

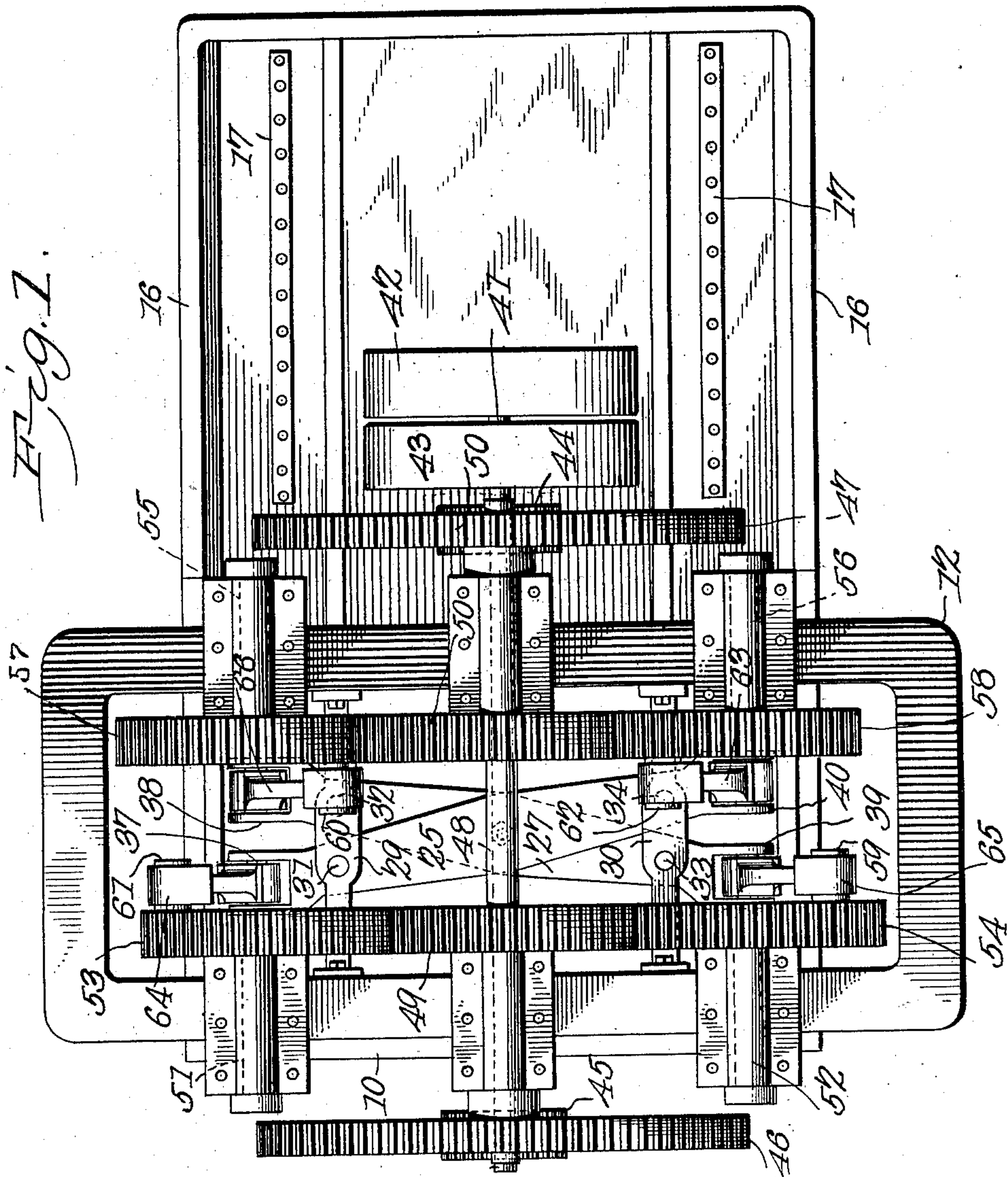
No. 752,715.

PATENTED FEB. 23, 1904.

J. E. SMITH.  
PUMPING APPARATUS.  
APPLICATION FILED OCT. 12, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



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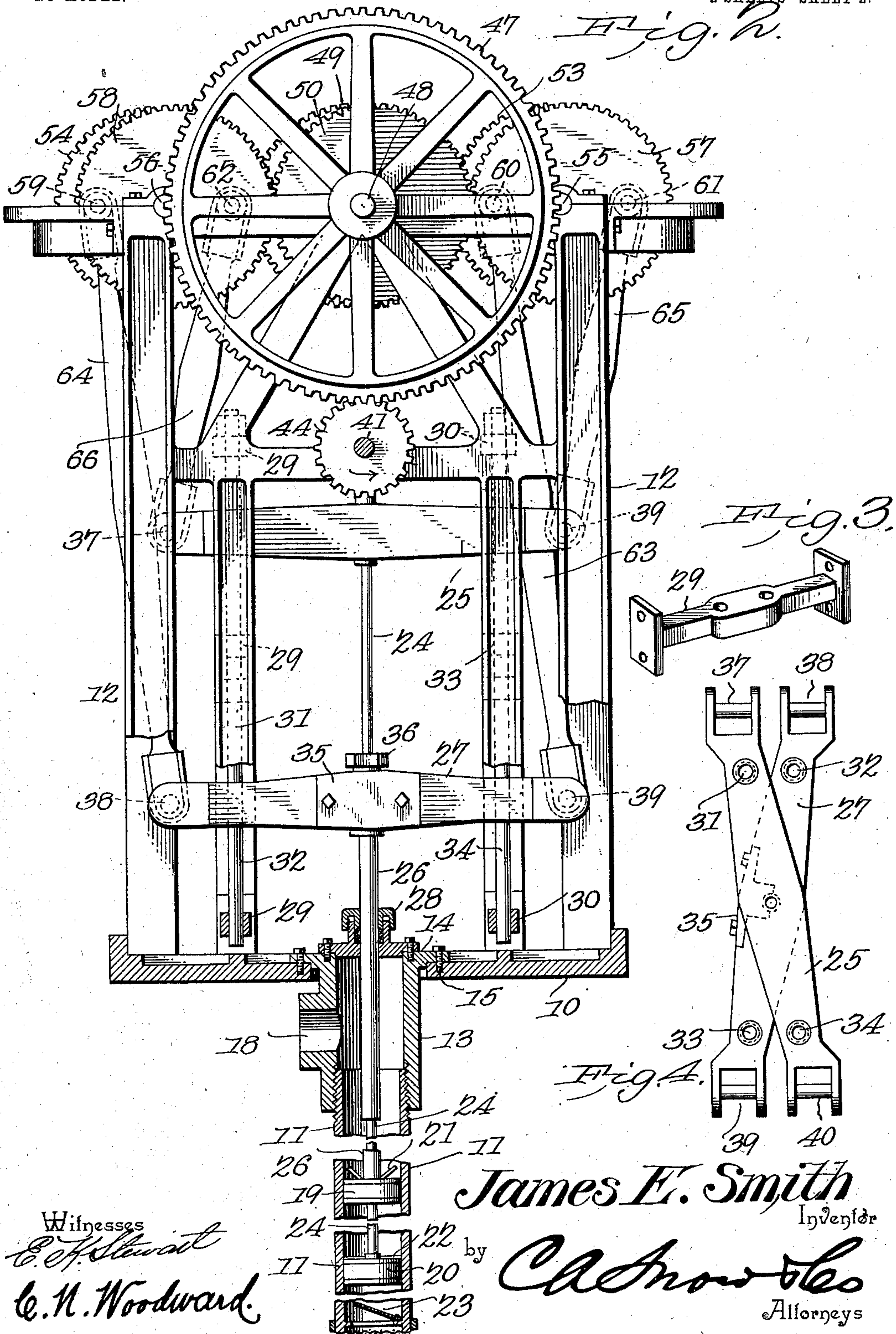
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# UNITED STATES PATENT OFFICE.

JAMES E. SMITH, OF ALAMOGORDO, TERRITORY OF NEW MEXICO.

## PUMPING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 752,715, dated February 23, 1904.

Application filed October 12, 1903. Serial No. 176,683. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES E. SMITH, a citizen of the United States, residing at Alamogordo, in the county of Otero and Territory of New Mexico, have invented a new and useful Pumping Apparatus, of which the following is a specification.

This invention relates to apparatus employed for operating pumps, more particularly pumps employed in connection with deep wells or in mining operations where a steady uniform stream is desirable, and has for its object to increase the efficiency without increasing the power required to operate and also decreasing the expense of construction; and the invention consists in certain novel features of construction, as hereinafter shown and described, and specified in the claims.

In the drawings illustrative of the invention, in which corresponding parts are denoted by like designating characters, Figure 1 is a plan view. Fig. 2 is a side elevation, partially in section, of the device applied. Fig. 3 is a perspective view of one of the combined braces and guides detached. Fig. 4 is a plan view of the pump-rod cross-heads detached.

The improved apparatus comprises a base-frame 10, from which the pump-cylinder 11 depends and above which the supporting-frame 12 for the plunger-operating mechanism is disposed, as shown.

The pump-cylinder is provided with a T-head 13, by which it is suspended by its flange 14 from the base-frame 10 and secured in place by bolts 15, as shown.

The base-frame is provided with a lateral extension 16 as large or a little larger than the supporting-frame 12 and upon which the latter may be moved when required or when the pump-rods, pipe, or other parts are to be removed or the pump repaired. To this end the supporting-frame 12 will be secured by bolts only, and the extension 16 will be provided with perforated bars or plates 17 to provide means for the attachment of the levers or other means employed for shifting the supporting-frame upon the extended portion 16 of the base-frame.

The pump-cylinder is represented at 11 and may be any distance from the base-frame and is provided with a lateral discharge 18.

The pump-cylinder is provided with two plungers 19 20, provided, respectively, with upwardly-opening valves 21 22 and with a check-valve 23 in the bottom of the cylinder, the plungers and valves being of the usual construction.

The plunger 20 is provided with a rod or stem 24, extending upwardly through the plunger 19 and the base-frame 10 and terminating in a cross-head 25, and the plunger 19 is provided with a tubular operating-rod 26, surrounding the rod 24 and extending through the base-frame 10 and terminating in a cross-head 27, similar to the cross-head 25, as shown.

The tubular rod 26 passes through a stuffing-box 28 upon the upper end of the T-head 13 to prevent the escape of the water around the rods.

Supported, respectively, by brackets 29 30 within the frame 12 are guide-bars 31 32 33 34 for the ends of the cross-heads 25 27, the cross-heads being disposed in reversely-diagonal positions, as shown. The cross-heads will be provided with detachable bushings, preferably of brass or other relatively soft metal, surrounding the rods to receive the wear, and which are readily renewable when worn.

The cross-head 27 is provided with a detachable section 35, forming a cap to support the upper end of the tubular rod 26 and also to support a wear-bushing 36 for the rod 24 where it passes through, as shown. The removable cap 35 provides means for the attachment and detachment of the cross-head 27 when required without disturbing the other parts.

In the ends of the cross-heads wrist pins or bearings 37, 38, 39, and 40 are formed to provide means for the attachment of the operating means, whereby the plungers may be alternately operated, as hereinafter shown.

Mounted for rotation transversely of the frame 12 is the main driver-shaft 41, having means such as a tight and loose pulley 42 43 or other suitable means for applying motion and disconnecting the motive power and with spaced gear-pinions 44 45, adapted for engagement with gear-wheels 46 47 upon a main counter-shaft 48, as shown.



The gears 46 47 and pinions 44 45 are preferably disposed outside the frame 12, and connected to the shaft 48 inside the frame are gears 49 50, eccentric to the shaft and oppositely disposed, as shown.

Mounted for rotation upon the frame 12 at one side and at opposite sides of the shaft 48 are stub-shafts 51 52, carrying gears 53 54, eccentrically disposed thereon and engaging the eccentric gear 49 from opposite sides, as shown, while similar stub-shafts 55 56 are mounted for rotation at the other side of the frame 12 and at opposite sides of the shaft 48 and carrying eccentrically-disposed gears 57 58, engaging the gear 50 from opposite sides, as shown.

The eccentrically-disposed gears 54 57 are provided, respectively, with crank-pins 59 60, while the gears 53 58 are provided, respectively, with like crank-pins 61 62.

The crank-pins 60 61 are connected to the short or narrower sides of their respective gears 53 57, and the crank-pins 59 62 are connected to the longer or wider sides of their respective gears 54 58, as shown.

The crank-pins 60 59 are connected, respectively, to the wrist-pins 38 39 at the opposite ends of the cross-head 27 by connecting-rods 63 64, and the crank-pins 61 62 will be similarly connected to the wrist-pins 40 37 of the cross-head 25 by connecting-rods 65 66. By this arrangement of gearing it will be obvious the speed of the crank-pins 59 60 is uniform, and the speed of the crank-pins 61 62 is correspondingly uniform. The crank-pins 59 60 thus carry one of the plungers, and the crank-pins 61 62 carry the other plunger, and the gears 53 58 exert a compound leverage when moving the plunger 20 downwardly upon the gears 54 57, which are drawing the plunger 19 upwardly, and also operate the gears 54 57 and the plunger 19, to which they are connected, at a reduced speed during the upstroke. Then as the gears 53 58 pass the center of their motion the action is reversed, the gears 54 57 exerting a compound leverage upon the gears 53 58, with the effect of moving the plunger 20 more slowly during its upstroke and simultaneously moving the plunger 19 downwardly more rapidly. An increased force and slower speed is thus imparted to the upstroke, at which time the "loads" are being borne by the plungers. It will thus be seen that when thus arranged and motion imparted to the shaft 41 in the direction of the arrow in Fig. 2 the plungers 19 20 will be alternately operated and moved downwardly with a relatively rapid motion and upwardly with a relatively slow motion, but with an increase in the force employed, owing to the variations in the "leverage" imparted by the eccentric mounting of the gears.

The downward strokes of the pump-plungers, which require less force, as they carry no load, are thus comparatively rapid, while

the upstrokes, which carry the loads, have an increased force applied. The power is thus economically employed and waste of energy obviated.

The parts may be formed of any desired material and applied to any size or style of pump having two alternately-working plungers.

In the foregoing description is shown the preferred form of the invention, but is not necessarily limited thereto, as modifications may be made therein without departing from the principle of the invention or sacrificing any of its advantages, and the right is therefore reserved of making all the changes which may fairly fall within the scope of the invention and the claims made therefor.

Having thus described the invention, what is claimed is—

1. A pumping apparatus, comprising a supporting-frame having a cylinder associated therewith, two plungers disposed for alternate movement in said cylinder, a driver-shaft carried by said frame and having spaced gears eccentric thereto and oppositely disposed thereon, counter-shafts upon opposite sides of said driver-shaft and carrying gears having crank-pins and eccentric to their shafts and interengaging said eccentric gears upon said driver-shaft, and connecting means between said crank-pins and plunger-rods, whereby the operative strokes of said plungers will be at a slower speed and with increased force, substantially as described.

2. A pumping apparatus, comprising a supporting-frame having a cylinder associated therewith, two plungers disposed for alternate movement in said cylinder, a driver-shaft carried by said frame and having spaced gears eccentric thereto and oppositely disposed thereon, counter-shafts upon opposite sides of said driver-shaft and carrying gears having crank-pins and eccentric to their shafts and engaging the gears upon said driver-shaft, and connecting-rods between said crank-pins and said cross-heads, substantially as described.

3. In a pumping apparatus of the class described, a supporting-frame having four uprights, reversely-diagonal cross-heads engaging said uprights and disposed crosswise with relation to each other, a tubular plunger-rod connected with the lower cross-head, a plunger-rod connected with the upper cross-head and extending through the tubular plunger-rod, reversely-disposed eccentrics arranged, one pair at each end of the frame, and pitmen connecting opposite ends of each cross-head with an eccentric at each end of the frame.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JAMES E. SMITH.

Witnesses:

WM. O'REILLY,

I. N. JACKSON.