threadedly engaging with the openings 26 are holdfast means 31 for detachably securing the section 4 of housing 1, the column 24 and the member 27 together. The inner face of body part 28 intermediate its ends is formed with an inwardly extending annular rib 32 formed with threads 33. The lower end of the body part 27 is provided with an outwardly directed laterally extending flange 34 formed with openings 35. The body part 28 is open at its upper and lower end and its lower end constitutes a water intake therefor. The body part 28 in proximity to flange 34 and below the rib 32 is provided with a laterally directed water outlet or discharge nipple 36 leading outwardly from the interior of member 27.

A water intake pipe is indicated at 37 and which depends from the member 27 into the wall or a water source. The pipe 37 is of the desired length and is formed at its upper end with an outwardly directed annular laterally extending flange 38 formed with openings 39. The flange 38 is arranged against the lower face of flange 34 and is formed with openings 39 which align with the openings 35. Extending through the aligned openings 35, 39 are holdfast means 40 for detachably connecting member 27 to pipe 37.

Positioned within the lower portion of the column 24 and the upper portion of the member 27 is a vertical disposed cylinder 41 having the lower terminal portion of its outer periphery formed with threads 42 for correlation with the threads 33 for securing cylinder 41 to member 37 to dispose said cylinder vertically relative to column 24 and member 27. The cylinder 41 is open at each end and it is of such an outer diameter to space it from column 24, the upper portion of the inner face of member 27 and the flange 11.

Operating in and disposed in coaxial relation with respect to the column 24, the member 27, the pipe 37 and the cylinder 41 is a vertically disposed sectional reciprocatory sucker rod structure 43 of pipe like form. The structure 43 includes a lower section 44, an upper section 45 and a coupling 46 between the sections 44, 45. Secured upon the lower terminal portion of the section 44, in proximity to the coupling 46 is a plurality of superposed spaced pump leathers 47 operating in the cylinder 41 and acting to force the water out on the down stroke of the structure 43. The upper terminal portion of the outer periphery of the section 44 of the structure 43 is formed with threads 48.

The pump includes a reciprocatory cross head 49 which is connected to and functions to reciprocate the structure 43. The cross head 49 is slidably arranged in and diametrically of the upper portion of the column 24. The cross head 49 includes a body part 50 of any suitable contour preferably circular formed eccentrically thereof with a threaded opening 51 disposed on the axis of the column 24. Extended from body part 50 is an arm 52 which passes through a vertical rectangular cutout 53 formed in and lengthwise of the body of column 24. The cutout 53 opens at the top edge of column 24. The threaded upper terminal portion of the struc-

ture 43 extends in and correlates with the threads of the wall of opening 51 for detachably securing the structure 43 to the cross head. A plurality of cap screws may be employed to assist in fixing structure 43 to the cross head. These cap screws are to be removable when one desires to disconnect the structure 43 from the cross head. The arm 52 at its outer end merges into the upper end of a tubular reciprocatory slide 54 which encompasses the upper portion of column 24. The slide 54 is of less length than the length of the cutout 53 and it is formed with an upwardly directed part 55 into which merges the arm 52. That part of the slide 54 which bridges the cutout 53 has its lower portion formed with a cutout 56 to form a clearance for the slide on the downward movement of the latter.

Pivotally mounted, as at 57 on oppositely extending bearings 58 arranged at diametrically opposed points at the upper end of the outer periphery of the slide 54 are upstanding vertically disposed combined reciprocatory and oscillatory links or pitmans 59. The bearings 58 are spaced from the part 55 at the upper end of the slide 54 and the latter is guided in its movement by the column 24. The links provide drivers for reciprocating the slide 54 and the latter constitutes a means for reciprocating the cross head which in turn will reciprocate the structure 43 to make the pump active. The upper ends of the links are in the form of annuli, as at 60 for loosely mounting on the bearings 58. The links are to be suitably retained on the bearings 58. The lower ends of the links are in the form of annuli, as at 61 for a purpose to be referred to.

The links 59 are operative from a pair of gear wheels 62 of the type including a toothed rim 63, a series of spokes 64 and a hub 65. A corresponding arranged spoke of each wheel is formed intermediate its ends with an enlargement 66 formed with a laterally extending bearing 67. The lower ends 61 of the links 59 are loosely mounted on the bearings 67 and suitably retained on the latter. The points of connection between the links 59 and the gear wheels 62 are eccentrically disposed with respect to the axes of said wheels. These latter are fixed to a rotatable shaft 68 mounted in a tubular bearing 70 integral with the column 24. The wheels 62 are disposed at opposite sides of the column and when the pump is active operate in oil or lubricant within the section 4 of housing 1 and are positioned between the links 59.

The wheels 62 are driven from a pair of spaced parallel pinions 71 meshing with the toothed rims 63. The pinions 71 are carried by a rotatable shaft 72 journaled in a horizontally disposed tubular bearing 73 integral with the column 24 and arranged below the cutout 53. The shaft 72 is also arranged in a removable bearing 74 mounted in the cutout 18 of the wall 14 of housing section 4. The shaft 72 is extended outwardly from the said wall 14 and has fixed thereto the driven pulley 75 of a power transmitting means 76. The latter includes an endless belt 77 travelling around the pulley 75 and around a pulley 78 fixed to the extended portion of the shaft 78a of the motor 1.

The pump includes an air pump 79 formed by a part of the section 44 of the structure 43, a rod 80 and a check valve element 81 on the lower end of rod 80. The rod 80 is suspended stationary within the said section 44 from an anchoring means 82 at the upper end of the column 24. The said section 44 is movable relative to the rod 80 and element 81. The length of the rod 80 is less than the length of section 44. The structure 43 reciprocates relative to the rod 80 and element 81.

The pump includes an oil cavity 83 as indicated in dotted lines.

The manner in setting up the reciprocatory structure 43 provides for a direct pull on the water. The manner of setting up the structure 43 relative to the cross head enables for the convenient removing of the structure 43 when desired. The bearings, other than the bearing 73 are mounted on the column 24, which provides for a compact arrangement of the movable parts of the pump. All the parts of the pump may be removed from the housing by lifting off housing section 3 from housing section 4 after disconnecting the holdfast means 31 between the housing, column 24 and member 27. It is to be understood that the pump, if desired may be mounted on any well, without employing the housing 2, as the column 24 may be connected directly to the member 27 by the holdfast means 31.

The lower portion of the column 24 correlates with the section 4 to provide a lubricant well in which operates the gears 62. The pinions 71 are arranged over and at one side of the gears 62. The cutout 56 in the slide 54 provides a clearance for the latter relative to the point of mergence of the bearing 73 with the outer periphery of the column 24. The latter may be termed the body portion of the pump and which also acts as a support for the driven means which reciprocates the cross head. The bearing 70 for the shaft 68 is extended a greater distance from the column 24 than the bearing 73.

What I claim is:

1. A reciprocating water pump comprising a housing formed of a pair of superimposed sections, the upper end of the lower section adapted for supporting a driving means, said lower section having a vertical opening in its lower end, a column arranged within the housing detachably connected at its lower end to the lower end of said lower section and registering with the top of said opening, said column being cut out lengthwise of its upper portion, an upstanding water outlet member detachably connected at its upper end to the lower end of said lower section and registering with the bottom of said opening, an upstanding water intake pipe for depending into a water source and detachably connected at its upper end to and opening into the lower end of said outlet member, a cylinder connected to said outlet member and extending upwardly through the lower end of said lower section into said column, a reciprocatory sucker rod structure operating in said column, cylinder, member and intake pipe, piston forming means on said structure correlating with cylinder, a reciprocatory cross head within the column connected to said structure, said head being formed with a lateral arm extending through said cutout, driven means adapted to be driven from said driving means, supported from said column and including a vertically movable slide connected to said arm, and a driving connection for the slide between the latter and said driven means for vertically moving the slide.

2. In a water pump, a stationary column, an upstanding water outlet member communicating at its upper end with the lower end of the column and having a laterally disposed water discharge

means, an upstanding water intake pipe opening into the lower end of said member, an upstanding cylinder secured at its lower end terminal portion to the inner face of said member and extending into said column, a reciprocatory sucker rod structure operating in said column, cylinder, member and pipe, piston forming means on said structure correlating with said cylinder, a reciprocatory cross head arranged in said column for reciprocating said structure, said structure being detachably connected to said cross head, driven means removably supported from the column and connected to the cross head for reciprocating the latter, said structure being hollow, and means suspended from the column and extending into and coacting with said structure to provide an air pump having a stationary valve controlled ported piston and a reciprocatory cylinder formed by said structure whereby on the downward stroke of said structure it will provide for the intaking of air into the air pump cylinder and on the upward stroke said structure air is forced into said discharge means.

3. In a water pump, a stationary column having its upper portion formed lengthwise thereof with a slot opening at its upper terminus, a tubular water outlet member communicating at one end with the lower end of the column and adapted to have its other end communicate with a water intake means, said member provided with a laterally disposed water discharge nipple and on its inner face with an annular rib, a cylinder having an end terminal portion secured to said rib and extending into and disposed in spaced relation to the latter, a reciprocatory sucker rod structure operating in said column, cylinder and member, piston forming means on said structure correlating said cylinder, a reciprocatory cross head operating in said column for reciprocating said structure, said cross head being detachably connected to said structure and including a part extending outwardly through said slot, driven means connected to said part and removably supported from said column for reciprocating said cross head, said structure being hollow, and means suspended from the column and extending into and coacting with said structure to provide an air pump having a stationary valve controlled ported piston and a reciprocatory cylinder formed by said structure whereby on the downward stroke of said structure it will provide for the intake of air into the air pump cylinder and on the upward stroke of said structure air is forced into said discharge nipple.

4. The invention as set forth by claim 1 having said lower section in connection with the part of said column providing a lubricant well, said driven means including gears operating in the lubricant in the well, pinions above and driving said gears, a lower shaft common to the gears, an upper shaft common to the pinions, and superposed bearings on the column for said shafts.

5. In a water pump a housing formed with an opening in the bottom thereof, a stationary hollow column within the housing, said column having its lower end secured to the upper face of the bottom of the housing and registering with said opening, an upstanding water outlet member secured at its upper end to the lower face of the bottom of the housing and registering with said opening, said member having a laterally disposed water discharge means arranged below said housing, an upstanding water intake pipe secured at its upper end to the lower end of and opening into said member, an upstanding cylinder having its lower terminal portion secured with the inner face of said member above said discharge means and extending into the lower portion of and spaced from the inner face of said column, and a reciprocatory sucker rod structure operating in said column, cylinder, member and intake pipe, piston forming means on said structure correlating with said cylinder.

6. In a water pump a housing formed with an opening in the bottom thereof, a stationary hollow column within the housing, said column having its lower end secured to the upper face of the bottom of the housing and registering with said opening, an upstanding water outlet member secured at its upper end to the lower face of the bottom of the housing and registering with said opening, said member having a laterally disposed water discharge means arranged below said housing, an upstanding water intake pipe secured at its upper end to the lower end of and opening into said member, said member baving its inner face, above said discharged means formed with an annular rib, an upstanding cylinder having its lower terminal portion secured to said rib and extending through said opening into the lower portion of said column, said cylinder being spaced from the wall of the opening and inner face of said column, and a reciprocatory sucker rod structure operating in said column, cylinder, member and pipe, piston joining means on said structure correlating with said cylinder.

7. In a water pump a housing formed with an opening in the bottom thereof, a stationary hollow column within the housing, said column having its lower end secured to the upper face of the bottom of the housing and registering with said openings, an upstanding water outlet member secured at its upper end to the lower face of the bottom of the housing and registering with said openings, said member having a laterally disposed water discharge means arranged below said housing, an upstanding water intake pipe secured at its upper end to the lower end of and opening into said member, said member having its inner face, above said discharge means formed with an annular rib, an upstanding cylinder having its lower terminal portion secured to said rib and extending through said opening into the lower portion of said column, said cylinder being spaced from the wall of the opening and inner face of said column, a reciprocatory sucker rod structure operating in said column, cylinder, member and pipe, piston forming means on said structure correlating with said cylinder, the rod of said structure being hollow, and means suspended from the upper end of the column and extending into and coacting with said rod to provide an air pump having a stationary valve controlled ported piston and a reciprocatory cylinder formed by said structure whereby on the downward stroke of said structure it will provide for the intaking of air into the air pump cylinder and on the upward stroke of said structure air will be forced into said discharge means.

8. In a water pump, a stationary hollow column having its upper portion formed lengthwise thereof with a slot opening at the top of the column, a water outlet member secured with the lower end and opening into said column, said member intermediate its ends having a laterally disposed water discharge means, a water intake pipe opening into said member below said means, an upstanding cylinder having its lower terminal portion arranged within said member above said means, said portion being secured to said mem-

ber, said cylinder extending into the lower portion of said column and being spaced from the inner face of the latter and said member, a reciprocatory cross head operating in and having a part extending outwardly through the slot of said column, a sucker rod structure bodily carried by said cross head and operating in said column, cylinder, member and pipe, piston forming means on said structure correlating with said cylinder, a reciprocatory tubular slide connected to said part and encompassing said column, upper and lower horizontal bearings connected to opposite sides of and disposed in offset relation with respect to said column, a driven upper shaft in said upper bearing provided with pinions, a lower shaft in said lower bearings provided with gears meshing with and operated from said pinions, and means connected to said gears and to said slide for reciprocating the latter.

9. In a water pump, a stationary hollow column having its upper portion formed lengthwise thereof with a slot opening at the top of the column, a water outlet member secured with the lower end and opening into said column, said member intermediate its ends having a laterally disposed water discharge means, a water intake pipe opening into said member below said means, an upstanding cylinder having its lower terminal portion arranged within said member above said means, said portion being secured to said member, said cylinder extending into the lower portion of said column and being spaced from the inner face of the latter and said member, a reciprocatory cross head operating in and having a part extending outwardly through the slot of said column, a sucker rod structure bodily carried by said cross head and operating in said column, cylinder, member and pipe, piston forming means on said structure correlating with said cylinder, a reciprocatory tubular slide connected to said part and encompassing said column, upper and lower horizontal bearings connected to opposite sides of and disposed in offset relation with respect to said column, a driven upper shaft in said upper bearing provided with pinions, a lower shaft in said lower bearings provided with gears meshing with and operated from said pinions, means connected to said gears and to said slide for reciprocating the latter, said rod being hollow, and means suspended from said column extending into said rod and coacting with the latter to provide an air pump having a stationary valve controlled ported piston and a reciprocatory cylinder formed by said structure whereby on the downward stroke of said structure it will provide for the intaking of air into the air pump cylinder and on the upward stroke of said structure air will be forced into said discharge means.

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