M. J. QUIMBY.

HYDRAULIC POWER APPARATUS.

APPLICATION FILED JUNE 14, 1910.

990,390.

Patented Apr. 25, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

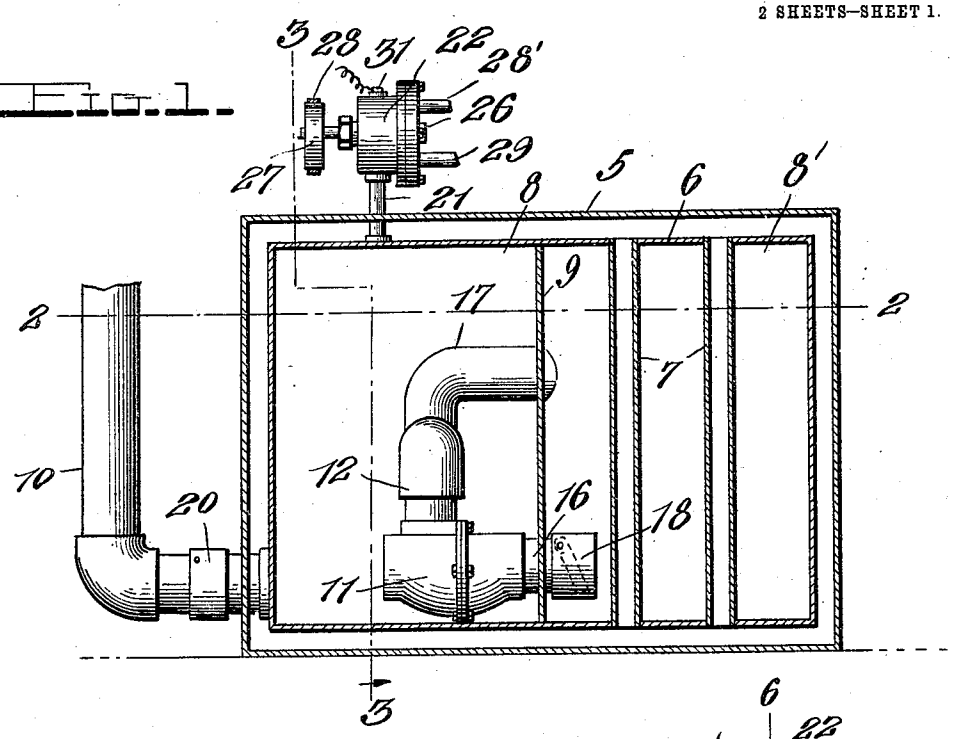


Fig. 4.

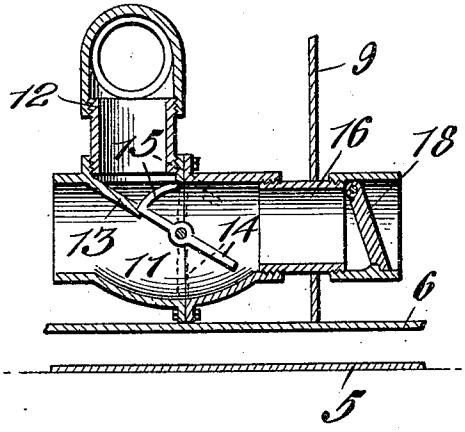


Fig. 5.

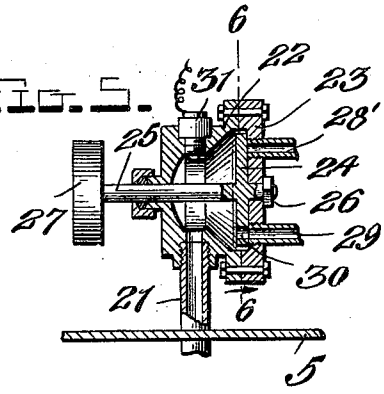
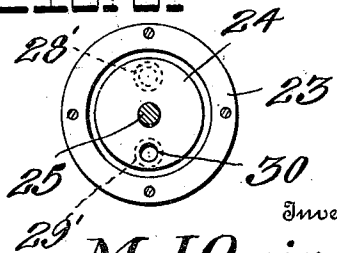


Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 2.

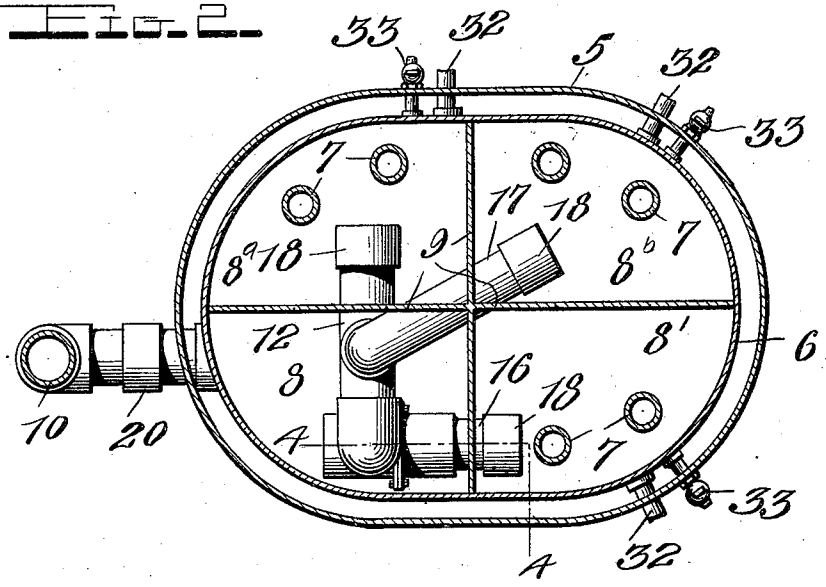
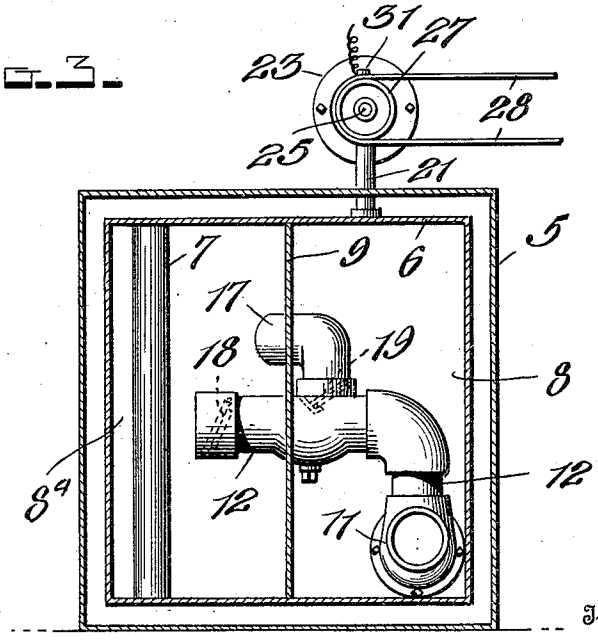


Fig. 3.



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HYDRAULIC POWER APPARATUS.

990,390. Specification of Letters Patent. Patented Apr. 25, 1911.

Application filed June 14, 1910. Serial No. 566,810.

To all whom it may concern:

Be it known that I, MARK J. QUIMBY, a citizen of the United States, residing at Bristol, in the county of Addison and State of Vermont, have invented certain new and useful Improvements in Hydraulic Power Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in hydraulic power apparatus and has for its object to improve and simplify the construction of apparatus of this character and to provide means for storing water under various pressures.

Another object of my invention is to provide means whereby the use of cylinders and reciprocating pistons for obtaining the desired pressure is entirely eliminated.

A further object is to provide a tank for storing water under pressure, said tank being divided into four chambers, and means for supplying water under pressure to each of said chambers, said means also varying the pressure in each chamber.

A still further object is to provide a plurality of pressure chambers surrounded by a body of water which is adapted to reduce the heat in the chambers generated by the pressure fluid, and a rotary valve connected by means of an inlet and exhaust pipe to one of the chambers to supply pressure fluid thereto.

With these and other objects in view, the invention consists of the novel features of construction, combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section through the outer casing and the water storage tank or reservoir, the valve being shown in elevation; Fig. 2 is a section taken on the line 2—2 of Fig. 1; Fig. 3 is a section taken on the line 3—3 of Fig. 1; Fig. 4 is a section taken on the line 4—4 of Fig. 2; Fig. 5 is an enlarged detail section of the rotary valve; and Fig. 6 is a section taken on the line 6—6 of Fig. 5.

Referring more particularly to the drawings 5 indicates the outer casing or housing in which the tank or reservoir 6 is contained. The walls of the tank 6 are spaced from the walls of the casing 5 and in this space water is contained. The top and bottom walls of the tank 6 are connected by means of a plurality of tubes 7 thereby allowing the water to rise in said tubes between the walls of the tank. This body of water in which the tank 6 is disposed is adapted to lower the internal temperature of the tank, said water gradually increasing in temperature thus maintaining a heated surrounding body for the tank.

As will be noted from reference to Fig. 2 the tank 6 is divided into a plurality of chambers or compartments 8 by means of the partitions 9 which are arranged in the tank and secured to the walls thereof in any desired manner. A stand pipe 10 communicates with one of the chambers 8 and is adapted to supply the water thereto from whence it is conducted to the remaining chambers as will more fully hereinafter appear. In the chamber 8 with which the stand pipe 10 communicates a valve 11 is arranged. This valve consists of the usual valve casing with which a vertical pipe 12 is connected. The entrance point of this pipe to the valve casing is partially closed by means of the angularly disposed plate 13 which may be integrally formed with the valve casing and extends inwardly and downwardly below the pipe 12. A valve plate 14 is pivoted in the valve casing and has a flange or lip 15 formed upon one end which is adapted at times to entirely close communication between the valve and the pipe 12 as clearly shown in Fig. 4. This valve plate is pivoted adjacent to the lip 15 and is normally disposed in the position indicated by the dotted lines, said valve plate moving to such position by gravity upon decrease of water pressure in the chamber 8. A pipe 16 also extends from the valve 11 through one of the partitions 9 into the adjacent chamber 8′. The pipe 12 is extended into another of said chambers 8ª

and a pipe 17 communicates with the pipe 12 and opens into the remaining chamber 8^b. A check valve 18′ is arranged in each of the pipes 12, 16 and 17 and prevents back pressure of the water from the chambers in said pipes. A similar check valve 19 also is arranged at the point of communication with the pipe 17 of the pipe 12 and is adapted to close the pipe 17 under pressure of the water in the pipe 12. A check valve 20 is also arranged in the stand pipe 10 and prevents back pressure of the water in said pipe from the chamber 8 in which the valve 11 is located.

The supply of pressure fluid to the apparatus is controlled by means of the rotary valve illustrated in Figs. 5 and 6. This valve is arranged upon an inlet and exhaust pipe 21 communicating with the chamber 8 in which the valve 11 is arranged and extending through the outer casing 5. The rotary valve comprises a casing 22 which is threaded or otherwise secured upon the pipe 21. Upon this casing a head plate 23 is secured in which a valve seat is formed. The rotary valve plate 24 is disposed upon said seat and is secured upon an arbor 25 the end of which extends through the head plate 23 and has a nut 26 threaded thereon to secure the same in the valve casing. Upon the other end of the arbor 25 a band pulley 27 is secured over which the driving belt 28 passes. An inlet and outlet pipe 28′ and 29 respectively are secured in the head plate 23 and are adapted to register with an opening 30 in the valve plate 24 when the same is rotated. The pressure fluid may be either steam or gas and when the latter is used a spark plug 31 is arranged in the valve to explode the gases and discharge the same into the tank chamber 8.

In the operation of the apparatus, when the opening in the rotary valve plate registers with the outlet pipe 29 so as to exhaust the steam or gas from the chamber 8, water enters said chamber from the stand pipe 10, the check valve 20 preventing back pressure of the water in said pipe when the rotary valve is closed. As the valve plate is rotated to aline the opening therein with the intake pipe 28, steam is admitted to the chamber 8 through the pipe 21 and the water therein thus placed under pressure and forced through the valve 11. This pressure of the water in the valve raises the valve plate 14 to the position shown in full lines in Fig. 4 thus closing communication between the chamber 8 and the pipe 12. Water is discharged through the pipe 16 into another of the chambers 8′ as long as the pressure of water in the valve is sufficient to maintain the plate 14 in open position. When the water in each of the chambers is at substantially the same height, the pressure in the chamber 8 will be sufficiently lowered to permit the valve plate 14 to move to its closed position by gravity and open communication between the chamber 8 and the pipe 12. The pressure in said chamber now forces the water through the pipe 12 and into another of the chambers 8^a, the water impinging in its passage upon the check valve plate 19 and closing communication between the pipes 12 and 17. Upon a further decrease in pressure caused by the discharge of water into the last named chamber, the check valve in the end of the pipe 12 seats itself against the pressure of the water. The valve 19 now opens so that the water is discharged through the pipe 17 into the last of the chambers 8^b until the pressure of steam or gas upon the water decreases to such extent that the same is not capable of opening the check valve in the end of the pipe 17. Thus it will be seen that the pressure in each of the chambers of the tank or reservoir differs, the pressure in the first named chamber in which the valve 11 is located being the greatest and the pressures in the chambers into which the pipes 16, 12 and 17 extend decreasing in the order named. This disposition of the water admitted to the first chamber is repeated with each rotation of the rotary valve plate 24.

32 indicate discharge pipes which communicate with each of the chambers with the exception of chamber 8 in which the valve 11 is located and into which the water is primarily discharged from the stand pipe 10. The pressure of water from each of the pipes 32 will be different so that they may be connected to flexible hose and the water conducted to different places and used for different purposes. Cocks 33 also communicate with the chambers so that they may be quickly drained and left open to air the chambers.

From the foregoing it will be seen that I have devised a very simple hydraulic power apparatus whereby a number of different water pressures may be obtained. By means of my device the necessity of employing pressure cylinders and pistons is entirely eliminated. It will be obvious that compressed air may also be used besides steam and gas to secure the desired pressure upon the water contained in the chambers. With each rotation of the valve plate 24 communication is made with the outlet pipe 29 to relieve the chamber of pressure and permit water to enter the same from the stand pipe 10. The pipe 21 thus serves as an exhaust and inlet pipe for the chamber. The arrangement of the pipes and check valves whereby the water is caused to flow into the several pressure chambers is very simple and

at the same time highly efficient in practical use. The heat generated within the chamber 8 into which the pressure fluid is discharged is equally distributed about the walls of the various chambers by means of the body of water in which the storage tank is disposed.

The apparatus is constructed of very few parts thereby minimizing the necessity for repairs and it is extremely durable in construction and may be manufactured at a comparatively low cost.

While I have shown and described the preferred embodiment of the invention, it will be understood that the same is susceptible of many minor modifications without departing from the essential feature or sacrificing any of the advantages embodied therein.

Having thus described the invention what is claimed is:—

1. In a hydraulic power apparatus, a casing, a water reservoir arranged in said casing and spaced from the walls thereof, said reservoir having a plurality of chambers therein, a water supply pipe communicating with one of the chambers, means for intermittently admitting a pressure fluid to said chamber, and means arranged in said chamber and extending into the other chambers for discharging water into the latter chambers upon variations of pressure in the first named chamber.

2. In a hydraulic power apparatus, a reservoir provided with a plurality of chambers, a water supply pipe communicating with one of said chambers, means for intermittently admitting a pressure fluid to the latter chamber, pipes connecting said chamber with the remaining chambers, and means for successively closing said pipes when the pressure in the first named chamber has lowered to a certain point.

3. In a hydraulic power apparatus, a reservoir, partitions dividing said reservoir into a plurality of chambers, a water supply pipe communicating with one of the chambers, means for intermittently admitting the pressure fluid to said chamber and exhausting said fluid therefrom, pipes connecting said chamber with the remaining chambers, and valves arranged in said pipes normally closing communication between said chambers, said valves being adapted to be opened by various pressures to admit the water to the remaining chambers.

4. In a hydraulic power apparatus, a reservoir, partitions in said reservoir dividing the same into a plurality of chambers, a water supply pipe communicating with one of the chambers, a pressure fluid inlet and exhaust pipe communicating with said chamber, a rotary valve intermittently admitting and exhausting the fluid to and from said chamber, means connecting said chamber with the remaining chambers, and means controlled by the variations of pressure in said chamber adapted to open communication between the first named chamber and the remaining chambers to discharge water under pressure into the latter.

5. In a hydraulic power apparatus, a reservoir divided into a plurality of chambers, a water supply pipe communicating with one of said chambers having a check valve therein, a pressure fluid inlet and exhaust pipe communicating with said chamber, a rotary valve for intermittently admitting and exhausting the pressure fluid to and from the chamber, a valve casing arranged in said chamber, a pivotal valve plate therein, pipes extending from said valve into adjacent chambers, said valve plate having a lip formed on one end and adapted to be moved by pressure in the chamber to open one of the pipes communicating therewith and close the other, a pipe communicating with one of said first named pipes and extending into another of the chambers, a check valve in said pipe, said pipe discharging water into the chamber upon a decrease of pressure in the first named chamber to a certain point, and a check valve in each of the first named pipes to prevent back pressure therein from their respective chambers.

6. In a hydraulic power apparatus, a reservoir, partitions in said reservoir dividing the same into a plurality of chambers, a water supply pipe communicating with one of said chambers, a pressure fluid pipe communicating with said chamber and extending from a source of fluid supply, a rotary valve in said pipe adapted to intermittently admit and exhaust the fluid to and from said chamber, a valve in said chamber, the fluid pressure in the chamber being adapted to force the water through said valve, said valve having a pivoted valve plate therein, pipes extending from said valve to the remaining chambers, said valve plate being moved by the pressure in the chamber to open communication between adjacent chambers and close communication between the remaining chambers, decrease of pressure in said chamber admitting the water to the remaining pipes, and means arranged in said pipes to shut off the supply of water to their respective chambers upon further decrease of pressure.

7. In a hydraulic power apparatus, a casing, a reservoir arranged in said casing and spaced from the walls thereof, tubes extending through and connecting the top and bottom of the reservoir, the space between said reservoir and casing being adapted to contain water, said reservoir having a plurality

of chambers therein, a water supply pipe communicating with one of said chambers, means for intermittently admitting and exhausting a pressure fluid to and from said chamber, and means arranged in said chamber and extending into each of the remaining chambers adapted to admit water into the last named chambers upon successive decreases of the fluid pressure in the first named chamber.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

MARK J. QUIMBY.

Witnesses:

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FREDERICK H. PALMER.

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