

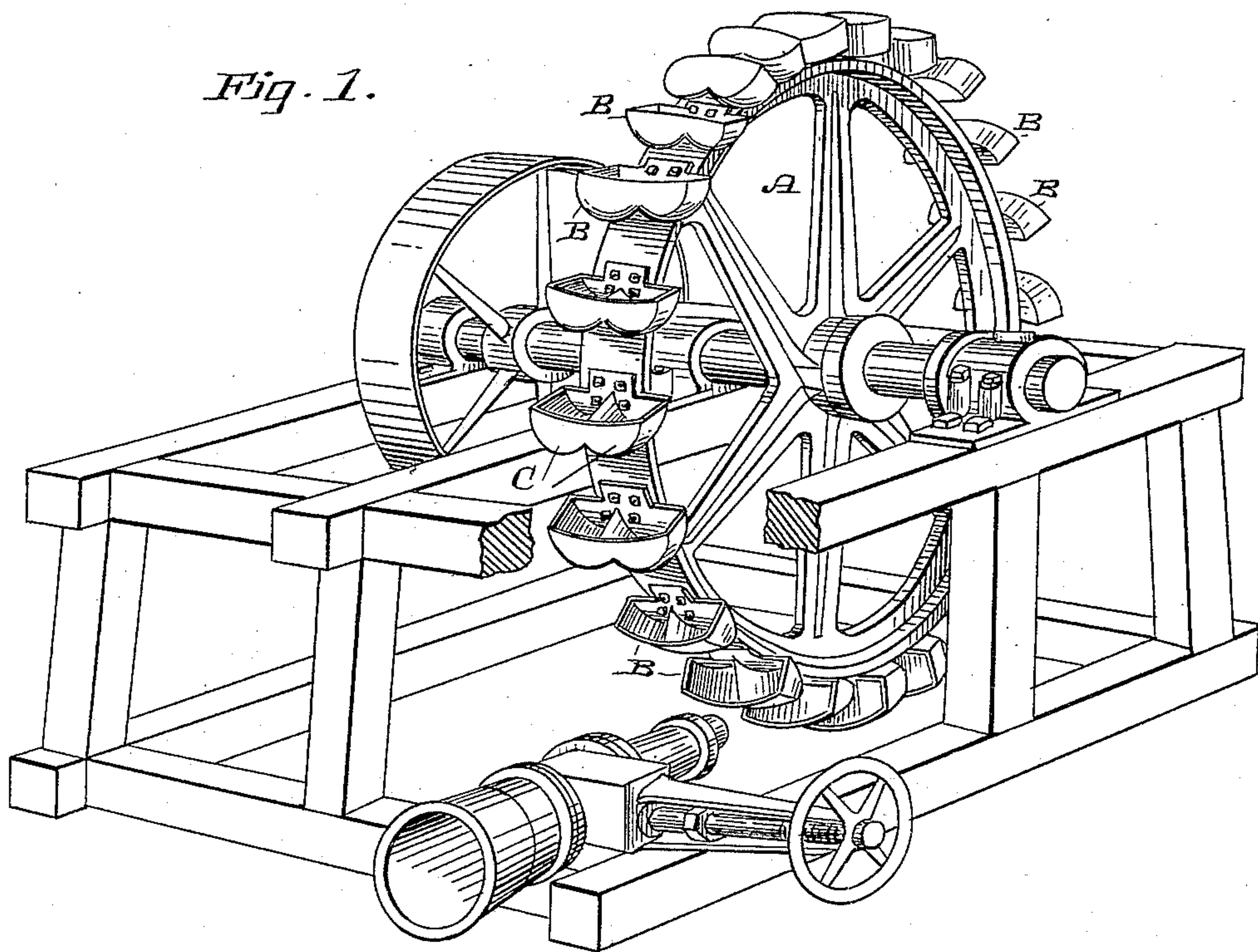
(No Model.)

L. A. PELTON.  
WATER WHEEL.

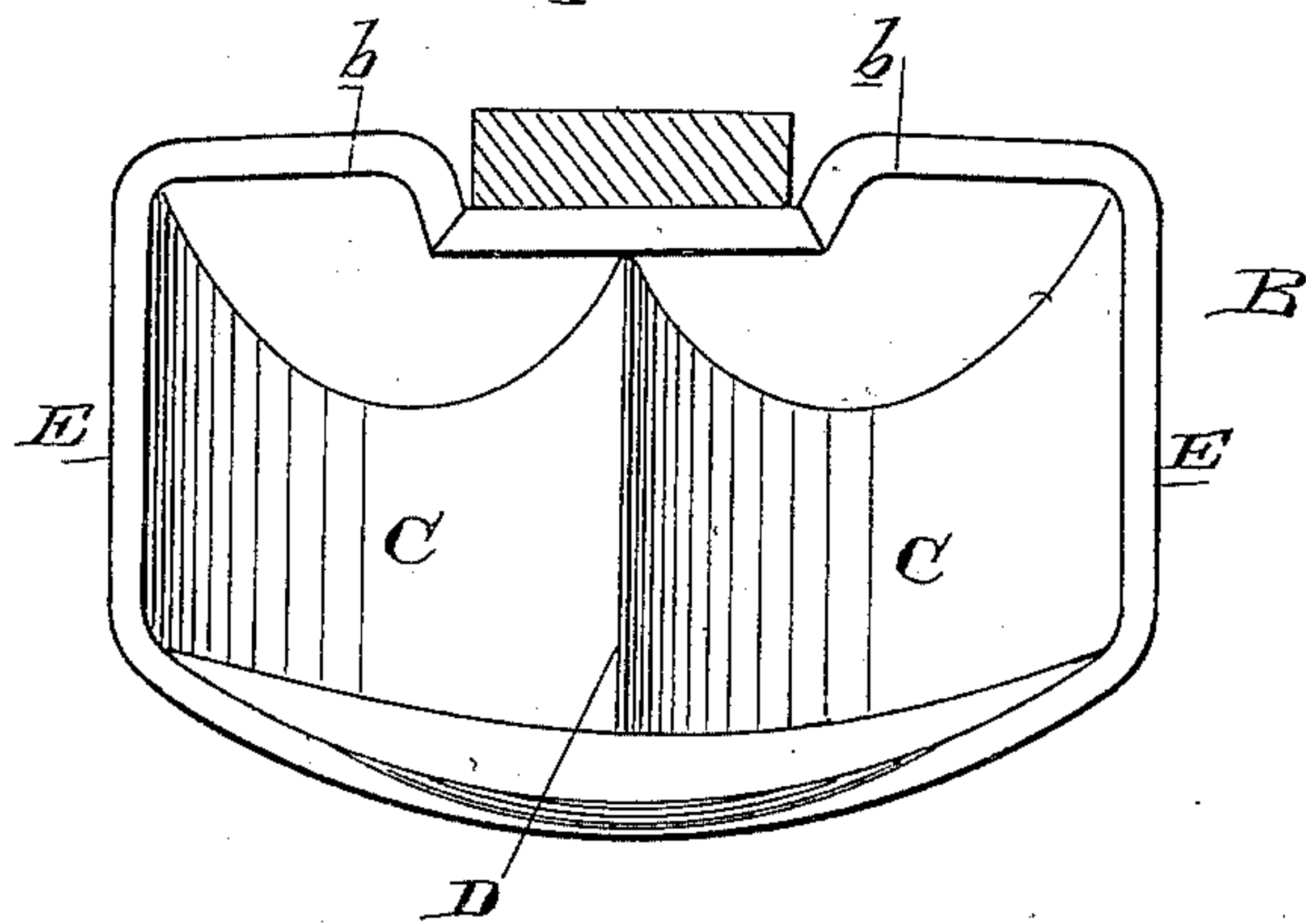
No. 409,865.

Patented Aug. 27, 1889.

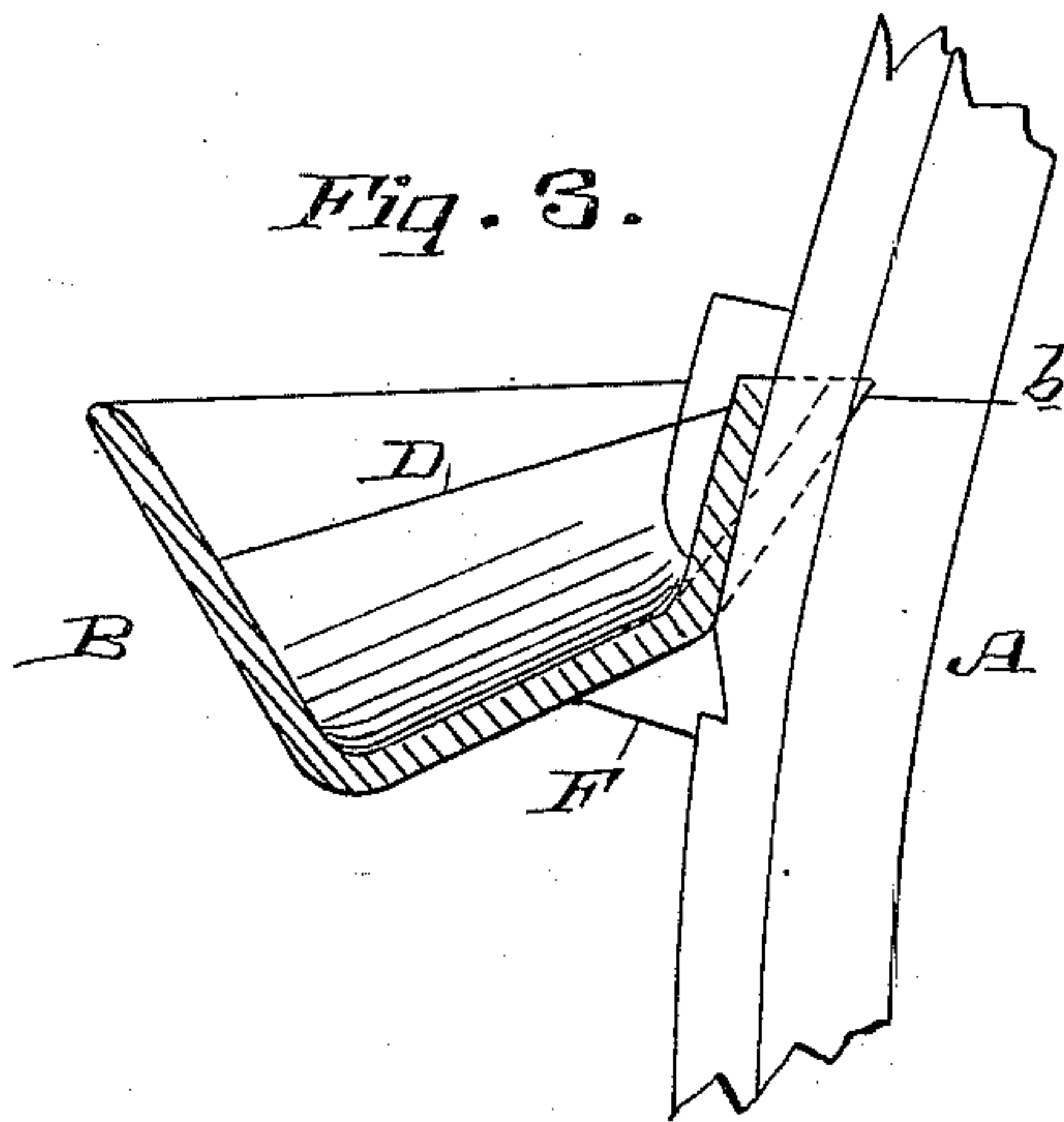
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses,  
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# UNITED STATES PATENT OFFICE.

LESTER A. PELTON, OF NEVADA CITY, ASSIGNOR TO ALBERT P. BRAYTON, JR., OF SAN FRANCISCO, CALIFORNIA.

## WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 409,865, dated August 27, 1889.

Application filed January 2, 1889. Serial No. 295,218. (No model.)

*To all whom it may concern:*

Be it known that I, LESTER A. PELTON, of Nevada City, Nevada county, State of California, have invented an Improvement in Water-Wheels; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements in water-wheels of that class which are driven by the momentum of a stream of water delivered into buckets on the periphery of a wheel through a suitable discharge-nozzle and under a high pressure.

My invention consists, essentially, in a novel construction of the buckets into which the water is discharged, so that the stream of water is divided into two parts by a central ridge or apex which directs the current of water into the curved bottoms of the two halves of the bucket, from which it passes out over the flaring or divergent sides of the bucket, so as to escape smoothly and utilize the full reactionary force of the escaping stream in addition to the direct force of the impinging jet.

It also provides an improved means for adjusting and securing the buckets to the wheel-rim.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a view of my improved wheel, showing the buckets, distributing-box, and discharge-nozzles. Fig. 2 is an enlarged plan view of one of the buckets. Fig. 3 is a longitudinal section of the same.

The object of my improvement is to provide a series of buckets to be attached to the periphery of a water-wheel, these buckets being of such construction as to utilize to its highest degree, first, the direct impact of the column of water, which is discharged into them with great velocity from the nozzle, and, secondly, to utilize in a similar manner the full reactionary force caused by the change of direction of the column of water and its perfect discharge and clearance from the wheel, so that no portion of it acts to impede the wheel by contact with the following buckets or any other portion of the wheel.

The wheel A may be of any suitable construction and size, its diameter depending

upon the speed at which it is desired to run it and the quantity and head of water available, and as these requirements vary in almost every case it will be manifest that the diameter of the wheels may be from eighteen inches to six feet, and that the size of the buckets B may be proportionally varied.

In some cases it may be found practicable where the height or pressure of the column of water is very great to make the buckets and the discharging-nozzle of considerably smaller proportions relative to the wheel diameter than would be the case if the pressure of the water were less and the quantity discharged from the nozzle were greater.

The buckets B may be formed, if desired, as a part of the wheel; but I have found it preferable to make them separate, each bucket being bolted or otherwise secured upon the wheel-rim so as to be immovable, and having lugs by which they are adjusted and kept in place upon the rim, as will be hereinafter described. The side of the bucket which rests against the wheel-rim is made flat or slightly concave, so as to correspond approximately with the convexity of the wheel-rim against which it lies. This portion I would term the "rear side" of the bucket.

The front side of the bucket is inclined so that the bottom of the bucket is narrower than the top and is curved outwardly, as shown more distinctly in Fig. 2, so that the central portion of the front is at the greatest distance from the rear side. This central portion is also beveled off or made rounded and thinner than the remainder of the edge of the bucket, so that while the stream from the nozzle momentarily impinges upon it while the bucket is passing into position for the stream to strike its interior, this edge will not break the stream or scatter it. The outward curvature or convexity of the front of the bucket greatly increases its capacity and enables me to use a greater amount of water upon any given size of wheel than can be utilized with flat front buckets. The efficiency is also increased by concentrating a portion of the discharge, so as to add to the reactionary power. The upper rear edge of each bucket is carried backward upon each side of the rim, as shown at *b*, which gives this por-



tion of the bucket a greater inclination from the bottoms toward the top, thus increasing its capacity in this direction, and it also provides by its inclination for the escape of any  
 5 portion of the stream which is diverted toward it, and prevents this escaping water from striking the bucket which follows. Each bucket has its bottom formed into two distinct curves C C, which meet in the central  
 10 apex at D, so that when the stream of water strikes this apex after the bucket arrives fully in line with the nozzle the stream will be divided into two parts, one half being directed upon one side of the apex and the  
 15 other half upon the other side of the apex into the curved bottoms of the buckets. The sides E are continuations of the curved bottoms, extending upwardly and diverging outwardly, and in such relation with the curved  
 20 bottoms that the water passes smoothly from the apex D down over the curved bottoms C of the buckets, and thence up the inclined sides E, so as to be discharged clear of the wheel upon each side, and in such manner as not to in  
 25 any way touch or impede the succeeding bucket, which follows closely as the wheel revolves. The water is thus delivered from the nozzle into the bucket, so that the full power or momentum is utilized to rotate the wheel, and  
 30 as it passes into the bottom of the curves and has its direction reversed so that it passes up the inclined sides E it will be manifest that the whole reactionary force caused by this change of direction will be added to the direct  
 35 power exerted by the stream as it first strikes the bucket. The construction of the bucket is such that the force of the water is utilized, so that it drops upon each side as it leaves the buckets perfectly inert and dead. The  
 40 curved front of the bucket extends lower than the rear portion, so that the bottoms C C, which are curved in a transverse plane, are inclined from the rear toward the front. The ridge or dividing apex D is also inclined in a  
 45 like manner from the rear toward the front of the bucket, where it is lower than at its point of contact with the rear edge of the bucket. This construction insures the stream striking the apex and bottoms of the buckets  
 50 at the proper angle, so that it is directed to right and left and up the inclined sides of the bucket, while a portion of the stream is directed toward the front and will pass out over the curved front of the bucket and in a  
 55 solid body near the center, thus adding to the

reactionary force and efficiency. As the bucket is passing out of the line of the stream, the latter again momentarily strikes the inclined front of the bucket and is directed toward the rear so as to discharge over the inclines  
 60 at each side of the wheel-rims and escape without striking the following bucket. Lugs F project from the rear lower edge of the central portion of the bucket, and they fit in corresponding slots or cavities made in the rim  
 65 of the wheel. By means of these lugs and slots the buckets are properly adjusted, so that when the bucket is bolted upon the rim it will be accurately fixed in place and prevented from moving by any force which may  
 70 be applied to it. At the same time these buckets are easily removed, if it is necessary to replace them or to make any repairs, by simply taking out the bolts which hold them to the rim, and the lugs and channels insure  
 75 their standing in the proper position for the best work.

Having thus described my invention, what I claim as new, and desire to secure by Letters  
 80 Patent, is—

1. The buckets of a water-wheel, having the curved bottoms meeting at an apex or sharp ridge in the center and continuous with the inclined discharge sides, the bucket-fronts curved in the arc of a circle and inclined so  
 85 as to narrow the buckets from the top toward the bottom, and the bottom and dividing ridge also declining from the rear toward the front, as shown and described.

2. The buckets of a water-wheel, having the  
 90 curved bottoms meeting at a central apex or sharp ridge and continuous with the discharge sides, the convex front, and the inclined bottoms, with the projecting angular lugs fitted to corresponding depressions or notches in  
 95 the rim in which they are adjusted and retained, substantially as herein described.

3. The buckets of a water-wheel, with the curved bottoms meeting in a central apex or ridge and continuous with the discharge sides,  
 100 the convex front, and the rear walls inclining backward upon each side of the wheel-rim, substantially as herein described.

In witness whereof I have hereunto set my hand.

LESTER A. PELTON.

Witnesses:

S. H. NOURSE,  
 H. C. LEE.