

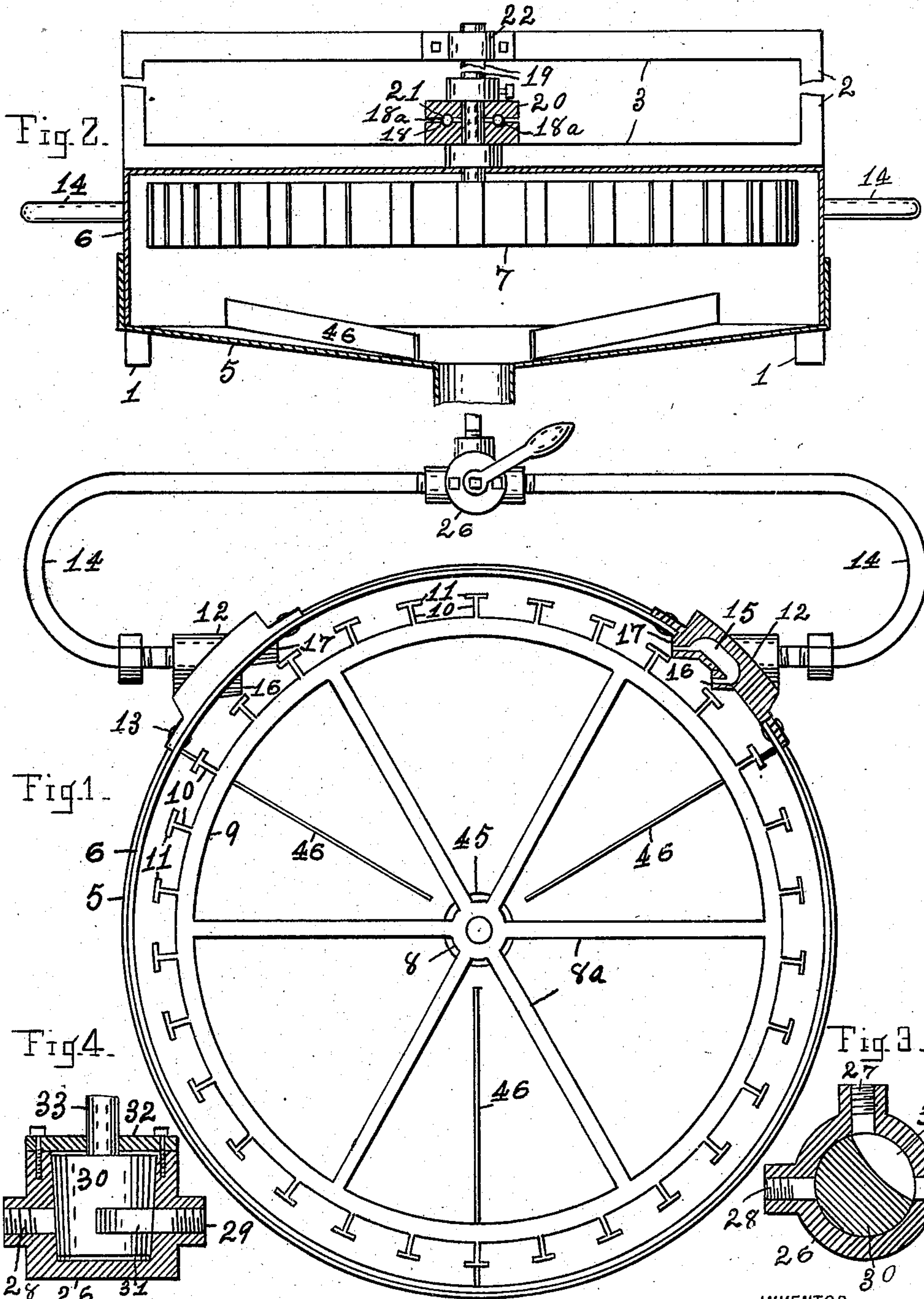
H. H. HELD.  
WATER MOTOR.

APPLICATION FILED MAR. 7, 1908.

Patented Oct. 6, 1908.

2 SHEETS—SHEET 1.

900,535.



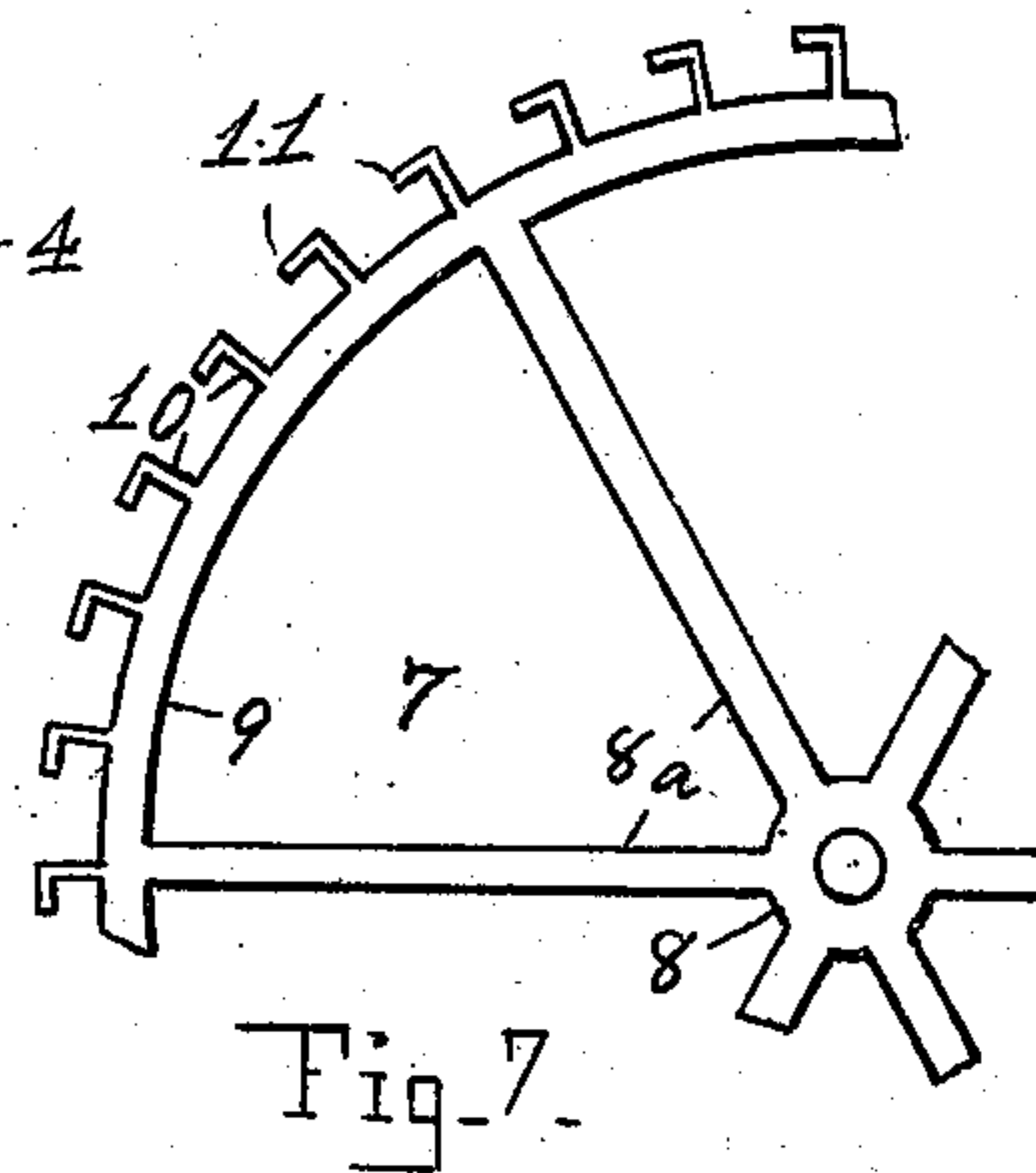
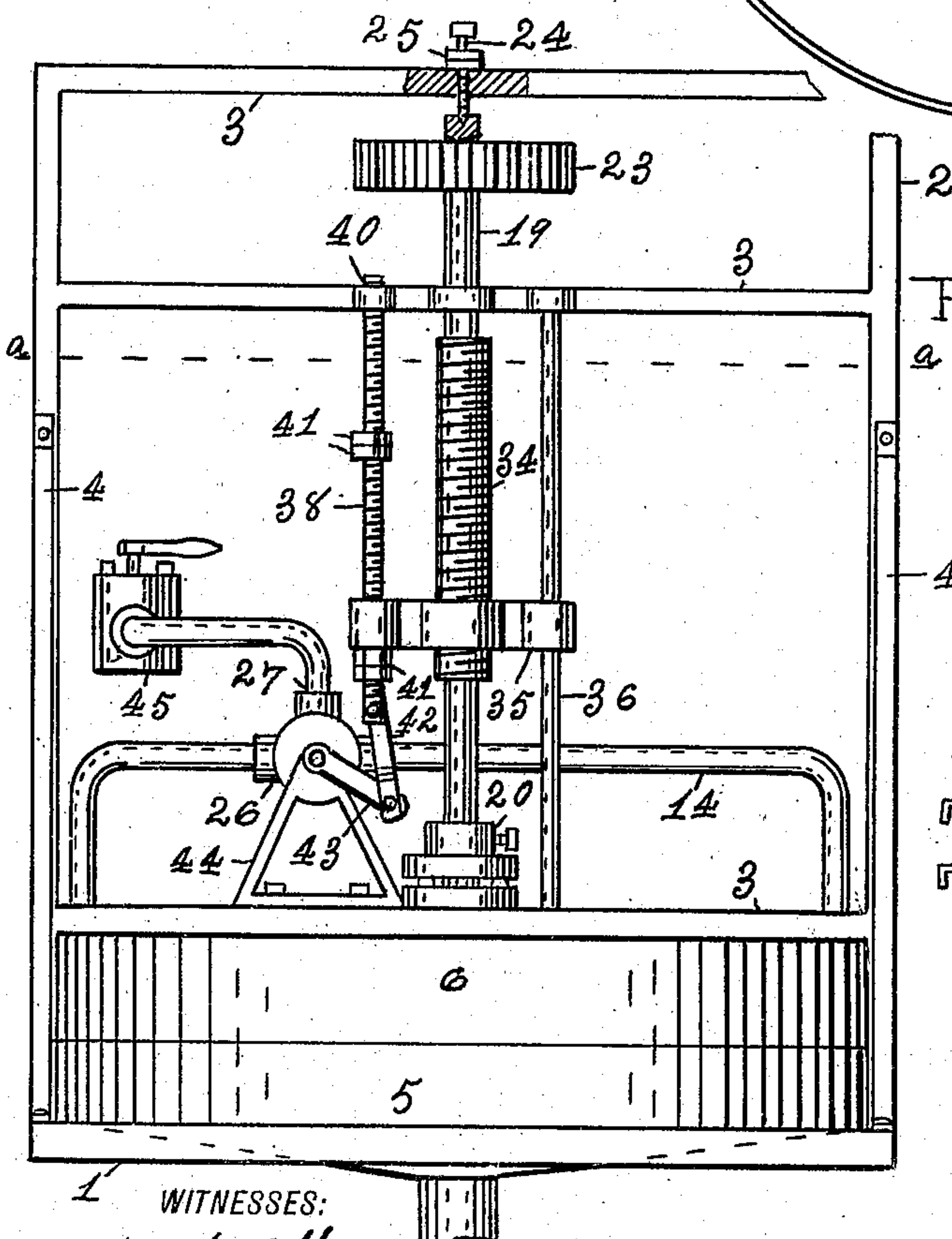
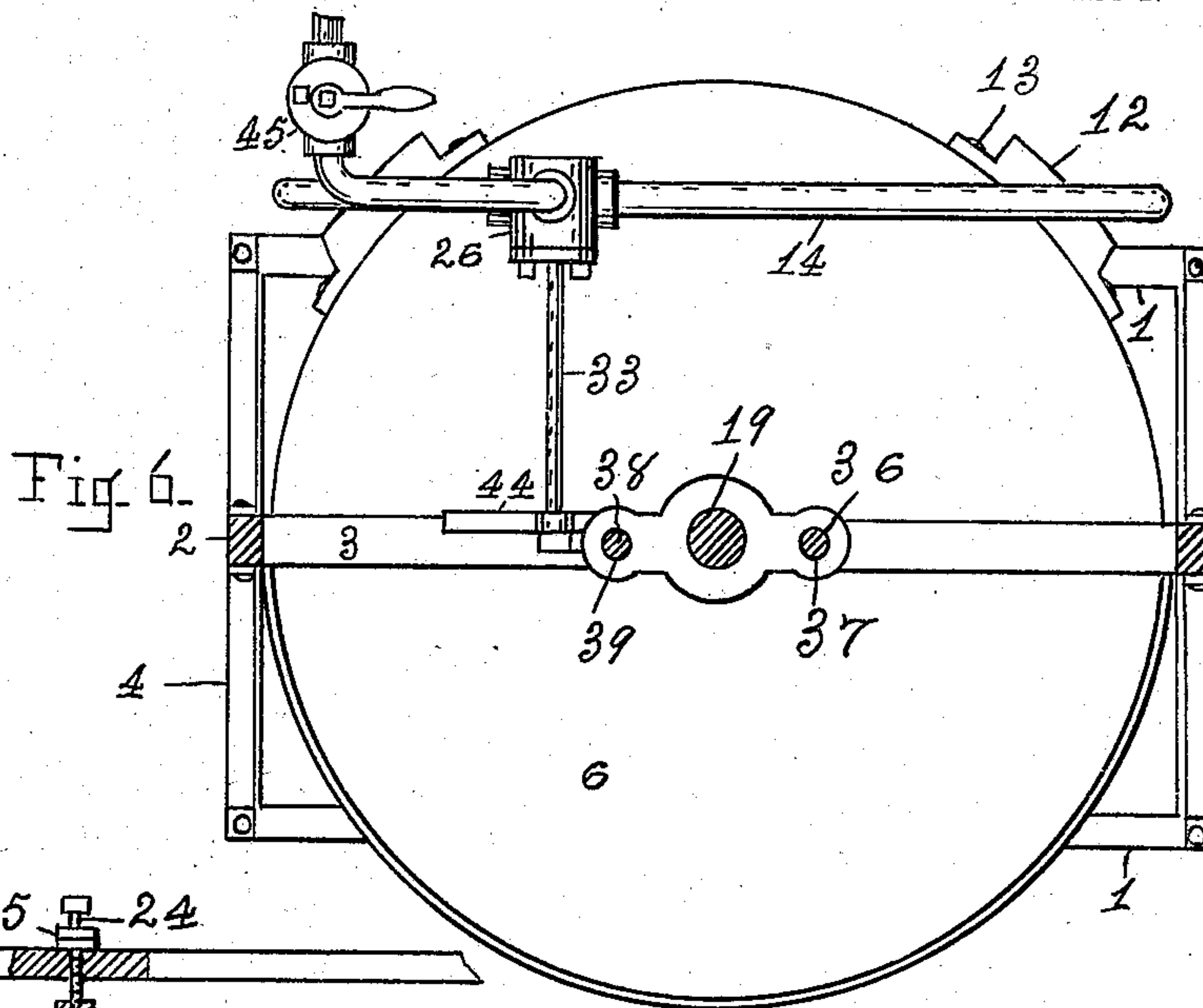
WITNESSES:  
E. E. Merchant  
E. M. Albee.

INVENTOR  
Henry H. Held.  
BY *E. M. Albee.*  
ATTORNEY

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# UNITED STATES PATENT OFFICE

HENRY H. HELD, OF MENASHA, WISCONSIN.

## WATER-MOTOR.

No. 900,535.

Specification of Letters Patent.

Patented Oct. 6, 1908.

Application filed March 7, 1908. Serial No. 419,624.

*To all whom it may concern:*

Be it known that I, HENRY H. HELD, a citizen of the United States, residing at Menasha, in the county of Winnebago and State of Wisconsin, have invented a new and useful Improvement in Water-Motors, of which the following is a specification.

My invention relates to small water wheels or motors, such as are adapted to be run by the force rather than by the weight of the water and are operated by the public water works system of a city for running elevators, domestic machines, &c., and it consists of an improved form of bucket for a wheel, and adapting the wheel for running in either circular direction, such wheels being useful for running some styles of washing machines; it consists also of the manner in which the water is applied to the buckets, and of devices operated by the running of the wheel for automatically reversing the direction in which the wheel runs, and the objects of my improvements are, first, to provide a wheel that is capable of receiving and transmitting the greatest amount of force of the water delivered to it, second, a wheel that is provided with buckets adapted for receiving the water for running the wheel in either circular direction, and third, to provide automatically operating mechanism for changing the direction in which the wheel is run in one direction, after a predetermined number of revolutions, to the opposite direction. I attain these objects by the construction and arrangement of mechanism shown in the accompanying drawing, in which—

Figure 1 is a plan of the wheel showing it in its casing with the casing cover removed, and showing it with its water delivering pipes arranged for running it in either direction, the cock for changing said direction being adapted to be operated by an attendant. Fig. 2 is a vertical section of the wheel case and showing a side elevation of the wheel suspended for revolution therein, and a frame upon which the wheel is supported and journaled for revolution. Fig. 3 is a horizontal section across a three way cock which I use in supplying the wheel shown in Figs. 1 and 2, with water. Fig. 4 is a vertical section of a three way cock. Fig. 5 is a side elevation of a wheel case within a supporting frame, and showing a different arrangement of the water supplying pipes than in Figs. 1 and 2, and showing

its water feeding cock arranged to operate automatically for changing the direction of the wheel's running. Fig. 6 is a plan of the parts of the same below the line *a, a*, of Fig. 5. Fig. 7 is a plan of a fragment of the wheel having buckets adapted for running the wheel one way only. Figs. 5, 6 and 7, are upon a smaller scale than Figs. 1 and 2, and Figs. 3 and 4 are upon a larger scale than Figs. 1 and 2.

Similar numerals indicate like parts in the several views.

1, indicates sills of the frame pieces upon which the motor case may be mounted, which frame may consist of sills, 1, posts 2, girths 3 and braces 4, the braces extending from sills to posts, the posts and girths being arranged in any suitable position for supporting the mechanism of the motor.

5, indicates the bottom part of the wheel case, the case being of a circular form, made of sheet metal in two parts preferably, the bottom part being provided with a concave bottom leading to a central outlet and is supported upon the sills of the frame, the top part 6, is made to fit closely within the vertical sides of the bottom part.

7, indicates the motor wheel which is suspended from above the case for revolution in a horizontal plane, and is formed of a cast pulley having hub 8, arms 8<sup>a</sup>, and rim 9, the rim having integral with it, stems 10, extending in radial lines outward from the rim for forming buckets, those for one form of buckets, see Figs. 1 and 2, being somewhat in the form of the letter T, the head of the T extending in a circumferential direction an equal distance to the right and left of said stem and forming wings 11. The buckets can be made of sheet metal separate from the rim, and be riveted thereto if desired.

The buckets have both ends open, whereby the escape of water after it has struck the buckets is unobstructed. It will be observed that for a wheel running in but one direction, the wings 11, need be upon but one side of the stem 10, see Fig. 7.

In directing a stream of water upon a running wheel, there is a portion of the time that said stream will be of little effect, such time being while the stream is striking the end or circumferential surface of the buckets. For obviating this, I provide two nozzles for delivering water to the buckets, one nozzle being placed so that it will be delivering a jet or stream into a bucket, while the jet from



the other nozzle is striking the outside, or wings of the bucket. This improvement is shown in Fig. 1, where the segmental casting 12 is arranged to be secured to the case with  
 5 rivets 13, the casting being connected with the water delivery pipes 14 and being provided with a cavity 15, into which the water is delivered from the pipe 14 and from which the nozzles 16 and 17 deliver it to the wheel.

10 The nozzles are arranged at a distance apart different from the distance from one bucket to another, so that while one nozzle is delivering a jet of water against the wings 11, the other nozzle is delivering its jet into  
 15 a bucket. For a wheel running in two directions, pipes are arranged for delivering jets of water at two points on the circumference of the wheel, but ordinarily they are run in but one direction, when the pipe will be ar-  
 20 ranged at but one point on the wheel case.

Across the top of the wheel case, a girth of the frame is arranged, upon which the wheel is supported, a race-way 18 being formed thereon midway its ends, in which a plural-  
 25 ity of balls 18<sup>a</sup>, are arranged for forming a ball bearing for the wheel.

A shaft 19, extends upward from the wheel hub and passes loosely through the girth, and is provided with a collar 20, which  
 30 is secured to the shaft, it having upon its lower side a race-way 21, corresponding with the race-way 18. Continuing upward a suitable distance, an upper bearing 22, is arranged in Fig. 2, upon the upper girth of the  
 35 frame, and near said bearing any suitable device, as the gear 23, may be secured for transferring power to the machinery it is desired to operate. In Fig. 4, the upper end of the wheel shaft is centered and revolves  
 40 upon a thrust bolt 24, which bolt is threaded into the frame girth and is provided with pinch nuts 25, for adjusting the bolt vertically. This method of supporting the wheel on balls and of retaining the upper  
 45 end of the wheel shaft in position, reduces its friction to a small amount. In Figs. 4 and 5, mechanism is shown for automatically changing the direction in which the wheel is made to run. There are several arrange-  
 50 ments of devices by which this may be effected, but a simple one consists in providing a three way cock 26, for changing the direction, the cock having inlet 27, and outlets 28 and 29, its plug 30, being cut away at 31 for  
 55 permitting water to pass to either outlet, as the plug is turned a partial revolution. The cock is provided with a cap plate 32 which is bolted to the body of the cock, and through which the stem 33 of the plug extends. No  
 60 claim is made to the cock and any suitable style of one may be used.

A screw thread, 34, is formed along the wheel shaft, and a long nut, 35, is mounted upon said threads. A round rod 36, is ex-  
 65 tended from the lower to the intermediate

girth, the rod passing through the bore 37 of the nut, for guiding the nut vertically along the shaft of the wheel. A rod 38 passes loosely through an end of the nut at 39, and extends loosely through the girth at 40, for  
 70 holding the upper end of the rod in position, the rod being provided with pinch nuts 41 both above and below the nut 35, and with a link 42, connecting with the arm 43 of the three way cock stem, the stem of the cock  
 75 extending forward and being supported by the stand 44 near where said arm is mounted. A cock 45, is necessary on water supply pipes for positively shutting off the water whenever the automatic device is used for  
 80 supplying the wheel with water.

The operation of the mechanism is as follows: Water being supplied to the wheel by the turning of the stem of the cock so as to bring the cavity in the plug of the cock  
 85 opposite the inlet and one outlet opening therein, it will issue from the two nozzles upon one side of the wheel, strike the buckets with force and revolve the wheel, the water immediately falling from the buckets  
 90 to the bottom of the wheel case for escape through the opening 45, at the center of the bottom.

In order to break the circular motion of the water around the case and thus prevent-  
 95 ing its escape, a plurality of ribs 46, are secured in radial positions upon the bottom, which serve to arrest said circular motion and cause it to flow into the opening and out of the case. The automatic device for chang-  
 100 ing the direction of the flow of water toward the different pipes that supply the nozzles, act from the turning of the wheel shaft, its threads 34 engaging with those of the nut 35, raising or lowering the nut, as the case may  
 105 be, until it engages one set of pinch nuts on the rod 38, when the arm 43 will be swung by the reciprocating movement of the rod 38, and the position of the recess 31 in the plug of the cock thereby changed to the other out-  
 110 let of the cock, and the wheel made to revolve in the opposite direction. The length of time between changes in direction of the wheel's running, can be governed by arranging the two sets of pinch nuts nearer to, or  
 115 farther from each other.

Having described my invention, what I claim and desire to secure by Letters Patent, is,—

1. A wheel for a water motor arranged to  
 120 revolve in a horizontal plane, a suitable case for the wheel, a suitable hub and a circular rim outside of the hub of the desired width of face for the buckets, a series of buckets ar-  
 125 ranged outside of said rim, said buckets consisting, each of a thin plate arranged across the face of said rim in a plane parallel with the axis of the wheel and extending in a radial direction therefrom, a wing extending in a circumferential direction at equal dis- 130



tances from the rim from one side of the  
outer ends of each of said radially arranged  
plates, each of said buckets having an unob-  
structed escape for water, both above and be-  
5 low said plates and wings, and a suitable  
nozzle arranged for directing a jet of water  
into said buckets.

2. A wheel for a water motor arranged to  
be revolved in a horizontal plane, a suitable  
10 case for the wheel, a suitable hub and a cir-  
cular rim outside of the hub of the desired  
width of face for the buckets, a series of  
buckets arranged around and outside of the  
rim, said buckets consisting each of a thin  
15 plate arranged across the face of said rim in

a plane parallel with the axis of the wheel  
and extending in a radial direction there-  
from, a wing extending an equal distance in  
a circumferential direction, from each side  
of each plate at an equal distance from the 20  
rim of said wheel, each bucket having an  
unobstructed escape for water both above  
and below said plates and wings, and suit-  
able nozzles for directing a jet of water into  
the buckets for revolving the wheel in either 25  
direction.

HENRY H. HELD.

Witnesses:

M. H. WHEELER,  
HARRY E. BULLARD.