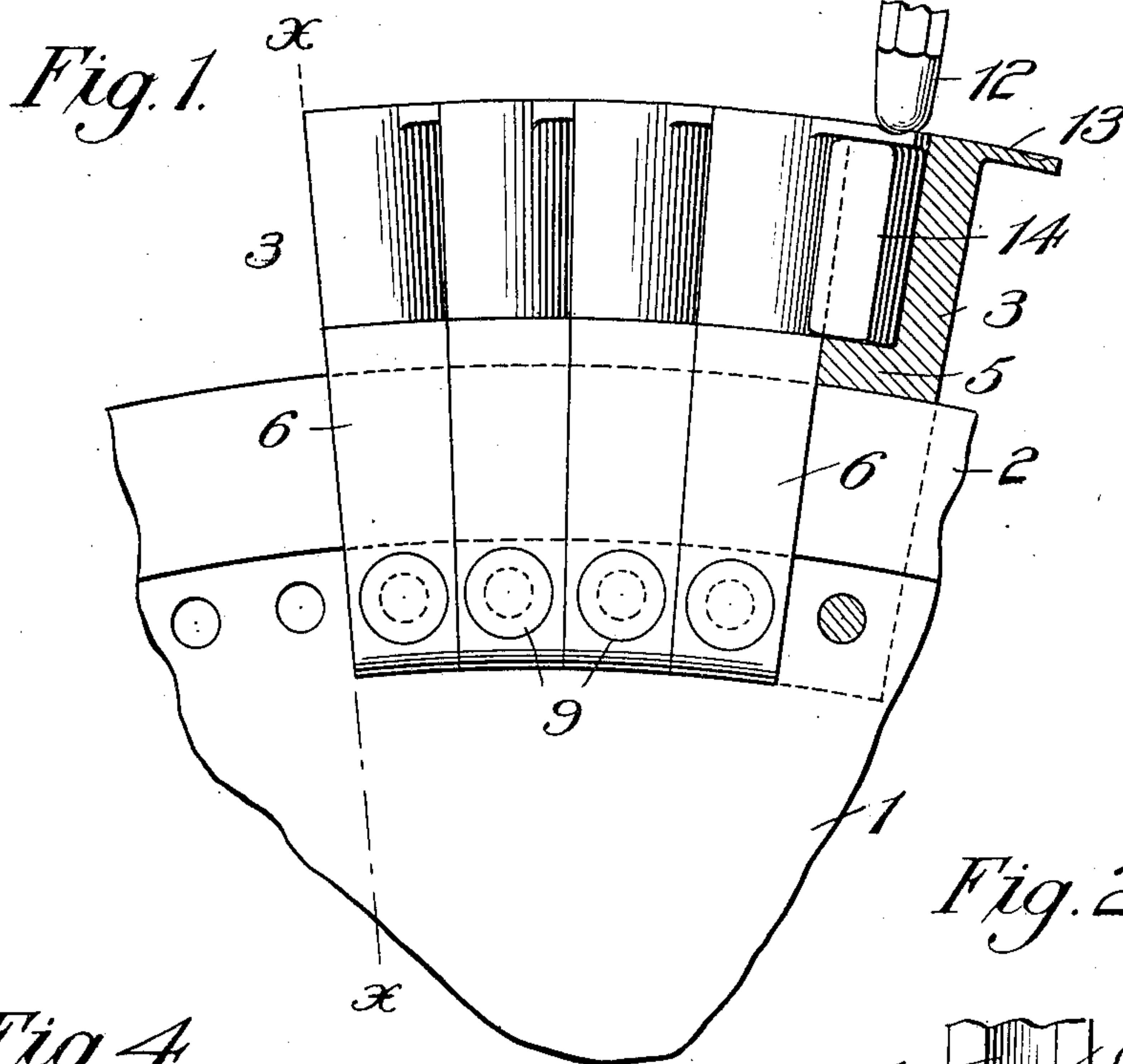


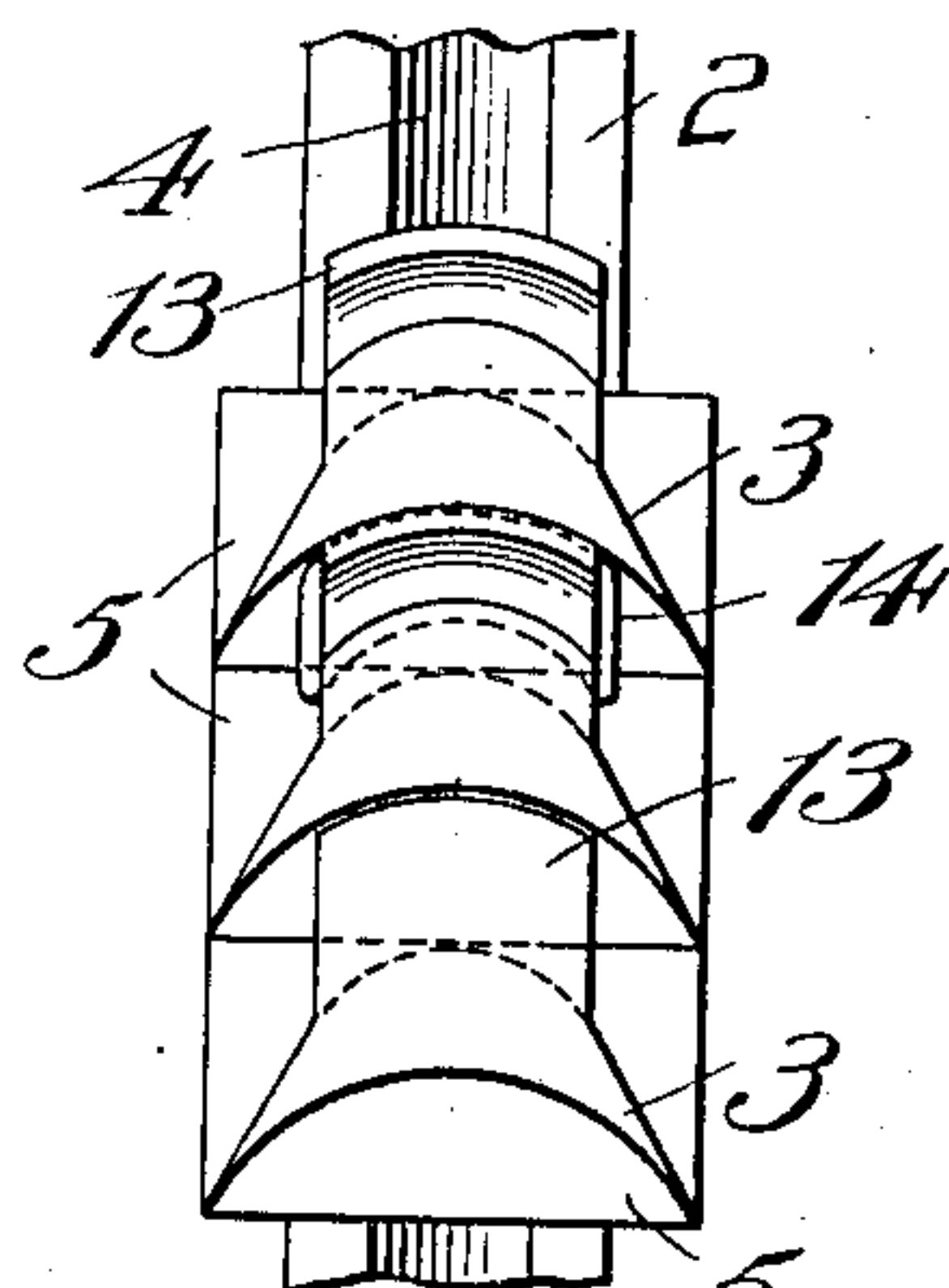
No. 819,106.

PATENTED MAY 1, 1906.

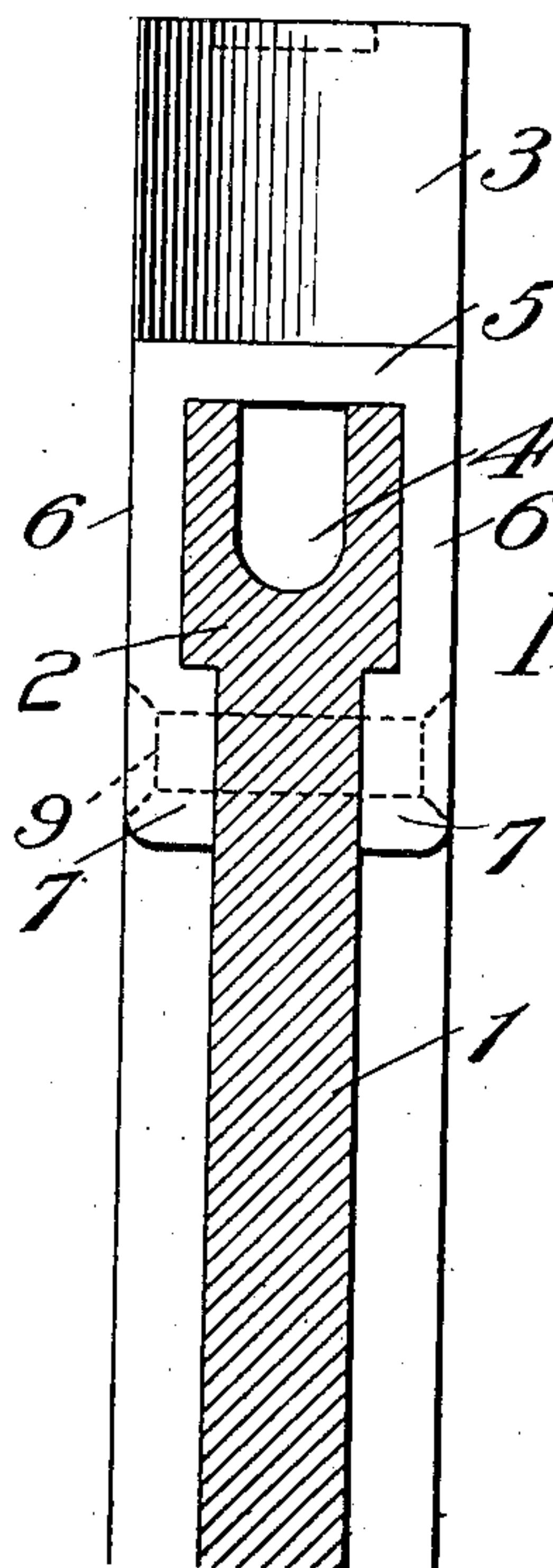
J. WILKINSON.  
TURBINE BUCKET WHEEL.  
APPLICATION FILED AUG. 9, 1905.



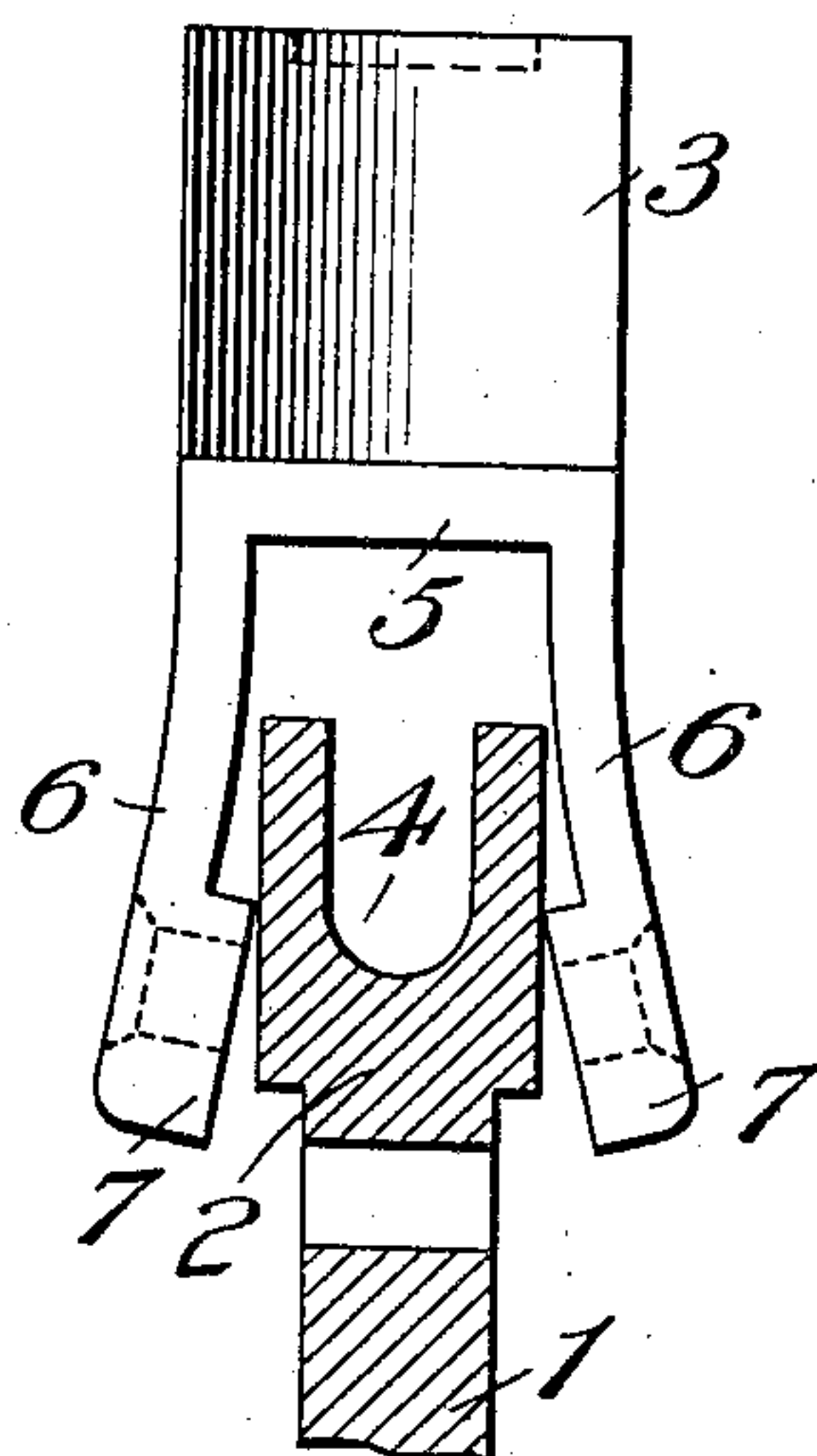
*Fig. 2.*



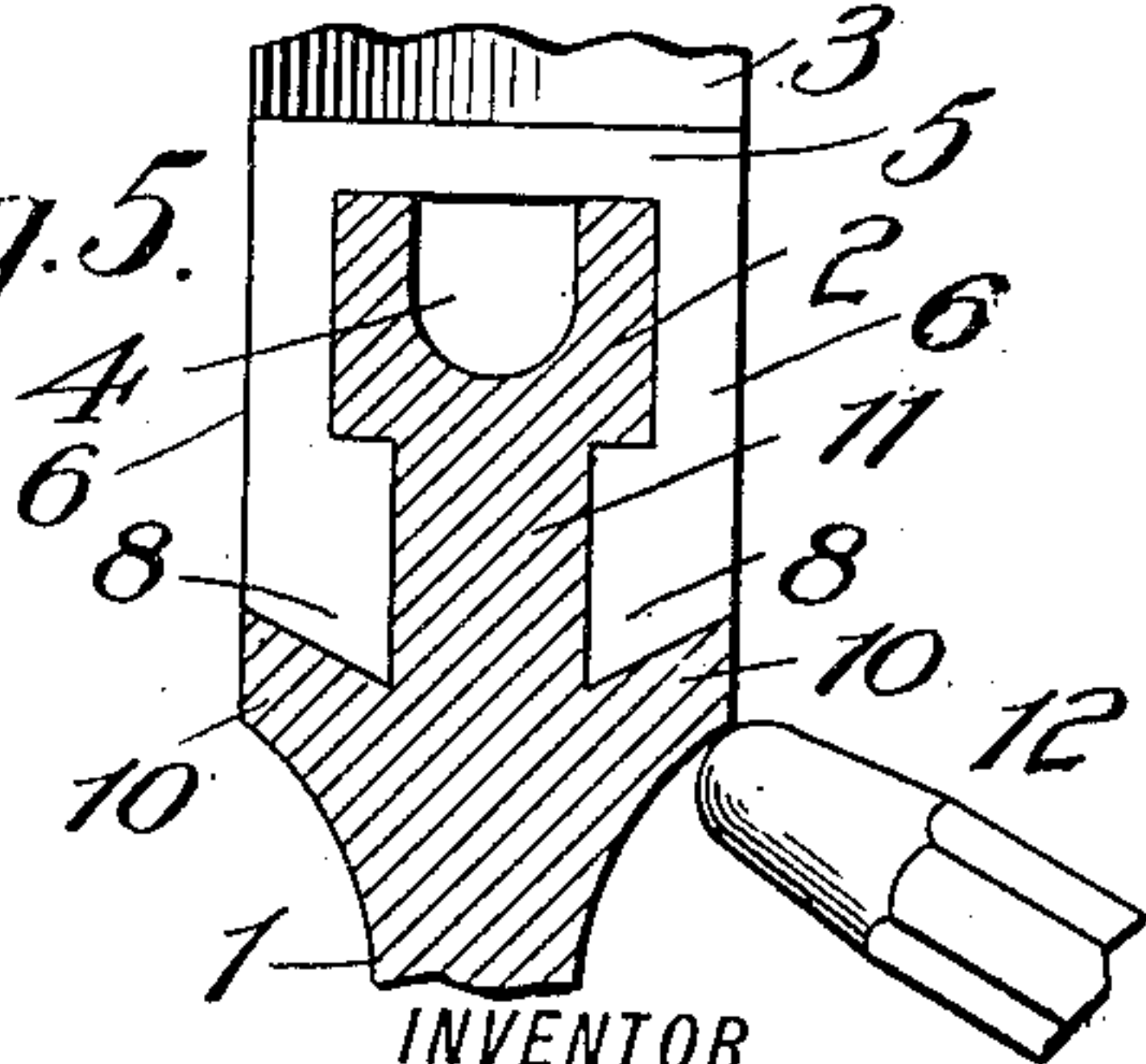
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



WITNESSES:

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ATTORNEY



# UNITED STATES PATENT OFFICE.

JAMES WILKINSON, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO  
WILKINSON TURBINE COMPANY, A CORPORATION OF ALABAMA.

## TURBINE BUCKET-WHEEL.

No. 819,106.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed August 9, 1905. Serial No. 273,426.

*To all whom it may concern:*

Be it known that I, JAMES WILKINSON, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Turbine Bucket-Wheels, of which the following is a specification.

My invention relates to improvements in buckets or vanes and means for mounting them upon wheels, drums, or rotors, such as are used in rotary fluid-motors, and particularly elastic-fluid turbines.

It is the object of my invention to form the buckets separately, providing them with ductile or flexible shanks, which are adapted to be sprung or bent into engagement with the bucket-supporting portion or rim and be there secured by calking or bending over a gripping-surface formed integral with the supporting portion or by rivets or bolts or in any other desired manner.

It is also an object to provide means to brace the outer ends of the buckets together and place them under an initial tension to hold them firmly together. To this end I provide the buckets with flanges which are adapted to be spread by a calking-tool until they firmly engage each an adjacent bucket, thus bracing them together and holding them evenly spaced around the wheel at a tension regulated by the extent to which the flanges are spread by the calking operation, which is readily effected by the aid of a curved anvil inserted between the flange and bucket-support.

In the accompanying drawings I illustrate several constructions embodying the improvements constituting my present invention.

Referring to the drawings, Figure 1 is a side elevation of a portion of a bucket-wheel constructed in accordance with my invention, showing the manner in which the bucket-flanges are calked. Fig. 2 is a top plan view of Fig. 1. Fig. 3 is a sectional view along the line  $x x$ , Fig. 1. Fig. 4 shows the manner of springing the bucket-shanks over their support. Fig. 5 illustrates the preferred manner of fastening the bucket-shanks to their support by calking.

Similar reference-numerals refer to similar parts throughout the drawings.

As an illustrative embodiment of my invention I show a turbine bucket-wheel 1,

having a shouldered rim portion 2, upon which are mounted a row of buckets 3. The rim is preferably of considerable radial depth, being grooved at 4 to lighten it and having shoulders projecting on each side of the wheel-body. The bucket 3 is concavo-convex and preferably formed integral with a base-block 5, having two elongated flexible or ductile shanks 6 depending therefrom and provided at their free ends with inwardly-projecting hooks, such as shoulders 7 or flanges 8, Fig. 5. The distance between the shanks 6 corresponds with the transverse width of the rim, which necessitates their hooked ends being sprung or bent outwardly, as shown in Fig. 4, to enable them to be slipped over the rim, after which they spring or are bent inwardly to cause them to interlock with the rim. When in place on the wheel-rim, the buckets are spaced equidistantly by their base-blocks, which abut, or in any other desired manner and are secured to the wheel either by rivets, bolts, or screws 9, which pass through the shoulders 7 and wheel-body, or by means of calking. This latter arrangement is shown in Fig. 5 and constitutes the preferred manner of mounting the buckets, as it does not weaken the wheel by drilling bolt-holes therein. To secure the bucket-shanks against displacement, I preferably form the flanges 9 so that their under sides slant inwardly to leave them thicker at their inner ends. Two annular calking-shoulders 10, preferably integral with the wheel-body, are disposed so that there is only sufficient clearance between them and the rim to enable these flanges to be forced inwardly to a position where they abut against a web 11 between the shoulders and rim and interlock with the rim. A calking-tool 12 is now used to turn the shoulders 10 until they close up against the slanting under sides of flanges 9, thereby securely locking the latter against outward movement, and therefore disengagement from the rim-shoulders with which the shanks interlock. According to this arrangement the strength of the wheel will not be impaired by the means used for positively securing the buckets in place thereon.

To brace the buckets together at their outer ends, I provide each with a flange 13, preferably formed integral therewith, which



projects at right angles from the bucket and engages the concave face of the adjacent bucket. The bucket-engaging edge of the flange is curved in correspondence with the face of the bucket which it engages, and when the buckets are assembled the curved edges of the flanges do not make tight joints with the buckets. I tighten these joints to any desired extent by inserting a curved anvil 14 under the flanges and spreading them by a calking-tool, such as 12. The flanges 13 may project to the front or rear of the buckets and, as shown, may be less in width than the bucket proper. Any other desired means may be used to spread the shoulders 10 and flanges 13. The buckets may be set at a uniform distance apart at their outer ends by proper attention in calking, and thus an even balance secured. The convex calked edge prevents a bucket shifting side-wise at its outer ends.

In the preferred construction (shown in Fig. 5) where the shanks 6 are calked they are made shorter than in the case where they are bolted to the wheel, for which reason it is desirable that more reliance should be placed upon their ductile quality rather than their spring action. After the buckets have been mounted on the wheel these shanks are again bent or forced inwardly against the web 11 of the rim, where they are locked in engagement with the rim shoulders in the manner already described.

Without therefore limiting myself to the details of construction as hereinbefore described, what I claim as new, and desire to secure by Letters Patent, is—

1. As an article of manufacture, a bucket or vane having integral ductile shanks oppositely disposed and provided with inwardly-projecting shoulders, the top faces of which are disposed substantially at right angles to said shanks.

2. As an article of manufacture, a bucket or vane having integral therewith a base-block and elongated shanks which depend from said base-block and are spaced apart, said shanks being adapted to be sprung or bent to or from each other, and shoulders near the free ends of said shanks which project inwardly and have their upper faces substantially parallel with said base-block, substantially as and for the purposes described.

3. The combination with a bucket-supporting element provided with shouldered portions on each side, of a plurality of buckets adapted to be mounted thereon and provided each with a pair of integral shanks adapted to straddle said element, and projections on said shanks which catch under said shouldered portions, the corresponding shanks of adjacent buckets being adapted to abut.

4. The combination with a bucket-wheel provided with a shouldered rim, of a plurality of bucket elements having bifurcated

bases which straddle said rim, hooked projections carried by said bases and adapted to engage under said rim, and means to hold said projections in engagement with the rim, said base portions serving to space the buckets and brace them in position when assembled.

5. The combination with an element having an undercut bucket-supporting portion, of buckets having shanks which straddle said element and provided with inwardly-disposed projections which are adapted to interlock with the overhanging parts of the bucket-supporting portion, and means to hold said parts in engagement.

6. A turbine bucket wheel or drum, a bucket-supporting rim thereon, buckets mounted on said rim and having integral elongated shank portions which straddle said rim and hug the sides thereof, inwardly-disposed hooked extensions carried by said shanks and adapted to engage with said rim to hold the buckets against radial displacement, and means to secure said buckets positively to said rim.

7. A turbine bucket-wheel having a rim, in combination with bucket elements, each of which is provided with arms adapted to be spread apart and passed over said rim so as to straddle it, hooked projections on said arms so disposed that when the bucket is seated upon the rim and said arms have been brought together against the sides of the rim, the said projections will catch under said rim, and means to hold said projections in engagement with the rim.

8. A turbine bucket element having a rim portion on which the buckets are mounted, in combination with buckets having shanks which straddle said rim portion, shoulders on said shanks adapted to engage a portion of said rim, and projections on said rim adapted to be calked against said shanks to hold them in engagement with said rim.

9. A turbine bucket-wheel having an undercut rim portion, a bucket having hooked shanks which straddle and interlock with said rim, calking-shoulders on the wheel adjacent to said shanks, and means to turn said shoulders to lock said shanks in engagement with said rim.

10. A turbine bucket-wheel having a shouldered rim of considerable radial thickness, an annular groove in said rim to lighten it, buckets adapted to seat against said rim and having elongated hooked shanks which straddle said rim, fitting closely against its sides and catching under the shouldered portions thereof, and means to hold said shanks in engagement with said rim.

11. In combination, a bucket-supporting element, a series of buckets mounted thereon, and a flange disposed at the outer ends of each bucket, said flanges being spread in a circumferential direction after the buckets



have been assembled to cause them to engage adjacent buckets, substantially as and for the purposes described.

5 12. The combination with a bucket-supporting element, of a row of buckets mounted thereon and provided each with a spacing flange at its outer end, which is spread until it abuts against an adjacent bucket.

10 13. A bucket-wheel comprising a row of buckets spaced at their inner and outer ends and placed under an initial tension at their outer ends by spreading or calking their abutting portions.

15 14. A bucket-wheel having a rim portion for supporting buckets and an annular flange on each side, in combination with buckets adapted to be mounted on said wheel and to be held in position by having said flanges bent into engagement with them.

20 15. A turbine bucket-wheel comprising an undercut rim and two calking-flanges, in combination with buckets having portions

which interlock with said rim, said flanges being so disposed relatively to said bucket portions that they may be bent into engagement 25 with them, for the purposes described.

16. A turbine bucket-wheel provided near its periphery with an annular flanged portion, and a narrow annular web connecting said portion with a rim which is wider than 30 said web but of less width than said flanged portion, in combination with buckets which straddle and interlock with said rim, the sides of said flanged portion being adapted to be bent into engagement with said buckets, for 35 the purposes described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES WILKINSON.

Witnesses:

JOHN J. CORBETT,  
JAMES H. NOLAN.