J. TALLEY, Jr.

Rotary Hydraulic Engines.

No. 196,266. Patented Oct. 16, 1877.

Fig. I

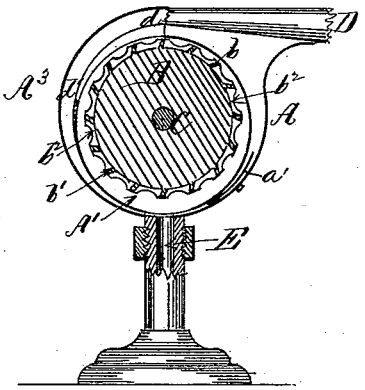


Fig. II

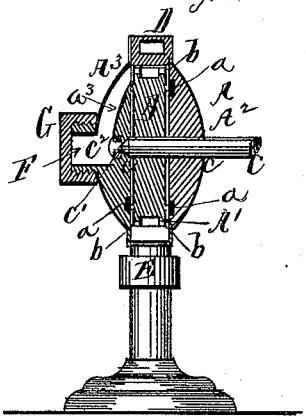
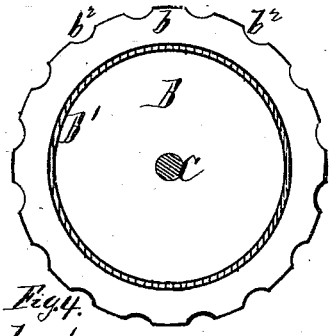


Fig. III.



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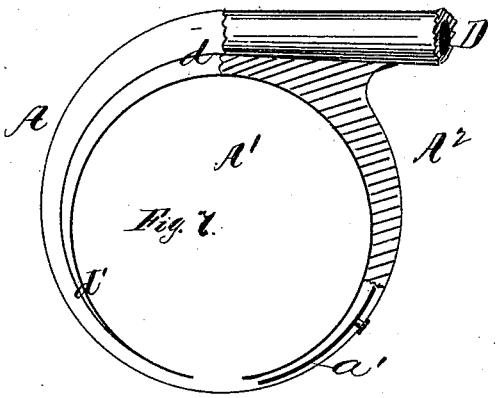


Fig. 4.

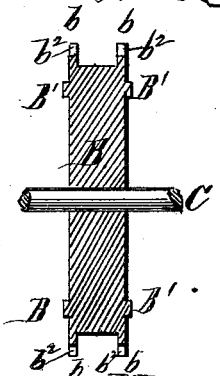


Fig. 6.

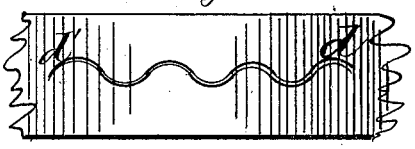
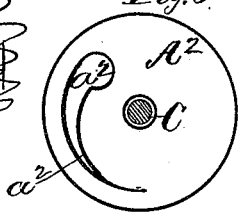


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES TALLEY, JR., OF KANSAS CITY, MISSOURI.

IMPROVEMENT IN ROTARY HYDRAULIC ENGINES.

Specification forming part of Letters Patent No. **196,266**, dated October 16, 1877; application filed June 8, 1877.

To all whom it may concern:

Be it known that I, JAMES TALLEY, Jr., of Kansas City, in the county of Jackson and State of Missouri, have invented a new and useful Improvement in Turbine Wheels, of which the following is a full and clear description.

This invention relates to certain improvements in the wheel itself, the casing which incloses the wheel, the chute for delivering the water to the wheel, and in the discharge arrangements for conducting the water from the wheel.

The invention consists in constructing the wheel with sloping buckets on its periphery, which said buckets are terminated against flanges at each side of the wheel, the flanges being scalloped out between the buckets, so as to allow the spent water to escape on the exit side of the wheel, and with annular packing-rims formed on each side of the wheel, so as to confine the water-way to the periphery or near the periphery of the wheel. The casing which incloses the wheel is constructed so that the wheel may be run in either a vertical or horizontal position, and the eduction-ports are formed so as to be changed at will to suit either position.

The chute which delivers the water to the wheel is formed with its discharge-aperture in a wave-line, extending for some distance around the periphery of the wheel, and diminishing from the first point of inlet toward the last end, so as to deliver the volume of water onto one or several buckets simultaneously, and with increasing force, decreasing the volume in proportion to the increase of distance from the inlet-pipe.

The invention will be readily understood by reference to the accompanying drawings, of which—

Figure 1 is a sectional elevation of the improved turbine wheel, its casing, and inlet and outlet pipes, taken as the machine would appear when used in a vertical position. Fig. 2 is a transverse sectional elevation of the same taken in the same position as above. Fig. 3 is a side elevation of the wheel taken without the case. Fig. 4 is a cross-section of the wheel taken without the case. Fig. 5 is a plan of that side of the case which becomes the bottom when the machine is used in a horizontal position. Fig. 6 is a plan of the wave-line chute-aperture. Fig. 7 is a detached plan view of one-half of the case.

The housing or case A may be formed with its exterior cylindrical or any other approved shape; but the interior chamber A^1 will be made either elliptical or nearly so, as shown in Fig. 1.

The interior faces of the ends A^2 A^3 of the said case will be flat, so as to fit tightly to the flat ends of the part A, to which they are to be securely bolted; but the exterior faces of the ends will be spheroid, as shown in Fig. 2, so as to accommodate in the part A^2, which forms the bottom when the machine is used horizontally, the eduction-chute. This spheroidal form of the ends also gives the requisite amount of strength to these plates without an unnecessary amount of metal.

The wheel B is, of course, circular in form, as is shown clearly in Fig. 3, and it is mounted on the driving-shaft C, which finds its bearings *c c* in the end plates A^2 A^3 of the case.

When the machine is used in a horizontal position the lower end of the shaft C rests on a step, C′, which is adjusted as to height by means of the set-screw c^2.

From the driving-shaft C, of course, power may be communicated in the usual manner. The extreme periphery of the wheel B terminates in two flanges, *b*, between which are placed the buckets or wings b^1. These buckets are set sloping at an angle of about thirty degrees (more or less) with the radial lines of the wheel. Between each pair of the said buckets the flanges *b* are cut out in scallops b^2, as shown best in Figs. 1 and 3.

Just inside of the scallops b^2, on the outside of the wheel B, are formed annular flanges B^1, which form packing-rims to bear against the inner faces of the casing ends A^2 A^3, raised seats *a* on the said inner faces of the ends being provided on the working side of the wheel to bear against the said flanges.

The effect of this construction is to cheapen the cost, by reducing to a minimum the bearing or finished parts, and also to reduce to a minimum of friction between the wheel and the case, the amount and also to limit the working water to contact with the wheel at or near its periphery.

The wheel B is placed eccentrically in the

chamber A^1, so as to touch, or nearly touch, the case on the inlet side, and leave a large water-way on the outlet side, as shown in Fig. 1.

From the point of greatest distance between the wheel B and the case A on the outlet side, as above explained, the distance between the wheel and the case gradually decreases toward the minimum distance at the first part of the inlet-aperture.

The induction-pipe D terminates on the inner face of the case A in a wave-line chute-aperture, $d\ d'$, as shown in Figs. 1 and 6.

The width of this aperture is greatest at d, where the stream is first discharged upon the wheel, and from that point the width of the said aperture is gradually diminished to d', where it is narrowed to a point.

The distance between the points d and d' may be varied as occasion may require, so as to deliver the water upon one, two, three, or several of the buckets of the wheel, as desired, but most preferably the entire length of the chute $d\ d'$ will coincide with about one-quarter of the periphery of the wheel, more or less.

By giving the outlet-aperture of the chute the wave-line formation above described, the water will be distributed better over the width of the wheel, and by prolonging the said chute from d to d' the water will be made to impinge upon the entire working side of the wheel, or a large portion of it, simultaneously, thereby utilizing to the greatest possible extent the entire force of the volume of water used, the weight of the water acting at the same time in harmony with its force.

The gradually-increasing space between the wheel B and its surrounding casing A, between the point d and the opposite outlet E, as hereinbefore described, will accommodate the increase of the flow of water from the chute between the points d and d'. There are two outlets, E and F, for the escape of the spent water from the case $A\,A^2\,A^3$. The first of these, E, is used to discharge the water from the periphery of the casing A at the bottom, when the machine is used in a vertical position, and the other outlet, F, is formed on the side A^2, which becomes the bottom when the machine is used in a horizontal position. A screw-cap, G, is mutually interchangeable to screw upon the outlets of either E or F when either is not in use. A slide or gate, a^1, is formed and seated in the casing A, so as to close the inner end of the outlet E when not in use, so as not to present any obstruction to the smooth flow of water past that point when the machine is used with the other outlet.

A tapering duct, a^2, is formed in the side piece A^2. This duct commences at a sharp end near the point d, and is gradually widened to a point diametrically opposite where the width of the said duct will be about equal to the diameter of the outlet F. The depth of the said duct at any point will be equal to its width at that place. From the large end of the duct a^2 a passage, a^3, will lead to the discharge-outlet F, outside of the flat part of the end A^3, as is shown in Fig. 2. The duct a^2, placed just inside of the periphery of the chamber A^1 on the discharge side of the wheel, and arranged with enlarged sectional area at the outlet end, will relieve the wheel from all back pressure of the spent water.

Having described my invention, I claim—

1. The wheel B, provided with sloping buckets b^1 on its periphery, confined between annular flanges b, as described and shown.

2. The wheel B, mounted on the shaft C and set eccentrically in the chamber A^1, the shaft C, having bearings $c\ c$ in the case $A^2\,A^3$, and an adjusting-step, c^1, and screw c^2, all arranged substantially as described and set forth.

3. The sliding gate a^1, placed in the casing A, and arranged to close the outlet E, as and for the purpose set forth.

4. The adjustable cap G, mutually interchangeable for the outlets E and F, so as to close either, as required to convert the machine into a vertical or a horizontal one, as and for the purpose set forth.

5. The wave-line chute $d\ d'$, forming the outlet to the induction-pipe D, as and for the purpose set forth.

6. The wave-line chute $d\ d'$, constructed widest at the first end, d, and thence gradually narrowing to a point, d', as described and set forth.

7. The end piece A^2 of the case A, with the tapering duct a^2, and arranged to conduct the spent water from the chamber A^1 to the outlet F, as and for the purpose set forth.

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