J. R. HALL.

DEVICE FOR ELEVATING WATER, MERCURY, OR OTHER LIQUIDS.

APPLICATION FILED MAY 7, 1910.

1,002,057.

Patented Aug. 29, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

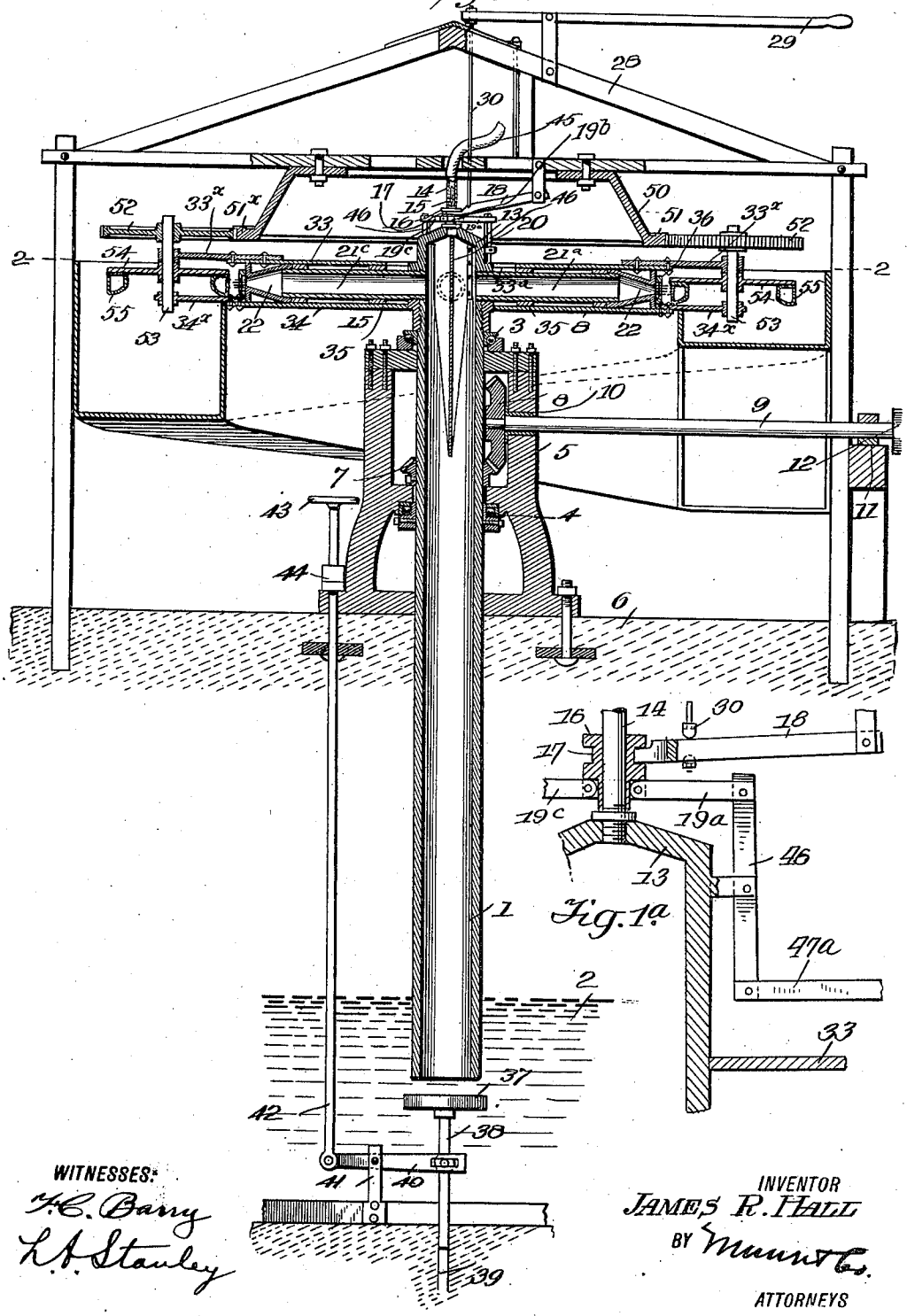

Fig. 1a

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2 SHEETS—SHEET 2.

Fig. 2.

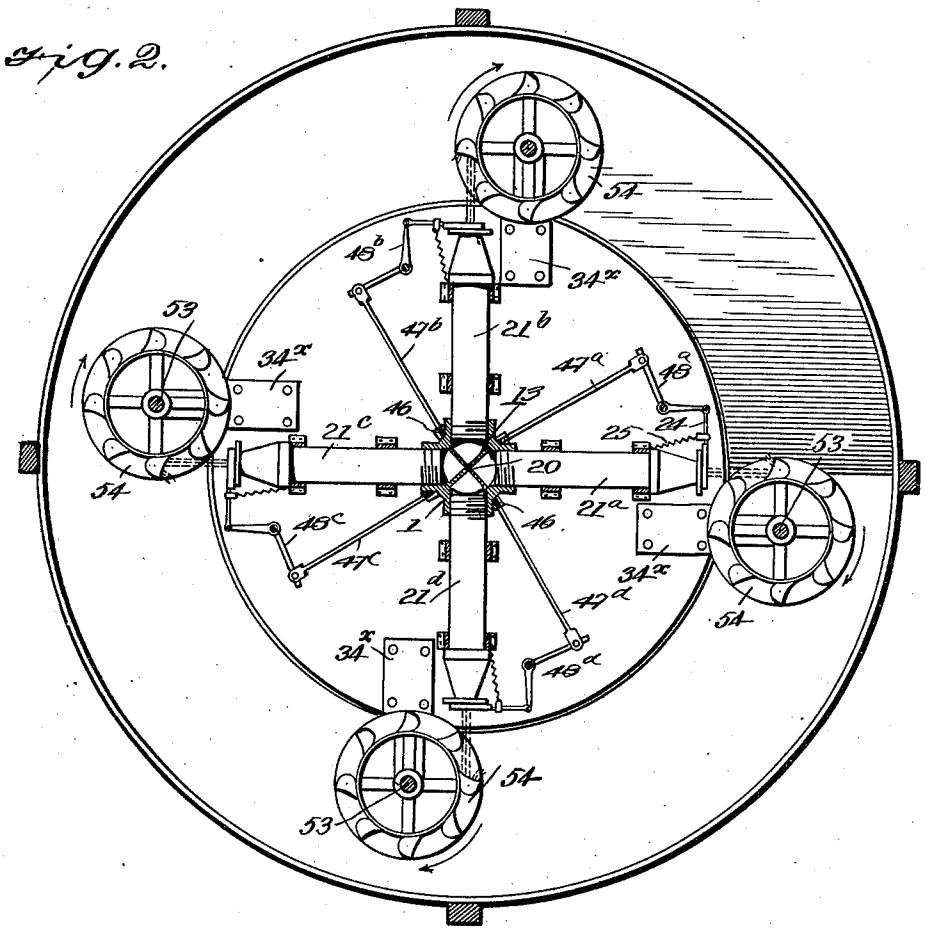
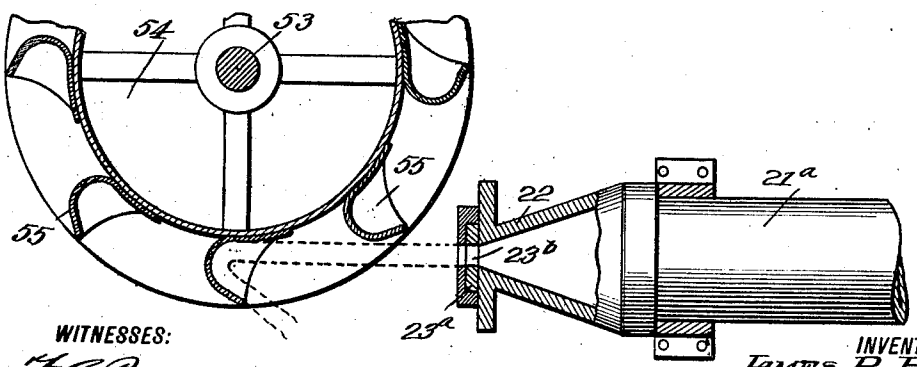


Fig. 3.



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DEVICE FOR ELEVATING WATER, MERCURY, OR OTHER LIQUIDS.

1,002,057. Specification of Letters Patent. **Patented Aug. 29, 1911.**

Application filed May 7, 1910. Serial No. 559,872.

To all whom it may concern:

Be it known that I, JAMES ROBERT HALL, a citizen of the United States, and a resident of Winnfield, in the parish of Winn and State of Louisiana, have made certain new and useful Improvements in Devices for Lifting Water, Mercury, or other Liquids, of which the following is a specification.

My invention relates in means for raising water, mercury or other liquids to a higher level and it consists in the constructions, combinations and arrangements herein described and claimed.

This invention is an improvement over that disclosed in a prior application No. 503,101, filed June 19, 1909. In said application I describe a means for raising water which consists in general of a vertical pipe having laterally extending hollow arms at its top, said pipe and arms being capable of being revolved rapidly so as to draw up water through the central pipe by the centrifugal action of the device. In said prior application the water was delivered from the hollow arms against a series of troughs carried by the supporting frame, thereby imparting to the frame a rotary motion in the direction of the revolving mechanism.

The main object of the present invention is to increase the turning effect by the use of impact wheels instead of troughs, the motion of the wheels being communicated to the revolving frame so as to increase the rotative movement of the latter.

Other objects and advantages will appear in the following specification and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this application, in which—

Figure 1 is a central vertical section through one embodiment of my invention. Fig. 1ª is a detail sectional view showing a portion of the valve operating devices. Fig. 2 is a section along the line 2—2 of Fig. 1, and Fig. 3 is an enlarged detail view showing the relation of the nozzle and the impact wheel.

In the following description of the device I shall describe only so much of the parts which have already been disclosed in my prior application above referred to, as will be necessary for an understanding of the improvements which constitute the invention in the present instance.

In carrying out my invention I provide a main tube or pipe 1 which extends down into the body of water, mercury or other liquid such as a well, receptacle or stream 2, and is rotatably supported upon the upper ball bearings 3, and the lower ball bearings 4 of the supporting base 5. The latter may be secured to the ground or floor 6 in any suitable manner. Secured to the pipe 1 is an annular bevel gear 7, which meshes with a similar bevel gear 8 on the end of a drive shaft 9, which is journaled at 10 at one end in the base 5 and at the other end at 11, and which bears the drive pulley 12. The top of the tube 1 is screwed into a cap or casing 13 which has a smaller tube 14 projecting upwardly therefrom. The latter is provided with a valve 15 on its interior. On the outer side of the tube is a collar 16 provided with a groove 17 into which the yoked end of a lever 18 projects. The lower end of the collar is pivotally connected with arms such as 19ª 19ᵇ and 19ᶜ.

Secured to the inner side of the cap 13 is a deflector 20 which divides the upwardly flowing stream into four parts. It will be seen that there are four lateral pipes 21ª, 21ᵇ, 21ᶜ, and 21ᵈ, which are screwed into the cap 13 and are provided at their ends with the nozzles 22 whose openings are controlled by the slide valves 23ª. Each valve gate 23ª is arranged to slide inwardly and outwardly to close the opening 23ᵇ. The valve gate is connected to a valve stem 24, the latter being connected with the pipe block 35 hereinafter mentioned by means of the spring 25 so that the valve gate is normally under the tension of the spring and will remain in any position in which it is set.

Referring now to Fig. 1, it will be seen that I provide a framework 28 to which the hand lever 29 is pivotally attached. The inner end of the hand lever is connected with the lever 18 by means of the rod 30.

In order to strengthen the laterally projecting tubes 21ª, 21ᵇ, 21ᶜ, and 21ᵈ, I arrange an annular plate 33 above the tubes and a similar plate 34 below the tubes with the blocks 35 between the plates and the tubes. Thus the plates serve as additional strengthening members, and tend to reduce the air friction. The upper plate is provided with a central opening 33ª.

In Fig. 1 I have shown a means for closing the lower end of the pipe 1 which consists of a plate 37 mounted for rotation at the top of a rod 38 arranged for reciprocation in a guide 39 and actuated by a lever 40 pivoted to a standard 41. The end of the lever is attached by means of a link 42 to a hand wheel 43 having a collar and sleeve connection 44 whereby the rotation of the hand wheel will raise the plate 37 up or down as desired. The apparatus described above is similar to that disclosed in my prior application above mentioned.

The following improvements constitute the subject of the present invention. Secured to the framework 28 is an annular plate 50 having a peripheral flange 51 at its lower edge provided with teeth, arranged to engage the teeth of four gears like those shown in Fig. 1 at 52. Each of these gears is mounted above the end of its respective nozzle and a description of the connections between one nozzle and the gear will suffice, since the other three sets are identical in construction. The gear 52 is mounted on the end of a shaft 53 which is carried by extensions $33^{\times}$ and $34^{\times}$ secured to the respective upper and lower plates 33 and 34. Between the extensions $33^{\times}$ and $34^{\times}$ is mounted a wheel 54. This wheel is similar to the ordinary Pelton wheel except having the curved buckets 55 secured to the side of the wheel instead of its edge. The wheel is securely fastened to the shaft 53 and as shown in Fig. 3 is in such a position that the stream issuing from the nozzle 22 will impinge upon the buckets so that they receive the full force of the stream.

From the foregoing description of the various parts of the device the operation thereof may be readily understood. With the apparatus set up as described the hand lever 29 is pressed down thereby pulling up on the rod 30, raising the collar 16 and the arms 19^a, 19^b, 19^c and 19^d, simultaneously. Each of these arms is pivotally connected to an upright lever 46 which has a pivotal connection at its bottom with one of the rods 47^a, 47^b, 47^c, and 47^d. These rods are connected by means of the bell crank levers 48^a, 48^b, 48^c, and 48^d (which are pivoted between the plates 33 and 34) with the valve stems 24 so that the upward movement of the collar 16 will cause the closing of the valve at the end of each of the nozzles 22. A suction pump (not shown) is attached by means of a flexible connection 45 to the pipe 14 and the air is exhausted from the pipe 1 thereby drawing the water, mercury or other liquid upwardly into said pipe and filling the lateral arms 21^a, 21^b, 21^c, and 21^d. The motor is started and the pipe 1 is revolved upon its bearings and the lateral arms are carried around with it. When sufficient speed has been attained, which varies with the length of the arms, the size of the pipes, the specific gravity of the liquid and other conditions, the lever 29 is pulled upwardly thereby opening the valves at the ends of the nozzles and permitting the liquid to flow outwardly by centrifugal action. The force created by the centrifugal action now causes the liquid to ascend the main pipe 1. As the liquid passes through the openings 23^b of the nozzle it shoots across the intervening space and is projected on to the buckets 55 of the wheels 54 turning these wheels and their shafts. The rotation of the shafts causes the gears to engage the teeth 51 of the annular gear 50 thereby augmenting the turning moment of the main pipe and the lateral pipes. This additional turning moment aids largely in keeping the apparatus in motion and greatly decreases the external power necessary to maintain the rotation.

An additional means of filling the main pipe 1 and the lateral pipes with water, mercury or other liquid is provided in the apparatus shown in Fig. 1. By manipulating the hand wheel the plate 37 may be brought up against the bottom of the pipe 1. The small tube 14 at the top of the pipe may be removed when liquid may be poured in through the opening until the main pipe and the lateral arms are completely filled. The pipe 14 may then be replaced, the main pipe and the lateral pipes are then set in rotation, the plate 37 turning on the bearing 38. As soon as a sufficient speed has been developed the plate 37 may be moved downwardly again, the valves at the nozzles may be opened and the water, mercury or other liquid will be drawn up in the manner already described.

I claim:

1. In a device for elevating water, mercury or other liquid a main pipe mounted for rotation around a vertical axis, laterally extending pipes communicating with said main pipe, supports for said lateral pipes, extensions secured to said supports at the ends of the lateral pipes, a vertical shaft carried by each extension, an impact wheel and a gear secured to each of said shafts, a stationary gear arranged to mesh with the teeth of each of the first mentioned gears and disposed between said first mentioned gears, means for filling said main and lateral pipes with water, mercury or other liquid and means for rotating them.

2. In a device for elevating water, mercury or other liquid a main pipe mounted for rotation around a vertical axis, laterally extending pipes communicating with said main pipe, means for filling the main and the lateral pipes with water, mercury or other liquid, means for rotating them, supporting plates above and below said lateral pipes, extensions secured to each of said

supporting plates at the ends of said pipes, a vertical shaft carried by each extension, an impact wheel and a gear carried by each of said shafts, a frame, and an annular gear secured to said frame between said first mentioned gears and arranged to engage the teeth of each of said first mentioned gears.

3. In a device for lifting water, a main frame, a main pipe mounted for rotation around a vertical axis beneath said main frame, laterally extending pipes communicating with said main pipe, valves for said lateral pipes, means for rotating said main and lateral pipes, supporting plates above and below said lateral pipes, extensions secured to each of said supporting plates at the end of said pipes, a vertical shaft carried by each extension, an impact wheel and a gear carried by each of said shafts, an annular gear suspended from said frame between said first mentioned gears and arranged to engage the teeth of each of said gears, and an operating lever pivoted on said frame within said annular gear for operating the valves of said extending arms.

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Witnesses:
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S. M. ABEL.