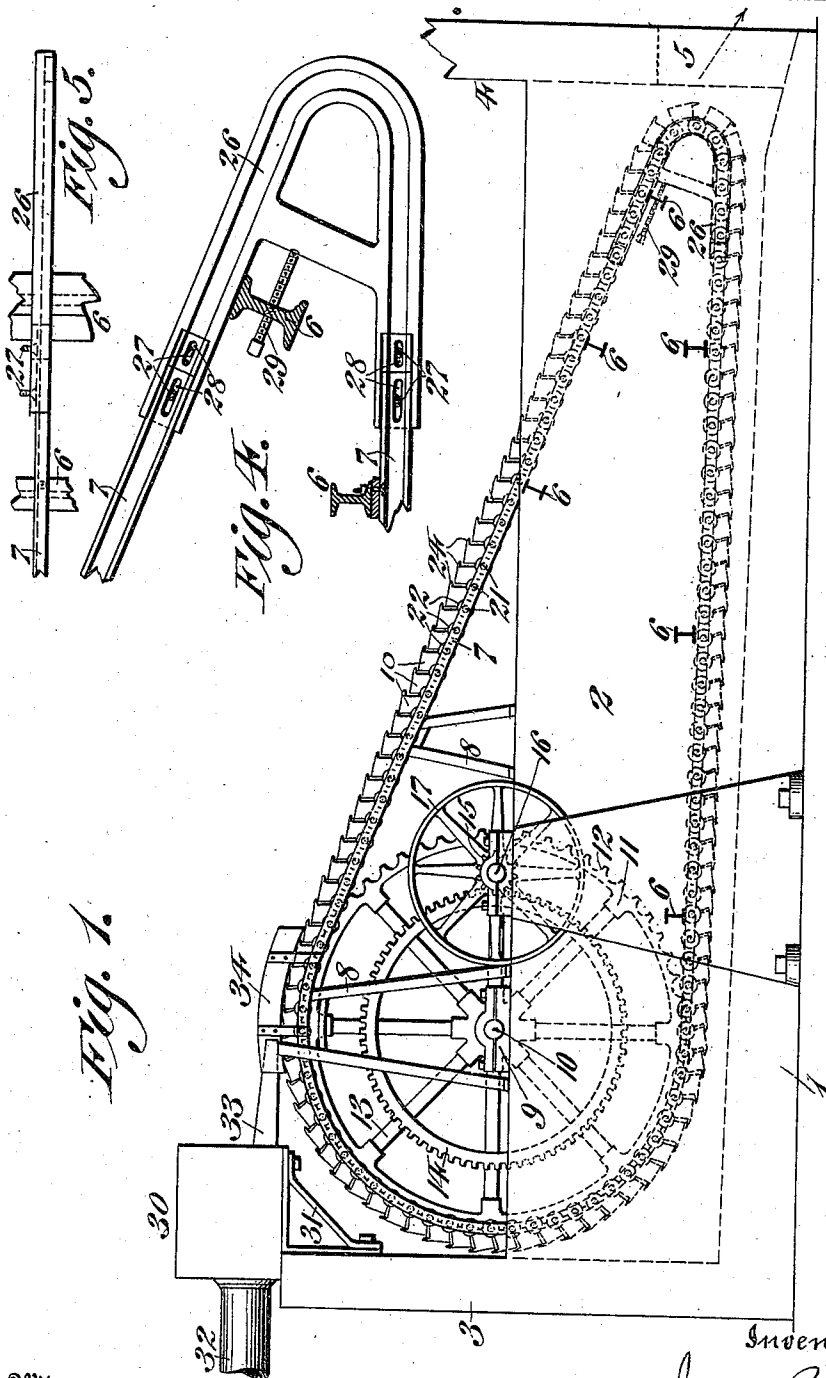


973,088.

I. C. WALKER.
HYDRAULIC MOTOR.
APPLICATION FILED FEB. 8, 1909.

Patented Oct. 18, 1910.

3 SHEETS-SHEET 1.



Witnesses
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Fig. 2.

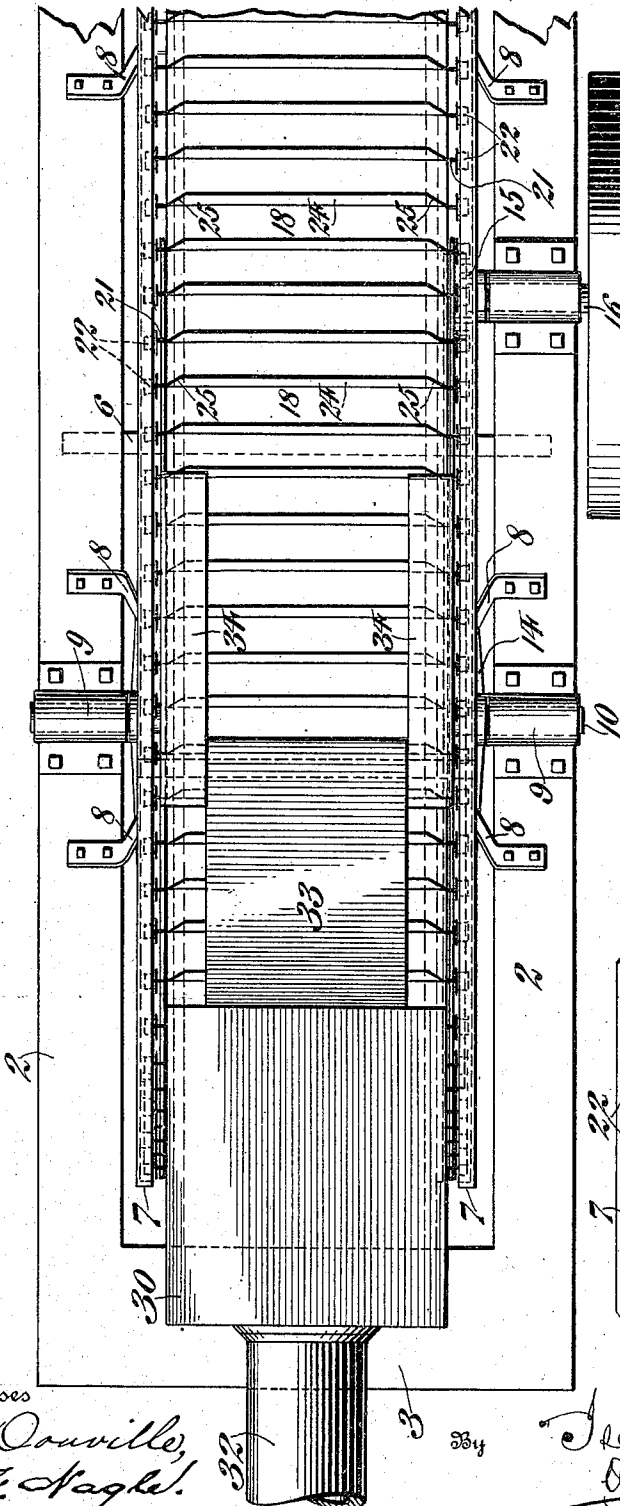
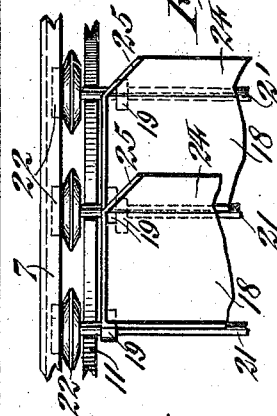


Fig. 3.



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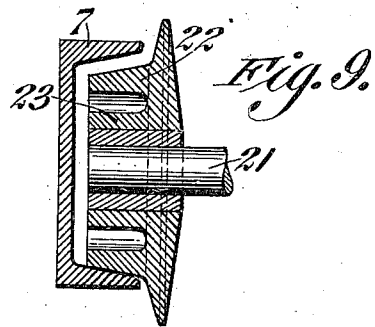
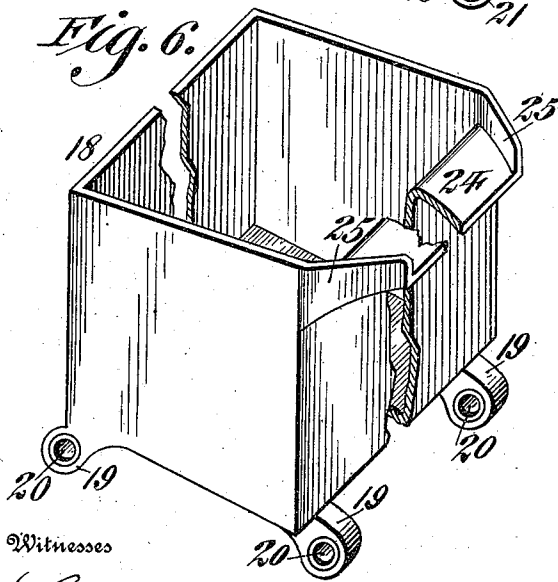
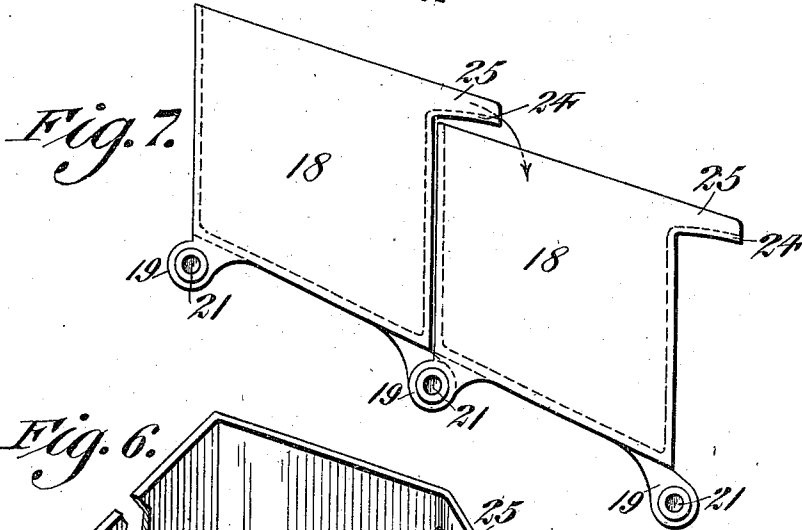
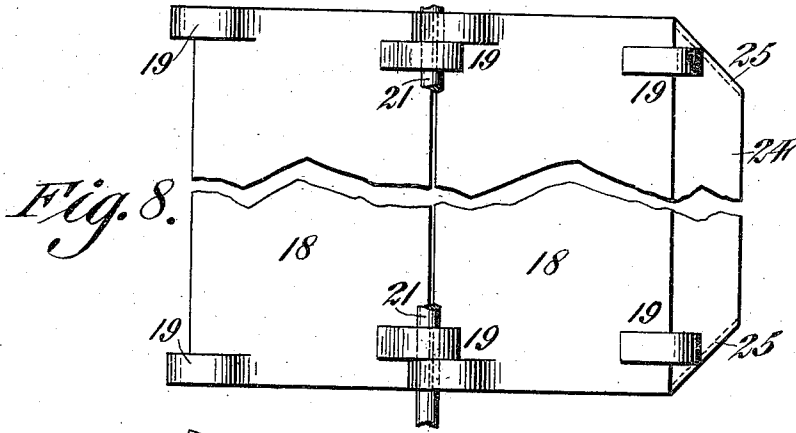
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3 SHEETS—SHEET 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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HYDRAULIC MOTOR.

973,088.

Specification of Letters Patent.

Patented Oct. 18, 1910.

Application filed February 3, 1909. Serial No. 476,665.

To all whom it may concern:

Be it known that I, ISAAC C. WALKER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Hydraulic Motor, of which the following is a specification.

This invention relates to a new and novel water wheel and more particularly to that type of wheel known as an overshot water wheel, in which a head of water is utilized to drive a wheel by delivering the water to a series of buckets at a point adjacent the top thereof.

In water wheels, as heretofore constructed, it has been necessary, in order to obtain any degree of efficiency, to construct a wheel of such large diameter as to make it impracticable in ordinary use since it is only by this means that the great losses, due to the entering and discharge head, may be reduced sufficiently to permit effective working.

In my present invention, I have devised a mechanism operating on the principle of an inclined plane and by which a wheel of impractical diameter may be avoided and still a high degree of efficiency be obtained.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof, which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a side elevation of a machine embodying my invention. Fig. 2 represents a plan of a portion of the same. Fig. 3 represents a detail of a portion of the operating mechanism. Fig. 4 represents a detail of a slack adjuster. Fig. 5 represents a plan of the same. Fig. 6 represents a perspective of one of the driving buckets. Fig. 7 represents a side elevation of two of the driving buckets. Fig. 8 is a bottom view

of the same. Fig. 9 represents a section of a bucket wheel and the runway therefor.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates a casing, having side walls 2 and end walls 3 and 4, whereby a flume-like structure is formed, adapted to receive and cooperate with my novel overshot water wheel mechanism. This casing is adapted to be placed in the bed of a stream or adjacent thereto, the end walls 3 serving to dam up the water in order to obtain the head necessary for operating my device. Of course it will be understood that the end wall 4 is provided with a suitable opening 5 for the discharge of water from the wheel. The upper face or floor of the flume is inclined from the end 3 to the end 4, so that the water dropping from the wheel will drain from end to end of the flume.

6 designates a plurality of I-beams, preferably built in the side walls 2 and extending transversely of the interior of the casing, whereby suitable supports are formed for a runway 7, to be presently described. It will be noted from Fig. 1 that certain portions of this runway extend some distance above the side walls 2 and in order to support this portion thereof, I preferably provide uprights 8 suitably mounted on the walls 2 and secured in any desired manner to the said runway.

9 designates a bearing, here shown as mounted on the top of each of the side walls, having, in the present instance, mounted therein a driving shaft 10 which carries thereon sprocket wheels 11 provided with suitably spaced teeth 12 for engagement with the bucket conveying mechanism, to be hereinafter described.

Suitably secured to the spokes of one of the sprocket wheels 11 is a gear 14, adapted to transmit power from the sprocket wheel to a pinion 15, fixedly mounted on shaft 16 and from thence to pulley 17 carried by said shaft.

It will now be apparent that when the sprocket wheel is rotated by the bucket mechanism the pulley 17 will likewise be caused to rotate and by the use of a belt or the like thereon, the power may be taken for any desired purpose.

The runway 7, in the present instance, is formed of channel iron, as shown in section in Fig. 9 and follows the contour of the periphery of the sprocket wheels for a portion of their circumference and then extends some distance from said wheels on a substantial incline, returning horizontally to the lower portion of the said sprocket wheels 11. As here shown, the runway comprises two sets of channel irons spaced apart a sufficient distance to permit the conveyer mechanism to run freely therebetween.

The conveyer mechanism consists of a plurality of buckets 18 preferably rectangular in shape and provided with depending lugs or ears 19 which are respectively off-set in order to cooperate with similar lugs on the next adjacent buckets, whereby apertures 20 in the said lugs 19 are brought into alignment so that a rod 21 or the like may be inserted to movably secure the same together. When all of the buckets are thus secured together by the rods 21, it will be obvious that a complete articulated conveyer mechanism is formed and which constitutes my novel driving means for the sprocket wheels 11 which engage with the rods without the employment of sprocket chains for connecting one bucket with the other. Preferably I extend each of the rods 21 some little distance on either side of each bucket and on the extremity thereof, I mount rotating pulley members or wheels 22, whose hubs 23 receive said rods 21, said wheels being in the channel of the runway. It will be noticed here that the runway has its upper portion inclined and its base portion horizontal, the runway thus being substantially wedge-shape, the widest end containing the driving wheel 11.

The narrow end of the runway joins the upper and base portions of the runway and curves from one portion to the other, see Figs. 1 and 4; the same being true of the wide end of the runway, said narrow end serving to guide and support the buckets or conveyer mechanism as the latter passes from the upper to the lower portion of the runway. The ears 19 at the opposite ends of the buckets project respectively forwardly and rearwardly, whereby said ears of adjacent buckets have their openings in alignment to receive the rods 21, approximately directly below the joint of said adjacent buckets, whereby the latter are close together in their descent on the runway. It will be noted from Fig. 3 that these wheels 22 are positioned a slight distance from their respective buckets in order to provide a space for each sprocket wheel 11, the teeth of which are engaged and driven by the several rods 21. These buckets, forming as they do in the present instance, the driving means for a novel type of an overshot water wheel are adapted to

carry water and therefore, in order to prevent as small amount of waste water as possible, I provide an overhanging lip 24 on each bucket so that should one bucket overflow, the excess of water will be delivered directly into the next adjacent bucket. The lips 24 are provided with converging sides or flanges 25 which prevent lateral discharge of water from said lip and consequently from the sides of the buckets, and the buckets fill one from the other. The lip 24 and flanges 25 form together a spout, which is quite an important feature in the construction of my conveyer, since thereby a large quantity of water, otherwise wasted by overflowing, is now maintained directly in the buckets and adds to the effective working force.

Referring to Fig. 3, attention is directed to the fact that the sprocket wheels 11 engage the rods 21 of the buckets beyond the sides of the latter, whereby the buckets are removed from direct contact with said wheels, by which provision friction on and wear of the buckets by said wheels are prevented, it being noticed that the bottoms of the buckets form an unbroken continuity throughout the length of the conveyer mechanism and adjacent buckets abut at their front and rear ends respectively without material space between them, it being noticed that the bottoms of the buckets are inclined and the front and rear sides of the same respectively make acute and obtuse angles with the bottoms.

In order to take up at various times lost motion due to wear and the like and to otherwise eliminate whatever slack may occur, I cut away the runway 7 at a suitable point and insert therein a means for readily performing this function. In the present instance I have shown in Fig. 4, the runway divided forming the same in sections, the meeting ends of the sections being fitted to each other telescopically. In said ends are slots 28 to receive bolts 27, whereby said ends may be firmly connected and the sections rendered rigid as one.

29 designates an adjusting screw threaded into one of the I-beams 6 and adapted to engage a suitable part of the section 26, whereby the adjustment of the sections of the runway may be readily accomplished.

30 designates a receiving tank mounted on a bracket 31 on the end wall 3, the said tank having communication through outlet pipe 32 with the water reservoir on one side and on the other having an outlet nozzle 33 suitably positioned to deliver the water to the bucket conveyer at a point substantially tangent to the pressure of the conveyer. The mouth of this nozzle 33, as here shown, is suitably inclosed by side guards 34 so that there may not be an undue waste of water at this point. It will be noted by bringing

this discharge nozzle 33 into close proximity with the buckets and at a small angle thereto, say about 10° or 15°, that loss to the entering head is reduced to a minimum.

5 Attention is directed to the delivery ends of the bucket conveyer and the manner in which the buckets are tilted to deliver the water to the discharge opening 5 after the completion of the working stroke on the in-
10 cline. It will be seen that the buckets do not empty until they are substantially at a level with the discharge and thereby the efficiency of the device is increased since practically all of the total head is utilized
15 in view of the small discharge head at the opening 5.

In operation, water is admitted to the receiving tank 30, from which it passes through the nozzle 33 and runs into the ad-
20 jacent conveyer buckets which are filled one by one, the weight of the water in the first two or three buckets being sufficient to overcome the friction of the conveyer runway and the like and the conveyer starts moving
25 and imparts motion to the sprocket wheels 11. The sprocket wheels 11, while rotating, impart movement to the gear 14 which, through its pinion connection, transmits motion to the pulley 17, from which it is taken
30 off by any well known means.

It will be noticed that I refer to a plurality of sprocket wheels 11 for the purpose of description, but it will be readily understood that these elements form sides of a
35 single large wheel, which latter I refer to throughout the claims, as the details of its construction may of course be variously modified.

Of course it will be understood that I am
40 not to be limited to any particular location of the driving wheel, relative to the runway, as in varying conditions it may be found desirable to take off the power at one end or another, as the case may be. Furthermore,
45 is will be readily apparent that at times it may be necessary to remove the bucket or buckets to shorten the conveyer or to put in new buckets and for this purpose I preferably provide at a suitable place in the run-
50 way a cut-away portion permitting free removal of the buckets.

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

55 1. In a hydraulic motor, a runway substantially wedge-shaped, a series of chainless connected buckets having means for delivering the excess of water directly from one bucket to the other, said buckets having projecting and reciprocally articulating ears,
60 rods passing transversely through the articulating ears across the entire width of the buckets, supporting pulleys journaled upon the ends of said rods to travel and be guided
65 in said runway, power-transmitting means

constructed to be engaged and actuated by the transverse rods, and a conduit for the actuating liquid arranged to discharge the latter at substantially the top or upper end of the inclined side of the runway.

2. In a hydraulic motor, a substantially wedge-shaped runway, a series of chainless buckets, the same having ears directly depending therefrom in alinement, a rod passing through the ears of adjacent buckets
75 from side to side, a power transmitting wheel adapted to be engaged by said rod, and supporting pulleys on said rod freely movable on said runway, said power transmitting wheel occupying the wide end of
80 said runway, and a discharge member on each bucket adapted to overhang the bucket in front thereof.

3. In a hydraulic motor, a continuous runway substantially wedge-shaped, a series
85 of chainless connected buckets having means for delivering the excess of water directly from one bucket to the other, said buckets having projecting and reciprocally articulating ears, rods passing transversely
90 through the articulating ears from side to side, supporting pulleys journaled upon the ends of said rods to travel in and be continually guided by the runway, and a power-transmitting wheel journaled at the wide
95 end of the wedge-shaped runway and constructed to be engaged and revolved by the transverse rods.

4. In a hydraulic motor, a runway composed of a continuous frame comparatively
100 wedge-shaped, a series of chainless articulatively-connected buckets, the same having ears depending therefrom, the ears of adjacent buckets being adapted to aline and connecting rods passing through the ears
105 and adapted to articulatively connect the buckets, said runway being provided at opposite ends with means around which the buckets turn, and constructed to support
110 said buckets in their turning motion at the end of the runway, each bucket being provided with a forwardly projecting spout to adapt it to overhang the bucket in front thereof.

5. In a hydraulic motor, buckets adapted
115 to be articulatively-connected, and each provided with a spout projecting forwardly from each bucket adapted to overhang the bucket in front thereof.

6. In a hydraulic motor, the combination
120 with power transmitting mechanism of a series of articulatively-connected buckets adapted to engage said mechanism, each being provided with a spout which projects forwardly from the same and overhangs the
125 rear of the adjacent bucket in advance thereof.

7. In a hydraulic motor, the combination of a runway composed of a continuous frame comparatively wedge-shaped, buckets adapt- 136

ed to be supported and run thereon, a wheel adapted to occupy the widest end of said runway and being in gear with said buckets, the narrow end of said runway being adapted to have said mechanism ride on and be guided by the same in its turning motion from the top to the bottom of the runway, the adjacent members of the buckets each having a lip to overhang the next adjacent bucket.

8. In a motor of the character described, the combination of a wheel, with a runway having inclined and substantially horizontal portions, and end portions continuous therewith, a plurality of buckets movably connected and movable over said runway, each bucket having a lip overhanging the next adjacent bucket and means arranged and terminating tangentially of said wheel to deliver a flow of water to said buckets.

9. In a motor of the character described, the combination of a wheel, with a runway having inclined and substantially horizontal portions, a plurality of buckets movably connected and movable over said runway, said runway having an adjustable section, each bucket having a lip overhanging the next adjacent bucket and means arranged and terminating tangentially of said wheel to deliver a flow of water to said buckets.

10. In a motor of the character described, the combination of a wheel, with a runway having inclined and substantially horizontal portions, a plurality of buckets movably connected and movable over said runway, a spout with side guards arranged and terminating tangentially of said wheel to deliver a flow of water to said buckets, and an inclosing casing having an end portion and a tank supported on said end portion.

11. In a motor of the character described, the combination of a wheel, with a runway having inclined and substantially horizontal portions, a plurality of buckets movably connected and movable over the runway, a supply device terminating tangentially over said wheel to deliver a flow of water correspondingly to said buckets, and an inclosing casing therefor having an end portion, a tank supported on said end portion, said casing having also an opening for the discharge

of the water adjacent the junction of said inclined and horizontal portions of the runway.

12. In a motor of the character described, a support, a wheel rotatably mounted thereon, a continuous runway encircling said wheel and having an inclined portion, a bucket mechanism carried by said runway, a spout arranged and terminating tangentially to said wheel and adapted to deliver motive fluid into said bucket mechanism, and means upon opposite sides of the spout and supported from the runway to direct substantially all of said motive fluid delivered from said spout into said buckets.

13. In a motor of the character described, a support, a wheel rotatably mounted thereon, a continuous runway encircling said wheel and having an inclined portion, a conveyer comprising a plurality of buckets carried by the runway, a lip on each bucket having converging sides and overlapping the next adjacent bucket, a spout arranged and terminating tangentially to said wheel and adapted to deliver motive fluid into said conveyer, and means upon opposite sides of the spout to direct substantially all of said motive fluid delivered from said spout into said buckets.

14. In a motor of the character stated, a runway formed of separate sections, devices adapted to adjustably connect the same, a supporting member, and a screw, the latter being mounted on said member and adapted to bear against a section of the runway to provide for the adjustability of the latter.

15. In a motor of the character described, a rotatably mounted wheel, a continuous runway encircling said wheel, a conveyer comprising a plurality of buckets carried by the runway, a lip on each bucket overlapping the next adjacent bucket, a spout adapted to deliver motive fluid into said conveyer, and means to direct substantially all of said motive fluid delivered from said spout into said buckets.

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