No. 883,528. PATENTED MAR. 31, 1908.

J. R. DE REMER.

WATER WHEEL.

APPLICATION FILED DEC. 26, 1905.

2 SHEETS—SHEET 1.

FIG. 1.

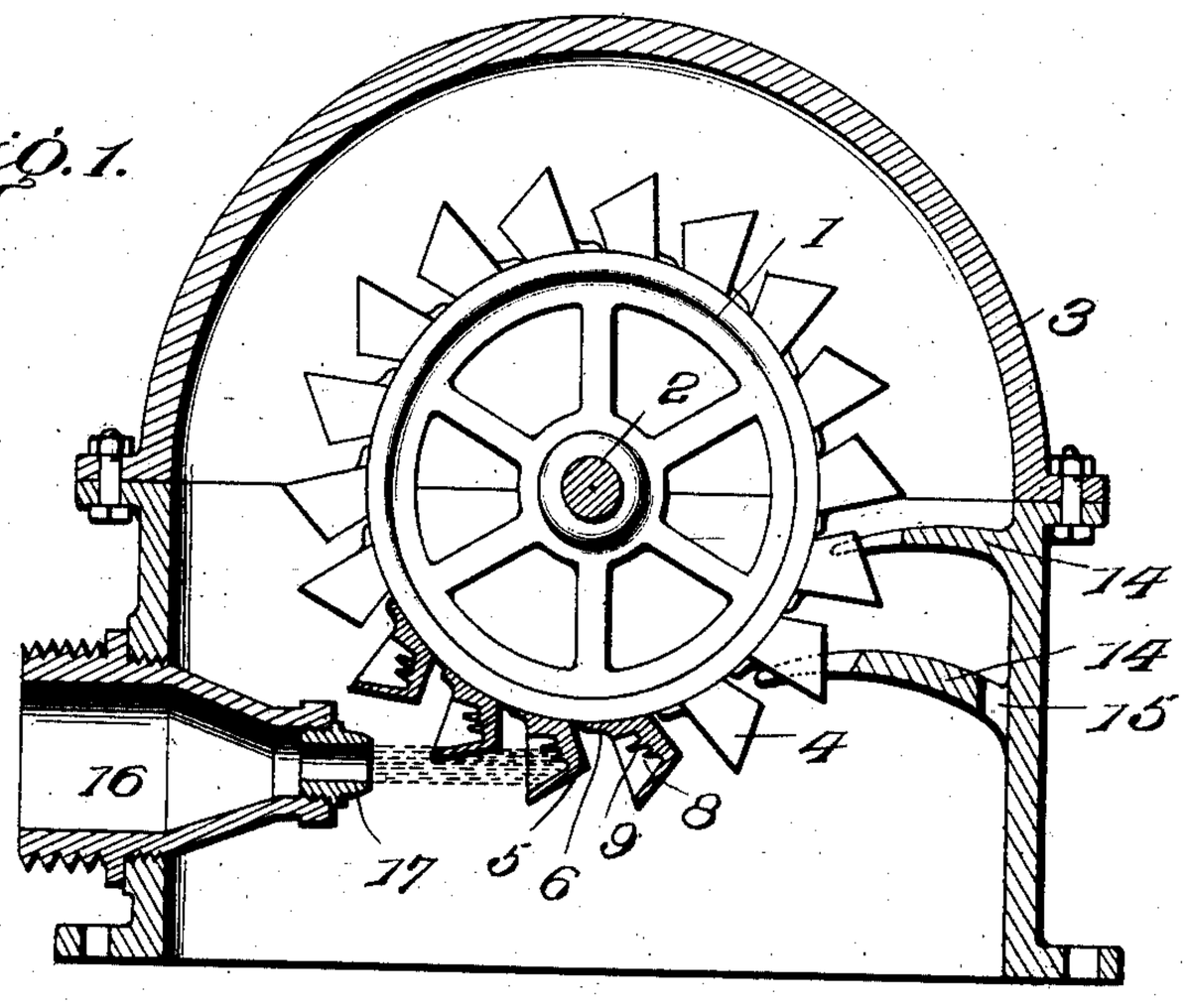


FIG. 2.

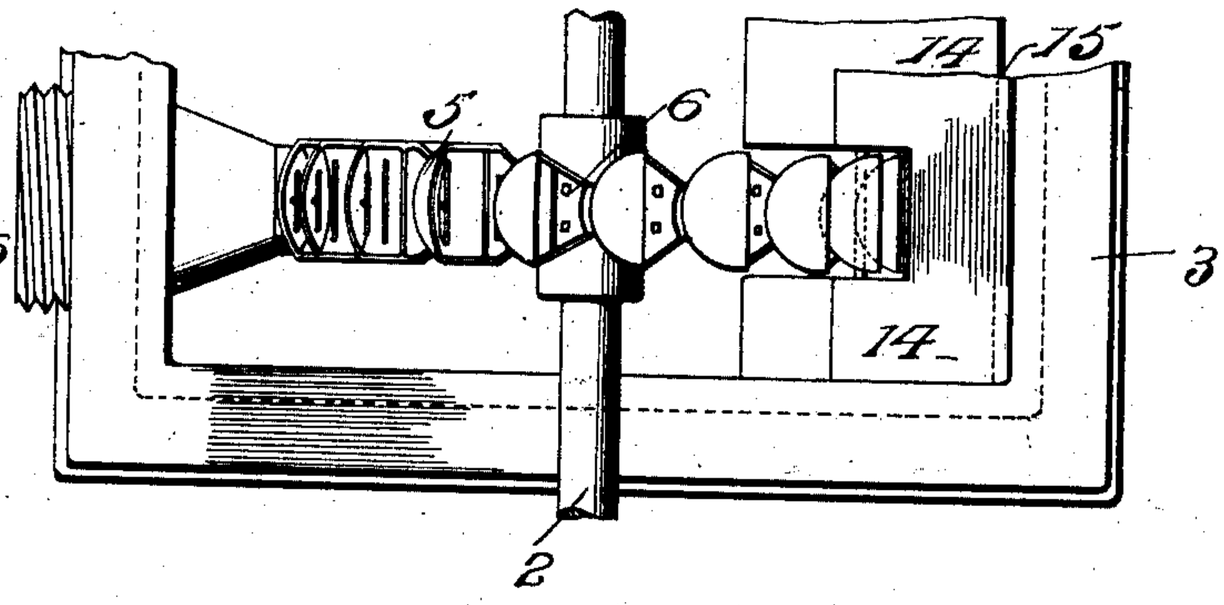
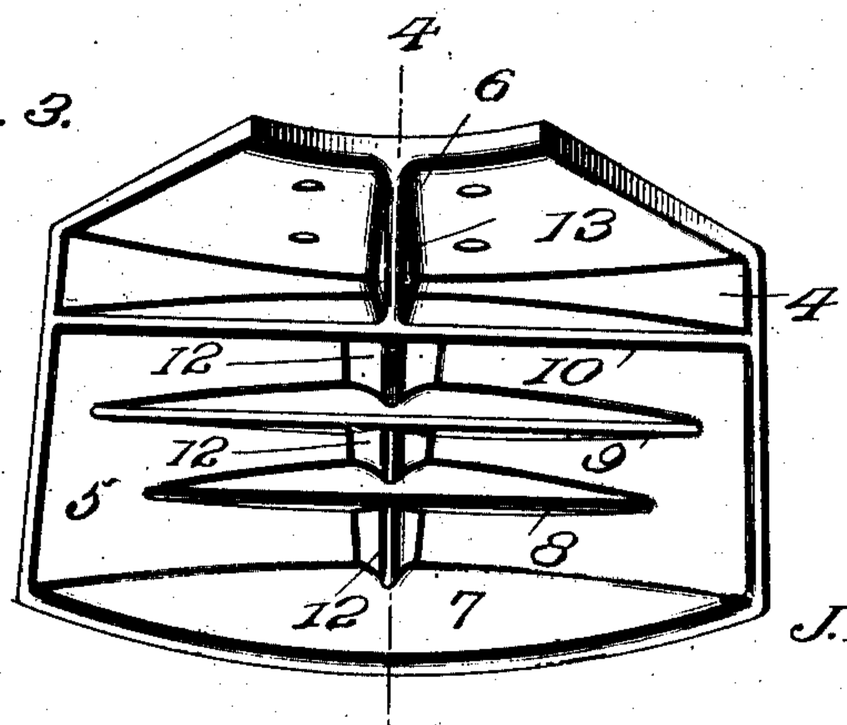


FIG. 3.



Witnesses

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2 SHEETS—SHEET 2.

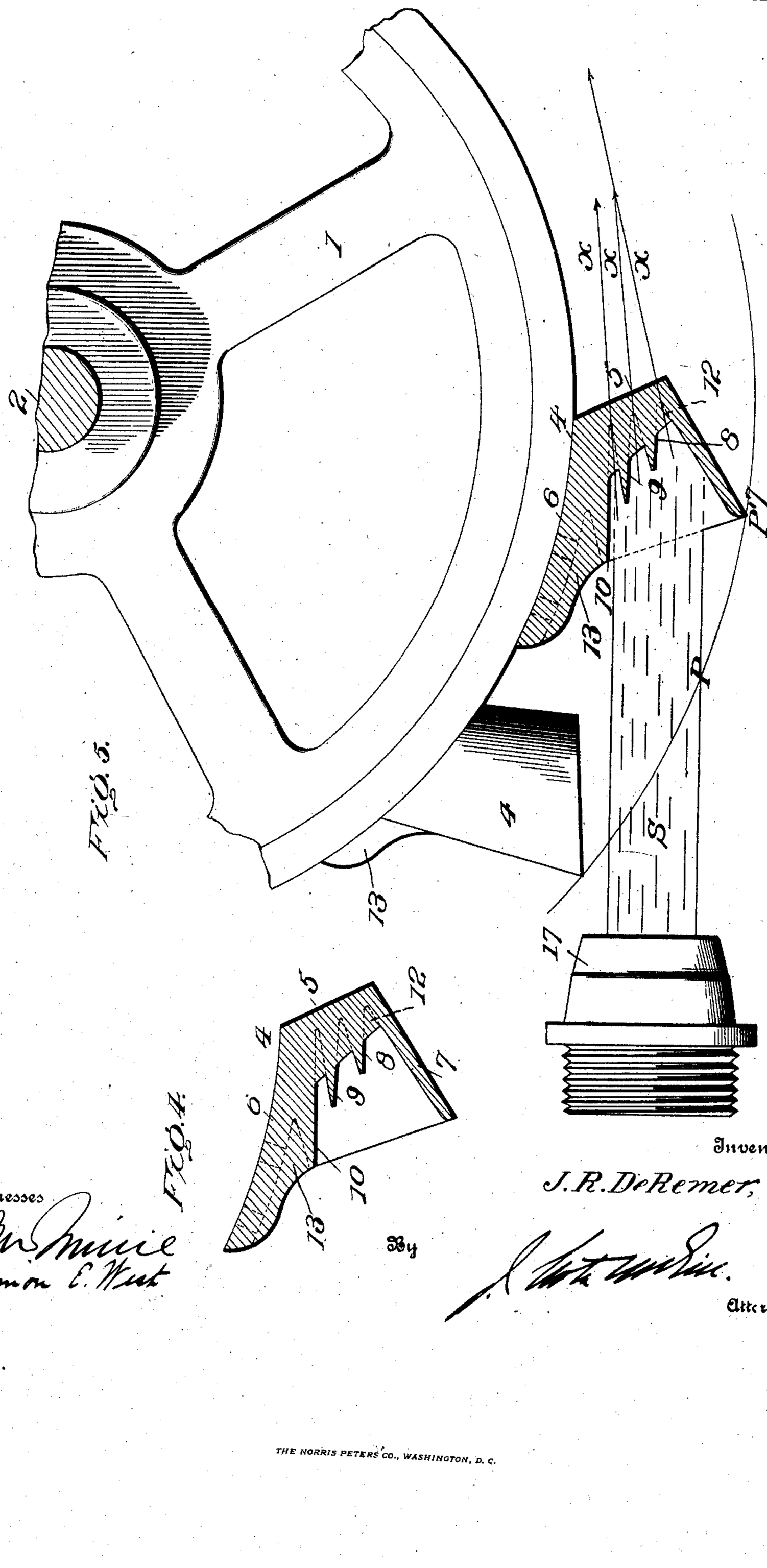

FIG. 5.

FIG. 4.

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UNITED STATES PATENT OFFICE.

JARED R. DE REMER, OF GLENWOOD SPRINGS, COLORADO.

WATER-WHEEL.

No. 883,528. Specification of Letters Patent. Patented March 31, 1908.

Application filed December 26, 1905. Serial No. 293,348.

To all whom it may concern:

Be it known that I, JARED R. DE REMER, of Glenwood Springs, in the county of Garfield and State of Colorado, have invented certain new and useful Improvements in Water-Wheels; and I do hereby 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.

The objects of this invention are to provide, in a hydraulic motor, improved means for preventing back-lash of the discharged water; and secondly, to so construct the buckets as to secure the maximum efficiency and avoid back-lash on any succeeding bucket.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation, with some of the buckets, the nozzle, and the casing in section. Fig. 2 is a plan view, with parts broken away. Fig. 3 is a face view of one of the buckets. Fig. 4 is a section on line 4—4, Fig. 3. Fig. 5 is an enlarged view of a portion of the wheel with one of the buckets in section.

Referring to the drawings, 1 designates the wheel keyed on a shaft 2; and 3 the inclosing casing or housing, which, in practice, is mounted on a suitable base or support, not shown. Upon the periphery of the wheel are secured buckets 4 having the general appearance, in some respects, of the buckets shown in Letters Patent No. 611,406, issued to me September 27, 1898, and in others of the buckets shown in Letters Patent No. 659,652, issued to me October 16, 1900. The bucket in the present instance embodies features of construction intended to utilize the entire energy of the stream so as to transmit the power thereof to the wheel, and at the same time prevent back-lash, the dead-water being discharged by gravity and centrifugal force.

To the end that the construction of the bucket may be clearly understood, it will be described in the position in which it is shown in Figs. 3 and 4. The wall 5 is of concavo-convex formation; the wall 6 is curved to conform to the periphery of the wheel, and the outer wall or lip 7 is divergent. Integral with the wall 5, and extending across the open end of the bucket, are ribs 8, 9 and 10, which I shall refer to as horizontal splitters. They are of varying depths, that is to say, the splitter 9 extends forwardly a greater distance than the splitter 8, while the splitter 10 extends outwardly beyond the splitter 9 to the plane of the outer edge of the wall 5. This enables me to obtain the maximum efficiency, the water effecting a right-angle pull from the wheel center. Transversely of these several horizontal splitters are what I term vertical splitters 12, which extend from the wall 5, at the center and bases of the horizontal splitters, such vertical splitters slanting off from their centers to the inner face of wall 5. These intersecting or vertical splitters do not extend upward as far as the outer edges of the horizontal splitters, but are short thereof so that while they are capable of effecting the thorough discharge of the water they do not interfere with the horizontal splitters receiving the impact of the stream tangentially to the wheel. The splitter 10 is braced or strengthened at its center by a longitudinal web 13, which, like the vertical splitters 12, as well as the horizontal splitters, are preferably formed integral with the walls 5 and 7 of the bucket.

The outer sides or faces of the horizontal splitters are substantially parallel with the inner wall 6, as pointed out in my before noted patent, No. 659,652. The vertical splitters 12 effect a thorough discharge of the dead water when the stream is cut off by the passage of a bucket out of the range thereof, thereby preventing back-lash on a following bucket. The force of the impact of the stream of water is tangential to the circumference of the wheel, resulting in maximum efficiency, the entire energy of the stream being transmitted to the wheel. This will be clearly understood by reference to Fig. 5, wherein S designates the stream of water, and the arrow-lines x the tangents of the force of impact between the horizontal splitters, which impact is also tangential to the wheel circumference. While these lines change with the movement of each bucket, they always remain tangential to the wheel circumference. The maximum capacity of the stream against any one bucket is between the points P and P′, Fig. 5, while at other periods the force is divided between two of the buckets, that is to say, it is beginning to feed into one as it is cutting off from another. As it is so cutting off, the vertical splitters effect a thorough discharge of the dead water.

Under the conditions recited the dis-

charged water is lashed against the rear wall of the housing, and the tendency thereof is to glance back onto the buckets, thereby retarding the wheel and lessening the efficiency thereof. To effectually guard against this, I provide water-breaks 14, which are shown in the form of arches on curved plates integral with the rear wall of the housing, and formed with slots or cut outs (see Fig. 2) to permit of the passage of the buckets. These breaks are located wholly above the horizontal plane of the lowermost buckets so as to allow of free play of the water and yet prevent it from retarding the wheel. As the discharging water is driven against the rear wall of the housing it will be arrested and deflected by the water-breaks. The lower break is equipped with an opening 15 for the downward passage of the water taken up by the upper break, which water, as well as that taken up by the lower break, is diverted along the rear wall of the housing and down into the tail race, not shown. These water-breaks are shown as being integral with the housing, but they may be made separate therefrom and secured thereto, and under variable conditions, one or more breaks may be used, although two are preferable.

The water is introduced into the housing in line with the lowermost buckets through a nozzle 16, which is shown as screwed into the front wall thereof. This nozzle is ordinarily made of cast iron, and in the discharge end thereof I locate a removable tip 17, preferably of steel.

The advantages of my invention will be apparent to those skilled in the art. By reason of the peculiar construction of the splitters, when impingement of the water takes place there is a right angle pull from the wheel center during the passage of a bucket through the stream, resulting in maximum efficiency. The nozzle is so arranged that the discharging stream is at right angles to the wheel's axis, and while the water fills the spaces between the splitters, and its movement is arrested, as far as its relation to the bucket is concerned, its discharge therefrom is by gravity and centrifugal force, with the least possible friction. In addition, back-lash of the discharged water is prevented by the overhanging water-breaks.

I claim as my invention:—

1. The combination with a wheel having a series of buckets on its periphery, of a casing, means for introducing water through one of the walls of the casing, and water breaks for deflecting the water downwardly into a tail race, said water breaks consisting of upper and lower arches extending from the other wall of said casing, both of said arches being located wholly above the plane of the lowermost buckets, the lower arch having an opening adjacent to the casing to permit of the passage of water, both arches being extended on opposite sides of the wheel.

2. The combination with a wheel, of a series of buckets mounted on the periphery thereof, having each an open end, said buckets having a series of horizontal splitters of varying lengths and depths, the shortest and narrowest splitter being nearest the outer end of each bucket, while the longest and widest splitter is nearest the inner end of the bucket, and vertical splitters at right angles to the planes of the horizontal splitters, located at the centers of the latter.

3. The combination with a wheel, of a series of buckets mounted on the periphery thereof, having each an open end, said bucket having a series of horizontal splitters of varying lengths and depths, the shortest and narrowest splitter being nearest the outer end of each bucket, while the longest and widest splitter is nearest the inner end of the buckets, and vertical splitters at right angles to the planes of the horizontal splitters, located at the centers of the latter, said vertical splitters extending but a short distance over the width of the horizontal splitters, short of the outer edges of the latter.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

JARED R. DE REMER.

Witnesses:

EDWIN S. HUGHES,

CLIFFORD G. ROWE

Correction in Letters Patent No. 883,528.

It is hereby certified that in Letters Patent No. 883,528, granted March 31, 1908, upon the application of Jared R. De Remer, of Glenwood Springs, Colorado, for an improvement in "Water-Wheels," an error appears in the printed specification requiring correction, as follows: In line 7, page 2, the word "on" should read *or;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of April, A. D., 1909.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.