(Model.) 2 Sheets—Sheet 1.

A. A. DE LOACH.

TURBINE WATER WHEEL.

No. 302,242. Patented July 22, 1884.

Fig. 1.

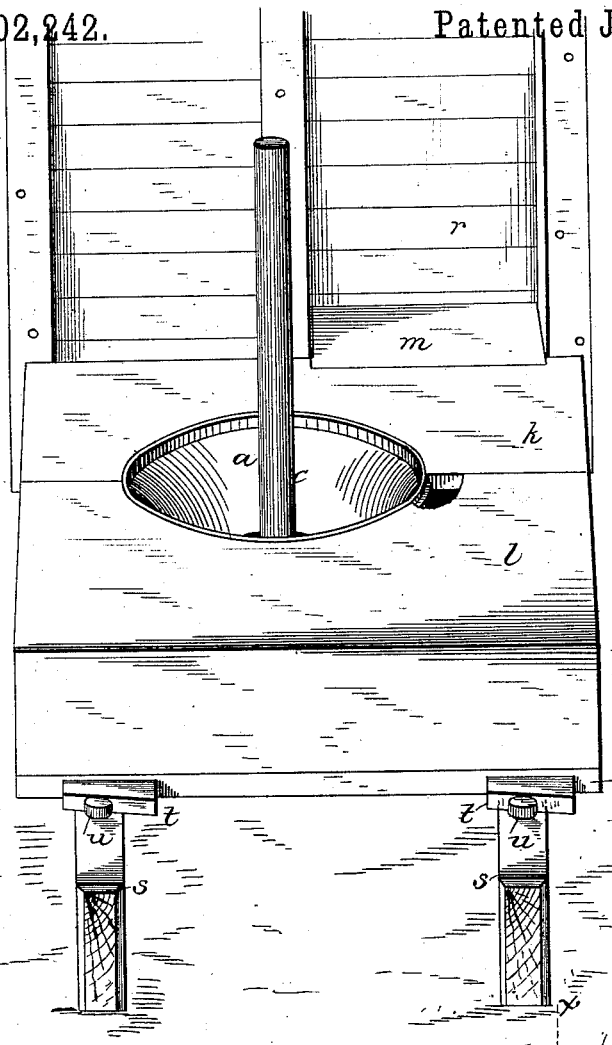


Fig. 4.

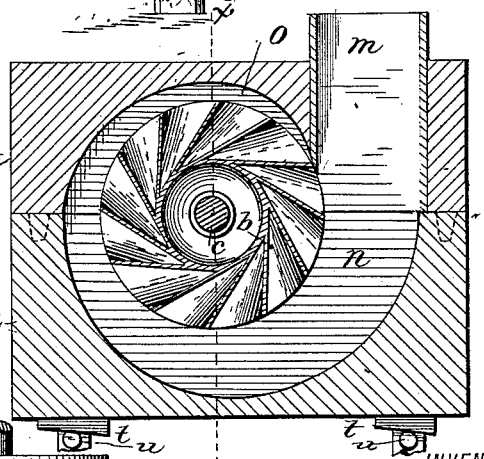


Fig. 2.

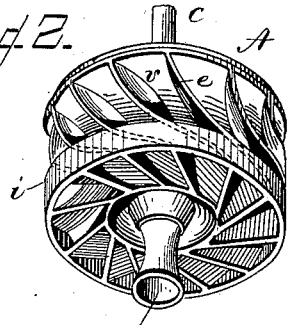
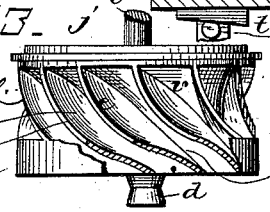


Fig. 3.



WITNESSES

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(Model.)

2 Sheets—Sheet 2.

A. A. DE LOACH.

TURBINE WATER WHEEL.

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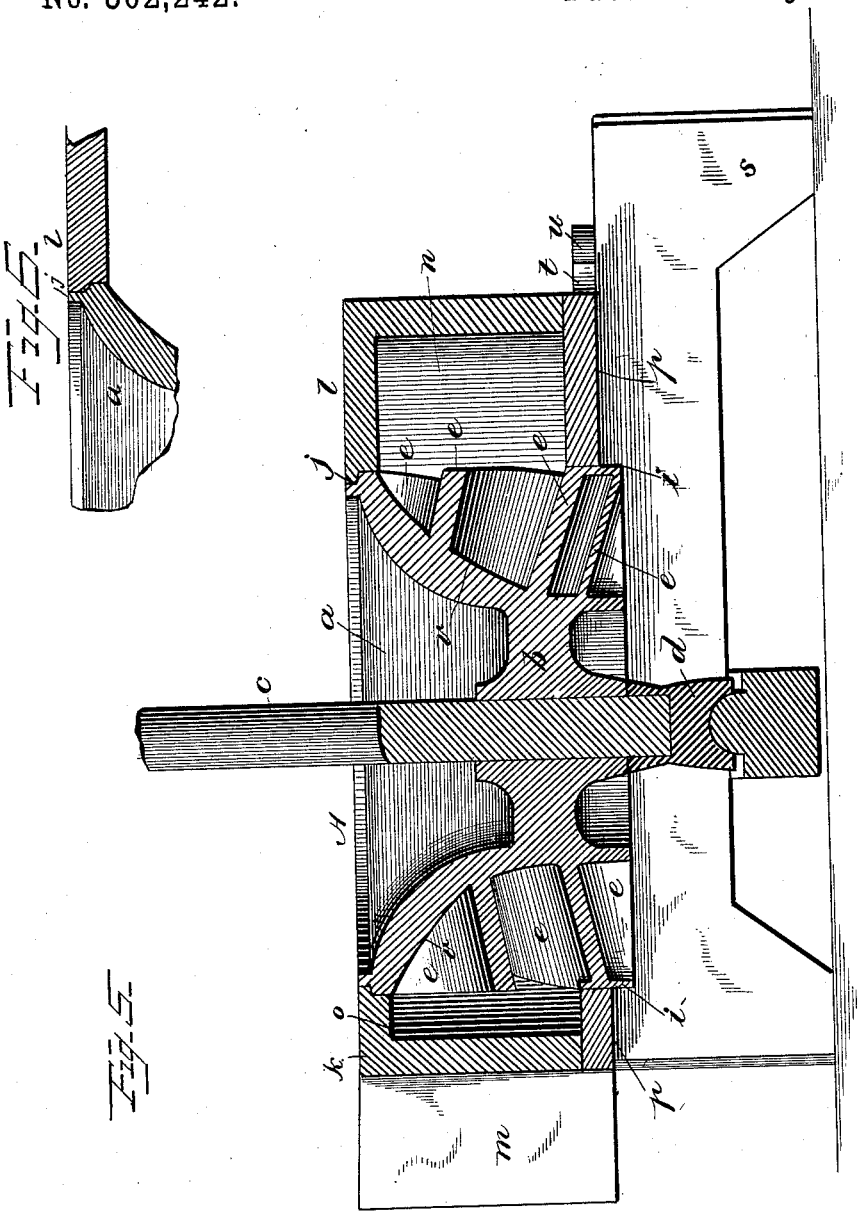

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UNITED STATES PATENT OFFICE.

ALONZO A. DE LOACH, OF ATLANTA, GEORGIA.

TURBINE WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 302,242, dated July 22, 1884.

Application filed June 19, 1883. (Model.)

To all whom it may concern:

Be it known that I, ALONZO AARON DE LOACH, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Turbine Water-Wheels, of which the following is a full, clear, and exact description.

The present improvements in water-wheels are specially designed for use in small streams, and where the head of water is not large; and the object of the invention is to so simplify the construction as to permit the country millwright to make a large part of the wheel, and specially the part most expensive to transport, directly and out of material to be had at the place where the wheel is to be set up, thus also saving much expensive shop-work. I aim, also, in my invention to decrease the number of movable parts, so as to avoid the use of pins, bolts, nuts, and other small metal parts, which are soon disarranged, rusted, broken, or worn out. To effectively utilize the small streams and heads of water for inland-milling purposes, I find the most good points in that class of wheels in which the supply of water is admitted at the side of the wheel in the plane of the bed of the stream, the water being discharged through the bottom of the wheel; and hereinafter, in referring to the discharge end of the buckets, or the wheel itself, I mean the open bottom. Power from such streams or heads of water is obtained only by rather nice attention to the details of the construction of the wheel, and I find that a wheel gives the most satisfactory results, so far as my experience shows, in which the buckets are dished or concave on their faces, stand off from an outwardly-curved hub tangentially, rather than radially, extend diagonally along the curved face of such hub at their edges next it, and have a rather abrupt discharge end.

My invention consists, then, in a water-wheel combining such features of construction, substantially as hereinafter particularly set forth and claimed.

In the accompanying drawings, in the several figures of which like parts are similarly designated, Figure 1 is a perspective view, with the casing partly broken away, of my improvements; Fig. 2, a perspective view of the wheel detached, with a metal shaft. Fig. 3 is a side elevation of the wheel, the lower band or rim being broken away to more fully show the curvature of the buckets. Fig. 4 is a central horizontal section of the wheel and its casing. Fig. 5 is a central vertical section of the same on a larger scale, and Fig. 6 a detail showing a chamfer or bevel-joint of the wheel and its casing.

The wheel, as a whole, is designated by the letter A, and I prefer to construct such wheel as a single casting, although I may make it in two or more pieces or sections, doweled or bolted together, and of metal or wood; but on the score of economy, simplicity, durability, and strength the single casting has largely the advantage. The top *a* of this wheel is closed, and preferably concave, and the wheel is provided with a core or hub, *b*, in which the shaft *c* is fitted, the hub terminating in the downwardly-projecting center *d*, to be stepped in the framing or bed-timbers of the casing.

e are the buckets, shaped as shown, and arranged around the core or hub *b*, so that horizontal lines drawn through them would be tangential to the hub, as indicated in Fig. 4, while their edges *f* next the hub, or by which they are jointed to it, are diagonal of said hub. The curvilinear face *v'* of the hub, which extends upward and outward, serves to give shape and size to the water-way of said buckets, and to direct the water passing into and through such buckets. The face *h* of the buckets is dished or concaved, as indicated in Figs. 2 and 3, and their outer edge, *g*, is a curve. The lower or discharge end of the buckets below the dished or concave portion is flat, or nearly so, and abrupt or sharp. These several features entering into the make-up of the wheel produce one of large capacity, adapted to fully utilize the head of water in which it is erected. The curving of the hub upward, so as to overhang, as it were, the buckets, affords a surface against which there is an upward thrust of the water, whereby the step for the spindle of the wheel is relieved of much weight, friction, and pressure, thus permitting the wheel to run easily. The initial edge of one bucket is about the distance of one-tenth the wheel's diameter in advance of the succeeding bucket, and I find this about the correct proportion in this kind

of wheel to get good results. The inlet to the buckets is of comparatively greater area than the outlet, and the pitch of the inlet portion of the buckets is toward a horizontal plane, while that of the outlet is toward a vertical. By this construction a large acting surface is presented to the running water, and hence its best effects are utilized, and thereafter it is quickly discharged. The discharge end—that is to say, the bottom of the wheel—is provided with the rim *i*, encircling the lower end of the buckets, and extending up the buckets about one-fifth the height of the wheel, and the top of the wheel has preferably a rabbeted edge, *j*, to make a good joint with the casing.

The shaft *c* may be suitably inserted in the core or hub, and if a wooden shaft be used it will be fitted in the wheel from below and retained by wedges, or otherwise.

The casing, if of wood, is made up of a plurality of blocks of wood, doweled or otherwise removably fitted together. I have shown it of two pieces, *k l*. The piece *k* will have the gateway *m* of the flume-chute or water-way *n*, and the flume will then continue through the two pieces in a spiral line until it ends at the inner edge of the gateway, so that, taking the circumference of the wheel as the inner line of the flume, said flume is of gradually-diminishing width to its end; but I prefer to have the flume of sufficient dimensions throughout in order to insure plenty of water up to its end, and hence I have it stopped off suddenly at the remote point *o*, Fig. 4. The depth of the flume throughout is that of the buckets. As in the Patent No. 231,411, so here, I form this flume by hewing out solid blocks of wood, as thereby I effect great durability and strength in the casing. I prefer to make the solid face of the logs the top of the casing, and then close the bottom with planks or boards *p*, leaving, of course, in said planks an opening fitting closely the rim *i*. The edge of the opening in the casing in which the wheel is set is rabbeted (see broken-out portion, Fig. 1) to make a close joint with the rabbeted or shouldered edge *j* of the wheel; or this joint may be a chamfer or bevel, (see Fig. 6,) or other close-fitting construction.

Instead of a wooden casing, I may employ one of metal.

The most advantageous arrangement of my form of wheel with relation to the water-house is outside the same, and I have so shown it in Fig. 1, *r* being the boarding of the water-house, a slide-gate of ordinary construction (not shown) being arranged inside the water-house over the gateway to the flume. If any obstruction should occur in the wheel in this arrangement, it may be readily remedied by access to the interior through the removal of the part *l* of the casing, thus saving in time, trouble, and expense. The casing is set upon bed-timbers *s s*, and removably held against the water-house on the timbers by wedges *t t*, interposed between the casing and pins *u u* on the timbers.

What I claim is—

1. The turbine water-wheel having a solid top, *a*, curved core *b*, and buckets *e*, opening at the rim and bottom of such wheel, in combination with the casing *k l*, having the flume *n o*, all constructed and arranged substantially as shown and described.

2. The turbine water-wheel, substantially as shown and described, composed of the solid top *a*, core or hub *b*, edge *j*, rim *i*, buckets *e*, center *d*, and shaft *c*.

3. The combination of a turbine water-wheel with its casing, the latter composed of blocks properly surrounding the wheel, and having hewn therein the flume *n*, with solid outer walls, and opening directly to the rim or side of the wheel, substantially as shown and described.

In testimony whereof I have hereunto set my hand this 13th day of June, A. D. 1883.

A. A. DE LOACH.

Witnesses:
S. F. PERKINS,
W. H. NUTTING.