(No Model.)

L. J. HOLZHAUSER.

WATER WHEEL.

No. 589,350. Patented Aug. 31, 1897.

Fig. 1.

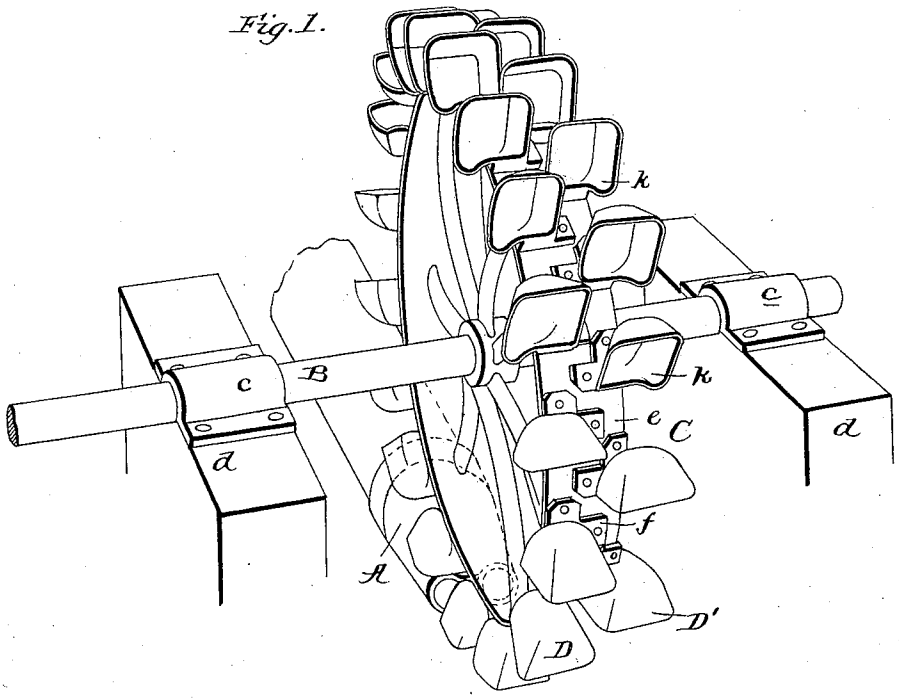


Fig. 2.

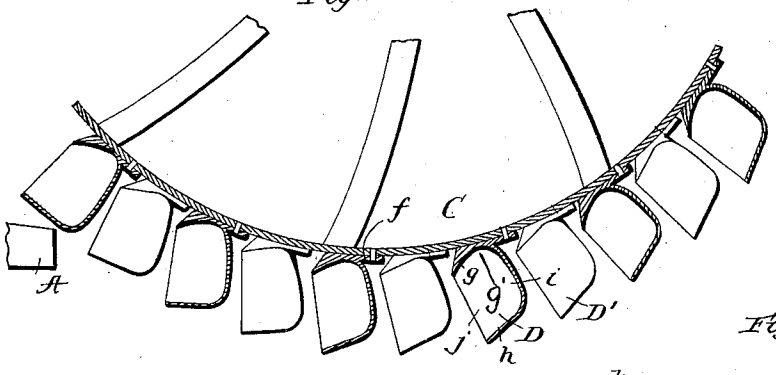


Fig. 3.

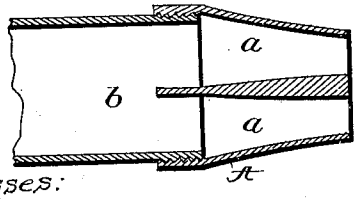


Fig. 4.

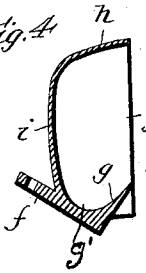
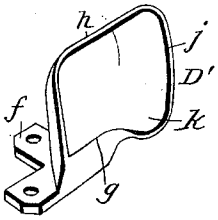


Fig. 5.



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UNITED STATES PATENT OFFICE.

LUDWIG J. HOLZHAUSER, OF ETNA MILLS, CALIFORNIA.

WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 589,350, dated August 31, 1897.

Application filed April 1, 1897. Serial No. 630,294. (No model.)

To all whom it may concern:

Be it known that I, LUDWIG J. HOLZHAUSER, a citizen of the United States, residing at Etna Mills, in the county of Siskiyou and State of California, have invented certain new and useful Improvements in Water-Wheels; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in that class of water-wheels which are especially applicable to very high heads and small streams of water; and it has for its general object to provide, in conjunction with a twin or double nozzle, a water-wheel having two parallel series of buckets upon its periphery, the buckets of one series being arranged in a staggering manner with respect to those of the other, so that a stream from the nozzle will always be acting against at least one of the buckets, and all of the buckets being so formed that the water will quickly leave them and in consequence no water will be carried around with the wheel and the power of the wheel will be increased.

With the foregoing ends in view the invention will be fully understood from the following description and claims when taken in conjunction with the annexed drawings, in which—

Figure 1 is a perspective view illustrating my improved water-wheel and twin or double nozzle. Fig. 2 is a detail longitudinal section of a portion of the wheel, together with a portion of the nozzle. Fig. 3 is a horizontal section of the nozzle. Fig. 4 is a sectional view of one of the buckets, and Fig. 5 is a perspective view of the same.

In the said drawings similar letters designate corresponding parts in all of the several views, referring to which—

A indicates my improved nozzle, which comprises two spouts *a*, arranged side by side in the same horizontal plane, and is connected to a conduit *b*, leading from a suitable source of supply.

B indicates a shaft which is journaled in suitable bearings *c* on standards *d*, and C indicates my improved water-wheel, which is keyed or otherwise fixed on the shaft B so as to turn therewith. This wheel C is provided upon its periphery *e* with two series of buckets D D′, the buckets of one series being arranged staggering with respect to the buckets of the other series, or, in other words, the buckets of one series are arranged in transverse alinement with the spaces between the buckets of the other series, whereby it will be seen that a stream of water from the nozzle will always be acting against at least one bucket, and in consequence the rotation of the wheel will be smooth and continuous, which is an important advantage.

The buckets comprising the two series D D′ are respectively formed in one piece and comprise the base-flange *f*, the inner wall *g*, outer wall *h*, bottom *i*, and side walls *j*, the side walls *j* being inclined outwardly from the bottom *i*, as shown, so as to permit the full head of water to strike said bottom *i* and also to facilitate the exit of water from the bucket. The inner wall *g* of each of the buckets is provided with the outer side approximately perpendicular to the base-flange *f* and the inner side inclined inwardly, as better shown in Fig. 4, so as to form a channel *g′*, extending in the direction of the width of the bucket and wheel-rim. Said inner wall *g* is also provided at the outer side of the bucket and at the outer end of the channel *g′* (see Figs. 4 and 5) with a lip *k*. These lips *k* of the buckets rest on opposite sides of the vertical plane of the wheel-periphery and depend from the ends of the channels *g′*, which serve to facilitate the passage of water to them. The inner inclined side of the wall *g* of each bucket facilitates the discharge of water from the bucket after the bucket is struck by the stream from the nozzle and before it reaches the horizontal center of the wheel. After the bucket reaches the horizontal center of the wheel any water that may remain in said bucket will quickly find its way into the channel *g′* and be thereby conducted to the lip *k* and discharged. In this way the water is prevented from staying in the bucket long enough to be carried around with the wheel, which is an important advantage, for it will be readily appreciated that the quicker the water leaves the buckets after expending its power against the same the easier the wheel can be rotated. In other words, when the water is discharged from the buckets as soon as it has

expended its power against the same the force which would otherwise be necessary to lift said water is utilized in the rotation of the wheel, and consequently the power and the speed of the wheel are increased, which is an important desideratum. It will also be seen that in virtue of the buckets being provided with lips or discharge-spouts *k*, arranged as shown, the water when it leaves the buckets will fall at opposite sides of the wheel and not on the same and will consequently not tend to retard the rotation of the wheel.

The wheel C and the nozzle A are arranged as shown in Fig. 1, the nozzle being adapted to throw jets of water against the buckets shortly before said buckets reach the vertical center of the wheel. Consequently it will be seen that when the valve (not shown) which controls the passage of water through the conduit *b* is opened the water from the nozzle will act against the buckets to rotate the wheel, and after expending its power will immediately leave the buckets through the lips or spouts *k*, so as not to retard the rotation of the wheel. The speed and power of the wheel will depend upon the extent to which the valve in the conduit *b* is opened and the head of water, but it will be seen that with an ordinary head of water the wheel will be rotated with sufficient force to drive mill and other machinery.

Notwithstanding the many advantages as pointed out in the foregoing it will be seen that my improvements are very simple and durable and that they are adapted to be easily placed in position and are also adapted to be easily kept in repair.

Having thus described my invention, what I claim is—

1. The combination of a nozzle arranged at the discharge end of a conduit, and a wheel arranged in the same vertical plane as the nozzle and having buckets upon its periphery adapted to be acted upon by water from the nozzle; the said buckets respectively comprising the base-flange *f*, the bottom *i*, the side walls *j*, the outer wall *h*, and the inner wall *g*, having its outer side perpendicular or approximately perpendicular to the base-flange and its inner side inclined inwardly so as to accelerate the discharge of water from the bucket and form a channel *g'*, extending in the direction of the width of the bucket and also having the depending lip *k* at one end of said channel *g'* and arranged at the side of the periphery of the wheel, substantially as specified.

2. The combination of a twin nozzle arranged at the discharge end of a conduit and having the two spouts in the same horizontal plane and a wheel arranged in the same vertical plane as the nozzle and having the two parallel series of buckets on its periphery; the buckets of one series being arranged staggering with respect to the buckets of the other series and each bucket comprising the base-flange *f*, secured to the wheel-periphery, the bottom *i*, the side walls *j*, the outer wall *h*, and the inner wall *g*, having its outer side perpendicular or approximately perpendicular to the base-flange and its inner side inclined inwardly so as to accelerate the discharge of water from the bucket and form a channel *g'*, extending in the direction of the width of the bucket and also having the depending lip *k* at one end of said channel *g'* and arranged at one side of the periphery of the wheel, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

LUDWIG J. HOLZHAUSER.

Witnesses:
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F. H. DAVIDSON.