

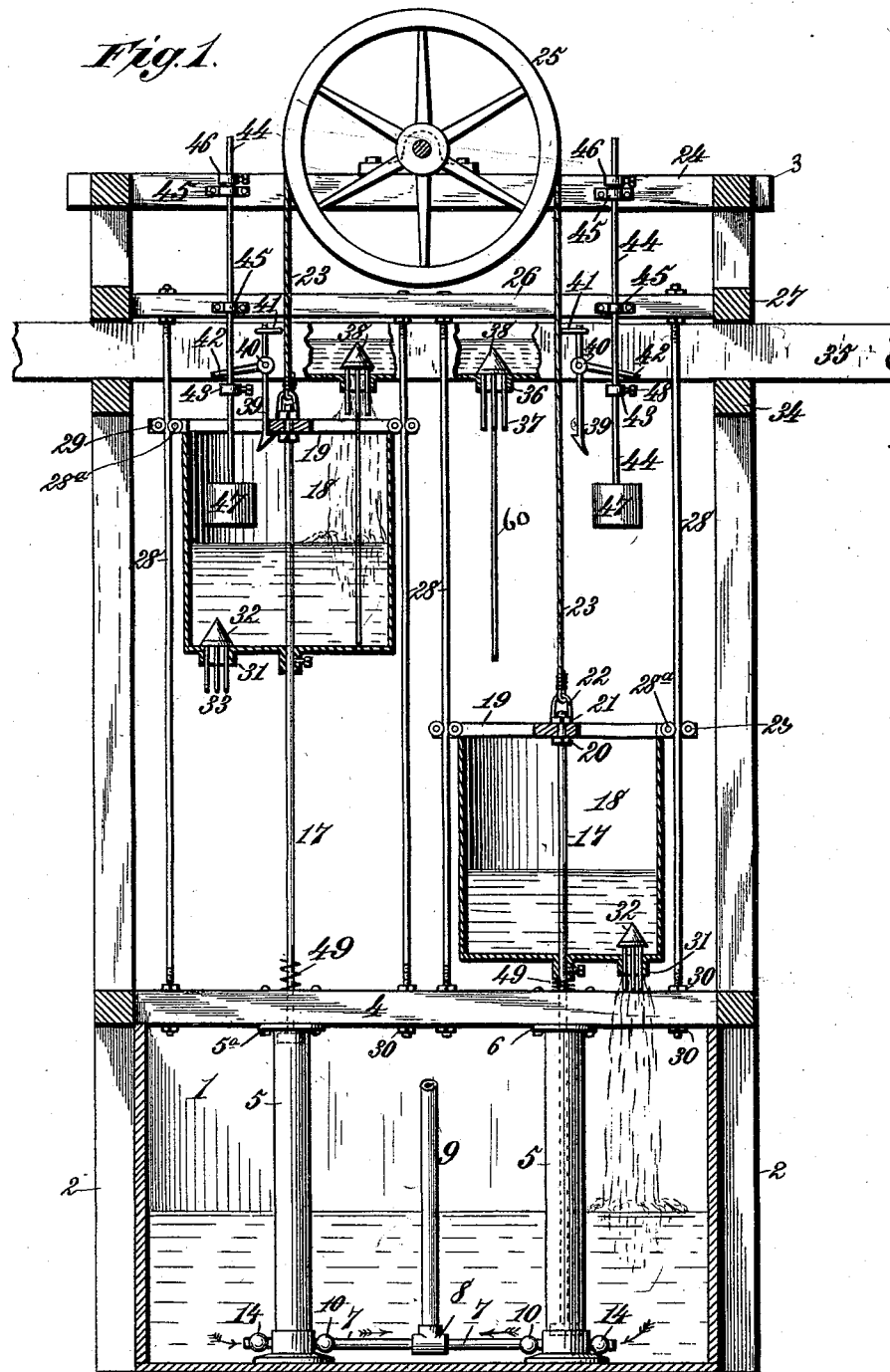
(No Model.)

J. W. GARRETT, Jr.  
HYDRAULIC MOTOR.

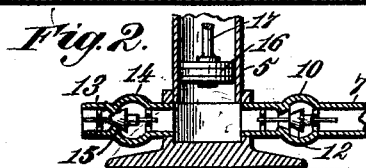
2 Sheets—Sheet 1.

No. 459,280.

Patented Sept. 8, 1891.



Witnesses:  
*Phat Swett.*  
*Geo. H. Rea*



Inventor  
*John W. Garrett Jr.*  
By *James L. Norris*  
*Atty.*

(No Model.)

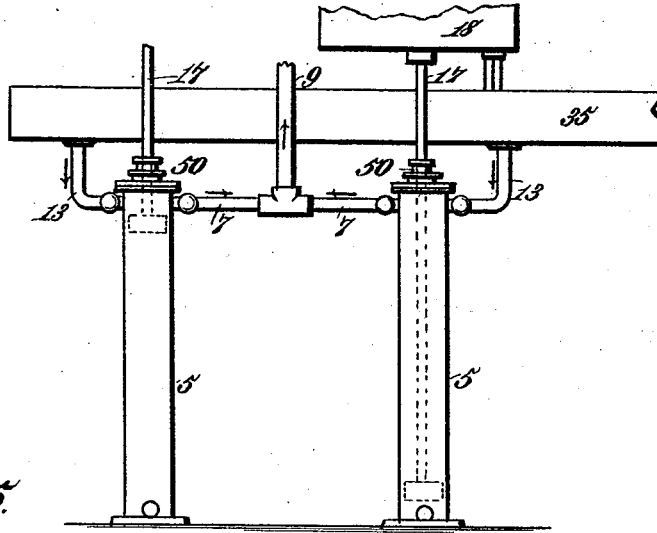
2 Sheets—Sheet 2.

J. W. GARRETT, Jr.  
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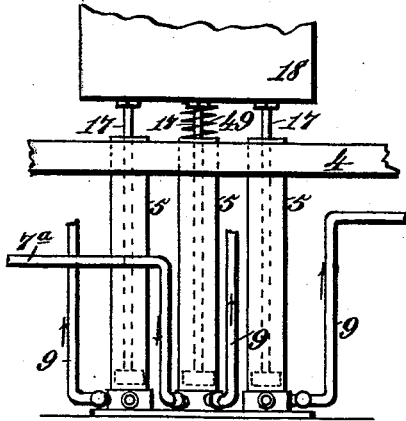
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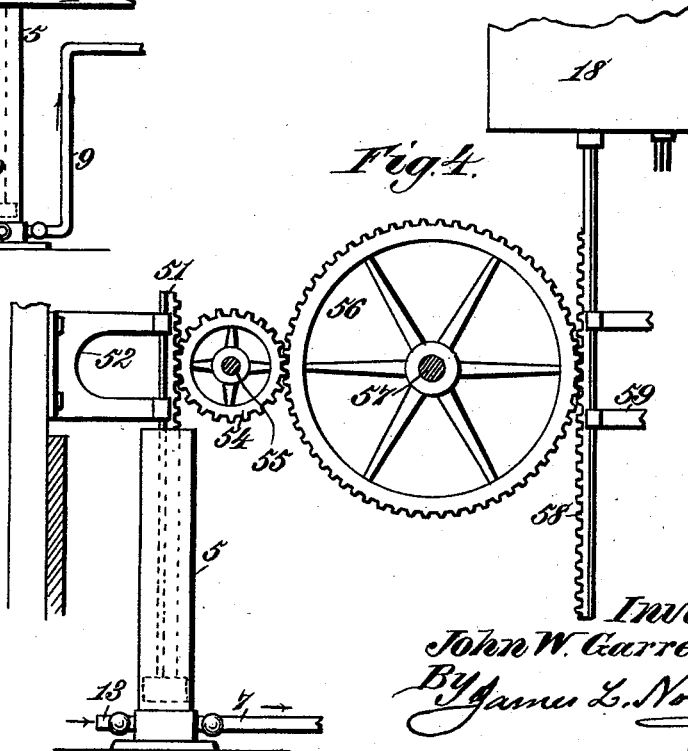
*Fig. 3.*



*Fig. 5.*



*Fig. 4.*



*Witnesses.*  
*Robert Garrett,*  
*J. H. Daly.*

*Inventor.*  
*John W. Garrett, Jr.*  
*By James L. Norris,*  
*Att'y.*

# UNITED STATES PATENT OFFICE.

JOHN W. GARRETT, JR., OF SPARTANBURG, SOUTH CAROLINA.

## HYDRAULIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 459,280, dated September 8, 1891.

Application filed May 21, 1891. Serial No. 393,588. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. GARRETT, JR., a citizen of the United States, residing at Spartanburg, in the county of Spartanburg and State of South Carolina, have invented new and useful Improvements in Hydraulic Motors, of which the following is a specification.

My invention relates to hydraulic motors of the type shown and described in Letters Patent of the United States, granted me the 26th day of November, 1889, No. 416,033.

It is the purpose of my present invention to provide a hydraulic motor of this type having such simplified construction and arrangement of parts that the friction shall be materially diminished and the full power of the apparatus utilized in the operation of the pump.

It is my purpose, also, to so organize a mechanism of the kind specified that the forcing or pumping apparatus shall be actuated by a variable power which may be increased or decreased to the exact degree required by a simple adjustment of one of the parts, thereby adapting the mechanism to the different conditions which may be imposed by change of location, by variations in the volume of water supplied, and by the variable height to which the water is to be pumped.

It is my purpose, also, to provide and combine with apparatus of the character specified novel and simple means whereby water may be forced by the pump to more than one level at each stroke, or to several different points; or, if desired, several different kinds of water may be driven through as many separate pipes to one or more points, thereby adapting the mechanism to be used at points where a number of springs, each having water of a different medicinal property, are found located within a short distance of each other.

My said invention also contemplates the provision of means whereby the descent of the loaded accumulators shall be cushioned to avoid shock, simplified and improved devices for guiding said accumulators, a novel construction of the valves by which these vessels are filled and emptied, whereby they may be readily removed and replaced, and of novel means for holding the accumulators

until they are filled to the required weight and then automatically releasing the same.

My invention also includes the provision of a construction and organization of parts whereby the same principle of operation may be applied to the same end by means of gearing intermediate of the rising and falling accumulators and the piston-rods of the pumps, whereby I am enabled to multiply the power or vary the stroke to any degree desired.

My said invention also contemplates and includes varied constructions and modifications in arrangement or organization, all of which are clearly within the scope of my discovery, as will more fully appear hereinafter.

The invention consists, to these ends, in the several novel features of construction and new combinations of parts, hereinafter fully disclosed, and then more particularly pointed out and defined in the claims concluding this specification.

To enable others skilled in the art to which my invention pertains to make, construct, and use the same, I will proceed to give a detailed description of said invention, reference being had for such purpose to the accompanying drawings, in which—

Figure 1 is a sectional elevation of an organized mechanism embodying my invention. Fig. 2 is a detail section of part of one of the pump-cylinders, showing the inlet and part of the outlet pipes with their valves. Fig. 3 is an elevation of the pump-cylinders with their inlet-pipes and service-pipe, showing a slight change in the arrangement of the inlets and outlets, whereby the pumps are converted from force into lift-pumps. Fig. 4 is a partial view taken from a point in line with the cylinders, showing the application of gearing for the transmission of power from the accumulators to the piston-rods of the pumps. Fig. 5 is a view showing a construction whereby a plurality of cylinders may be employed, their pistons being operated by a single accumulator, or by each accumulator, each cylinder receiving water from a separate source and delivering it through a separate pipe.

In the said drawings the reference-numeral 1 indicates a tank or reservoir of any suitable character and constructed of any preferred size and from any suitable material,

such as lumber, masonry, or cement, or other suitable substance. Surrounding the tank and rising to a suitable height above the same is a substantially rectangular frame-  
 5 work consisting of four uprights 2, connected immediately above the tank by horizontal timbers 3, between two of which extends a cross-brace 4. Within the tank and resting  
 10 usually on the bottom thereof I arrange two vertical pump-cylinders 5, their upper ends rising above the water-level and abutting against the cross-brace 4, to which said ends may be fastened by bolts 5<sup>a</sup> passing through  
 15 a flange 6. These cylinders are separated by a short interval and their lower closed ends are connected by pipes 7 with a T-joint 8, from which rises a service-pipe 9. In each of the pipes 7, which form the outlets for the cylinders, are valve-chambers 10, in which are arranged  
 20 puppet-valves 12, which open by the pressure of a stream flowing from the bottom of the cylinder and close against any inflowing current. Upon the opposite side of each cylinder is an inlet or short water-supply pipe 13, having a  
 25 valve-chamber 14 and puppet-valve 15, similar to those in the outlet-pipes, said valve opening to admit the stream, which enters under the suction of the pump and the natural pressure of the water and closing as the  
 30 outlet-valve opens. Within each cylinder is arranged a piston 16, of any preferred form, reciprocated by a piston-rod 17, which extends upward, passing through an opening in the cross-brace 4 and rising some distance above  
 35 the same. Upon each piston-rod is mounted a vessel 18, somewhat similar in form to a bucket, which is termed an "accumulator." These accumulators may be made of sheet metal or any other suitable material and of  
 40 any preferred size, according to the work to be performed. The piston-rods pass through their bottoms and extend above their tops, the upper ends of said rods being preferably carried through segmental parts 19 of covers  
 45 formed upon or rigidly connected to the top of the bucket and resting upon a collar 20, a nut 21, having a bale 22, being turned upon the upper end. To these bales are attached the ends of a chain, cord, strap, or similar  
 50 connection 23.

Journalled in suitable bearings upon parallel timbers 24, which connect the upper ends of the uprights 2, is a shaft carrying a pulley  
 55 25 of comparatively large diameter, over which the chain or strap 23 is carried, its length being such that when one piston is at the bottom of its cylinder the other will be raised to or nearly to the top of the other cylinder.

Between the cross-brace 4 and a similar  
 60 brace 26, extended between timbers 27, which extend between the uprights 2 at a point a little below the timbers 24, are vertical rods or bars 28, passing outside the accumulators 18 at diametrically-opposite points. Upon op-  
 65 posite sides of each rod or bar are guide-rolls 28<sup>a</sup>, turning upon bearings carried by arms 29, extending from the accumulator, which is

preserved in a correct position thereby as it rises and falls. These rods or bars may be fastened to the braces or timbers by nuts 30, 70 turned upon their ends and bearing against opposite faces of said timbers.

In the bottom of each accumulator, at a point so located that it lies in the vertical  
 75 plane of the cross-brace 4, are formed discharge-openings 31, which are opened and closed by valves, each consisting of a conical body 32, having several parallel stems 33 depending from the base of the conical body and lying in the discharge-opening, their ends 80 projecting some little distance below the bottom of the accumulator. The conical body of the valve is usually made of wood and the stems of metal, though this is a matter of preference. As shown in the drawings, the 85 valve-stems are four in number upon each valve; but it is evident that there may be three only on each valve, or the number may be more than four. These valves are opened by the descent of the accumulators, by which 90 the stems are brought into contact with the cross-brace 4, raising and holding the valve until the fluid is discharged.

Immediately beneath the braces 27 and resting upon similar and parallel braces 34 95 is a trough or conduit 35, of any suitable form and construction, its ends extending beyond the frame on which it is supported to any required distance. This trough or conduit is fed by any suitable or known means 100 with a constant supply of water from a proper source, such as a stream or branch or one or more springs, from which the water may be conveyed in pipes, or, if necessary, raised to the altitude of the trough by a hydraulic ram 105 or other means. This trough or conduit is arranged just without the plane of the upright guide rods or bars, and in its bottom are formed two discharge-openings 36, so located that one is over each accumulator. In 110 these openings hang the stems 37 of valves 38, similar in all material respects to those already described. These valves are raised and lowered to open and close the discharge from the trough by the rise and fall of the 115 accumulators, the segmental parts 19 of the covers abutting against the hanging stems as the accumulators rise and holding the valves open until a proper quantity is discharged.

In order to sustain the accumulators until 120 they receive a proper volume of water, I mount upon the sides of the trough or conduit, or upon supports attached thereto, latches 39, pivoted upon pins 40 and having extended ends which rise above the pivotal 125 points and lie in keepers 41. From the boss on each latch through which the pivot passes extends an arm 42, forming an angle with the latch-bar of ninety degrees or less, the end of said arm extending above a collar 43 130 and in the path thereof, said collar being mounted on a vertically-movable stem 44, movable in guides 45, mounted on the timbers 24 and 26. Upon each stem, above one of the

guide-brackets 45, is mounted an adjustable stop 46 to limit the downward movement, and on the lower extremity of each stem is a float 47, which enters the accumulator as the latter reaches its upward limit of movement. The collars 43 are made adjustable upon the stems 44 by means of set-screws 48. Each latch is so located that the hook upon its end will drop under the edge of the segmental top 19 of the accumulator as the upward movement of the latter is arrested. The accumulator will be sustained thereby as the water flows in until the water-level rises to such a point that the float is lifted and sufficient force exerted upon the angular arm of the latch by the collar 43 to trip the latch and release the accumulator. It will be seen that the volume of water received by the latter will be controlled by the position of the collar 43 or by the adjustment of the stop 46 or by both, and the apparatus may thus be regulated to act with a force exactly adapted to the requirements of each particular case, thereby avoiding waste of water on the one hand and obviating the necessity of altering the construction upon the other. I may extend the pump-cylinders somewhat above the cross-brace 4, if preferred; but in any case springs 49 are so arranged as to cushion the loaded accumulator upon its descent and enable it to come to a stop without serious shock. It should be noted, also, that two, three, or more separate cylinders may be arranged beneath each accumulator, each having its individual piston and piston-rod and either discharging into a common service-pipe or into separate pipes. In the latter case the cylinders will be fed or supplied with water by separate pipes, which may be taken from separate water-sources, and thus waters of different kinds may be forced to the same or to different points by the same mechanism; or the separate pipes may be carried to different points arranged upon different levels. Moreover, it is an important feature of this invention that spring-water may be raised from a source or sources wholly distinct from that which supplies the tank and conduit. The modification referred to is shown in Fig. 5 of the drawings, in which the numeral 5 indicates the cylinders, three of which are shown, though any required number from two upward may be used. These cylinders are arranged or grouped in any manner most convenient in order that their piston-rods 17 may all be connected directly to the same accumulator 18 in any suitable manner. Each cylinder is provided with a separate inlet 13<sup>a</sup>, which usually brings the water from a separate and distinct source, such as a spring having some marked medicinal or other quality. A separate service pipe or outlet 7<sup>a</sup>, having a suitable valve, will also be provided in order that the water from each source may be kept from mingling with the other waters. I have shown the cylinders in this figure as extending up through the cross-brace 4, as this con-

struction may in some instances be preferred. It should be noted, also, that I may lead the inlet and outlet pipes into and out of each cylinder at the top, as shown in Fig. 3, thus converting the pumps into lift-pumps, instead of forcing-pumps. In this case each piston-rod 17 will be provided with a packing-head or stuffing-box 50, as shown.

I may also substitute for the devices intermediate of the cylinders 5 and the accumulators 18, as already shown and described, the apparatus shown in Fig. 4, in which the piston-rod of each cylinder is either provided with or composed of a rack-bar 51, movable in guide-brackets 52, mounted upon a suitable support 53. Geared with the rack 51 is a pinion 54, loose upon a shaft 55, and meshing with this pinion is a spur-gear 56, of any suitable diameter, which is supported by a shaft 57, on which it is loose. A similar pinion and spur-gear are arranged in like manner to actuate the rack-bar of the other cylinder. If the shafts 55 and 57 are long enough each to carry both the pinions 54 and both the spur-gears 56, it will be necessary to mount the same loosely and have the shafts rigid. The said pinions and gears may, however, be mounted upon separate shafts, if preferred. The spur-gears 56 are driven by rack-bars 58, movable in suitable guide-brackets 59, each rack-bar being attached to one of the accumulators 18 in place of the piston-rod 17. The remaining parts of the mechanism do not differ substantially from those already described.

It will readily be seen that by the mechanism described I may gain power by varying the diameter of the gears, each gain being accompanied by a corresponding loss in the volume of water raised.

I may use a rod 60 upon each valve in the conduit 35, arranged to strike the bottom of the accumulator as it rises, and in this case the segmental part 19 of the cover will be dispensed with, a suitable engagement for the latch 39 being substituted.

I may of course use two or more discharge-openings in the conduit 35, to supply each accumulator, should greater expedition in filling the latter be desired, or I may increase the size of the discharge-openings.

These machines may be made of any size desired, and may be used to supply towns with water, to raise water to railway and other tanks, to pump water from any source or sources, for irrigation, and for other purposes too numerous to mention.

It should be stated that the cone-shaped valves in the conduit and in the accumulators are provided with a seating disk or annulus of metal, to which the stems are connected, and the valve-seats in the discharge-openings for said valves are formed of flanged metallic collars, which are inserted in the openings until their flanges rest on the bottoms around the said openings, the collar projecting below.

What I claim is—

1. In a hydraulic motor, the combination,

with separate pump-cylinders connected with service-pipes and having suitable valved inlets, of rising and falling accumulators having the piston-rods connected thereto, said accumulators being connected by a chain, cord, or strap passing over a pulley, a conduit arranged above the upper limit of movement and having valved openings arranged to discharge into the accumulators, latches sustaining the accumulators when raised, and floats arranged to enter the accumulators as the latter rise, said floats having stems carrying collars to trip the latches, the bottoms of the accumulators having valved openings, substantially as described.

2. In a hydraulic motor, the combination, with pump-cylinders receiving the water to be raised and having communication with the service-pipes, of accumulators having valved discharge-openings and connected by a chain or strap passing over a pulley above, said accumulators being connected to the piston-rods, a conduit arranged above the upper limit of movement and having valved discharge-openings, pivoted latches sustaining the accumulators when raised, and floats mounted on rising and falling stems having adjustable collars arranged to strike arms on the latches and trip the same, substantially as described.

3. In a hydraulic motor, the combination, with the separate pump-cylinders connected by valved pipes to a common service-pipe and having valved inlets, of rising and falling accumulators having discharge-openings in their bottoms and provided with free valves having a plurality of stems lying in and depending below the said discharge-openings, piston-rods rigidly connected to said accumulators and to a chain or strap passing over a pulley above, a conduit arranged beneath the pulley and provided with valved discharge-openings, the stems of said valves being lifted by segmental parts of covers on the accumulators, pivoted latches sustaining the accumulators when raised, and floats carrying stems provided with adjustable stops and adjustable collars, the latter tripping the latches as the floats are raised by the water in the accumulators, substantially as described.

4. In a hydraulic motor, the combination, with a plurality of cylinders connected to separate service-pipes, of connected accumulators carrying the piston-rods of said cylinders and having valved openings in their bottoms, a conduit arranged above the upper limit of movement of said accumulators and provided with valved openings, pivoted latches to sustain the accumulators while filling, and floats carrying stems having adjustable collars to trip the latches, substantially as described.

5. In a hydraulic motor, the combination,

with a plurality of cylinders, each having a separate inlet and a separate service-pipe or outlet, of a plurality of piston-rods, a single accumulator having a valved opening and connected to the group of said piston-rods, a second accumulator connected by a flexible connection passing over a single central pulley to the first accumulator and having a plurality of piston-rods operating in a plurality of cylinders, each having a separate inlet and service pipe, a conduit arranged above the accumulators and provided with valved discharge-openings, valves having stems which are lifted by the rise of the accumulators to close said openings, pivoted latches engaging said accumulators as they rise and lift the valves in the conduit, floats adapted to enter the accumulators and provided with stems, and devices adjustably mounted on said stems to trip the latches and release the accumulators when loaded, substantially as specified.

6. In a hydraulic motor, the combination, with one or more pump-cylinders having each a valved inlet and outlet, of a piston-rod in each cylinder, an accumulator rigidly connected to said rod and having a flexible connection supported by a pulley with a similar accumulator, a conduit arranged above the cylinders and accumulators and provided with valved openings for supplying the accumulators, valves lying in said openings and having stems which are raised by the accumulators, and automatic devices for sustaining the accumulators when raised and releasing the same when filled, said devices consisting of pivoted latches automatically engaging the raised accumulators and tripped by floats which rise with the water entering the accumulators, substantially as described.

7. In a hydraulic motor, the combination, with one or more pump-cylinders having suitable valved inlets and outlets, of piston-rods operating the pistons in said cylinders, accumulators connected to said piston-rods and to each other, a pulley over which the flexible connection passes, a conduit arranged above the accumulators and having valved discharge-openings to supply the accumulators when raised, automatic devices for sustaining the accumulators when raised, and floats operating adjustable releasing devices whereby the accumulator may be dropped when filled to the desired point, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

JOHN W. GARRETT, JR. [L. S.]

Witnesses:

JAMES L. NORRIS,

JAMES A. RUTHERFORD.