

March 18, 1941.

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2,235,631

VARIABLE STROKE PUMP

Filed Sept. 13, 1939

2 Sheets-Sheet 1

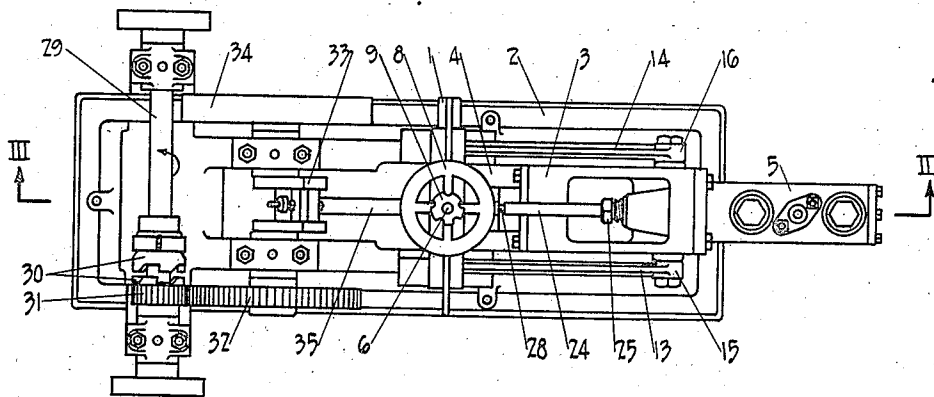


FIG. 1

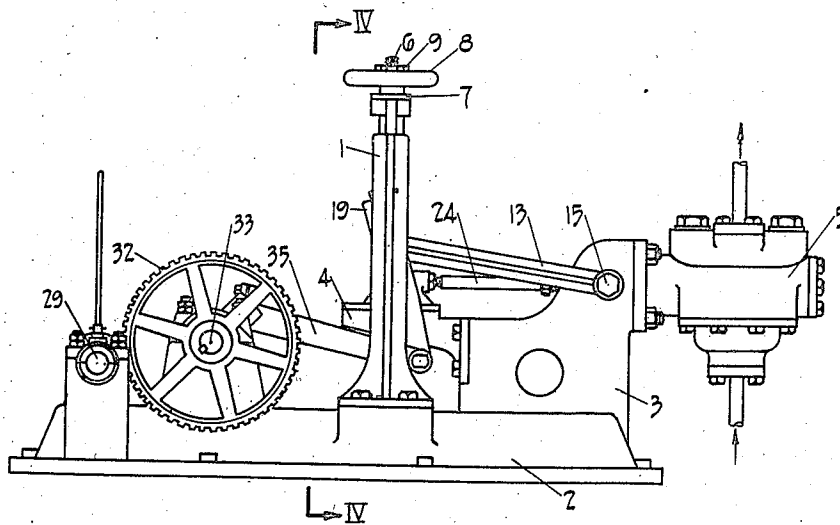


FIG. 2

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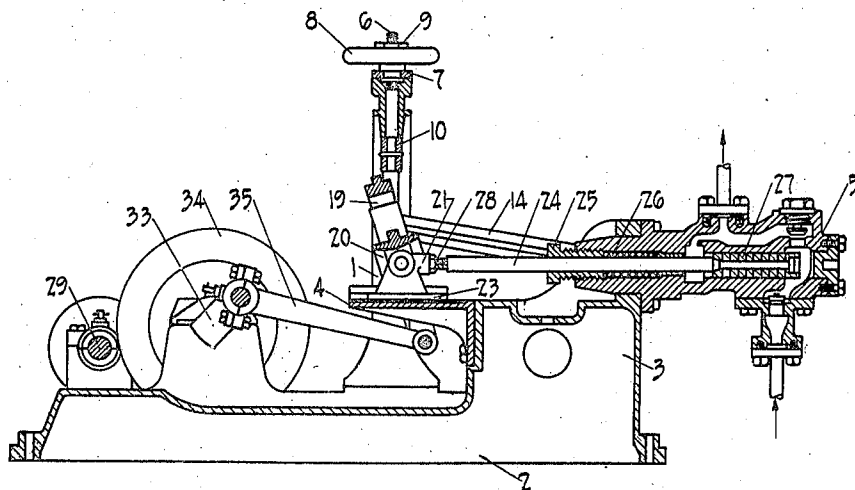


FIG. 3

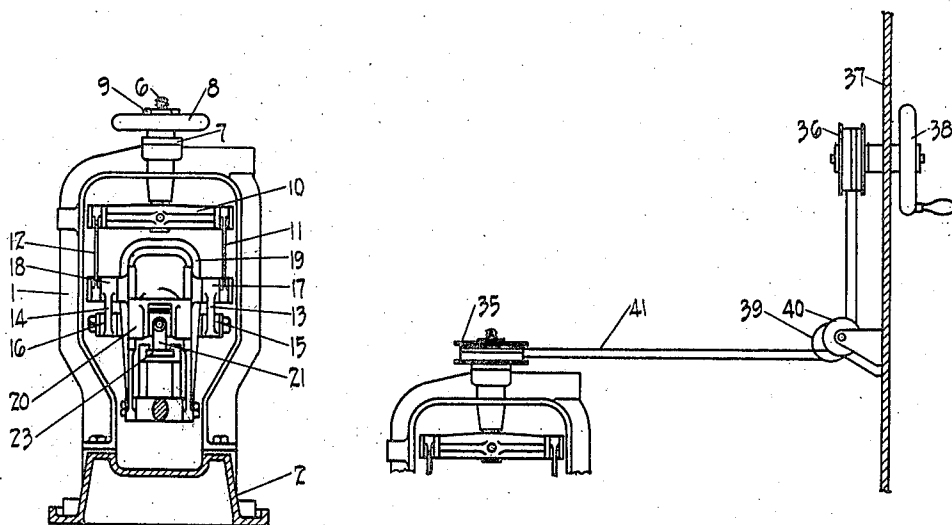


FIG. 4

FIG. 5

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UNITED STATES PATENT OFFICE

2,235,631

VARIABLE STROKE PUMP

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4 Claims. (Cl. 103—38)

The present invention relates to pumping devices of the proportioning type. More particularly the invention relates to proportioning pumps wherein the rate of delivery is varied according to variations in the length of stroke of a reciprocating piston pump.

One of the objects of the present invention is to provide a simple, advantageous and practical construction of a proportioning device of the class specified.

Another object is to provide an improved means of adjusting the delivery rate of the pump.

A further object is to provide adjustment means particularly adapted to remote control.

Still further, it is an object of this invention to provide improved means whereby the rate of delivery of the pump may be easily varied during operation.

Other objects of the invention will appear and be pointed out hereinafter.

In the accompanying drawings:

Figure 1 is a plan view of the unit.

Figure 2 is a side elevation of the unit.

Figure 3 is a side elevation taken along the line 3—3 of Figure 1.

Figure 4 is an end elevation taken along the line 4—4 of Figure 2.

Figure 5 is a fragmentary view of the top of the unit showing one method of adapting the adjusting wheel to remote control.

In Figures 1, 2, 3 and 4, a support bracket 1 is mounted on a bed 2. Formed as an integral part of the bed 2 is a support 3 on which is removably mounted a platform support 4 and a pump cylinder 5. A spindle 6, threaded at the upper end to receive bearing ring 7, hand wheel 8 and lock nut 9, is slidably mounted in the top of support bracket 1 and supports an upper cross-piece 10. Two links 11 and 12 are pivotally attached to the upper cross-piece 10 at their upper ends. A pair of toggle levers 13 and 14 pivotally mounted at one end on support 3 at 15 and 16, the other end being pivotally attached to and supported by the lower ends of links 11 and 12 at 17 and 18.

Also pivotally attached and supported at 17 and 18 is a forked yoke 19 straddling a platform support 4. A slideshoe 20 slidably mounted in yoke 19 is pivotally attached to a crosshead 21 by means of wrist-pin 22, crosshead 21 being in itself slidably mounted on platform support 4 at 23. Piston rod 24 leading through packing nut 25 and packing gland 26 to piston 27 is attached to crosshead 21 at 28.

A drive shaft 29 mounted on bed 2 is provided with a dog clutch 30 and driving gear 31 meshing

with a spur gear 32 keyed on a crankshaft 33 which is also mounted on bed 2. Also mounted on crankshaft 33 is a flywheel 34. A connecting rod 35 driven by crankshaft 33 is pivotally attached at one end to the lower end of forked yoke 19.

In Figure 5, the handwheel has been replaced by a pulley wheel 35. A second pulley wheel 36 is mounted on a panel 37 and is rotated by a handwheel 38 on the opposite side of the panel. A pair of pulley wheels 39 and 40 are also mounted on panel 37. By means of a belt drive 41 pulley wheel 35 may be rotated by turning handwheel 38.

The operation of the mechanism is as follows:

A reciprocating action is delivered to the piston rod 24 by the rocking arm effect of the pivoted yoke 19 acting through slideshoe 20 and crosshead 21. Since toggle levers 13 and 14 are mounted on the frame 3 at 15 and 16 and on the rocking yoke 19 at 17 and 18 these last two points will act as fulcrum points. Therefore, as the stationary handwheel 18 is turned and cross-piece 10 raised or lowered, indirectly raising and lowering toggle levers 13 and 14, the extent of the rocking motion of slideshoe 20, and accordingly the degree of reciprocation transmitted to crosshead 21 attached to piston rod 24 will be varied.

When the toggle levers 13 and 14 are lowered so as to be in alignment with piston rod 24, the fulcrum point of the rocking yoke 19 will also be in the horizontal plane of the piston rod and there will be no reciprocating motion transmitted. As the toggle's levers are raised, the length of stroke of the piston rod will gradually increase to its allowable maximum.

Numerous advantages are to be found in the present design over existing mechanisms of the general type, as for example, the adjustment wheel is stationary at all times, thus making for more efficient, accurate and simple control of delivery rates. This feature is also particularly desirable for remote control purposes as various types of such devices may be installed with little or no modification of the unit and without the necessity of the complicated arrangements required when the adjustment means moves during the operation of the pump.

Another advantage is the arrangement of the pump and piston rod whereby, due to the mounting of crosshead 21 in the platform support 4 at 23, the piston rod is always maintained in positive alignment and any possibility of lateral stresses avoided. Further, the horizontal pump axis provided enables the ready removal of gas pockets from the pump when pumping liquids.

Still another advantage is the fact that the pump proper is detachably mounted to the drive unit. This enables the use of various types of reciprocating pump elements, as for example
 5 double acting, single acting, diaphragm, etc., without modification of the drive unit.

An additional advantage of this invention is that several similar pumps can be readily driven by one source of power without the usual require-
 10 ment of pack shafts, etc.

I claim as my invention:

1. A variable stroke proportioning pump unit of the class described comprising a frame, a piston cylinder and a reciprocable piston, a piston rod for reciprocating said piston, a cross-
 15 head slidably mounted on said frame, one end of said piston rod being rigidly attached to said crosshead, a support rigidly mounted on said frame, a slideshoe pivotally attached to said crosshead, a yoke slidably mounted on said slide-
 20 shoe, a pair of toggle levers pivotally mounted at one end on said frame in the same horizontal plane as the axis of said piston cylinder, the other ends of said toggle levers being pivotally
 25 attached to said yoke, a cross-piece above said yoke, means for forming a pivotal connection between said yoke and said cross-piece, a threaded spindle rigidly attached to said cross-piece, extending upwards and through said pre-
 30 viously mentioned support, being slidably mounted therein, a wheel threaded on the upper end of said spindle whereby vertical adjustment of said cross-piece will be attained by rotation of said wheel, a crank arm pivotally connected to
 35 the lower end of said yoke and means for operating said crank arm.

2. Apparatus according to claim 1 including a second wheel positioned remotely from said apparatus and interconnecting means whereby ro-
 40 tation of said second wheel will cause rotation of said first wheel.

3. A variable stroke proportioning pump unit of the class described comprising a frame, a piston cylinder and reciprocable piston, a piston
 45 rod for reciprocating said piston, a crosshead

slidably mounted on said frame, one end of said piston rod being rigidly attached to said cross-
 head, a support rigidly mounted on said frame, a slideshoe pivotally attached to said crosshead, a yoke slidably mounted on said slideshoe, a pair
 5 of toggle levers pivotally mounted at one end of said frame in the same horizontal plane as the axis of said piston cylinder, the other ends of said toggle levers being pivotally attached
 10 to said yoke, a cross-piece above said yoke, means for forming a pivotal connection between said yoke and said cross-piece, spindle means supporting said cross-piece and supported by
 15 said previously mentioned support, means for adjusting the vertical disposition of said spindle means whereby vertical adjustment of said cross-piece will be coactively attained, a crank
 20 arm pivotally connected to the lower end of said yoke and means for operating said crank arm.

4. Mechanism suitable for adjustment of the
 20 degree of reciprocation of a reciprocating element comprising a frame, a crosshead slidably mounted on said frame, one end of said re-
 25 ciprocating element being rigidly attached to said crosshead, a support rigidly mounted on said frame, a slideshoe pivotally attached to said crosshead, a yoke slidably mounted on said slideshoe, a pair of toggle levers pivotally
 30 mounted at one end on said frame in the same horizontal plane as the longitudinal axis of said reciprocating element, the other ends of said toggle levers being pivotally attached to said
 35 yoke, a cross-piece above said yoke, means for forming a pivotal connection between said yoke and said cross-piece, a vertically disposed element supporting said cross-piece and supported
 40 by said previously mentioned support, means adapted for adjusting the vertical disposition of said vertically disposed element whereby vertical dispositional adjustment of said cross-piece will
 45 be coactively attained, a crank arm pivotally connected to the lower end of said yoke and means for operating said crank arm.

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