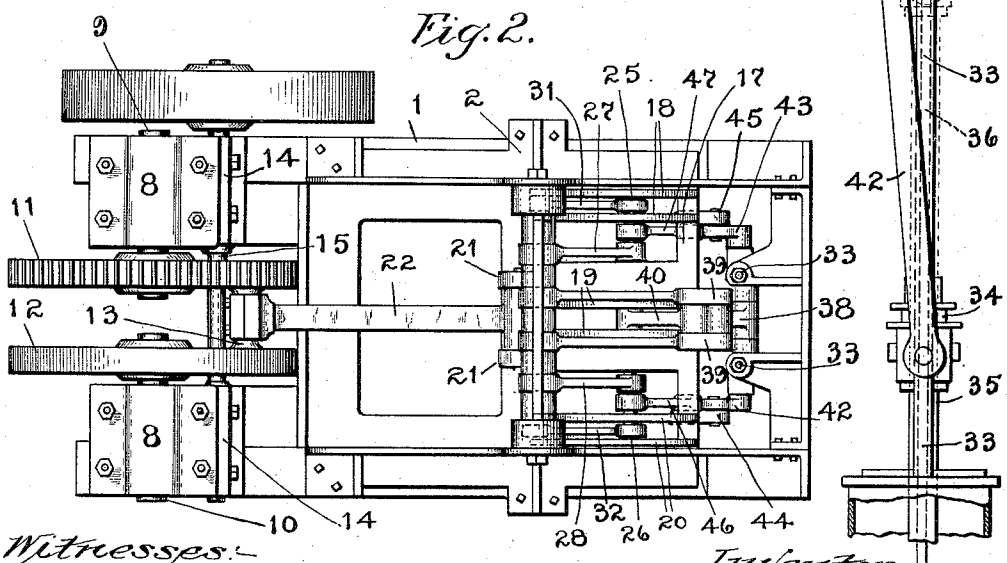
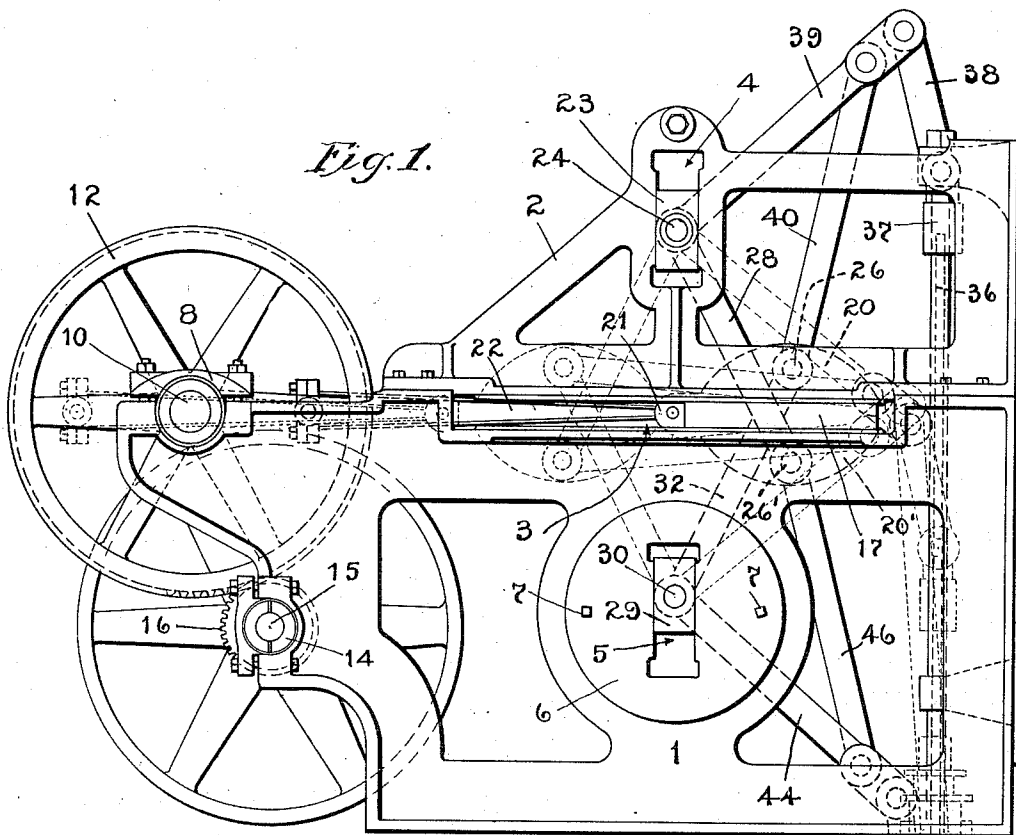


L. P. NORTON.
PUMP OPERATING MECHANISM.
APPLICATION FILED JUNE 27, 1911.

2 SHEETS--SHEET 1.



Witnesses:-
 Lester H. Fulmer.
 Lilla D. Alter.

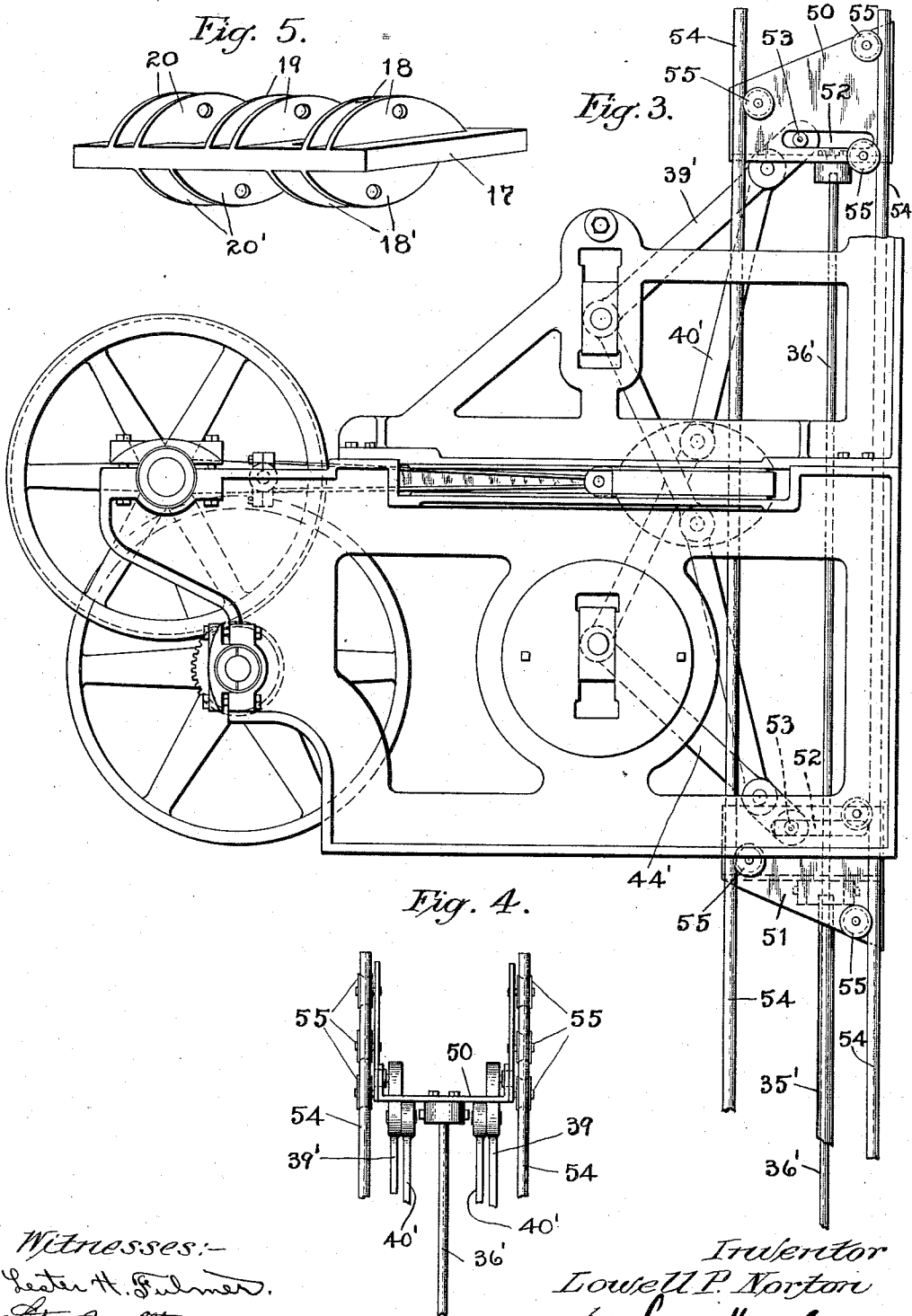
Inventor:
Lowell P. Norton
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2 SHEETS—SHEET 2.



Witnesses:-
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Lester O. Allen.

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UNITED STATES PATENT OFFICE.

LOWELL PRINSTON NORTON, OF ARDEN, NEVADA.

PUMP-OPERATING MECHANISM.

1,018,583.

Specification of Letters Patent.

Patented Feb. 27, 1912.

Application filed June 27, 1911. Serial No. 635,681.

To all whom it may concern:

Be it known that I, LOWELL P. NORTON, a citizen of the United States, residing at Arden, in the county of Clark and State of Nevada, have invented a new and useful Pump-Operating Mechanism, of which the following is a specification.

This invention relates to pump operating mechanism and has for its object to provide a novel and improved means for converting rotary motion into a reciprocatory motion, the invention being particularly adapted for operating double plunger pumps wherein two rods are simultaneously moved in opposite directions during each half of each stroke.

Referring to the drawings:—Figure 1 is a side elevation, full lines and heavy dotted lines showing the position of the parts in one extreme position, light dotted lines showing the position of the parts in the other extreme position. Fig. 2 is a plan view. Fig. 3 is a side elevation of another form. Fig. 4 is a front elevation of one of the vertically moving heads. Fig. 5 is a perspective view in detail of the horizontal cross head.

The machine comprises a frame consisting of lower side frames 1 and upper side frames 2 bolted to the lower side frames 1. Between each upper and lower side frame 1 and 2 is formed a horizontal way 3, and formed in each upper side frame 2 is a vertical way 4, and in each lower side frame 1 is a vertical way 5, the latter being preferably formed in a disk 6 which is secured by bolts 7 to the side frame 1. The disk 6 may be revoluble in the side frame 1 and the slot 5 machined therein, after which the disk 6 may be bolted to the frame 1 in an angular position such that the slot 5 is in parallelism with the upper slot 4. The lower frame 1 is constructed with bearings 8 in which, as shown in Fig. 2, are mounted shafts 9 and 10, shaft 9 carrying a gear 11 and shaft 10 carrying a fly-wheel 12, and fly-wheel 12 and gear 11 carrying a crank pin 13. The lower side frames 1 are provided with journals 14 in which is mounted a driving shaft 15 with a pinion 16 which meshes with the gear 11.

Sliding in the horizontal ways 3 is a horizontal cross head 17, shown in detail in perspective in Fig. 5. The horizontal cross head 17 on its upper side is provided with three sets of lugs 18, 19 and 20 and on its

lower side with lugs 18' and 20', and at one side is formed with lugs 21 to which one end of a connecting rod 22 is pivoted, the other end of the connecting rod 22 being connected to the crank pin 13 so that the rotation of gear 11 and fly-wheel 12 imparts longitudinal reciprocation to the cross head 17.

Sliding in the upper ways 4 are blocks 23 in which is mounted a shaft 24. Secured to the lugs 18 is a pin 25, and secured to the lugs 20 is a pin 26, and secured to the lugs 18' is a pin 25', and secured to lugs 20' is a pin 26'. A connecting rod 27 extends from the pin 25' to the shaft 24 and a connecting rod 28 extends from the pin 26' to the shaft 24. Sliding in the lower slots 5 are blocks 29, and a shaft 30 is carried thereby, and extending from pin 25 to the shaft 30 is a connecting rod 31, and extending from the pin 26 to the shaft 30 is a connecting rod 32, so that as the horizontal cross head 17 reciprocates the connecting rods 27 and 28 serve to reciprocate the blocks 23 and shaft 24 vertically and at the same time the connecting rods 31 and 32 serve to reciprocate the blocks 24 and shaft 30 vertically, shafts 24 and 30 being moved simultaneously first from each other and then toward each other, being at their extreme outward end of stroke when the cross head 17 is at mid stroke and being at their extreme inner end of stroke when the cross head 17 is at either extreme of its stroke. Thus the shafts 24 and 30 are given two strokes for each stroke of the cross head 17 and the action of the connecting rods 27, 28, 31 and 32 in swinging between the respective shafts 24 or 30 and central horizontal cross head 17 is very powerful being that of a toggle in effect, the greatest power and slowest movement being imparted to the shafts 24 and 30 when they are at their outer ends of stroke.

Extending vertically and supported by the lower and upper frames 1 and 2 are two guide rods 33 on which is slidable a cross head 34, cross head 34 being attached to the outer tubular pump plunger 35. Extending through the outer tubular pump plunger 35 is an inner pump rod 36, the upper end of which is connected to a cross head 37 which travels on the rods 33, and a link 38 connects the upper cross head 37 with the outer end of a pair of arms 39, the other ends of the latter being journaled on the shaft 24, while

an intermediate link 40 is connected at its upper end to the arms 39, and its lower end is pivotally connected to the lugs 19.

The lower ends of two links 42 and 43 are connected to the lower cross head 34 and the upper end of the link 42 is connected to the outer end of an arm 44 which is pivoted on the shaft 30, while the upper end of the link 43 is connected to the outer end of an arm 45 which is pivoted on the shaft 30. Respectively pivoted to the arms 44 and 45 are links 46 and 47 which are also respectively pivoted to pins 26' and 25'. Pin 25' is directly back of pins 26' in Fig. 1, and in Fig. 2 it is immediately below cross head 17 and is therefore not seen in the drawings.

In operation, as the horizontal cross head 17 reciprocates, it imparts a thrust motion to the links 40, 46 and 47 so that the arm 40 as it is thrust outward acts upon the arms 39 to swing them upwardly and they acting through link 38 pull up the cross head 37 and pump rod 36. The links 46 and 47 which are thrust downward by the cross head 17 swing down the arms 44 and 45 and the latter acting through links 42 and 43 push down the pump rod 35. As the cross head 17 moves in the other direction it operates the links 40, 46 and 47 in the opposite direction and retracts cross heads 34 and 37 and pump rods 35 and 36.

It should be noted that when the cross heads 37 and 34 are in their extreme position apart from each other that the links 40, 45 and 46 stand nearly vertical with the cross head 17 near or at one end of its stroke. Thus when the cross heads 34 and 37 are in this position, although moving slowly, they receive the greatest power from the links 40, 45 and 46 on account of the angular position of the latter.

In addition to the swinging motion of the arms 39, 44 and 45 their pivots also are given the bodily motion before described. Thus as the arms 39 are swung upward their shaft 24 is moved upward during one-half of the stroke of the cross head 17 and down during the other half of the stroke of the cross head 17. This results in keeping the ends of the arms 39 more nearly directly over and in line with the cross head 37 than if the shaft 24 were held stationary and the outer ends of arms 39 had a path of movement which was a perfect circle, in which latter case their ends would sweep away from the line of movement of the cross head 37 as it swung upwardly. The same effect is produced by the lower arms 43 and 44, the shaft 30 also having a bodily movement similar to the shaft 24.

In the form shown in Figs. 3 and 4, I have employed a slightly different form of construction which is more especially adapted for heavy duty pumps. In this form of

construction, I employ, instead of the links 38 and 42 of the preceding form, an upper cross head 50 and a lower cross head 51 which are provided with transverse slots 52, and engaging in the slots 52 are rollers 53 carried on the ends of the respective arms 39' and 44'. The cross heads 50 and 51 slide vertically on rods 54, there being rollers 55 provided for reducing friction. The pump rod 36' is connected to the upper cross head 50, as clearly shown in Figs. 3 and 4, while the lower pump rod 35' is connected to the lower cross head 51, as clearly shown in Fig. 3. Also two links 40' are employed spaced apart sufficiently to receive the upper end of the pump rod 36', as shown in Fig. 4, the two links 40' being pivotally connected to the two arms 39'. Otherwise the construction employed in this form is similar to the preceding form.

What I claim is:—

1. In a pump operating mechanism, two reciprocating cross heads adapted for the attachment of the pump rods, a pair of swinging arms, a shaft supporting each arm and vertically movable, a link connecting each arm with the associated cross head, a reciprocating cross head traveling at right angles to the first named cross heads, a link extending from each of said vertically movable shafts to said horizontally movable cross head, and means for reciprocating said latter cross head.

2. In a pump operating mechanism, two vertically movable cross heads adapted to operate two pump rods simultaneously in opposite directions, a pair of pivoted arms, links connecting the respective arms with the associated cross heads, a horizontally movable cross head, links extending from the latter cross head to said pivoted arms, means operated by the latter cross head for reciprocating the pivoted ends of said arms at right angles to the direction of stroke of said cross head, and means for operating said cross head.

3. In a pump operating mechanism, two vertically movable cross heads adapted to operate two pump rods simultaneously in opposite directions, a pair of pivoted arms, means connecting each arm with its associated cross head for operating the cross head from the arm, a horizontally movable cross head, links extending from the respective arms to the latter cross head, vertically movable shafts supporting said arms, links extending from said shafts to the latter cross head, and means for operating said latter cross head.

4. In a pump operating mechanism, a frame provided with two sets of vertical ways, blocks slidable in said ways, a shaft carried by each set of blocks, arms pivotally supported by said shafts, two vertically operating cross heads, means operatively con-

necting each cross head with its associated arm, said frame having horizontal ways, a main cross head sliding in the horizontal ways, links extending from said main cross head to the respective sliding blocks, and links extending from said cross head to said arms for imparting a swinging motion to said arms and simultaneously producing a bodily movement of the pivotal support of said arms.

5. In a pump operating mechanism, a pair of vertically operating cross heads, a pair of arms, means operatively connecting said

arms with the respective cross heads for operating the latter, a horizontally movable cross head, means for reciprocating the latter cross head, and means operated by said latter cross head for simultaneously swinging said arms and bodily reciprocating the pivotal supports of said arms at right angles to the movement of said latter cross head.

LOWELL PRINSTON NORTON.

In presence of—
HENRY M. LILLIS,
A. N. PAUFF.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
