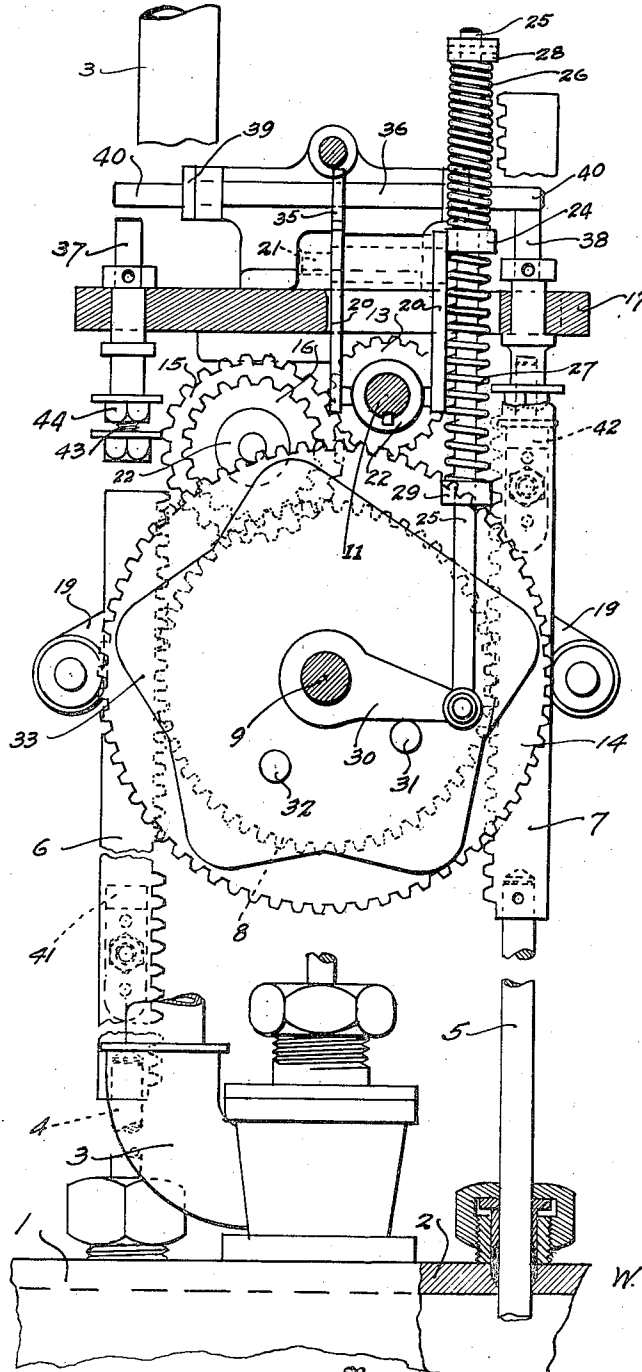


W. T. HATMAKER.
MEASURING PUMP.
APPLICATION FILED JULY 19, 1920.

1,378,029.

Patented May 17, 1921.
2 SHEETS—SHEET 1.

FIG. 1.



Inventor
W. T. HATMAKER.

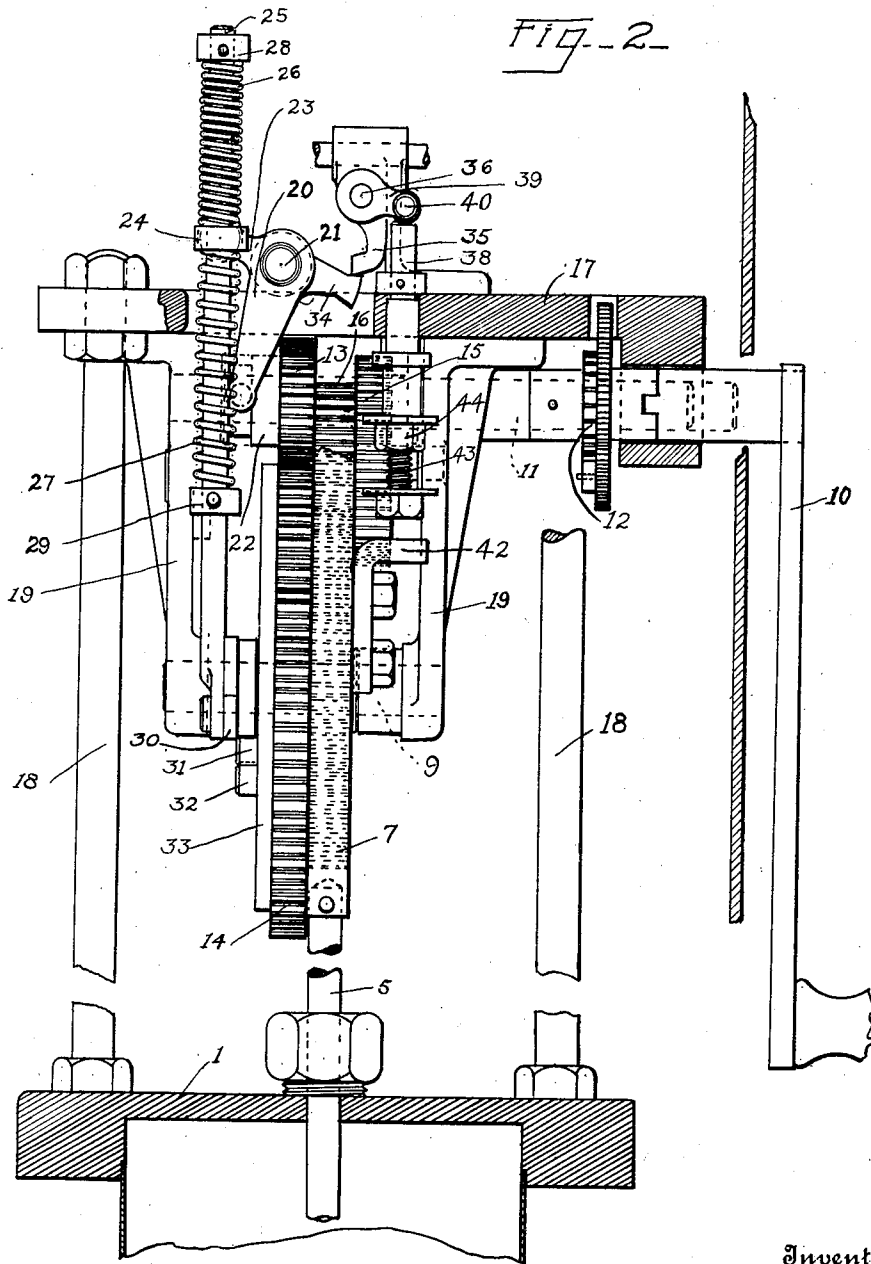
Carroll Reed
Attorney

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2 SHEETS—SHEET 2.



Inventor

W. T. HATMAKER.

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UNITED STATES PATENT OFFICE.

WILLIAM T. HATMAKER, OF DAYTON, OHIO, ASSIGNOR TO THE PROTECTO PUMP COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

MEASURING-PUMP.

1,378,029.

Specification of Letters Patent.

Patented May 17, 1921.

Application filed July 19, 1920. Serial No. 397,491.

To all whom it may concern:

Be it known that I, WILLIAM T. HATMAKER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Measuring-Pumps, of which the following is a specification, reference being had therein to the accompanying drawing.

10 This invention relates to operating mechanism for measuring pumps and is in the nature of an improvement on the device shown and described in Patent No. 1,316,032, granted to me September 16, 1919.

15 The measuring pump of the above mentioned patent comprises a cylinder, a piston operating therein and an operating member, shown as a crank, having operative movement in a forward direction only and which is connected with the piston by reversing mechanism comprising a movable part which can be shifted from one position to another to cause the continued forward movement of the operating member to move the piston in opposite directions. Suitable automatic means are provided for controlling the movement of the movable member so that it will be shifted at the proper time.

30 The object of the present invention is to provide a simple and efficient mechanism for controlling the shifting of the movable member of connecting mechanism.

A further object of the invention is to provide such a mechanism in which the movable member will be positively held against shifting movement until the piston has completed a predetermined movement, thereby preventing the short stroking of the piston and insuring the delivery of a full measure of liquid to the customer.

Other objects of the invention will appear as the mechanism is described in detail.

45 In the accompanying drawings Figure 1 is a view of a portion of a liquid measuring pump, partially broken away to show the operating mechanism in front elevation; and Fig. 2 is a similar view, partially broken away to show the operating mechanism in side elevation.

50 In these drawings I have illustrated one embodiment of my invention and have shown the same as applied to a double cyl-

inder pump, the pistons of which are operated by an operating member having operative movement in a forward direction only and which is connected with the two pistons through suitable gearing comprising a pinion movable from one position to another to reverse the direction of the movement imparted to the pistons by the forward movement of the operating member. This movable member, or pinion, is shifted by means of a spring actuated device, the spring of which is placed under tension as the pistons approach the limits of their movement in one direction and which is held positively against operation until the pistons have completed their movements, at which time the spring actuated device is released and permitted to operate, under the influence of the spring which has been compressed, to shift the pinion, thereby reversing the direction of the movement of the pistons without reversing the direction of movement of the operating member. The mechanism for accomplishing this result may take various forms and it will be understood that that here shown has been chosen for the purpose of illustration only.

In that form of the mechanism illustrated in the present drawings, the pumping devices comprise two cylinders, the heads of which are shown at 1 and 2 and both of which are connected with a common discharge pipe 3, which, in the arrangement here shown, extends upwardly to a point above the operating mechanism. Mounted in the respective cylinders are pistons, not shown, provided with piston rods 4 and 5, extending upwardly through the cylinder heads and having at their upper ends toothed portions 6 and 7 constituting rack bars which mesh with a driving gear 8 carried by a shaft 9. The two rack bars are arranged on the opposite sides of the gear 8 so that the movement of this gear in one direction will move the piston of one cylinder in a direction to discharge the liquid therefrom and will move the piston of the other cylinder in the opposite direction to permit the cylinder to be again filled with liquid above the piston. Obviously, the movement of the gear in the opposite direction will reverse the direction of movement of the pistons and will cause the first mentioned piston to be moved downwardly, or

in a filling direction, and the last mentioned piston to be moved upwardly, or in a discharge direction.

Movement is imparted to the gear 8, which constitutes a part of the pumping devices, by an operating member which may be of any suitable character but which is here shown as a crank 10 mounted on a shaft 11 and capable of operative movement in a forward direction only. If desired, the rearward movement of the operating member may be prevented by suitable pawl and ratchet mechanism, the ratchet wheel of such a mechanism being shown at 12 in Fig. 2. Interposed between the operating member, or crank 10, and the gear 8 of the pumping device is suitable connecting mechanism which, as here shown, comprises two sets of gearing and a pinion connected with the operating device and movable into operative relation with either train of gearing. As here shown, the pinion, 13, is slidably mounted on the shaft 11 and is held against rotation relatively thereto, preferably by splining it to the shaft. When the pinion 13 is at the limit of its movement in one direction it will mesh directly with a gear 14 mounted for rotation about the axis of the shaft 9 and rigidly secured to the gear 8 so that any movement imparted to the gear 14 will be transmitted in the same direction to the gear 8. When the pinion 13 is shifted to the opposite limit of its movement it will be brought into mesh with an intermediate, or idle, gear, 15, which is connected directly with the gear 8. In the present instance, because of the arrangement of the parts, the gear 15 has rigidly secured thereto, and forming in effect a part thereof, a second gear 16 which meshes with the gear 8. It will be apparent, however, that the gears 15 and 16 form in effect a single intermediate gear through which the movement of the pinion 13 is transmitted to the gear 8 in a direction opposite that imparted to the gear 8 through the gear 14.

The several gears and the operating member may be supported in any suitable manner but in the particular arrangement here illustrated a supporting frame 17 is carried by standards, or upright rods, 18 and has rigidly secured thereto depending brackets 19 in which the shafts 9 and 11 are journaled. This frame is here shown in the form of a plate and also serves to support the other parts of the mechanism to be hereinafter described.

The slidable pinion is shifted from one position to the other automatically, this being preferably accomplished by a spring actuated device which, as here shown, comprises a lever, or yoke, 20 pivotally mounted on a shaft 21 carried by the frame member 17 and having its arms connected at their free ends with a grooved collar 22 rigidly

secured to the pinion 13. Rigidly connected with the yoke 20 is an arm 23 the free end of which is connected with a collar 24 slidably mounted on a rod 25 and constituting a movable stop. Mounted on the rod 25 on opposite sides of the movable stop 24 are springs 26 and 27 which are confined respectively between the movable stop 24 and fixed stops 28 and 29 mounted on the rod 25 above and below the movable stop 24. Longitudinal movement is imparted to the rod 25 in one direction or the other as the pistons of the pumping devices approach the limits of their movement and in the present instance this is accomplished by connecting the rod 25 at its lower end with an arm 30 pivotally mounted on the shaft 9 and arranged in the paths of projections connected with the gear 8. In the present construction these projections are in the form of pins 31 and 32 carried by a cam 33 which is rigidly secured to the gear 14. This cam forms a part of a recording mechanism and forms no part of the present invention, the pins being mounted on this cam merely as a convenient method of connecting them with the gear 8. The pins are so arranged that as the gear 8 approaches the limit of its movement in one direction the pin 32 will engage the arm 30 and impart downward movement to the rod 25 and as the gear 8 approaches the limit of its movement in the opposite direction the pin 31 will engage the arm 30 and impart upward movement to the rod 25. During the movement of the rod 25 the collar 24 is held in a fixed position so that the rod will move relatively thereto, thereby causing one or the other of the springs 26 and 27 to be compressed, this depending upon the direction of movement of the rod 25. In the construction here shown, an arm 34 is mounted on the shaft 21 and rigidly connected with the yoke 20 and the arm 23, and cooperating with this arm 34 is a pivoted dog, or stop, 35 carried by a shaft 36 mounted in suitable brackets carried by the frame member 17. The nose of the dog 35 and the end of the arm 34 are so arranged that when the pinion 13 is in one position the dog will engage the upper edge of the arm 34, as shown in Fig. 2, and when the pinion is in its other position the nose of the dog will engage the lower edge of the arm 34, and in either instance the arm 34 and the parts connected therewith, including the pinion, are held positively against movement. Means are provided for moving the dog 35 into an inoperative position and releasing the arm 34 of the spring actuated device so that the latter can impart movement to the pinion, and this means is controlled by the pumping devices in such a manner that the dog will be moved into its inoperative position at the instant that the piston which is moving in a direction to dis-

charge the liquid from its cylinder has reached a predetermined position, that is, a position in which it will have discharged a full measure of liquid from the cylinder.

5 As here shown, I have slidably mounted in the frame member 17 two vertically movable rods, or plungers, 37 and 38, the upper ends of which are arranged to actuate a trip arm 39 rigidly secured with the dog 35. In the
10 present instance, the trip arm 39 comprises two members which are spaced apart and which have mounted therein a rod 40, the end portions of which lie in the paths, respectively, of the plungers 37 and 38. These
15 plungers are arranged adjacent to the toothed portions of the piston rods which are provided with tripping devices, here shown in the form of laterally projecting lugs 41 and 42 so arranged that they will
20 engage the lower ends of the plungers just prior to the completion of the upward movement of the rack bar, or piston rod, and will move the dog out of engagement with the arm 34 of the spring actuated device, just
25 as the rack bar completes its upward movement. The plungers are preferably adjustable so that the tripping of the dog may be properly timed and to this end the lower, or contact, portions thereof are in the form of
30 screws 43 threaded into the lower ends of the bodies of the plungers and locked in their adjusted positions by nuts 44.

The operation of the device will be readily understood from the foregoing description
35 of the several parts thereof and it will be apparent that the parts in the positions shown in the drawings, upward movement is being imparted to the piston rod 5 by the forward movement of the crank. The dog
40 35 is in engagement with the upper edge of the arm 34 of the spring actuated device and the movement of the gear 8 is being transmitted to the rod 25 in a downward direction so as to place the upper spring 26
45 under tension. The piston rod 5 has not quite completed its movement but a slight further movement of the same in an upward direction will cause the lug 42 thereon to engage the plunger 38 and trip the dog 35,
50 thereby releasing the spring actuated device and permitting the spring which has been compressed to expand and shift the pinion out of engagement with the gear 14 and into engagement with the intermediate gear 15,
55 thereby causing the gear 8 to be moved in a reverse direction by the continued forward movement of the crank 10. If the spring actuated device has sufficient power to force the pinion 13 out of mesh with its gear
60 while pressure is being applied to the operating member, the spring will be so heavy as to be objectionable and I therefore prefer to use a relatively light spring and to relieve the pressure on the operating member
65 at the end of each stroke, it being apparent

that the forward movement of the operating member will be checked by the contact of the lug 42 with the plunger 38. No rearward movement is imparted to the operating member but by relieving the pressure thereon
70 the frictional contact between the pinion and that gear with which it is in mesh is so reduced that the relatively light spring which I employ is enabled to shift the pinion. If the teeth of the pinion are not
75 in line with the spaces between the teeth of the gear toward which it is moved the first forward movement of the operating member will bring the same into line and the pinion will slip into mesh with its gear.
80 This movement of the pinion also moves the arm 34 of the spring actuated device into a position above the level of the nose of the dog 35 and as soon as downward movement has been imparted to the piston rod 5, the
85 dog will move by gravity into a position to engage the lower edge of the arm 34, thus locking the spring actuated device against further movement until the dog 35 is tripped by the upward movement of the other piston rod, 4. In this manner it will be apparent not only that I have provided a very
90 simple and efficient mechanism for automatically reversing the movement of the pistons without reversing the direction of movement of the operating member, but that
95 this mechanism is of such a character that the mechanism cannot be reversed until the pistons have completed their movements and a full measure of liquid has been discharged
100 from the one cylinder, and the other cylinder has been again filled with liquid.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited
105 to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a mechanism of the character described, a pumping device, an operating member therefor, a reversible connection between said operating member and said pumping device comprising a movable member, a spring actuated device to shift said movable member, means controlled by said pumping device to place the spring of said spring actuated device under tension, and means to
120 prevent the movement of said movable member by said spring actuated device until said pumping device has completed a predetermined movement.

2. In a mechanism of the character described, a pumping device, an operating member therefor, a reversible connection between said operating member and said pumping device comprising a movable member, a spring actuated device to shift said
130

movable member, means controlled by said pumping device to place the spring of said spring actuated device under tension, a locking device to hold said spring actuated device against movement, and means to render said locking device inoperative when said pumping device has completed a predetermined movement.

3. In a mechanism of the character described, a pumping device comprising a gear, an operating member, connecting mechanism interposed between said operating member and said gear and comprising a part movable from one position to another to cause said gear to be moved in opposite directions by the movement of said operating member in one direction, a spring actuated device to shift said movable part, means actuated by said gear to place the spring of said spring actuated device under tension, and means controlled by said pumping device to hold said spring actuated device against movement until said gear has completed its movement in one direction.

4. In a mechanism of the character described, a pumping device, an operating member therefor, a reversible connection between said operating member and said pumping device comprising a movable member, means for actuating said movable member comprising a part adapted to be connected with said operating mechanism for movement thereby in opposite directions, springs connected with said member of said actuating device, a movable stop to be engaged by one of said springs to cause the latter to be compressed when the movable member of said actuating means is moved in one direction, and means to hold said movable stop against movement until said pumping device has completed its movement in one direction and to then release the same to permit said actuating means to shift said movable member.

5. In a mechanism of the character described, a pumping device, an operating member therefor, a reversible connection between said operating member and said pumping device comprising a movable member, a rod adapted to be connected with said pumping device and to be moved in opposite directions thereby, fixed stops mounted on said rod, a movable stop interposed between said fixed stops, springs arranged between said movable stop and the respective fixed stops, an operative connection between said movable stop and said movable member of said reversible connection, and means to hold said movable stop against movement until said pumping device has completed a predetermined movement and to then release said stop.

6. In a mechanism of the character described, a pumping device comprising a gear, an operating member, connecting

mechanism interposed between said operating member and said gear and comprising a part movable from one position to another to cause said gear to be moved in opposite directions by the movement of said operating member in one direction, a rod mounted for longitudinal movement, means for causing movement to be imparted to said rod in one direction when said gear is rotated in one direction and for causing movement to be imparted to said rod in the opposite direction when said gear moves in the opposite direction, fixed stops mounted on said rod, a movable stop interposed between said fixed stops, springs mounted on said rod between said movable stop and the respective fixed stops, an operative connection between said movable stop and said movable member, and means controlled by said pumping device for holding said movable stop against movement until said gear has completed its movement in one direction and to then release said stop.

7. In a mechanism of the character described, a pumping device comprising a gear, an operating member, connecting mechanism interposed between said operating member and said gear and comprising a part movable from one position to another to cause said gear to be moved in opposite directions by the movement of said operating member in one direction, a rod mounted for longitudinal movement, means for causing movement to be imparted to said rod in one direction when said gear is rotated in one direction and for causing movement to be imparted to said rod in the opposite direction when said gear moves in the opposite direction, fixed stops mounted on said rod, a movable stop interposed between said fixed stop, springs mounted on said rod between said movable stops and the respective fixed stops, a bell crank lever having its respective arms connected with said movable stop and with said movable member, an arm connected with said bell crank lever, a dog to engage said arm to hold the same normally against movement, and means actuated by said pumping device to release said arm and to permit the movement of said stop when said gear has completed a predetermined movement.

8. In a mechanism of the character described, a pumping device comprising a gear, an operating member, connecting mechanism interposed between said operating member and said gear and comprising a part movable from one position to another to cause said gear to be moved in opposite directions by the movement of said operating member in one direction, a rod mounted for longitudinal movement, means for causing movement to be imparted to said rod in one direction when said gear is rotated in one direction and for causing

movement to be imparted to said rod in the opposite direction when said gear moves in the opposite direction, fixed stops mounted on said rod, a movable stop interposed
 5 between said fixed stops, springs mounted on said rod between said movable stop and the respective fixed-stops, a bell crank lever having its respective arms connected with said movable stop and with said movable
 10 member, an arm connected with said bell crank lever, a dog adapted to engage one side of said arm when said movable member is in one position and to engage the other side of said arm when said movable member
 15 is in its other position, and means actuated by said pumping device to move said dog into an inoperative position.

9. In a mechanism of the character described, a pumping device, an operating
 20 member therefor, a reversible connection between said operating member and said pumping device comprising a movable member, a lever for shifting said movable member from one position to another, springs
 25 to move said lever in opposite directions, means actuated by said pumping devices to cause one or the other of said springs to be placed under tension, and means to hold said lever against operative movement until
 30 said pumping device has completed a predetermined movement and to then release said lever and permit the same to be actuated by that spring which has been placed under tension.

35 10. In a mechanism of the character described, the combination with pumping cylinders, piston rods for said cylinders having toothed portions, a gear meshing with the
 40 respective toothed portions of said rods to move the latter simultaneously in opposite directions, and an operating member for said gear, of a reversible connecting mechanism between said operating member and
 45 said gear comprising a movable pinion, a spring actuated device for shifting said pinion from one position to another, a detent to hold said spring actuating device normally against movement, and means controlled by the movements of said piston rods
 50 to actuate said detent and release said spring actuated device.

11. In a mechanism of the character described, the combination with pumping cylinders, piston rods for said cylinders having
 55 toothed portions, a gear meshing with the respective toothed portions of said rods to move the latter simultaneously in opposite directions, and an operating member for said gear, of a reversible connecting mechanism between said operating member and
 60 said gear comprising a movable pinion, a spring actuated device for shifting said pinion from one position to another, and comprising a lever connected with said pinion, a holding device acting on said lever

when said pinion is in either position to hold said lever against movement, and means controlled by the movement of the respective piston rods to move said holding
 70 device into an inoperative position.

12. In a mechanism of the character described, the combination with pumping cylinders, piston rods for said cylinders having
 75 toothed portions, a gear meshing with the respective toothed portions of said rods to move the latter simultaneously in opposite directions, and an operating member for said gear, of a reversible connecting mechanism between said operating member and
 80 said gear comprising a movable pinion, a spring actuated device for shifting said pinion from one position to another, and comprising a lever connected with said pinion, a holding device acting on said lever when
 85 said pinion is in either position to hold said lever against movement, tripping devices for said detent movably mounted adjacent to the respective piston rods, and means carried by said piston rods for actuating the respective
 90 tripping devices to move said holding device into an inoperative position.

13. In a mechanism of the character described, the combination with pumping cylinders, piston rods for said cylinders having
 95 toothed portions, a gear meshing with the respective toothed portions of said rods to move the latter simultaneously in opposite directions, and an operating member for said gear, of a reversible connecting mechanism between said operating member and
 100 said gear comprising a movable pinion, a spring actuated device for shifting said pinion from one position to another, and comprising a lever connected with said pinion, an arm connected with said lever, a movable
 105 dog arranged to engage said arm to hold said lever in either of its two positions, tripping devices slidably mounted adjacent to the respective piston rods and each arranged to move said dog into an inoperative position, and parts carried by said piston rods
 110 to engage the respective tripping devices and actuate said dog.

14. In a mechanism of the character described, the combination with pumping cylinders, piston rods for said cylinders having
 115 toothed portions, a gear meshing with the respective toothed portions of said rods to move the latter simultaneously in opposite directions, and an operating member for said gear, of a reversible connecting mechanism between said operating member and
 120 said gear comprising a movable pinion, a spring actuated device for shifting said pinion from one position to another, and comprising a bell crank lever having one arm connected with said pinion, a rod mounted for longitudinal movement, means actuated
 125 by said gear for moving said rod in opposite directions according to the direction of

movement of said gear, fixed stops mounted
on said rod, a collar slidably mounted on
said rod between said fixed stops and con-
nected with the other arm of said bell crank
5 lever, springs coiled about said rod between
said collar and the respective fixed stops, an
arm connected with said bell crank lever, a
detent pivotally mounted adjacent to said
arm and having a nose arranged to engage
10 one side of said arm when said pinion is in
one position and to engage the other side

of said arm when said pinion is in the oppo-
site position, tripping devices movably
mounted adjacent to said detent, said detent
having a part connected therewith and lying 15
in the paths of both tripping devices, and
lugs carried by the respective piston rods
and arranged to actuate said tripping
devices.

In testimony whereof, I affix my signature 20
hereto.

WILLIAM T. HATMAKER.