

March 14, 1933.

D. R. SCHOLES

1,901,061

## PUMPS

Filed Jan. 19, 1931

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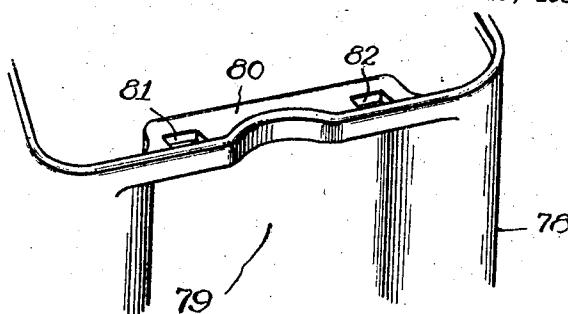
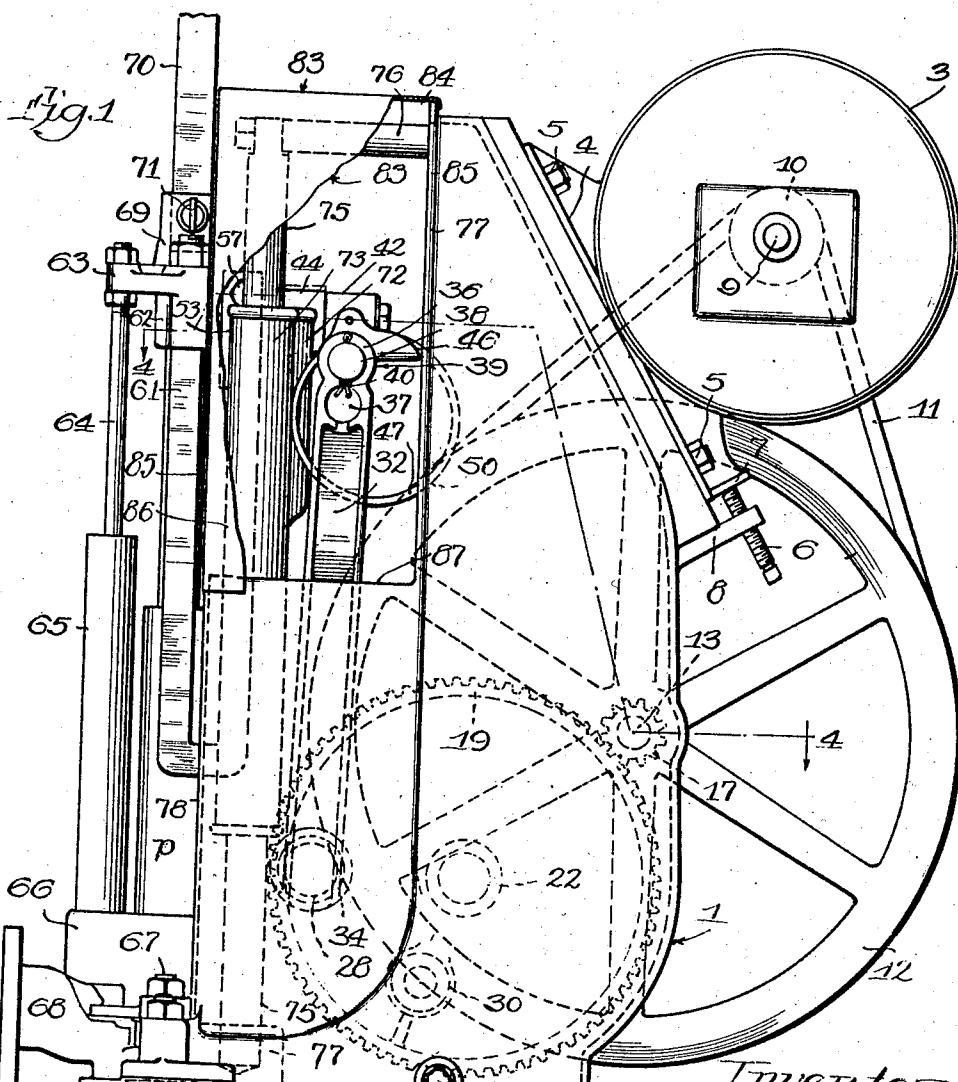


Fig. 5



Witness: Chas. P. Knous

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Daniel R. Schools,  
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March 14, 1933.

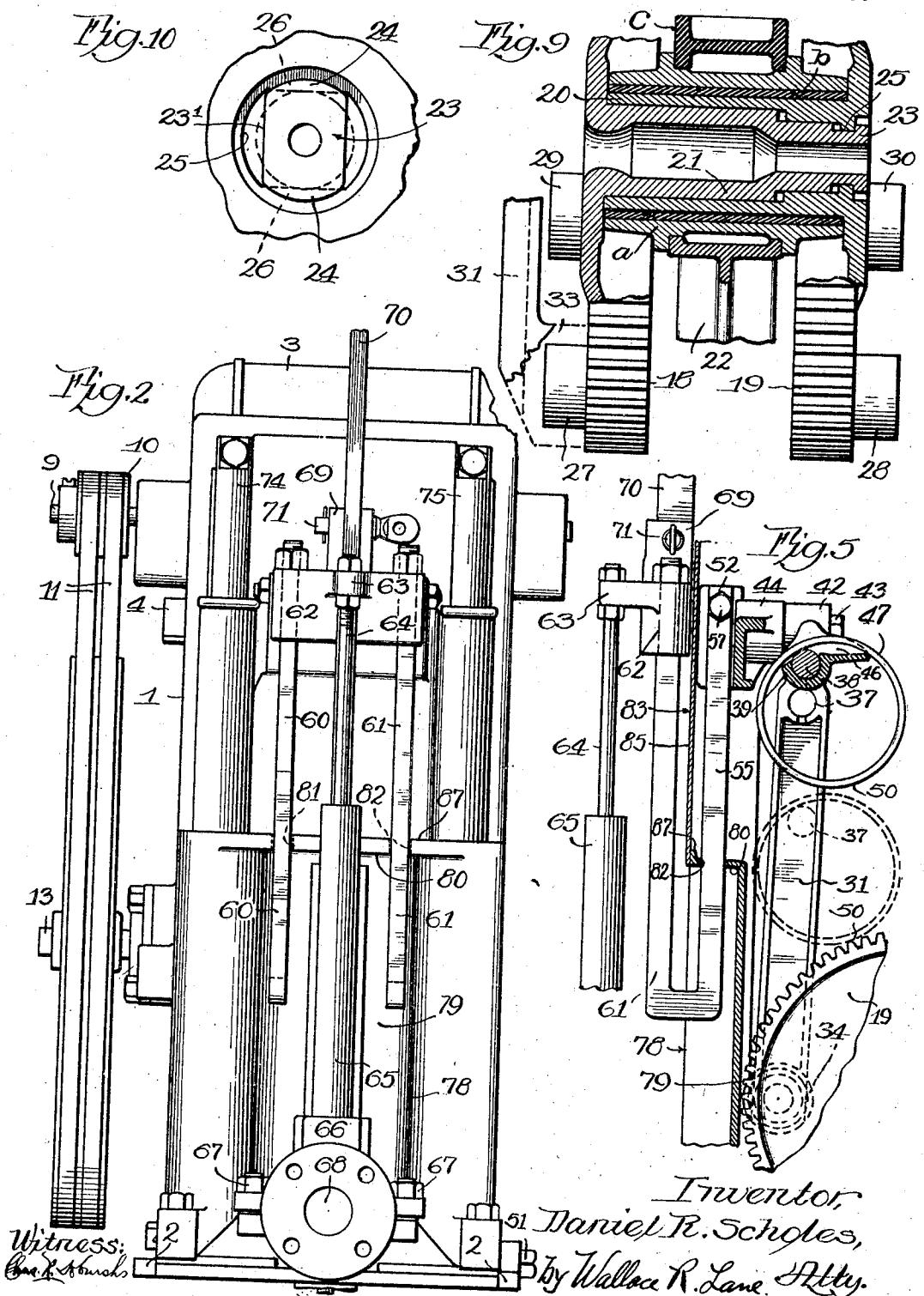
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## PUMP

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Fig. 3

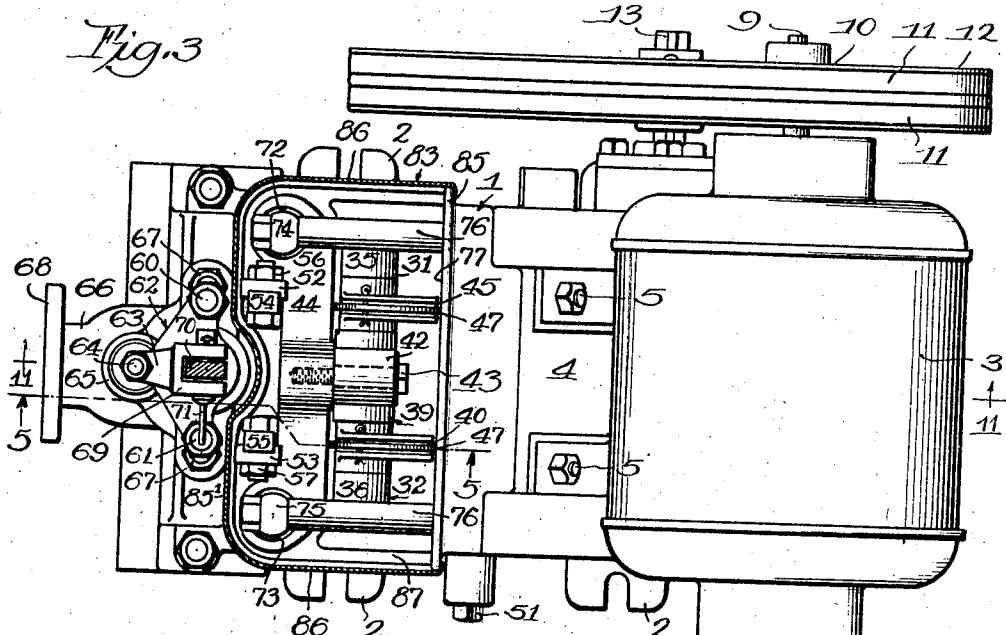


Fig. 4

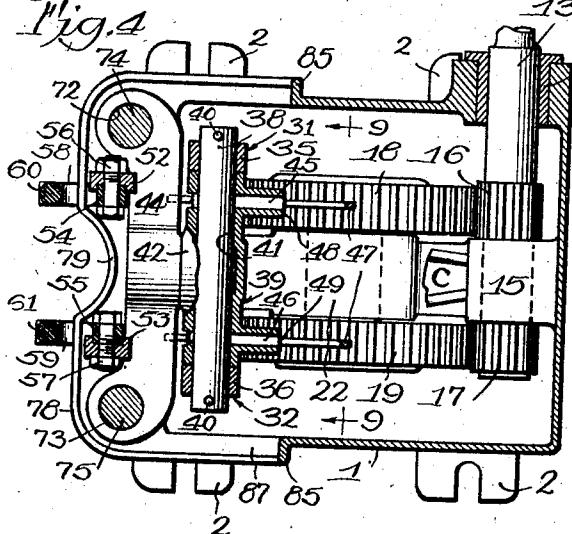


Fig. 6

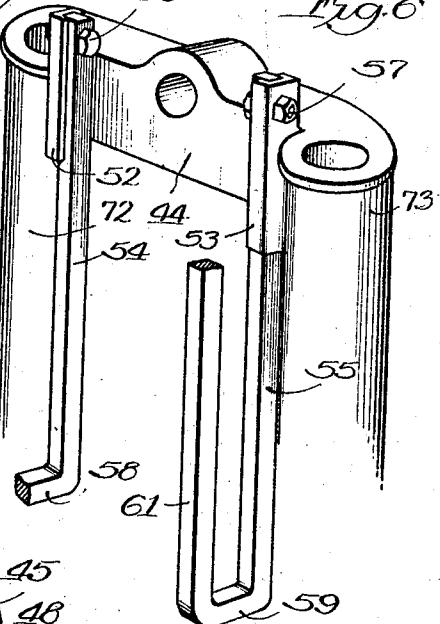
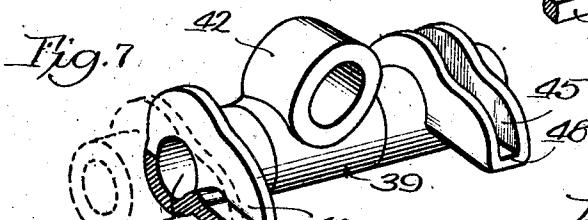


Fig. 7



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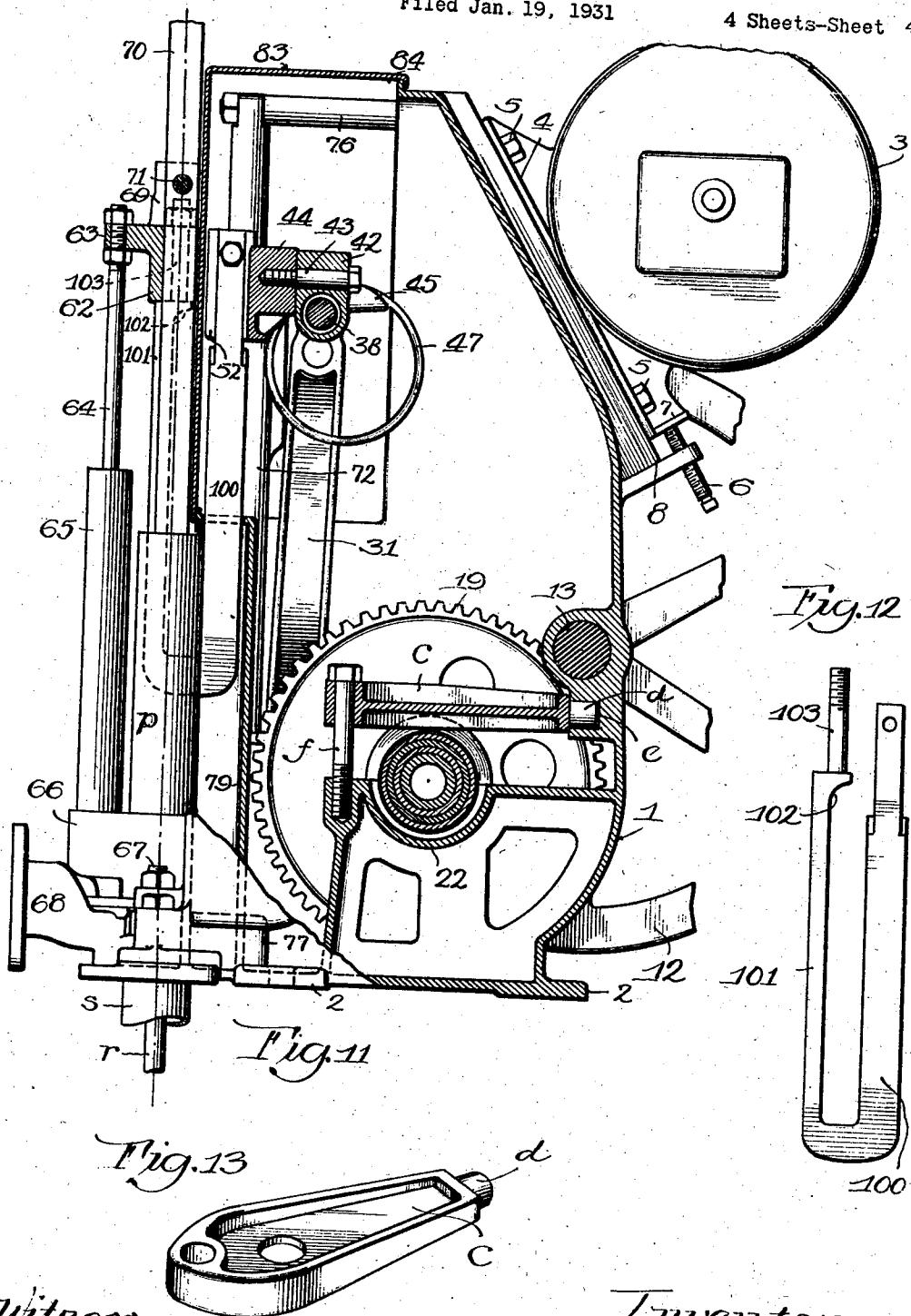
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PUMP

Filed Jan. 19, 1931

4 Sheets-Sheet 4



## UNITED STATES PATENT OFFICE

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## PUMP

Application filed January 19, 1931. Serial No. 509,740.

The present invention relates to pumping devices such as those used for wells or other similar work.

In structures of this kind shielding or housing means are provided to protect the operating mechanism from climatic elements. If the device is operated by a windmill, the windmill rod has heretofore passed through a hole in the top of the housing. A connecting element between the operating mechanism in the housing and the pump outside the same has oftentimes heretofore been provided to pass through a slot in the side wall of the housing. In both these instances the rain and other climatic elements readily enter the housing, which is highly undesirable.

The present invention has for an object the provision of a novel construction avoiding the above mentioned and other disadvantages. In a specific illustrative embodiment of the invention a side wall of the shielding means has an overhanging portion through which the connecting rod from the operating mechanism may pass for connection to the operated device. Preferably, the connecting rod is U-shaped with one leg thereof operating from within the housing through a hole or aperture in the off-set or overhanging portion of the side wall, and the other leg operating outside said housing. A windmill rod connection is preferably provided outside the housing for connection of said rod to the outer leg of the U-shaped connecting rod. The operating mechanism in the housing may be actuated by an electric motor or any other source of power.

Another object of the invention is to provide a novel means for automatically equalizing or compensating for any irregularity in the operating mechanism or the like. This means may be in the form of a compensating yoke pivotally connected to the reciprocating cross-head within the housing, and also connected to pitmen actuated by the operating means.

A further object is to so provide a connecting rod of U-shape or other offset construction as to substantially lessen binding action of the parts operated by the pump rod.

A still further object is to provide in pump construction a connecting rod with offset legs, one leg operating within the housing and the other outside thereof, the outside leg being so arranged and constructed that the line of the working force of said outside leg will fall inside of the longitudinal central axis of said last mentioned leg, in order to prevent lateral movement of yoke 62 and insure movement of the pump rod in a rectilinear path, thus lessening binding action of the parts operated by the pump rod. This would also tend to eliminate any binding action of the cross-head on its guide means inside the housing.

Another object is to provide a pump construction in which there is greater clearance and freedom of space for removal of the pump rod should the same become necessary.

Still another object is the provision of means to enable a more convenient assembling and disassembling of the main gears that actuate the two pitmen and the reciprocating parts.

A further object is the provision of a pump construction that is more economical in manufacture, simple in construction and operation, efficient in service, and arranged to give maximum accessibility to certain of its parts.

Other objects, advantages, capabilities and features are comprehended by the invention as will later appear and as are inherently possessed thereby.

Referring to the drawings:

Fig. 1 is a view in side elevation with parts broken away and parts shown in dotted lines; 85

Fig. 2 is a front elevational view;

Fig. 3 is a top plan view with the top of the housing omitted for the sake of clearness;

Fig. 4 is a horizontal sectional view taken 90

in planes represented by lines 4—4 in Fig. 1, with the cross-head 62 omitted;

Fig. 5 is a fragmentary sectional view taken in vertical planes represented by lines 5—5 in Fig. 3;

Fig. 6 is a fragmentary perspective view of the main cross-head which operates within the housing;

Fig. 7 is a perspective view of the compensating yoke;

Fig. 8 is a fragmentary perspective view of the overhanging portion of the housing with openings for the inner leg of the U-shaped connecting rod;

Fig. 9 is a fragmentary sectional view taken in a vertical plane represented by line 9—9 in Fig. 4;

Fig. 10 is a fragmentary side view of parts shown in Fig. 9;

Fig. 11 is a vertical section taken on the line 11—11 Fig. 3 with the motor and some of the other parts shown in elevation;

Fig. 12 is a detail side elevation of the U-shape connecting rod, and

Fig. 13 is a detail perspective view of a clamping bar for the bearing of the main gears.

Referring more in detail to the drawings the embodiment selected to illustrate the invention is shown as comprising a shielding means or housing 1 having feet 2 for securing the device to a floor, platform or the like. On the housing 1 is mounted a motor 3 having a base 4 secured to the housing 1 by bolts 5. The base 4 may be adjusted in position by an adjusting screw 6 acting against a part 7 of the base, and carried in a lug 8 rigid with the housing 1.

Motor 3 has a shaft 9 carrying pulleys 10 driving through the medium of belts 11, pulley 12 keyed to a shaft 13 rotatably supported in bearings 14 and 15 in the housing 1. (Fig. 4.) The shaft 13 has fixed thereon a pair of pinions 16 and 17 meshing with a pair of gears 18 and 19 having telescopic hub portions 20 and 21 rotatably supported in external member *a*, suitable bearing metal *b* being interposed. External bearing member *a* is supported in bearing bracket 22 integral or rigid, if desired, with the housing 1. See Figs. 4 and 11.

The hub part 21 has a flanged end portion 23 normally circular except having diametrically opposite segmental portions 23' cut away, or in other words the shape is that of a rectangle with rounded ends 24. The hub 20 has an opening 25 of similar shape and of a size to permit the axial passage of the flanged part 24 of the hub 21. Adjacent the opening 25 are flange portions 26 with which the ends 24 may lock when the hubs are angularly moved relatively to each other after the hub 21 is inserted in the hub 20, to prevent axial disengagement of the gears 18 and 19. After the gears are thus assem-

bled and enmeshed with the pinions 16 and 17, the angular relation of the gears 18 and 19 as also of the hubs 20 and 21 will be maintained.

As seen in Figs. 9 and 11, when assembled in the manner referred to above, gears 18 and 19 are placed in position to straddle bearing bracket 22 with the external member *a* resting in a suitable semi-circular seat in said bracket. When thus arranged, clamping member *C* is then placed in position over the bearing parts, with its projecting end *d* extending into opening *e*. The clamping member *C* is then secured in position by tightening bolt *f*, thus holding the bearing in operative position and enabling a quick assembling or disassembling of these parts as desired.

The gears 18 and 19 are provided with laterally extending crank pins 27, 28, 29 and 30, the pins 27 and 28 forming one pair and pins 29 and 30 another pair. To either of these pairs of crank pins are connected pitmen or connecting rods 31 and 32 having off-set sockets 33 and 34 for receiving the crank pins, the arms of the pitmen clearing the other set of pins carried by the gears.

The upper ends of the pitmen 31 and 32 are provided with bearing sockets or boxes 35 and 36 and also just beneath the same another set of similar sockets or boxes 37 (see Figs. 1 and 5), either pair of which receives the ends of a shaft 38 carried in a compensating yoke 39. Suitable cotter pins 40 may be used at the ends of shaft 38 to hold the pitmen in place.

The compensating yoke 39 is shown in perspective in Fig. 7. It comprises a bore 41 for the shaft 38, the ends of this shaft protruding beyond both ends of the compensating yoke. Medially, the compensating yoke 39 is provided with pivot bearing 42 for pivotally connecting the compensating yoke to a pivot pin 43 secured to the rear of a cross-head 44. Between the ends of the compensating yoke and the pivot bearing 42, the compensating yoke is provided with oil ring channels 45 and 46 having openings in the bottom of the channels to communicate with the bore 41 and the shaft 38 therein. In the channels ride oil rings 47 as clearly shown in Figs. 1 and 5. The rings will touch the oily teeth of the gears 18 and 19 when the compensating yoke 39 and cross-head 44 are reciprocated downwardly, and pick up some of the oil. In order to cause the rings to rotate in one direction, the compensating yoke channels have noses 48 and 49 eccentric to the bore 41, so that when the part 50 of the rings hits the gear teeth the rings will be lifted on that side and caused to slide circularly in the channels 45 and 46 and hence carry up adhering oil to the opening in the channels and into contact with the shaft 38 exposed at such openings. The

lower part of the housing contains oil to a suitable height in which the gears 18 and 19 dip as they rotate. An oil drain suitably closed with a plug 51 may be provided in the 5 lower part of the housing 1.

The cross-head 44 carries channels or sockets 52 and 53 in which are located the upper end portions of legs 54 and 55 of U-shaped connecting rods, such end portions being secured in place by bolts 56 and 57. The legs 54 and 55 are connected by cross-pieces 58 and 59 to legs 60 and 61 connected at their upper ends to a yoke 62. The 10 legs 54 and 55 are herein designated as the inner legs, and legs 60 and 61 as the outer legs of the U-shaped connecting rods.

The yoke 62 has a lateral lug 63 connected to the upper end of a rod 64 operating in an air pump used in a conventional manner in 20 connection with the main pump. Air pump 65 is provided with a cap 66 which is secured to discharge head 68 by bolts 67.

On the top of the yoke 62 is provided a socket 69 in which may be connected a pump 25 rod 70, a suitable cross pin 71 passing through the socket 69 and rod 70 for making this connection.

Pump rod 70 extends downwardly into packing tube *p*, it being connected in this 30 packing tube with the main pump rod *r* of the pump, which extends downwardly any required distance to the pump proper. Main pump rod *r* operates within a suitable casting *s* as will be readily understood.

The cross-head 44 has guide cylinders 72 and 73 bored to receive guide rods 74 and 75 secured at their upper ends to arms 76 fixed to the cross wall 77 of the housing 1, and fitting at their lower ends in sockets 77 provided in the base of the machine and housing.

The housing 1 has a front wall 78 provided with an off-set portion 79 extending upwardly to a portion 80 forming an overhanging portion for this wall of the housing. The overhang 80 has openings 81 and 45 82 through which the rod legs 54 and 55, respectively, pass and reciprocate, the lower portions of these legs reciprocating in the 50 depression formed by the off-set portion 79 of the wall 78. See Fig. 5.

The housing is provided with an opening at the upper and forward part thereof, which is closed by a removable cover 83 having a 55 top or cap 84 fitting over a bead or flange 85 formed on the housing, and front and side walls 85' and 86 which are sufficiently long to overlap or overhang the lower end 87 of the housing opening. The front wall 60 85' of the cover extends in the space between the inner legs 54 and 55, and the outer legs 60 and 61 of the U-shaped connecting rod. In this way the operating mechanism is suitably closed against entry of climatic elements, there being no exposed openings in 65

upper or side walls, the holes 81 and 82 being in an overhanging wall or portion where the chances of climatic elements entering upwardly therethrough are nil.

When it is desired to give the cross-heads 70 a long stroke or reciprocation, the pitmen 31 and 32 are connected to the crank pins 27 and 28 which are at a greater radial distance than crank pins 29 and 30. Also the 75 sockets 35 and 36 are connected to the shaft 38. For a lesser stroke the pitmen 31 and 32 are connected to crank pins 29 and 30, and the sockets 37 connected to the shaft 38. With this arrangement the cross-head 44 80 will end its downward stroke at the same locus as when reciprocating with a longer stroke.

When operating from the motor 3 alone the windmill rod (not shown) is disconnected from pump rod 70. The motor 3 drives the 85 gears 18 and 19 by way of the pulleys 10 and 12 and the belts 11. The crank pins 27 and 28 or 29 and 30 reciprocate the pitmen 31 and 32 and hence the compensating yoke 39 and cross-head 44 together with the connecting rods 54—58—60 and 55—59—61, and hence the yoke 62 with pump rod 70.

The legs 54 and 55 of the U-shaped connecting rods move through openings 81 and 82 and reciprocate in the depression formed 95 by the offset portion 79 of the front wall 78 of the housing 1. The cross-head 44 is guided on the guide rods 74 and 75 by way of cylinders 72 and 73. Should the teeth of the gears 18 and 19 not match up with the same angular relation so that the crank pins of one gear be a little ahead or behind the crank pins of the other gear the compensating yoke 39 may tip a little about the stud 43 to automatically compensate for that difference, and the reciprocation of the cross-head 44 will correctly take place.

When the rings 47 contact the teeth of the gears 18 and 19 they will pick up oil, and also be moved to slide in the channels 45 and 46, to bring up the oil and deposit it on the shaft 38.

When it is desired to operate by the windmill only, the pump rod 70 is coupled to the windmill and the yoke 62 is disconnected from rod 70 by the withdrawal of coupling 71. When this change is made pump rod 70 is reciprocated by the windmill and operates the main pump; air pump 65 and the other moving parts of the driving mechanism then remaining idle.

In Figs. 11 and 12, I have shown a somewhat different construction of the U-shape connecting rod, in the use of which the forces will be so distributed as to lessen to a large degree any binding action of the parts operated by the pump rod, and also tend to eliminate any binding action of the cross-head cylinders 72 and 73 with relation to guides 125 74 and 75 as they reciprocate thereon. In 130

the form shown in Figs. 1-10 it will be noted that the line of force acting on each of the outside legs, in the operation of yoke 62, will be substantially coincident with the longitudinal axis of the leg, which will tend, due to the outer leg being offset with relation to the inner leg, to throw the upper end of the outer legs to the left (see Figs. 1 and 5) or right of its normal vertical path depending on whether the movement of cross-head 44 and its associated parts be up or down.

This would tend to cause a greater or less binding action of the parts operated by the pump rod, due to the pump rod being thrown somewhat out of its normal vertical path of movement. It would also tend to cause a binding action between the cross-head cylinders 72 and 73 and the guides 74 and 75, which tendency would be increased by the angular thrust of the pitmen 31 and 32 on cross-head 44.

In the form of U-shape connecting rod shown in Figs. 11 and 12 a substantial amount of the inside portion of the outer leg has been cut away, and the threaded bolt-like extension for connecting said outer leg to yoke 62 has been positioned with its vertical axis a substantial amount to the right of the longitudinal central axis of the remaining portion of said outer leg as viewed in Fig. 11, so that the line of force acting upon the outer leg of the U-shape connecting rod will fall well within (to the right as viewed in Figs. 11 and 12) the longitudinal axis of said outer leg.

The result is that this will create a tendency for the top end of the said outer leg to move to the right (see Figs. 11 and 12), when moving upwardly and to the left when moving downwardly, and thus counteract and offset any tendency of the upper leg to move to one side or the other of its normal vertical path, in said figure, due to the U-shape or offset construction of this connecting rod, thus substantially eliminating any tendency of the parts operated by the pump rod, or the cylinders 72 and 73 of cross-head 44 binding during their operation. This will be readily understood by an inspection of Fig. 12, in which the inner leg of the U-shape connecting rod is indicated at 100, and the outer leg at 101, this outer leg being cut away for the greater part of its length, as indicated at 102, the bolt-like extension 103 being positioned with its central axis a considerable distance inwardly of the longitudinal axis of the outer leg 101.

Obviously offset forms of connecting rod other than the U-shape construction illustrated may be used if desired.

While I have herein described and upon the drawings shown an illustrative embodiment of the invention, it is understood that the latter is not limited thereto, but comprehends other constructions, details, arrangements of

parts, and features, without departing from the spirit thereof.

Having thus disclosed the invention, I claim:

1. In a pump having operated and operating means, a shielding means for the operating means and having an overhung portion, and a U-shaped connecting rod operatively connecting said operated and operating means and having a part thereof passing through said overhung portion, and another part thereof operating outside of said shielding means. 70

2. In a pump having operated and operating means, a shielding means for the operating means and comprising a wall having an overhung portion, and a connecting rod operatively connecting said operated and operating means and passing through said overhung portion. 75

3. In a pump having operated and operating means, a shielding means for the operating means and comprising a wall having an overhung portion having an aperture therein, and a U-shaped connecting rod operatively connecting said operated and operating means, one of the legs of said connecting rod operating through said aperture, and the other leg thereof operating outside of said shielding means. 80

4. In a pump having operated and operating means, a cross-head, a shielding means for the operating means and having an offset portion aligned with said cross-head, and a connecting rod connected to said cross-head and having portions disposed on opposite sides of the adjacent part of the shielding means, one of said portions of said rod passing through said offset portion. 100

5. A pumping device comprising operated and operating means, means for shielding the operating means, a U-shaped connecting rod operatively connecting said operated and operating means, said connecting rod having an outer leg exterior to said shielding means, and a windmill connection connected to said outer leg. 105

6. A pumping device comprising operated and operating means, a reciprocable cross-head connected to the operated means, a compensating yoke pivotally connected to said cross-head, and a pair of pitmen connected to said yoke on opposite sides of the pivotal connection between said yoke and said cross-head. 115

7. A pumping device comprising operated and operating means having a yoke and a cross-head, respectively, a connecting rod connecting said yoke and said cross-head, and a compensating yoke pivotally connected to the cross-head of the operating means and operatively connected to said operating means. 120

8. A pumping device comprising operated and operating means having a yoke and a 130

cross-head, a shielding means for the operating means and having an upwardly extending portion disposed between said yoke and said cross-head, and an off-set connecting rod connected to said yoke and cross-head and extending for operation on both sides of said upwardly extending portion of the shielding means.

9. A pumping device comprising operated and operating means having a yoke and a cross-head, respectively, a shielding means for the operating means and having a portion thereof disposed between said yoke and said cross-head, and a connecting rod connected to said yoke and cross-head and extending about said portion of said shielding means for operation on both sides thereof, and a compensating yoke pivotally connected to said cross-head to compensate for irregular operation of the operating means.

10. A pumping device comprising operated and operating means, a housing for the operating means and having a wall formed with an overhanging portion, and a connecting rod connected to said operated and operating means and passing through said overhanging portion.

11. A pumping device comprising operated and operating means, a housing for the operating means and having a wall formed with an overhanging portion, and a U-shaped connecting rod connected to said operated and operating means with one leg of said rod passing through said overhanging portion.

12. A pumping device comprising operated and operating means having a yoke and a cross-head, respectively, a connecting rod connecting said yoke and said cross-head, shielding means for the operating means, the yoke being outside and the cross-head being inside of the shielding means, and a guiding means for the cross-head shielded by said shielding means.

13. A pumping device comprising operated and operating means, shielding means for the operating means, a yoke outside of said shielding means, and a cross-head within said shielding means, a connecting rod connecting said yoke and said cross-head, a compensating yoke pivotally connected to the cross-head and the operating means, and guiding means for the cross-head.

14. A pumping device comprising operated and operating means having a yoke and a cross-head, respectively, a connecting rod connecting said yoke and said cross-head, shielding means for the operating means and the cross head, the said yoke being outside of the shielding means, a compensating yoke pivotally connected to the cross-head, and guiding means for the cross-head.

15. In a pump, a housing, operating mechanism within said housing, operated mechanism outside of said housing, a U-shaped connecting rod connecting said operating and

operated mechanism, said connecting rod having one leg operating from within said housing and another leg operating outside of said housing, the upper end of said outer leg being so connected to the operated mechanism as to throw the acting line of force on said outer leg inside of the longitudinal axis of the outer leg.

16. In a pump, operating mechanism, operated mechanism, and a U-shape connecting rod connecting said two mechanisms and having an inner and an outer leg, the outer leg being so constructed that the force acting at the upper end thereof is applied in a line falling nearer to the inner leg than the longitudinal center of the main portion of the outer leg.

17. In a pump, a sliding cross-head, guide means for said cross-head, a connecting rod secured at one end to said cross-head and extending downwardly, then laterally and then upwardly, the upwardly extending part being so constructed that the working force at its upper end is applied in a position closer to the cross-head than the main body of the upwardly extending part so as to lessen binding action of the parts operated by the pump.

18. In a pump, a housing having an undercut ledge formed in one face, a cross-head in said housing, guide means on which said cross-head reciprocates, a U-shape connecting rod having an inner leg connected to said cross-head in the housing and extending through openings in said ledge, the outer leg of said connecting rod being outside of the housing, the portion of the free end of said outer leg to which the working load is applied being nearer to the cross-head than the lower end of said outer leg.

19. In a pump, a cross-head, a U-shape connecting rod having an inner leg and an outer leg, the inner leg being secured to the cross-head, the outer leg having its free end to which the working force is applied offset inwardly to produce a flexure opposite to that produced in the inner leg.

20. In a pump, a housing, operating means within said housing, operated means outside said housing, a U-shape connecting rod coupling the operating means and operated means, and a cover portion on the housing having a wall located in the space between the legs of the connecting rod.

21. Pump operating mechanism comprising operated and operating means, a casing for the operating means, a yoke for the operated means, a cross-head for the operating means, the yoke and cross-head being laterally offset from each other, the yoke being outside of the casing and the cross-head inside, and an offset connecting member connecting the yoke and cross-head.

22. Pump operating mechanism comprising operated and operating means, a casing for the operating means, a yoke for the oper-

ated means, a cross-head for the operating means, the yoke being outside of the casing and the cross-head inside, connecting means connecting the yoke and cross-head, a compensating yoke pivotally connected to the cross-head, and a pair of pitmen connected to the compensating yoke, the latter permitting one pitman to run ahead of the other when required.

**10** In witness whereof, I hereunto subscribe my name to this specification.

**DANIEL R. SCHOLES.**

**15****20****25****30****35****40****45****50****55****60****65**