

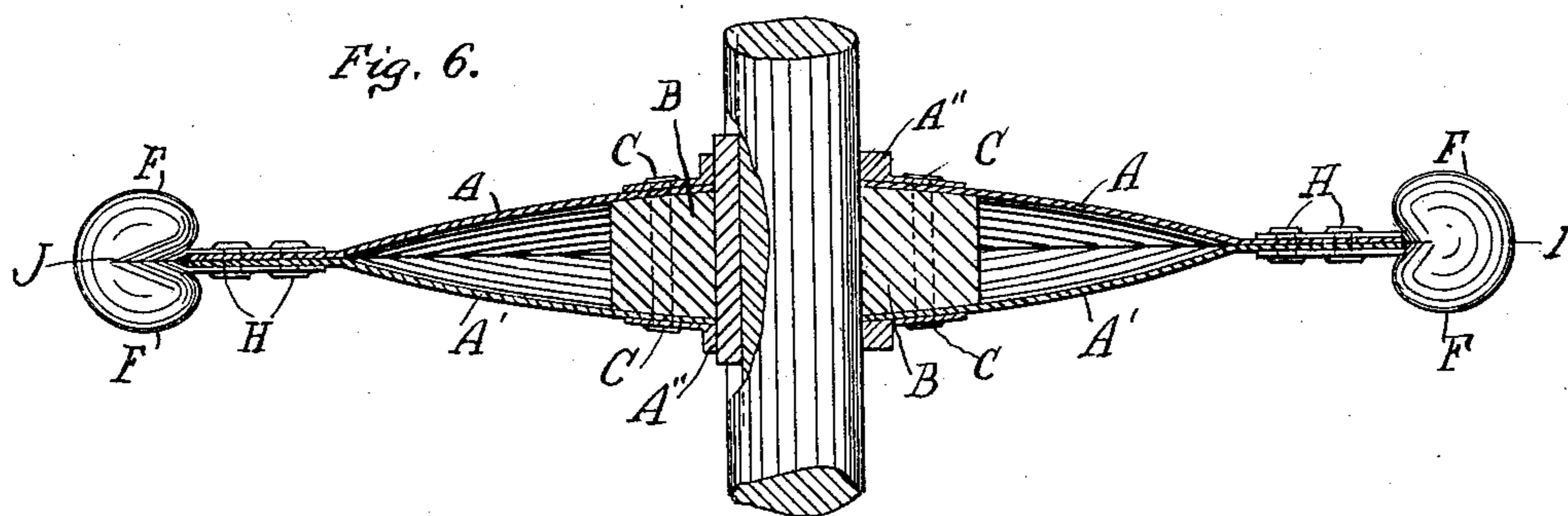
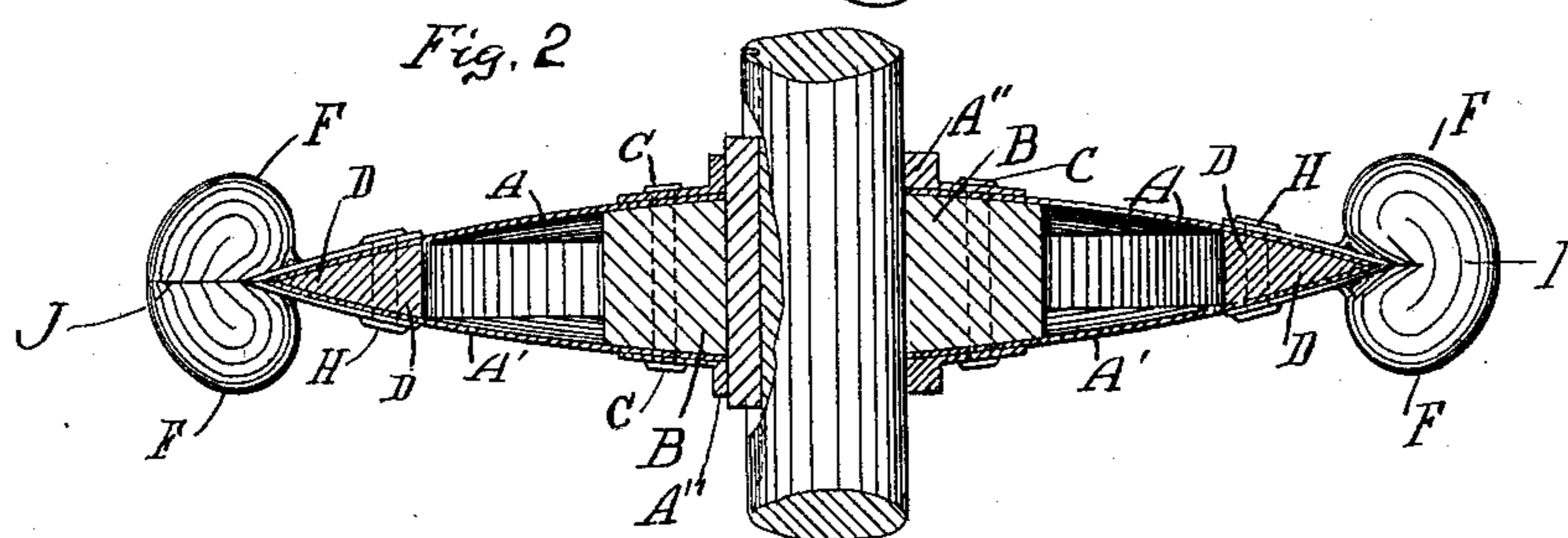
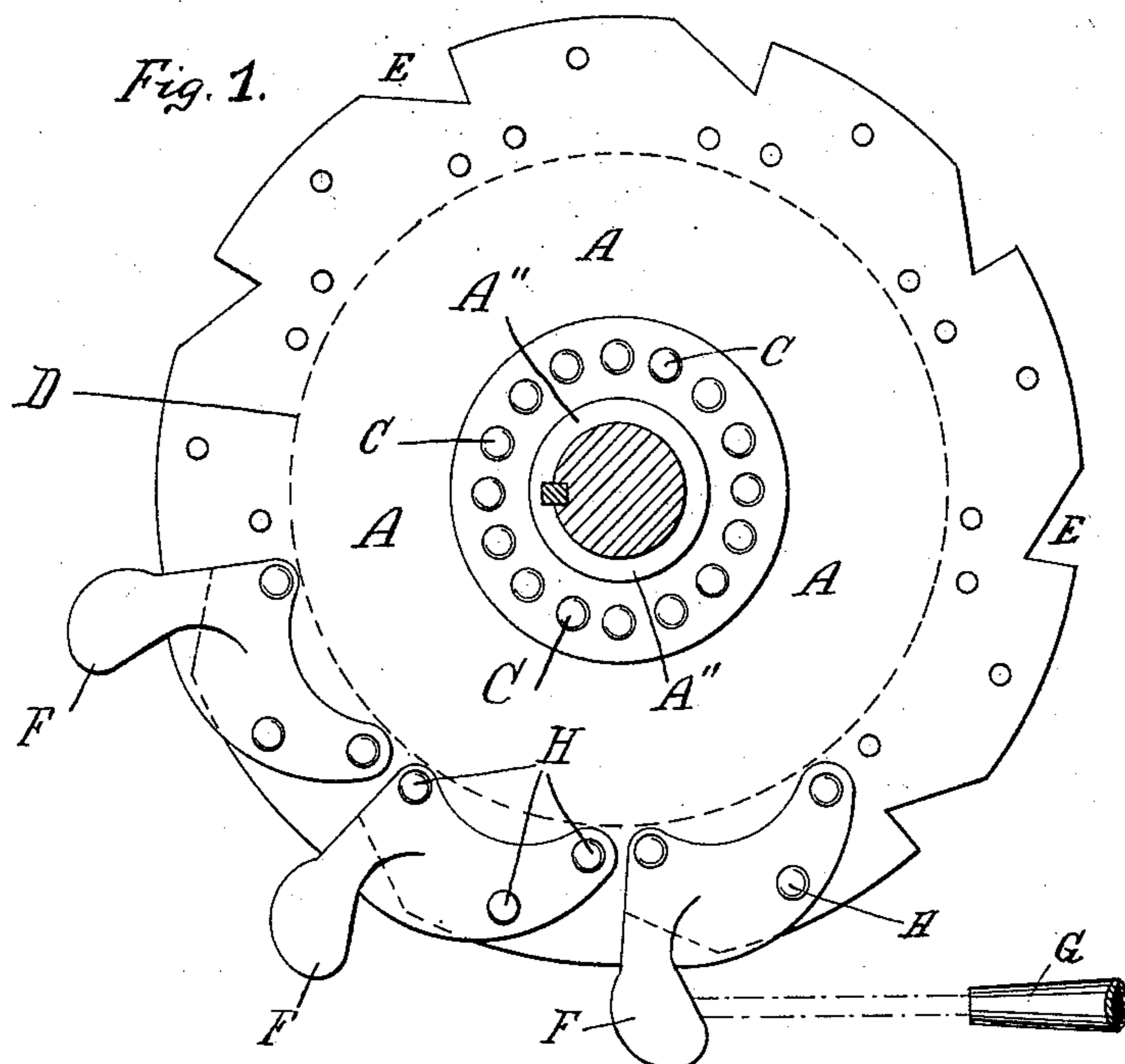
(No Model.)

2 Sheets—Sheet 1.

A. KENNEY.  
WATER WHEEL.

No. 603,770.

Patented May 10, 1898.



WITNESSES.

*M. L. Wilkinson.*  
*John Satterwhite*

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*Augustine Kenney*  
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ATTORNEY.

(No Model.)

2 Sheets—Sheet 2.

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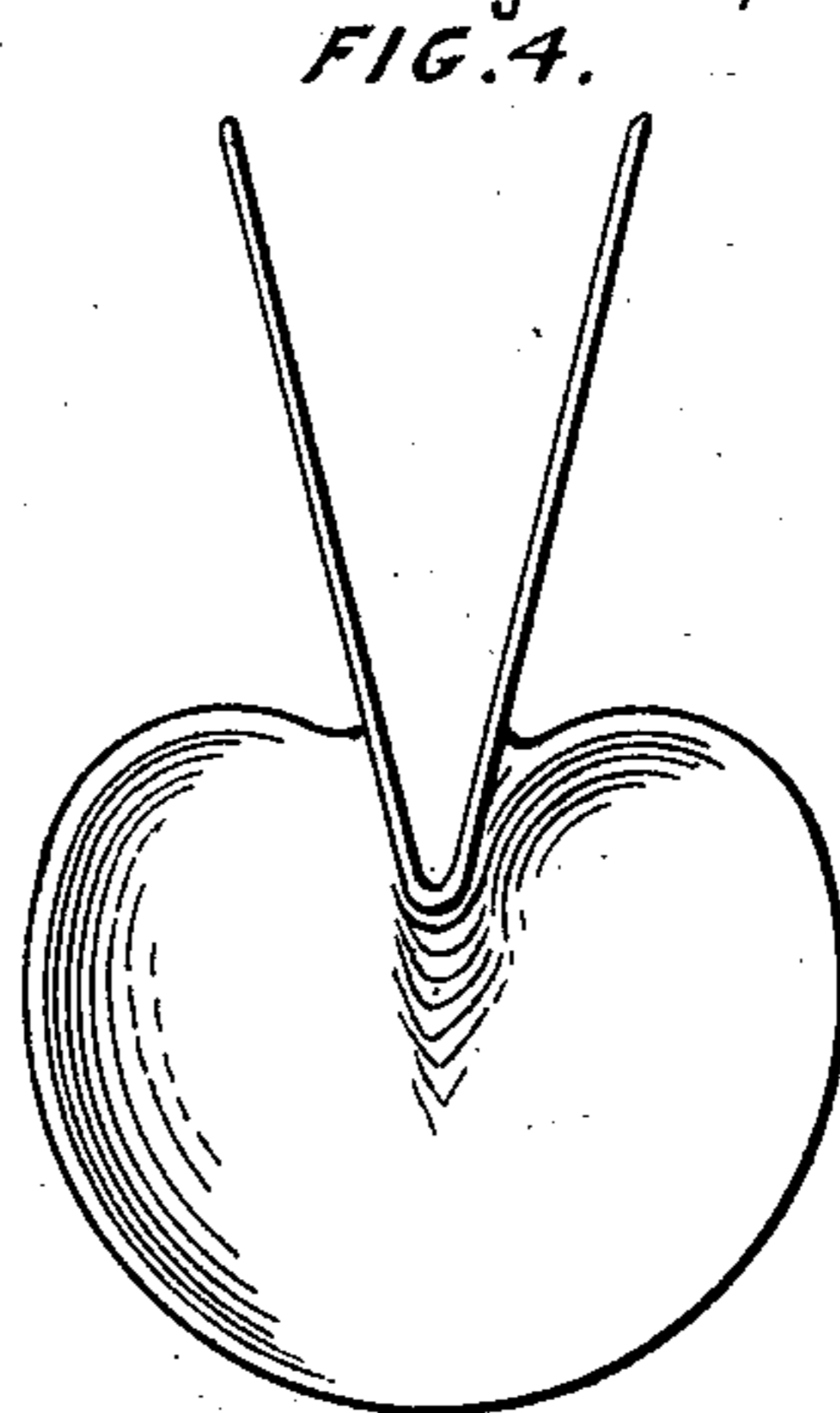
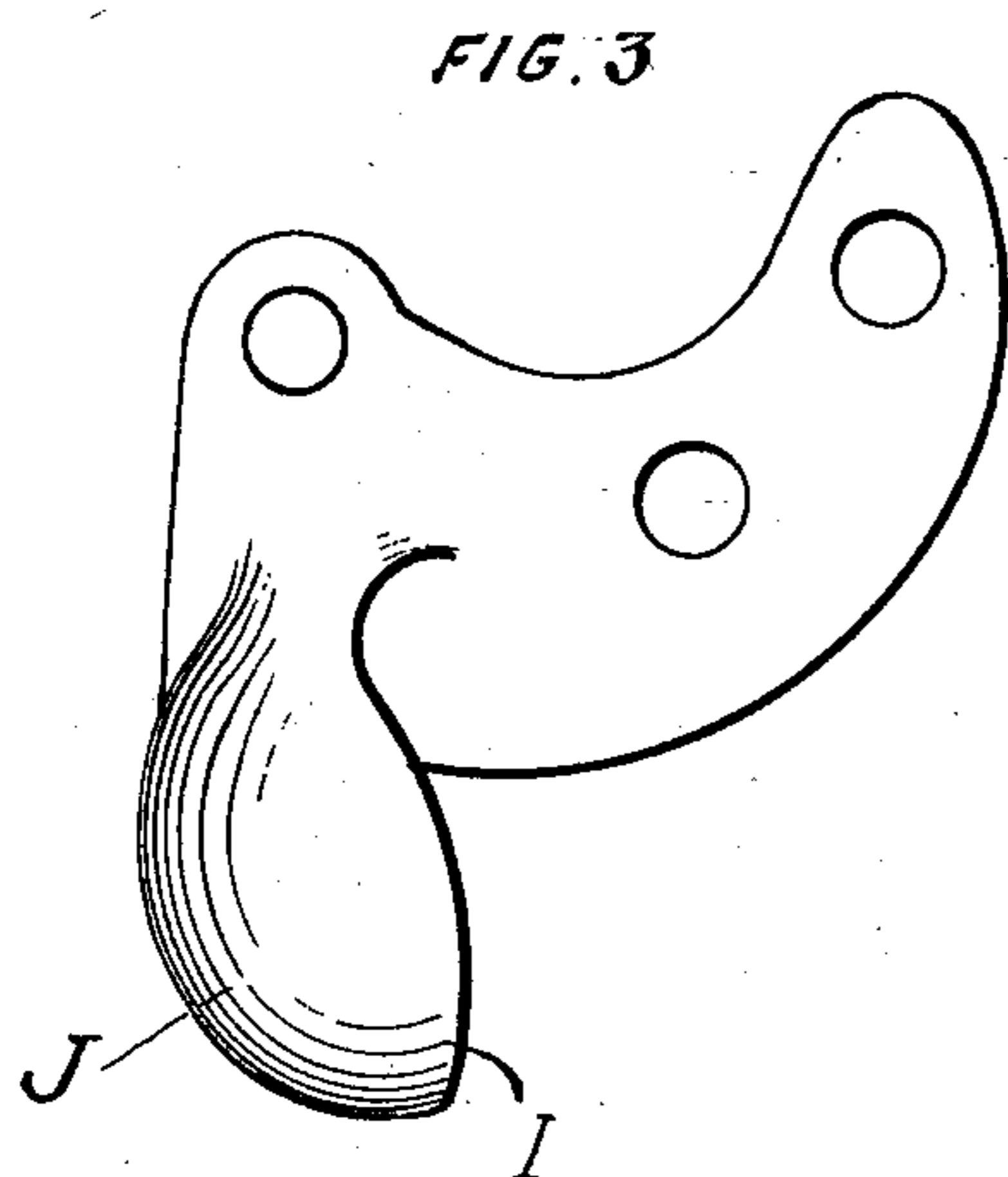


FIG. 8.

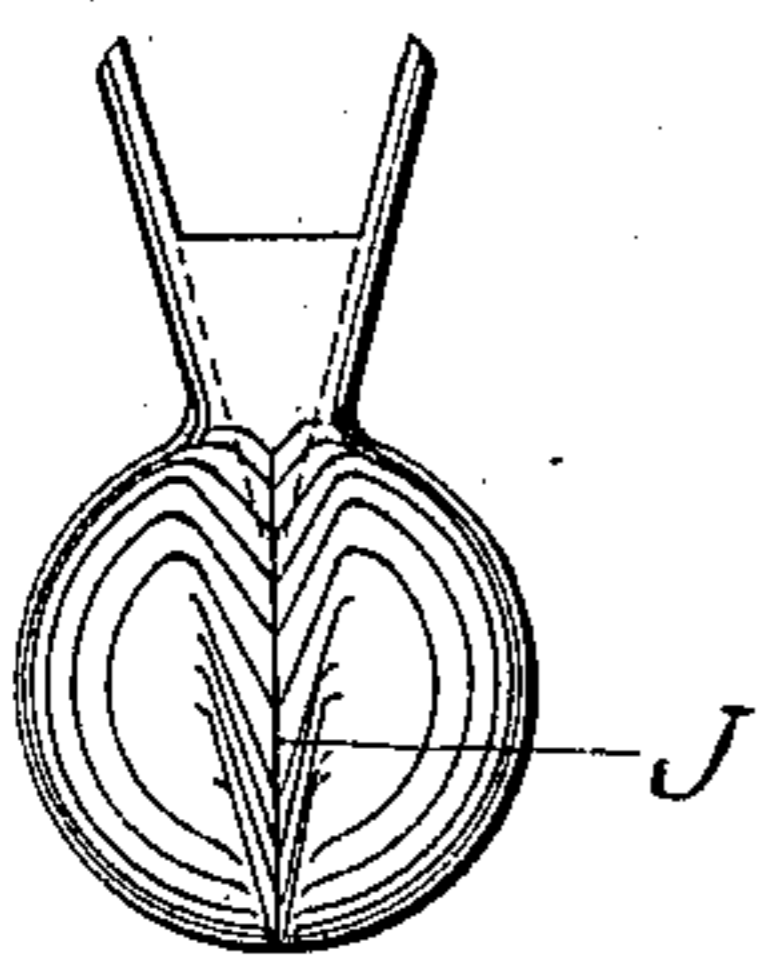


FIG. 5.

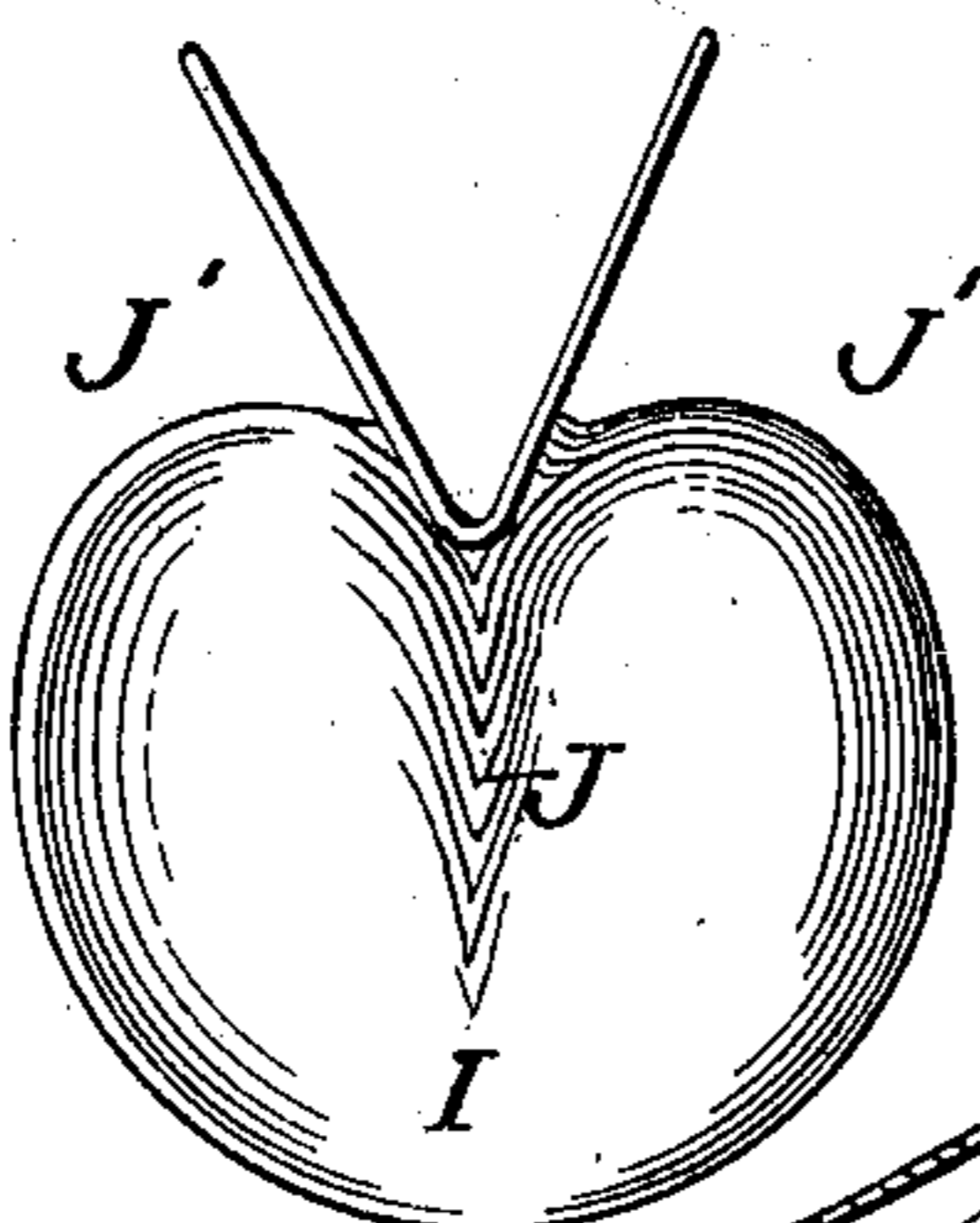


FIG. 10.

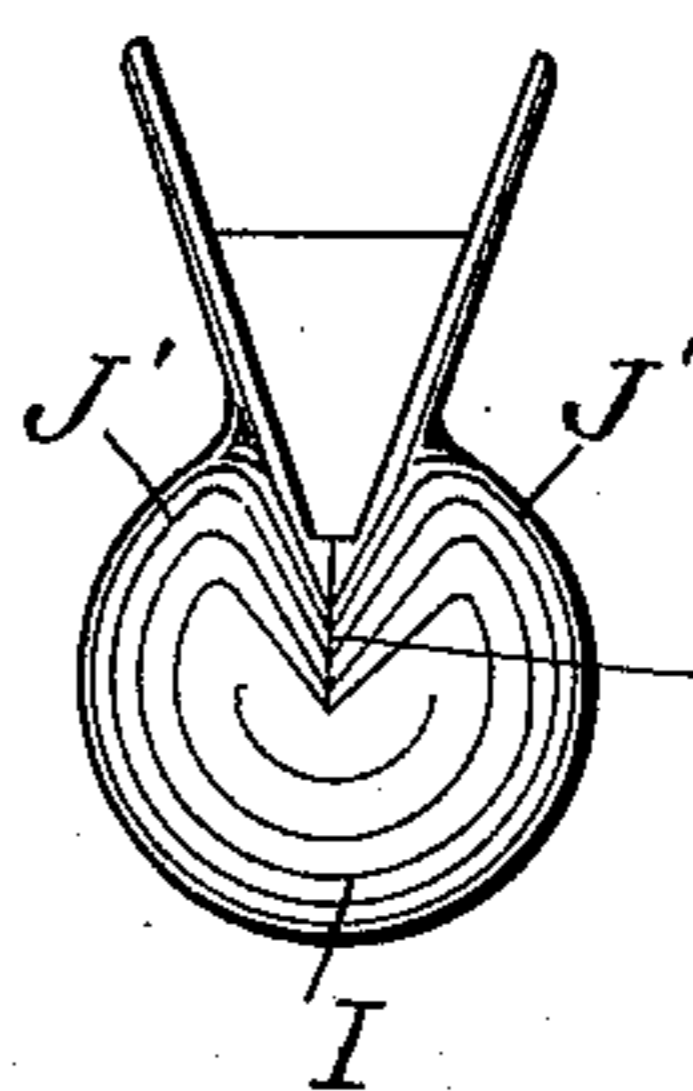
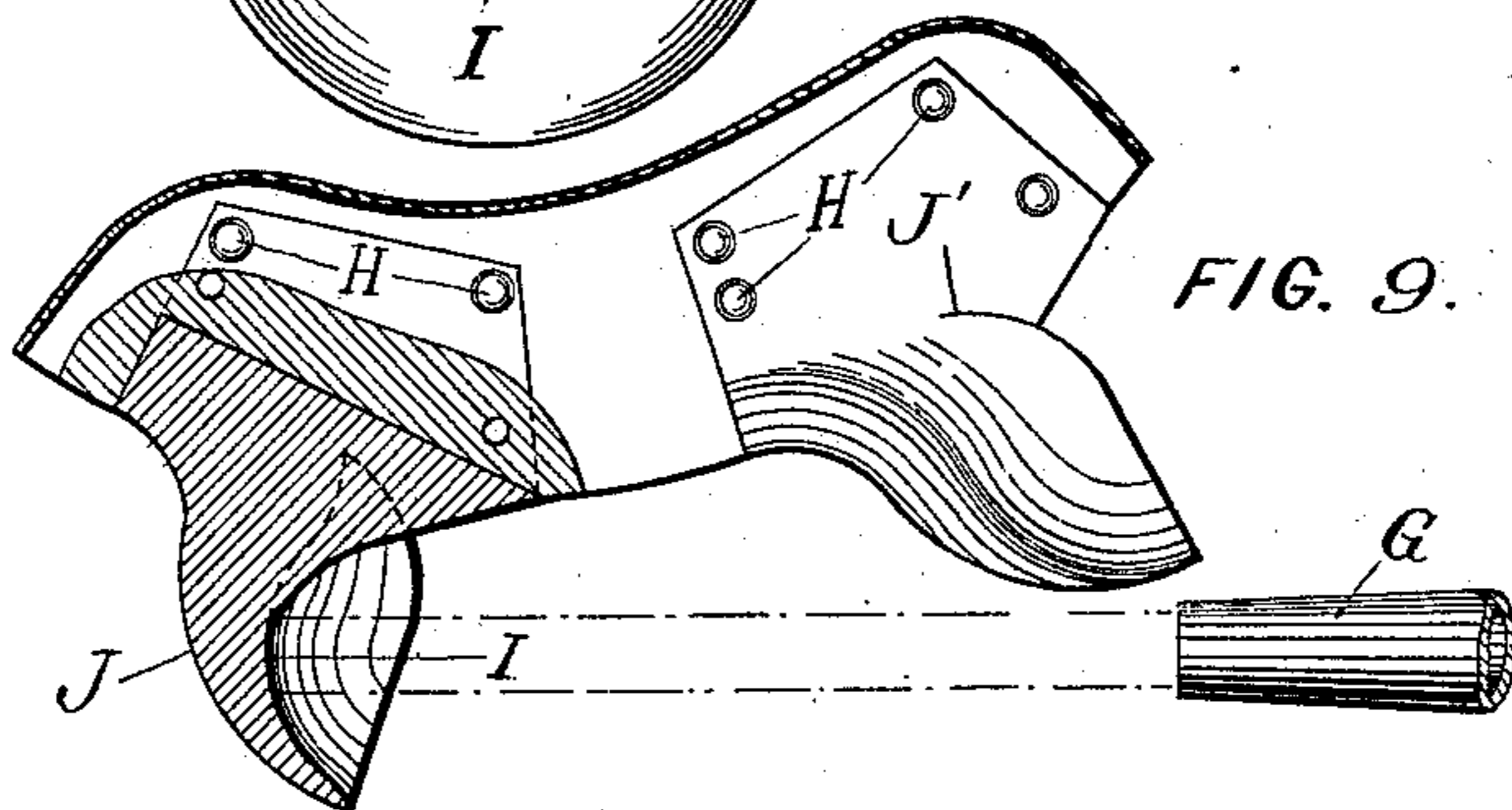
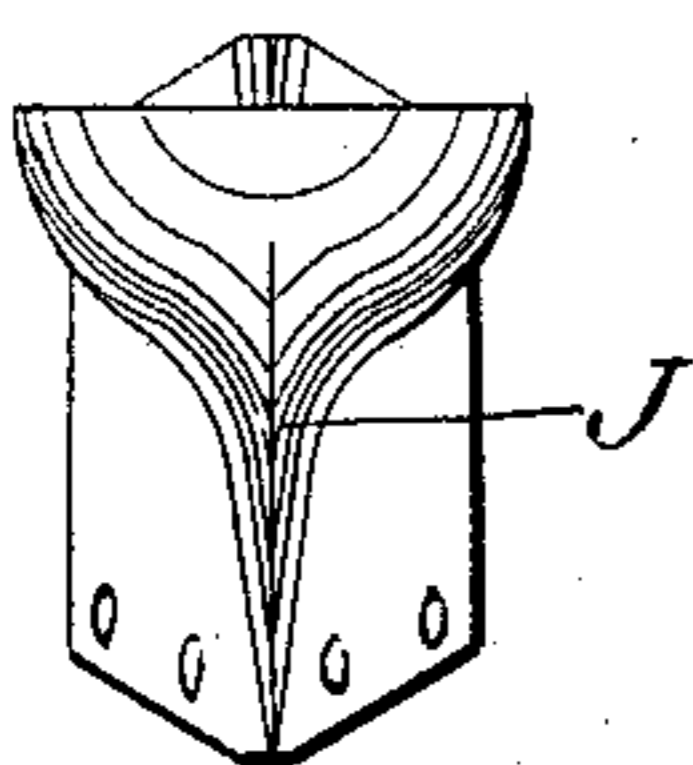


FIG. 7.



WITNESSES

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# UNITED STATES PATENT OFFICE.

AUGUSTINE KENNEY, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO JOHN E. WILSON, OF SAME PLACE.

## WATER-WHEEL.

SPECIFICATION forming part of Letters Patent No. 603,770, dated May 10, 1898.

Application filed March 9, 1897. Serial No. 626,628. (No model.)

*To all whom it may concern:*

Be it known that I, AUGUSTINE KENNEY, a subject of the Queen of Great Britain and Ireland, at present a resident of the city of Los Angeles, county of Los Angeles, and State of California, have invented a certain new and Improved Water-Wheel, of which the following is a full, clear, and exact description or specification, reference being had to the annexed sheets of drawings and to the letters marked thereon.

My said invention, which consists of certain new and useful improvements in the construction of water-wheels, relates to that class of such wheels which are driven by one or more jets of water under pressure impacted upon or into buckets or cups arranged around the rim or circumference of the wheel.

My improvements in the construction of such wheels are applicable to wheels driven at comparatively low pressures; but, my object more especially is to produce an exceedingly strong wheel and of light weight which shall be capable of withstanding the highest pressure or service of water-jet which can be obtained. In the construction of said wheel the body of the wheel consists of two circular plates of steel of a convex or conical form so shaped and made that while the central part of the body of the wheel is wide the circumferential part is narrow. The central part is attached to a hub for carrying it upon a driving-shaft. The circular plates are firmly secured to the hub by rivets, while the edges of the circular plates constituting the body of the wheel come more or less close together at their circumferences.

In the case of my improved water-wheels being used with jets of water of exceedingly high pressure the circumferential parts of the wheel are strengthened by means of a ring or disk, either flat or conical, inserted between their edges and fastened thereto by rivets. The buckets or cups are each made separate and formed with lugs or attachment-pieces which fit closely to the rim or circumferential parts of the wheel and are attached thereto by means of rivets passing through the lugs and through the circumferential parts of the plates constituting the body of the wheel, as well as through the

strengthening or stiffening ring or disk, when such is used.

An especial feature in the construction of my improved water-wheel is this: that the buckets or cups and lugs are so formed that the back of each bucket or cup fits into and rests solidly upon or in a recess with a shoulder formed in the circumference of the wheel. Thus the buckets or cups are so firmly supported that the strain due to the impact of the water-jets striking the buckets or cups is removed from the rivets and directly transferred to the rim or circumference of the body of the wheel itself.

Another essential feature in the construction of the buckets or cups consists in this: that each jet of water as it impacts against the interior or bottom of each bucket or cup and instantly after the blow is struck divides into two portions which pass out backward on either side of the body of the wheel, thus relieving the water as it escapes from the resistance due to back pressure. This object is achieved by constructing each bucket or cup with an impacting-surface at the front and having a fin or blade like portion at the center of the back, with a discharge-passage on each side thereof leading to the rear of each bucket or cup, while the lower part of the outside of the bucket is also formed wedge-shaped and with a knife-edge to cut and divide such water which it encounters.

By my invention I produce a water-wheel of exceedingly light weight which can be packed upon a mule or burro for transportation in mountainous regions where there are not roads adapted for transporting heavy water-wheels of the classes now generally in use.

Under the improved construction of water-wheels constituting my present invention a wheel capable of being driven so as to generate many hundreds of horse-power can be packed or conveyed upon the back of a mule or burro.

On the annexed sheets of drawings, Figure 1 is a side elevation of my improved water-wheel, showing my improvements applied therein. Fig. 2 is a horizontal section of the same. Fig. 3 is a side elevation of one of my improved buckets or cups on an enlarged

scale. Fig. 4 is an elevation of the rear of such bucket or cup corresponding to Fig. 3. Fig. 5 is a front elevation of my improved bucket or cup, showing the interior construction of the same. Fig. 6 is a section of my improved water-wheel without the stiffening-ring between the convex side plates. Fig. 7 is a front elevation of my improved impact bucket or cup with the knife-edge below. Fig. 8 is an inverted plan of the same. Fig. 9 shows a portion of a water-wheel with this improved impact bucket or cup applied therein or thereto. Fig. 10 is a plan of the said bucket.

In Figs. 1 and 2 the body of my improved water-wheel consists of two plates A and A', formed convex—that is to say, so that the central parts of the plates A and A' are much wider apart than the edges thereof, which, as seen from the drawings, come close together. At their central parts the plates A and A' are fastened together to the hub B, which is preferably made of cast-steel, and the plates A and A' are attached to the hub B by means of rivets C, preferably put in and riveted hot, so as to tighten by shrinkage on cooling, and the wheel may be further stiffened by the flanges A'', through which the rivets C also pass. The circumferential ring D is placed within the edges of the disks or plates A and A', as shown, and it is fastened thereto by means of rivets, also preferably put in hot, as shown on the annexed drawings. By means of this construction of the body of the wheel an exceedingly firm and rigid structure is obtained of very light weight.

At intervals corresponding to the distance apart of each bucket or cup a recess E is cut in the circumference of the wheel. As shown by Fig. 1 of the drawings, this recess is so shaped that it forms a square seat to the bottom of each bucket or cup F, so that the jet of water proceeding from the nozzle G or from each nozzle G when a series is used is received directly by the body of the wheel, and thus the stress upon the rivets H by which the wings of each bucket or cup are attached to the body of the wheel due to the impact of the water-jets striking each bucket is very considerably reduced.

With reference to Fig. 1 of the drawings it is to be understood that although I have shown three buckets F only as applied to the body of the wheel, yet the entire circumference is to be similarly supplied with buckets either at greater or less distances apart, according to the arrangement of the jets and according to the pressure of the water escaping from the jets.

With reference to the construction of the buckets or cups, which constitute one of the most important features of my improved water-wheel, I desire here to explain that the outward portion, (marked I,) as shown more especially in Figs. 3, 4, and 5 of the drawings, is that upon which the impact takes place, and that from the back of this portion of the

bucket a binding-support for the rim of the wheel, consisting of the V-shaped lugs or wings, projects. These lugs or wings at the back of each bucket embrace portions of the rim of the plates of the wheel and constitute a binding-support for the same, and the openings in the back portion of the buckets allow the water to escape therefrom immediately after impact has taken place, so that the water is discharged through the two hollow spaces J' at the back of each bucket or cup.

It is to be understood that the ring D may be dispensed with and the plates A and A' flattened at their circumferences, so as either to come close together or have a flat ring or disk placed between them to form a solid attachment for the wings of the buckets or cups to be riveted to, as shown at Fig. 6. It is also to be understood that the plates A and A' instead of being made convex may be conical and of a much greater or less convexity than shown upon the annexed drawings or having greater or less degree of cone. It is also to be understood that in the cases of water-wheels which are to be used for low-pressure service the plates A and A' may be perforated or have hollows or spaces cut in them for the purpose of lightening their weight; also, in cases of wheels used for high-pressure service the circular disks or plates A and A' may have their stiffness increased by corrugating them radially or concentrically. It is explained that in addition to the buckets or cups being of the form shown at Fig. 1 they may be formed with a knife-edge below the bucket, so as to stiffen the bucket against the impact of the jets and to cut the water, as shown at Figs. 7 to 9.

It is to be understood that in place of having a single jet discharging into each bucket the jets may be arranged at an angle to each other, so that two jets may discharge into each bucket—that is to say, at two impact-points—one on each side of the center. It is also to be understood that in place of the lugs or wings of the buckets being constructed as hereinbefore described and shown on the drawings they may be formed with a single lug or wing, so as to be fastened between the circumferential parts of the plates constituting the body of my improved water-wheel.

When a water-wheel is constructed according to my improvements, and after being turned up to a true balance, with the buckets or cups all in place, it is treated to a bath of molten zinc for galvanizing all parts thereof in order to prevent rust, or the entire wheel may be electroplated with the same object in view.

It is further to be understood that in the case of large wheels the disks A and A' may be still further strengthened by rivets passed through the body thereof in that space between the hub and the circumferential ring, tubes being placed between the plates through which such rivets pass, so that the rivets when closed and cooled pull the plates A

and A' against the ends of such tubes as shoulders.

Having now described the nature of my said invention and the best system, mode, or manner I am at present acquainted with for carrying the same into practical effect, I desire to observe in conclusion that what I consider to be novel and original and therefore claim as the invention to be secured to me by Letters Patent is as follows:

1. A water-wheel body consisting of a pair of convex or conical plates, the hub and rings to which such convex or conical plates are attached by rivets, the said convex or conical plates approaching toward or touching each other at their circumferences, and having notches or recesses cut into said circumferences, each such notch or recess forming a seat or support for each bucket or cup of the water-wheel, substantially as set forth.

2. A water-wheel body consisting of a pair of convex or conical plates, the hub and rings to which such convex or conical plates are attached by rivets, the said convex or conical plates approaching toward or touching each other at their peripheries, and having a ring riveted between them, the edges of such conical plates or disks and the ring between them having recesses or notches cut into each of them to constitute seats for the buckets or cups, substantially as hereinbefore described and shown upon the annexed sheet of drawings.

3. The improved buckets or cups for water-wheels, consisting of a cup-body into or against the front portion of which each jet of water impacts, or pair of jets impact, and having a

pair of wings or lugs reaching backward from the impact portions which bind or support the rim of the wheel, also having two curved discharge-passages, one on each side of the rim of the wheel at the rear part of each bucket, the said buckets being attached by the wings or lugs to the circumference of the body of the wheel and so as to fit into the recesses or seats cut into the circumference of the wheel and attached outside the convex disks or plates, substantially as described and shown upon the annexed drawings.

4. The improved water-wheel consisting of the combination of a pair of convex or conical circular plates, the hub to which said conical or circular plates are riveted, the ring between the plates at their circumferential portions, the recesses constituting seats in the circumference of the wheel for receiving the rear portions of the buckets, the wings or lugs on the said buckets whereby the buckets are attached by rivets to the body of the wheel, the buckets being constructed with the blade or fin like portion at the center of the back and with the double discharge at the back or sides thereof, all operating together in the manner and for the purposes substantially as set forth.

In testimony whereof I have hereunto set my hand and seal, in the presence of two subscribing witnesses, this 12th day of February, A. D. 1897.

AUGUSTINE KENNEY. [L. S.]

Witnesses:

H. S. ROLLINS,  
ST. JOHN DAY.