J. T. DOUGINE.

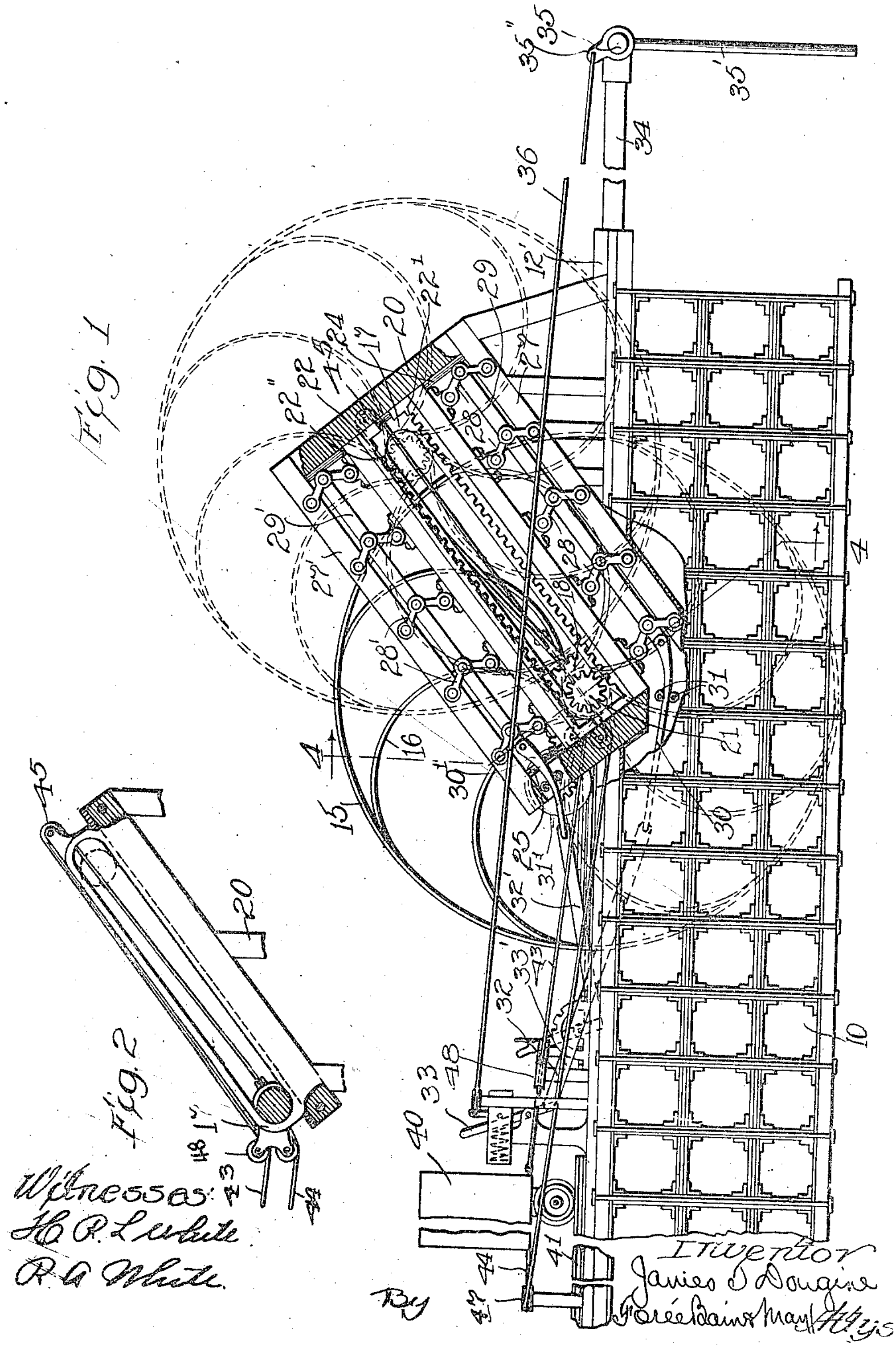
HYDRAULIC POWER PLANT.

APPLICATION FILED SEPT. 10, 1910.

1,024,188.

Patented Apr. 23, 1912.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 3

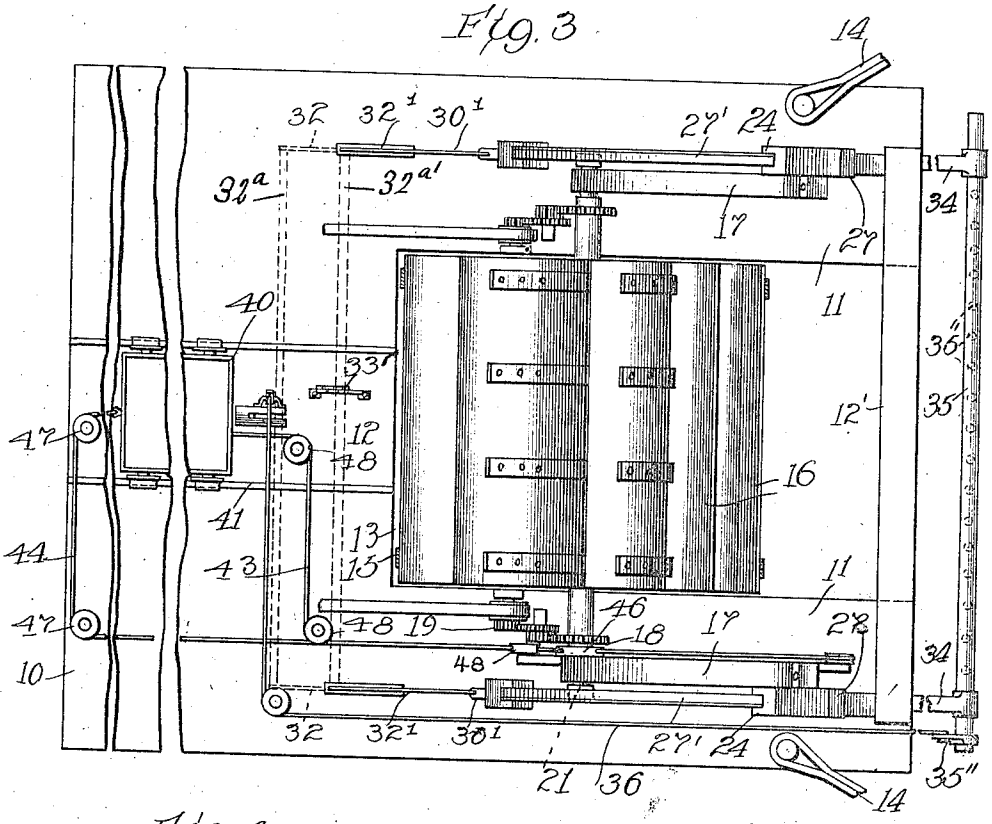

Fig. 4

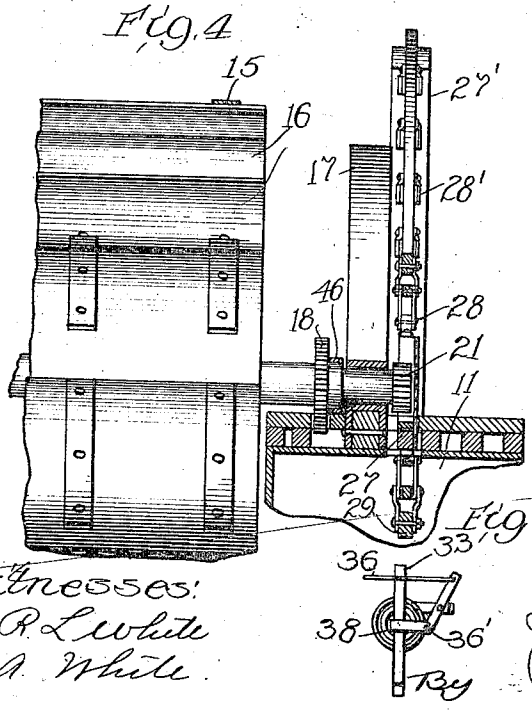

Fig. 5

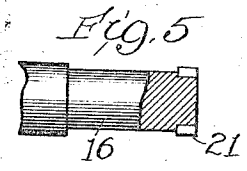

Fig. 6

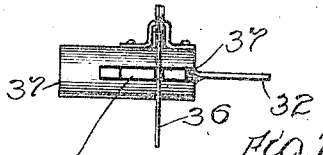

Fig. 7

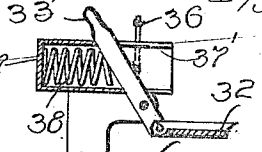

Fig. 8

Witnesses:
H. P. Lewis
R. A. White.

Inventor:
James T. Dougine
by Howell Baines May Attys

UNITED STATES PATENT OFFICE.

JAMES T. DOUGINE, OF KENOSHA, WISCONSIN.

HYDRAULIC-POWER PLANT.

1,024,188. Specification of Letters Patent. Patented Apr. 23, 1912.

Application filed September 10, 1910. Serial No. 581,426.

To all whom it may concern:

Be it known that I, JAMES T. DOUGINE, a citizen of the United States, residing at Kenosha, in the county of Kenosha and State of Wisconsin, have invented certain new and useful Improvements in Hydraulic-Power Plants, of which the following is a specification.

My invention relates to improvements in hydraulic power plants, and more particularly to mechanism of the character illustrated in my prior application filed Aug. 2, 1909, Serial No. 510,810.

Among the objects of my invention are to provide improved means for control of the water wheel, and improved means for maintaining the balance of the float or hull by compensating for the longitudinal displacement of the center of gravity of the wheel incident to its rise and descent.

In the drawings, wherein I have illustrated an embodiment of my invention, Figure 1 is a side elevation with parts broken away of a hull or floating dam bearing a water wheel made in accordance with the preferred form of my invention, Fig. 2 is a detail of a track; Fig. 3 is a plan view thereof; Fig. 4 is a fragmentary section on line 4—4 of Fig. 1; Fig. 5 is a detail of a gear construction; and Figs. 6, 7, and 8 are details of a latch construction for an operating handle.

In the embodiment of my invention shown, I mount the water wheel supporting frame work upon the hull 10 of what I may term catamaran construction involving two parallel floats 11—11, partially decked over as at 12, above the water channel which extends centrally through the hull of the float from end to end, leaving clear or open a water wheel well, 13, between the companion floats near the bow thereof.

14—14 indicate the shore lines by which the hull is secured against movement in the stream.

The water wheel 15 is preferably of construction providing a plurality of blades, 16, each curved approximately semi-circularly to present its concaved side to the running water so as to leave the water with minimum disturbance thereof, the wheel being mounted on a shaft 16 extending above the deck of the hull across the well 13 to find support, normally, in the lower end or bearing portion of inclined tracks, 17, constructed as shown in Fig. 2 to permit of rolling movement of the shaft in a forward and upward direction. Obviously, the passage of the water below the wheel rotates it in a direction which tends to roll it with the stream and up the track 17. When the shaft 16 is in its bearings, a gear 18 thereon meshing with companion gearing members generally indicated at 19 located permanently on the hull, communicates power for transference to any suitable mechanism to be driven.

In conjunction with the water wheel is provided mechanism whereby the power of the wheel is applied to the elevation of the wheel itself above its operative position. Each inclined track 17 is supported upon any suitable frame work 20 ascending at an angle of say 30° toward the bow of the hull. At each end, the shaft 16 is provided with a small pinion 21 which may be made integral with or otherwise secured to the shaft, and which has a pitch line of identical radius with the bearing surface of said shaft as best shown in Fig. 5. Each pinion 21 stands in a vertical plane beyond its track 17 and has coöperating therewith a movable rack structure 22 providing a bottom rack 22′ and an upper rack 22″ in confronting relation and mounted for independent movement. The upper rack is stripped or mutilated adjacent its lower extremity, so that when the shaft is at its lowest range of movement, or in operating position, the upper rack cannot engage the latter, while the opposite or upper extremity of the lower rack is preferably complete. The rack structure 22 is preferably arranged for such transverse displacement of each member in its plane—that is to say, such edgewise displacement at right angles to its longitudinal axis—as to permit either rack to be thrown into or out of position for coöperation with the pinion, and to this end, the rack structure has each of its members slidingly mounted at its ends in thrust blocks or grooved posts, 24 and 25 at the ends of the frame 20.

For producing the desired transverse movement of the rack members any suitable means may be provided, that which I prefer comprising a rack 22′, a rigid base 27, a plurality of toggle levers 28 bearing on the base and supporting the rack member 22′, and a central bar 29 connecting the knees of the toggles and having communication through a flexible strap 30 passing between

guiding rollers 31 with a link 32, arranged for operation by a lever 33, so that when the lever is thrown forward and the toggle members straightened to their greatest extent, the lower member 22′ will be thrown up into operative relation with the pinion 21 or, conversely, when the lever is thrown backward, the toggle joints are tightened to their maximum extent and the lower rack is drawn out of operative relation with respect to the pinion 21. It will be understood that the handle 33 will be common to the rack systems on opposite sides of the hull, as by common connection to the link 32 on each side as shown in dotted lines in Fig. 3 at 32^a, so that they operate simultaneously and equally at all times. The upper rack 22″ may be independently moved by similar means (the parts throughout such means having numerals corresponding to those used for like parts of the operating means for rack 22′ distinguished by the exponent prime), handle 33′, however, and the common connection $32^{a\prime}$ for links 32′, mounted on the hull slightly in front of the handle 33. Now, it will be apparent that, assuming the wheel to be in its normal position in coöperation with the transmission mechanism, 18, and both racks thrown out of operative relation to the pinion 21, if it is desired to elevate the wheel, the lever 33 is operated to straighten the toggles 28 thereby forcing the lower rack 22′ upward into operative relation to pinion 21, which, engaging the rack, exerts a thrust thereon against the block 24, and the rotary movement imparted to the wheel by the water causes the wheel of its own motion to roll up the incline in virtue of its gearing engagement with the rack, the weight of the wheel being carried by the inclined track 20, and the thrust alone being carried by the rack 22. When the wheel reaches the top of its incline with its blades at or near the surface of the water, it will be retained in such inoperative position by the action of the water, but to lock it there it is only necessary to throw the upper rack into mesh with the pinion, thereby securely to hold the wheel. Obviously, to restore the shaft to its operative position, the lower toggles are thrown to bent position, thereby disengaging the lower rack 22′ from the pinion 21, while the upper rack is left in engagement with the pinion 21, so that its rotary movement imparted to the water wheel by gravity, or by the water, will cause the wheel to roll down the incline, rotating it in the same direction as when moving it to its upper position, the downward motion being opposed however by the frictional grip upon the rails of the track so that the descent of the wheel does not occur at an unduly high speed.

In order that the water wheel may automatically so lift itself in the event of approach of drift wood or other floating bodies in the stream to prevent damage to the wheel by impact of such bodies, I provide a pilot structure comprising antennæ or fingers upon a support at a suitable distance in front of the hull, having operating connections with automatic devices on the hull for moving the lever 33 to cause engagement of rack 22′ with the pinion 21, whenever said antennæ or fingers are struck by floating bodies in the water. Specifically, 34 indicate arms projecting forward from the hull, carrying a rack-shaft 35 provided with depending fingers or antennæ 35′, normally extending vertically downward approximately to the bottom of the hull, said rock shaft bearing also a lever 35″ connected by an operating cable 36 with latch mechanism 36′ controlling the lever 33. The lever 33 is mounted to move in slot 37′ in a spring housing 37 in which is mounted a coiled spring 38 pressing forwardly upon the lever, the lever when in its normal position being held against the spring tension by the latch 36′. Obviously, when the antennæ 35′ are moved rearwardly by the impact of a floating body, lever 35″ is moved forwardly and cable 36 pulls the latch 36′ to inoperative position, thereby freeing the lever 33 to be thrown forward by the spring 38, so automatically causing the engagement of the lower rack with the water wheel pinion.

It is desirable in some instances that the forward displacement of the water wheel in running upward along its track shall be compensated for by the shifting of a counterpoise upon the hull, and to this end, I provide a shiftable counterpoise upon the hull, and connections between said counterpoise and the water wheel whereby the longitudinal displacement of the water wheel automatically displaces the counterpoise oppositely to a corresponding extent to maintain the balance of the hull. In the specific construction shown, the counterpoise 40 is in the form of a car mounted to run upon a track 41, extending longitudinally of the hull, said counterpoise having attached thereto at its bow and stern end respectively cables 43 and 44, the former cable running over a pulley 45 beyond the ends of the tracks 17 for the water wheel and thence to a loose ring 46 upon the wheel shaft, and the cable 44 running over pulleys 47 located beyond the stern-most limits of travel of the counterpoise and thence to the ring 46. Suitable idle pulleys 48 may be provided at any suitable point to give the moving cable a proper path relative to the mechanism mounted on the hull and it will be obvious that with the general arrangement described, as the water wheel shifts forwardly, or toward the bow, in rising along its track,

the counterpoise will automatically be shifted toward the stern of the hull and vice versa.

While I have herein described in some detail a particular embodiment of my invention, it will be apparent to those skilled in the art that numerous changes in the construction might be made without departure from the spirit of the invention and within the scope of the appended claims.

What I claim is:

1. The combination with a water wheel and shaft, of an inclined track therefor, a pinion upon said shaft, two independent opposing racks paralleling the track, and independent means for throwing each rack into or out of operative engagement with the pinion upon the shaft.

2. The combination of a water wheel, a hull whereon said wheel is mounted, means whereby the power of the wheel is applied to lift the wheel out of operative relation to the water, a pilot structure in front of the water wheel, movable by floating bodies in the water, and means operable by said pilot structure to initiate the self-elevation of the wheel.

3. The combination with a hull, of a water wheel and shaft mounted thereon, an inclined elevating track for said wheel shaft, means shiftable into or out of operative association with the wheel whereby rotation of the wheel is transformed into wheel-elevating power, and means automatically controlling the shifting of said means into operative relation to the wheel including a movable part located in front of the wheel for functional operation by the passage of floating bodies therepast.

4. The combination of a hull, a water wheel and shaft, an inclined elevating track therefor, a pinion upon the shaft, a rack paralleling the track, operating means for throwing said rack into or out of operative association with the pinion upon the shaft, antennæ in front of the wheel movable by the passage of floating bodies, and automatic means controlled by the movement of said antennæ to throw said rack into operative engagement with the pinion.

5. The combination with a hull, of an inclined elevating track, a water wheel, a shaft therefor bearing on said track, a pinion on said shaft, a rack paralleling the track movable into and out of association with said pinion, an operating lever for moving said rack, a spring tending to throw said lever to position to engage said rack with the pinion; a latch normally restraining the lever against such movement, a pilot structure in front of the wheel movable by the passage of floating bodies, and operative connections between said pilot structure and the latch whereby the movement of the antennæ releases the latch.

6. The combination with a hull, of a water wheel mounted upon said hull, an inclined track, a water wheel shaft adapted to roll upon said track, means for applying rotation of the water wheel to cause it to elevate or lower itself upon said inclined track, a longitudinally shiftable counterpoise upon said hull, and connections between said water wheel and counterpoise whereby to shift said counterpoise longitudinally, automatically to compensate for the longitudinal displacement of the water wheel.

7. The combination with a hull, of an inclined elevating track, a shaft thereon, a water wheel on said shaft, providing curved blades presenting their concave sides to the water flow, a pinion on said shaft, racks for coöperation with said pinion on opposite sides thereof, and means for independently moving the racks into or out of operative position.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

JAMES T. DOUGINE.

In the presence of—
MARY F. ALLEN,
W. LINN ALLEN.