P. R. RATES & C. L. BURRIGHT.

WATER MOTOR.

APPLICATION FILED DEC. 20, 1910.

989,873.

Patented Apr. 18, 1911.

3 SHEETS—SHEET 1.

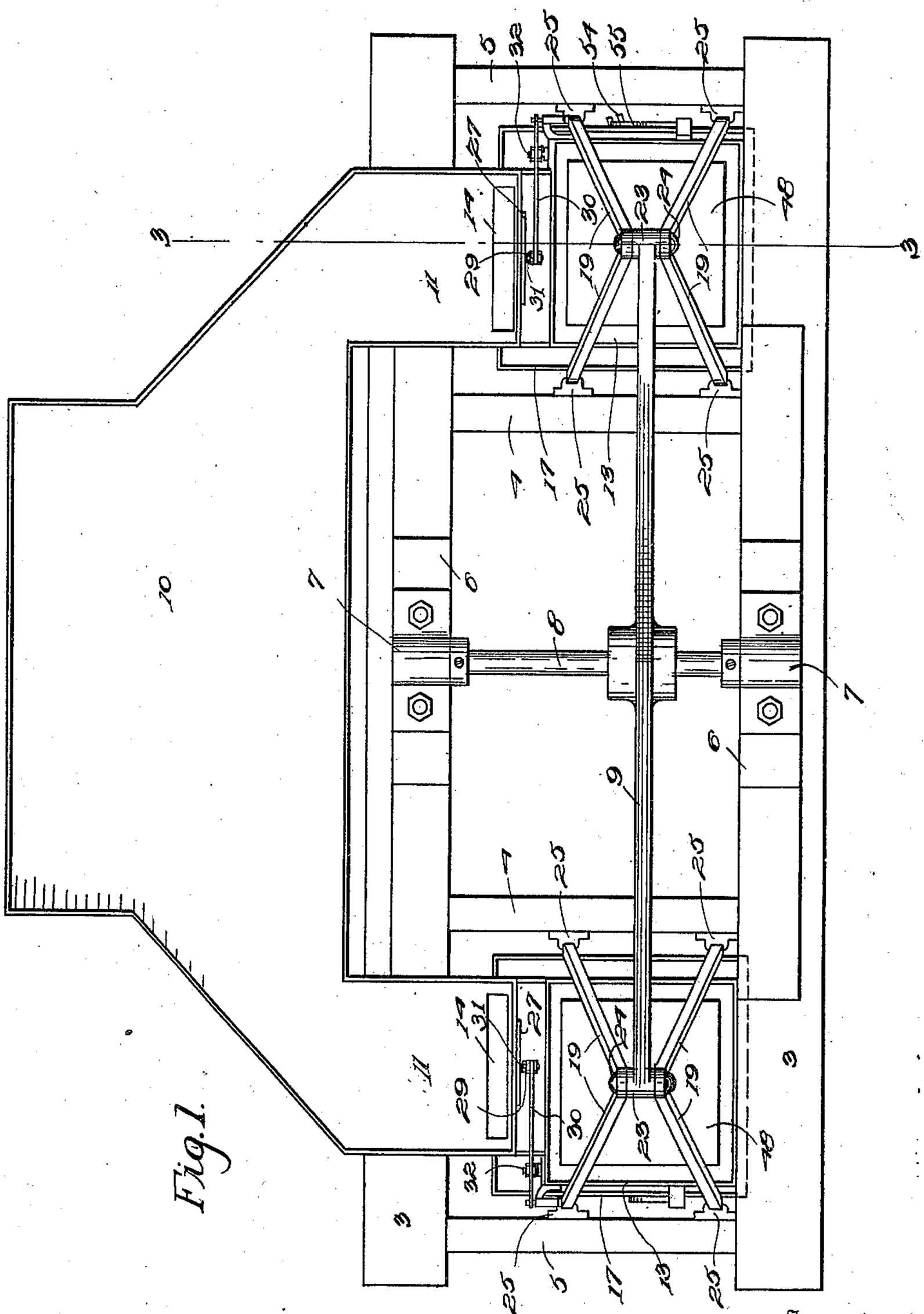

Fig. 1.

Witnesses
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H. C. Schroeder.

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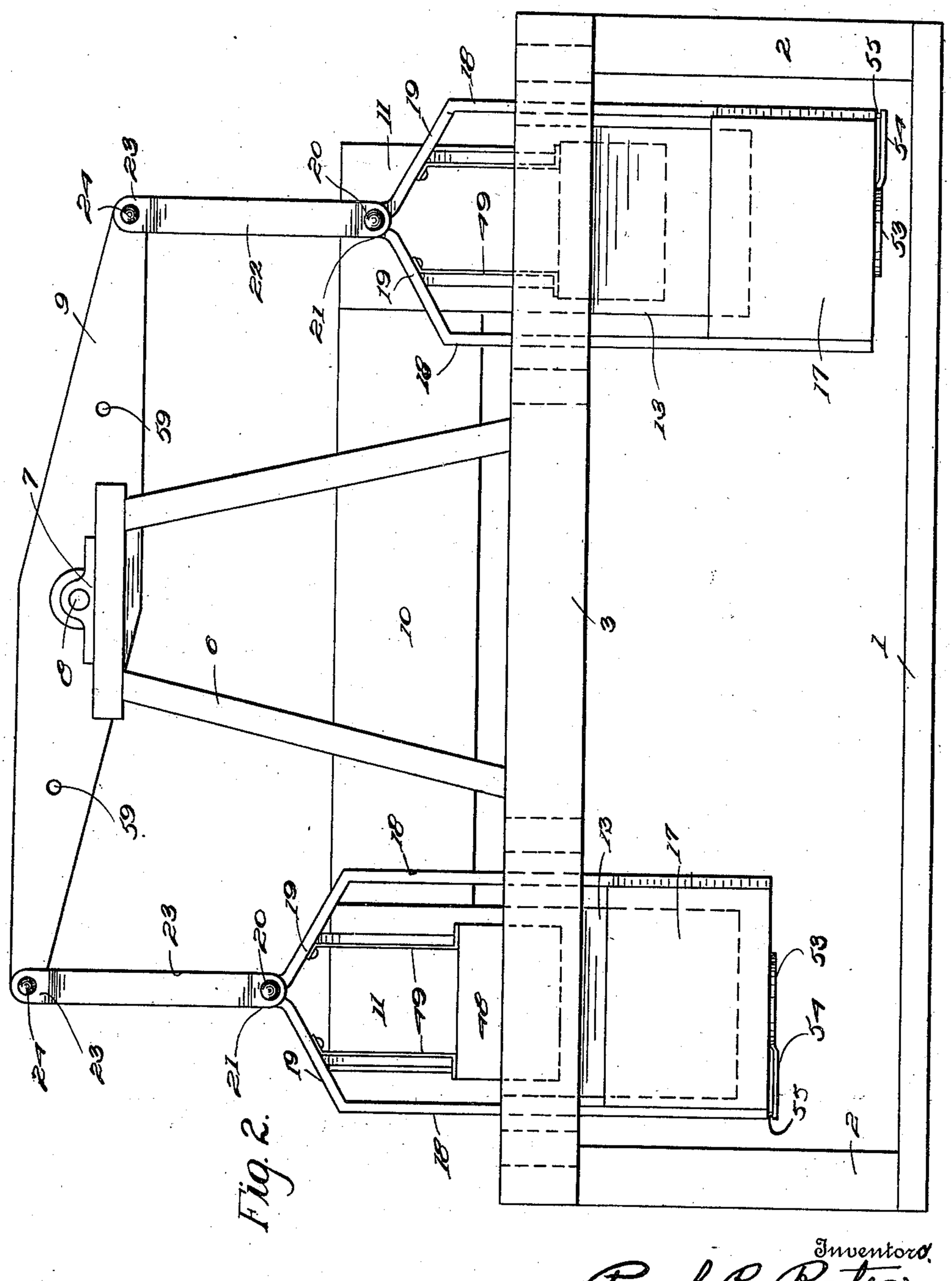

Fig. 2.

Witnesses
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3 SHEETS—SHEET 3.

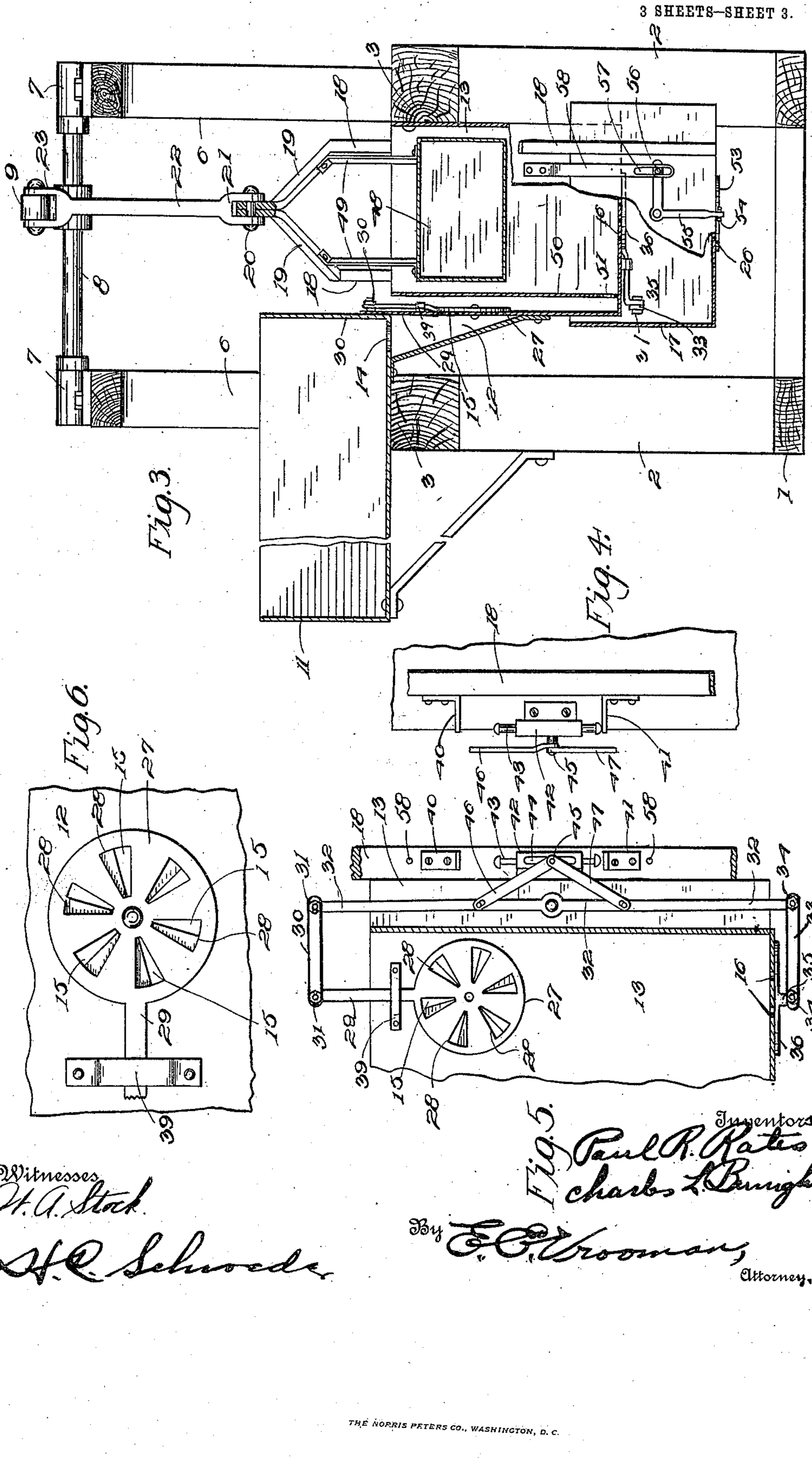

Fig. 3.

Fig. 6.

Fig. 4.

Fig. 5.

Witnesses.
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UNITED STATES PATENT OFFICE.

PAUL R. RATES AND CHARLES L. BURRIGHT, OF OAKLAND, CALIFORNIA.

WATER-MOTOR.

989,873. Specification of Letters Patent. Patented Apr. 18, 1911.

Application filed December 20, 1910. Serial No. 598,441.

To all whom it may concern:

Be it known that we, PAUL R. RATES and CHARLES L. BURRIGHT, citizens of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Water-Motors, of which the following is a specification.

This invention relates to hydraulic motors and the principal object of the same is to provide a novel motor in which floats are employed for rocking a lever or beam in one direction and the weight of the water that actuates the motor is utilized to rock said lever or beam in an opposite direction so that said lever or beam will be continuously rocked to permit power to be taken therefrom for operating pumps or other machines.

With the above generally stated object of the invention in view it is contemplated employing a rocking beam from the ends of which movable receptacles and floats are suspended and with which tanks coöperate in which water is delivered, the said tanks being provided with valves which are automatically operated so that the supply of water is cut off when the floats are at their highest points and the water discharged from the tanks into the movable receptacles so that the weight of the water will cause said receptacles to descend, said receptacles being provided with discharge valves which are automatically opened when the receptacles are at their lowest points so that the water therein is discharged. The floats, receptacles and tanks are arranged in duplicates at the ends of the beams so that when one set is rocking one end of the beam upward by means of the water admitted to the tank acting on the float therein, the other set is rocking the other end of the beam downward by means of the water discharged into the receptacle from the tank.

In carrying out the objects of the invention generally stated above it will be understood, of course, that the essential features thereof are necessarily susceptible of changes in details and structural arrangements, one preferred and practical embodiment of which is shown in the accompanying drawings, wherein:—

Figure 1 is a top plan view of the improved hydraulic motor. Fig. 2 is a view in side elevation thereof. Fig. 3 is a vertical sectional view taken on the line 3—3, Fig. 1. Fig. 4 is a fragmentary view in elevation of the mechanism for tripping the valves of the tanks and receptacles. Fig. 5 is a fragmentary vertical sectional view showing the inlet and discharge valves and the mechanism for simultaneously operating the same. Fig. 6 is a detail plan view showing the type of valves used in connection with this invention.

Referring to the accompanying drawings by numerals, it will be seen that the improved hydraulic motor is mounted on a frame formed of the base beams 1 carrying the end standards 2 which support the upper beams 3 in parallel relation to the base beams. The upper beams 3 are connected by the intermediate and end transversely arranged bars 4 and 5. Oppositely disposed trestles 6 are carried by beams 3 and are equipped with the bearing 7 for the transversely arranged rocker shaft 8 on which the walking beam 9 is mounted.

A water conveying trough 10 is provided with divergent branches 11 which have chute connections 12 with vertical tanks 13 fastened in the end of the supporting frame. The branches 11 are provided with base openings 14 that discharge into the chute 12, and the said chutes are provided with openings 15, preferably a circular row of radiating slots, which discharge into the tanks 13. The tanks 13 are provided with discharge openings 16 in their bottoms preferably the same type as the openings 15 of the chutes. Movable receptacles 17 inclose the lower ends of the tanks 13 and are carried by the bars 18 which depend from the radiating arms 19 that are mounted on the pivot bolts 20 in the lower bifurcated ends 21 of the links 22 which have their bifurcated upper ends 23 mounted on the pivot bolts 24 that extend transversely through the ends of the walking beam 9. The bars 18 are vertically movable in the guiding lugs 25 carried by the transverse bars 4 and 5 of the supporting frame. Discharge openings 26 are formed in the bottoms of the receptacles 17, said openings 26 being preferably of the same type as the openings 15 of the chutes 12 and the openings 16 of the tanks 13.

Disk valves 27 are pivotally mounted over the openings 15 of chutes 12 and are provided with radiating slots 28. Said valves permit water to pass through openings 15 when the slots 28 are in alinement with said

openings and when not in alinement with said openings, said openings are sealed by the valves. Valves 27 are provided with the arms 29 the free ends of which have the links 30 adjustably and detachably fastened thereto by the nuts 31. The links 30 are, in turn, adjustably and detachably fastened to the upper ends of the vertically arranged shifting levers 32 that are pivotally connected to the tanks 13. The lower ends of levers 32 project beyond the bottoms of tanks 13 and are adjustably and detachably fastened to link 33 by the nuts 34. Links 33 are adjustably and detachably fastened to the arms 35 of disk valves 36 by the nuts 37, said arms 35 projecting from the said disk valves which are preferably the same in shape and operation as the valves 27 and which control the discharge openings 16 of tanks 13. Guide loops 39 straddle the valve arms 29 and limit the rotary movements of the valves 27.

The suspending bars 18 of the movable receptacles 17 adjacent the shifting levers 32 are provided with upper and lower laterally projecting lugs 40 and 41 which are arranged above and below the pivotal points of said levers 32. Housings 42 project from tanks 13 between lugs 40 and 41 and have tripping rods 43 vertically slidable therein. The ends of said rods 43 are headed and are in the path of movements of the lugs 40 and 41 and are vertically moved by contact with said lugs. The housings 42 are provided with vertical guide slots 44 through which lateral pins 45 carried by rods 43 project. Said pins 45 have link connections 46 and 47 with levers 32 at points above and below the pivotal connections of said levers with the tanks 13. The links 46 and 47 have loose pivotal connections with the levers 32. The valves 27 are closed by contact of lugs 41 with the rods 43 on the upward movements of the bars 18 and the valves 36 simultaneously opened. On the downward movements of said bars 18, valves 27 are opened and valves 36 closed by contact of lugs 40 with rods 43.

Floats 48 are suspended in the tank 13 by the bars 49 that depend from the radiating arms 19. Vertical partitions 50 are arranged in tanks 13 adjacent the discharge openings of chutes 12 and are provided with openings 51 for delivering water to said tanks 13 below the floats 48 so that when water is admitted to the tanks 13, the said floats will rise and carry the movable receptacles 17 and through the described connections of said receptacles with the walking beam 9, will impart an upward movement to said beam. As has been described, the discharge openings of chutes 12 are sealed on the limit of the upward movement of the bars 18 and the discharge openings of tanks 13 simultaneously opened, it will therefore be obvious that the water in the tank 13 will discharge into the receptacles 17 and the weight of said water cause said beam 9 to rock downward.

The receptacles 17 are provided with the discharge openings 26 which as stated, are preferably the same as the openings of chutes 12 and tank 13 and are controlled by valves 53 which are the same as the valves of said chutes and tanks. The valves 53 are provided with bifurcated extensions 54 between which one of the arms of the bell crank levers 55 extends. The other arms of said levers are equipped with laterally projecting pins 56 that are slidable in the end slots 57 of shifting rods 58 that depend from tanks 13. When the receptacles 17 have reached the limit of their upward movements, the rods 58 rock the bell crank levers 55 so that valves 53 seal the openings 26 and thereby retain the water in receptacles 17 that has been discharged from tank 13, and when the limit of the downward movement of the said receptacles is reached, the rods 58 cause levers 55 to rotate the valves 53 to open the discharge openings 26 to permit the water to escape.

As is suggested in Fig. 5, the bars 18 may be provided with vertical rows of openings 58 to permit adjustments of the lugs 40 and 41. And as suggested in Fig. 2, the beam 9 may be provided with openings 59 so that the same may be connected to and operated pumps or other machines.

It will be understood from the foregoing that this invention provides duplicate sets of tanks, floats, and movable receptacles at opposite ends of the beam 9 which alternately operate so that the ends of said beam are alternately raised and lowered thereby and that the trough 10, which is in communication with a source of water supply and its branches 11, provide simple means for delivering the water for operating the motor.

From the foregoing detailed description of the invention it will be apparent that the beam 9 is rocked in one direction by buoyant means and in an opposite direction by weight, the shifting of the power being automatically controlled by the valves and their operating mechanism.

What we claim as our invention is:—

1. A hydraulic motor comprising a water-conveying trough, discharge chutes carried thereby, tanks receiving water from said chutes, a rocking beam, receptacles suspended from the ends thereof and inclosing the bottoms of said tanks, floats in said tanks and suspended from said beam, means for admitting water to the tanks to cause the floats to rock said beam in one direction, means for discharging water from said tanks to said receptacles to rock the beam in an opposite direction, and means for dis-

charging water from said receptacles after said receptacles have rocked said beam.

2. A hydraulic motor comprising a rocking beam, a water trough provided with branches, chutes for said branches, valve controlled discharges for said branches, tanks in communication with said branches, valve controlled discharges for said tanks, receptacles suspended from said beam, floats in said tanks and suspended from said beam, means operated by the movements of said receptacles for simultaneously and alternately controlling the opening and closing of said valve controlled discharges, valve controlled discharges for said receptacles, and means carried by said tanks for operating the valve controlled discharges in alternation to the openings and closings of the valve controlled discharges of the tanks.

3. A hydraulic motor comprising a support, a rocking beam carried thereby, a water trough provided with discharge chutes, valves controlling the discharge from said chutes, tanks in communication with said chutes and provided with discharge outlets, valves controlling said outlets, floats in said tanks and suspended from said beam, receptacles below said tanks and suspended from said beam, mechanism simultaneously opening the chute valves and closing the tank valves to cause the floats to rock the beam in one direction and closing the chute valves and opening the tank valves to cause the receptacles to operate the beam in an opposite direction, valve controlled discharges for the receptacles, and means for opening the valves of the receptacles in alternation to the valves of the tanks.

4. A hydraulic motor comprising a support, a water trough carried thereby, a rocking beam carried by said support, tanks in communication with said trough, suspending means carried by the ends of said beam, receptacles carried thereby, floats in said tanks and carried by said suspending means, means for admitting water to said tanks to cause the floats to rock the beam in one direction, and means for discharging the water from the tanks into the receptacles to cause said receptacles to rock the beam in an opposite direction.

5. A hydraulic motor comprising a support, a rocking beam carried thereby, water delivery means carried by said support, tanks carried by said support, suspending means carried by the ends of said beam, receptacles carried thereby, floats in said tanks for moving said beam in one direction, and means for discharging water from said tanks into said receptacles to cause said receptacles to move the beam in an opposite direction.

In testimony whereof we affix our signatures in presence of two witnesses.

PAUL R. RATES.
CHARLES L. BURRIGHT.

Witnesses:
H. C. SCHROEDER,
F. P. SCHROEDER.