No. 775,108. PATENTED NOV. 15, 1904.

W. S. ELLIOTT.

ELASTIC FLUID TURBINE.

APPLICATION FILED MAY 26, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

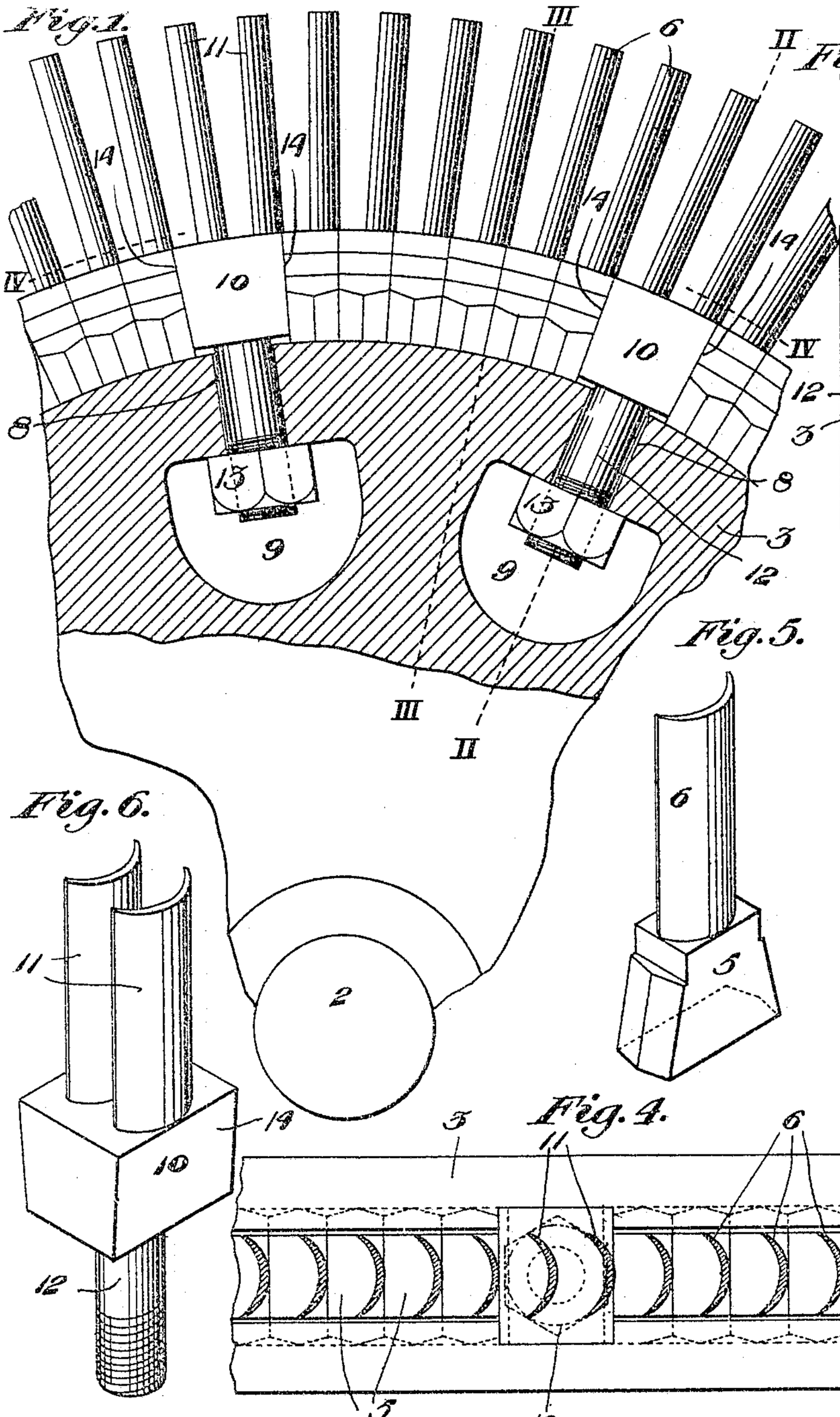


Fig. 2.

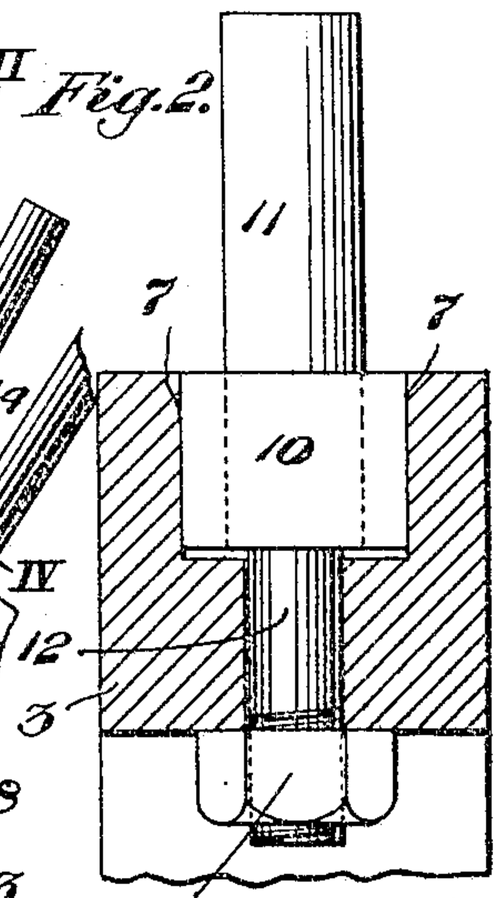
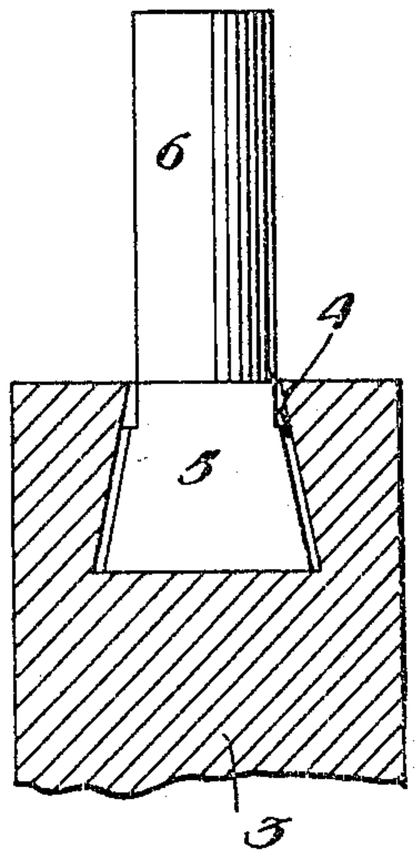


Fig. 3.

Fig. 5.

Fig. 6.



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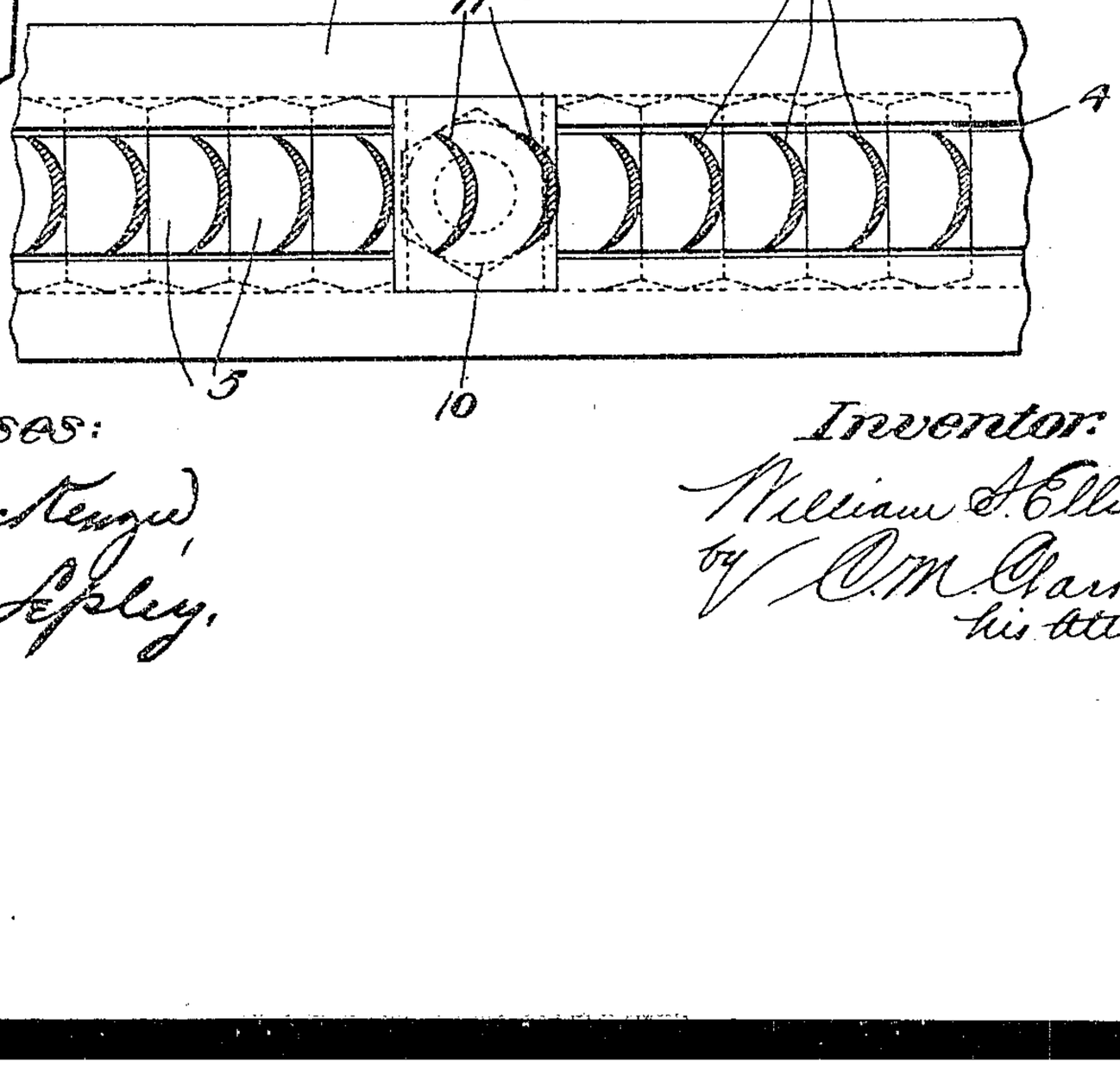

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ELASTIC FLUID TURBINE.

APPLICATION FILED MAY 26, 1904.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 7.

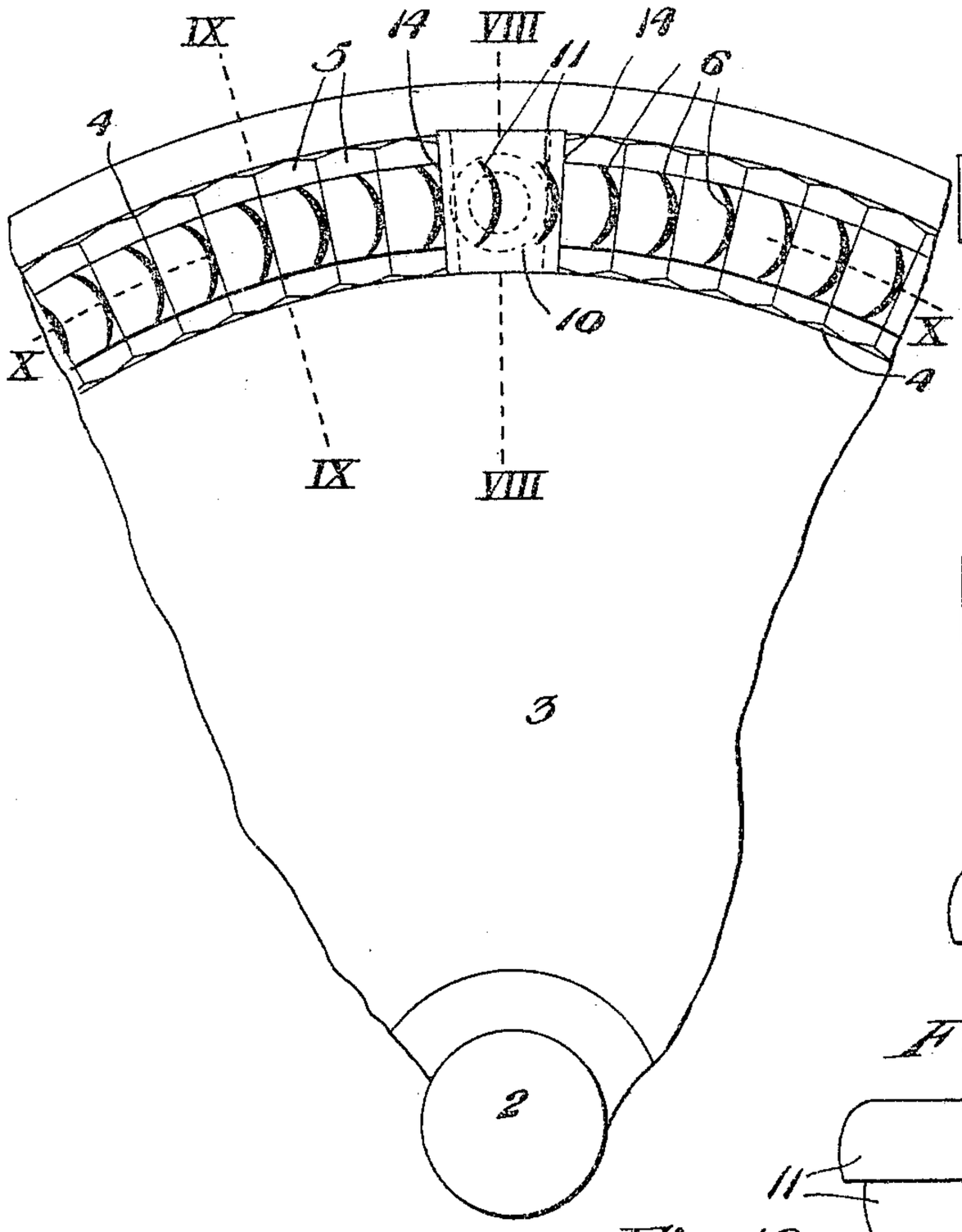


Fig. 8.

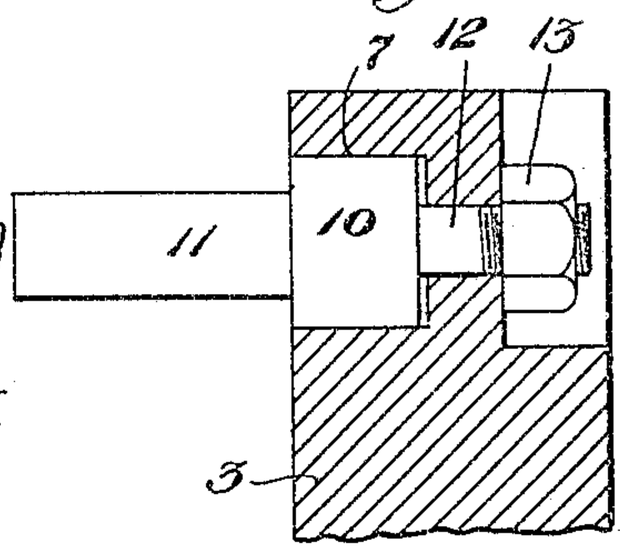


Fig. 9.

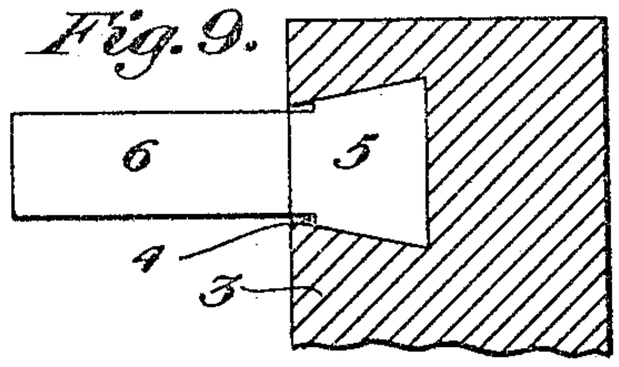


Fig. 11.

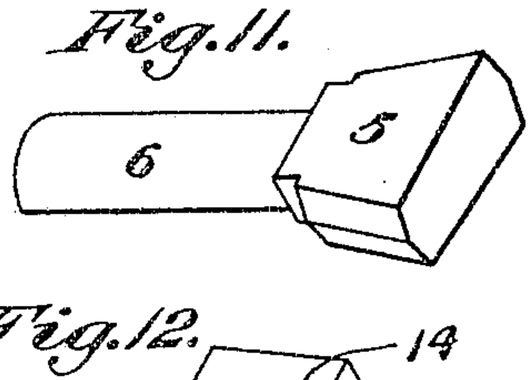


Fig. 12.

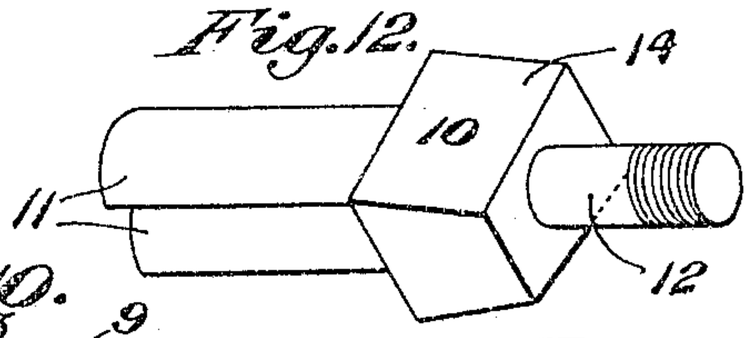
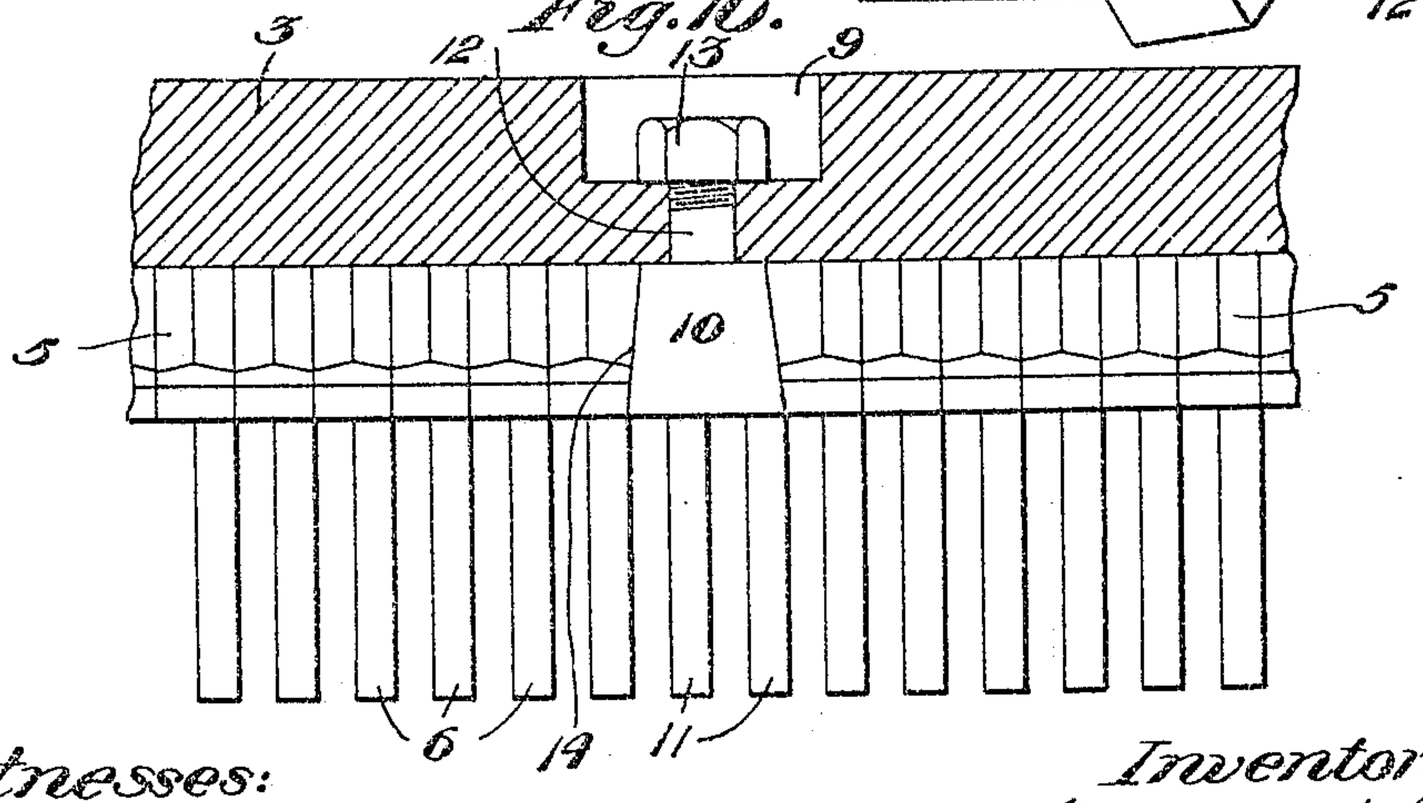


Fig. 10.



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No. 775,108. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM S. ELLIOTT, OF PITTSBURG, PENNSYLVANIA.

ELASTIC-FLUID TURBINE.

SPECIFICATION forming part of Letters Patent No. 775,108, dated November 15, 1904.

Application filed May 26, 1904. Serial No. 209,928. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. ELLIOTT, a citizen of the United States, residing at Pittsburg, in the county af Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Elastic-Fluid Turbines, of which the following is a specification, reference being had therein to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a face view of a portion of a vane-wheel of an elastic-fluid turbine, partly in section, illustrating my invention. Fig. 2 is a vertical sectional view on the line II II of Fig. 1. Fig. 3 is a similar view on the line III III of Fig. 1. Fig. 4 is a plan view of Fig. 1, the vanes having been cut off on the line IV IV of said figure. Fig. 5 is a perspective detail view of one of the vanes detached. Fig. 6 is a similar view of one of the master-keys. Fig. 7 is a partial face view of a vane-wheel provided with laterally-extending vanes mounted at right angles to the side face of the wheel. Fig. 8 is a sectional view indicated by the lines VIII VIII of Fig. 7. Fig. 9 is a similar sectional view indicated by the line IX IX of Fig. 7. Fig. 10 is a horizontal section on the line X X of Fig. 7, the vanes and master-key being shown in elevation. Fig. 11 is an isometric view of one of the vanes detached. Fig. 12 is a similar view of one of the master-keys.

My invention relates to the class of elastic-fluid turbines, and refers particularly to the attaching or mounting of the vanes of such an engine; and it has for its objects to so construct the vanes that they will constitute separate elements adapted to be mounted in the wheel or vane supporting portions of the engine by means of interfitting wedging engagement, together with a master-key preferably provided with vanes, by which the vanes are tightly secured.

The invention is illustrated by the application of the vanes to the wheel of the engine; but it is obvious that they may also be similarly applied to the stationary vane-supporting portion, so as to utilize the invention for the insertion of vanes of both types.

Referring to the drawings, 2 represents the turbine-shaft, upon which the vane-wheel 3 is mounted in the usual manner. The vane-wheel is provided with an annular groove 4, extending radially of the wheel or at right angles to its side, according to the desired position of the vanes. In cross-section this groove is preferably of dovetail form, so as to receive the correspondingly-shaped inner bases 5, provided with the integral vanes 6.

At intervals the groove 4 is provided with openings 7, sufficiently large to admit the base 5 to facilitate their insertion in the retaining-groove, which is accomplished by inserting them one by one through such opening 7 and then grouping them radially around the wheel. At intervals corresponding with such opening 7 the base of the groove is provided with radially-arranged bolt-holes 8, the wheel being also provided with apertures 9 for the reception and turning of the securing-nuts.

10 represents the base of one of the master-keys, also provided with radially-extending vanes 11 and having an inwardly-extending threaded bolt 12, adapted to be inserted in the bolt-hole 8 and to be secured in place by a nut 13. The faces 14 of the master-keys are tapered toward the inner end corresponding with the radial faces of the vane-bases 5, so that the master-key bases thereby constitute wedges by means of which the series of vane-bases are locked in position. The width of the vane-bases is slightly greater than the interior width of the receiving-slot, preferably being provided with obtuse or rounded edges 15 at each side, so that as the vane-bases are inserted in position they may be driven with sufficient force to tightly wedge them in place, the blunt rounded edges facilitating such wedging by allowing the metal to be slightly upset in such operation.

It will be seen that when the vane-bases are thus inserted and the master-keys are secured in place and drawn down to make a binding fit a very rigid unyielding construction will be provided adapted to withstand the constant strain to which the vanes are subjected.

In Figs. 7 to 12, inclusive, the vanes are arranged at right angles to those already de-

scribed, projecting laterally from the face of the wheel, and the receiving-groove is likewise located in the same manner at one side of the wheel. The construction and mode of assembling is likewise the same as I have just described, so that this arrangement will be readily understood without further description.

With either arrangement this method of mounting of the vanes may be adapted to or combined with various designs of turbine-engines, and it will be understood that the invention will be adapted or utilized in such manner by the designing engineer. It provides a very simple, cheap, and reliable construction. Broken vanes may be easily and neatly replaced, while the cost of the vanes themselves is comparatively low.

Various changes and modifications of the invention may be made by the skilled mechanic; but all such are to be considered as within the scope of the following claims.

I claim—

1. In an elastic-fluid turbine, a vane-supporting member provided with an annular vane-groove, vanes mounted therein, and a master-key provided with a wedging-base and means for adjusting the key radially.

2. In an elastic-fluid turbine, a vane-supporting member provided with an annular vane-groove, vanes mounted therein, and a master-key provided with a vane, and means for adjusting the master-key radially.

3. In an elastic-fluid turbine, a vane-supporting member provided with an annular vane-groove having an insertion-opening, vanes mounted in the groove provided with bases having blunt binding edges, with means for wedging said bases and vanes in the vane-groove.

4. In an elastic-fluid turbine, a vane-supporting member provided with an annular vane-groove having an insertion-opening, vanes mounted in the groove provided with bases having blunt binding edges, with an adjustable master-key provided with a vane, and means for wedging the vanes in the groove.

5. In an elastic-fluid turbine, a vane-supporting member provided with an annular vane-groove having an insertion-opening, vanes mounted in the groove provided with bases having blunt binding edges, and a master-key provided with a vane, a wedging-base, and an extended threaded portion adapted to enter a radially-disposed opening, and to be tightened therein by a nut.

6. A turbine-engine provided with an annular vane-groove having an insertion-opening, vanes mounted in the groove, and a master-key provided with a vane located in the insertion-opening, with means for adjusting it.

7. In a turbine-engine, vane-supporting means provided with an annular groove having a series of insertion-openings, a series of vanes mounted in the groove, and wedging master-keys located in the insertion-opening with means for tightening them radially, substantially as set forth.

8. In a turbine-engine, vane-supporting means provided with an annular wedge-shaped groove, vanes provided with wedge-shaped bases having obtuse binding edges, and means for tightening them in the groove.

9. In a turbine-engine, vane-supporting means provided with an annular wedge-shaped groove, a series of insertion-openings therein, vanes having wedge-shaped bases with binding edges mounted in the groove, and means for adjusting said bases.

10. In a turbine-engine, vane-supporting means provided with an annular wedge-shaped groove, and a wedge-shaped master-key located in the insertion-opening adapted to tighten the vanes laterally, with means for tightening the key.

11. A vane-supporting means provided with a groove having a greater width at the bottom of the groove than at the top, vanes having bases slightly larger than the width of the groove, and means for tightening the vanes, substantially as set forth.

12. In a turbine-engine, the combination with a vane-supporting member provided with an annular wedge-shaped groove and an insertion-opening therein, of wedge-shaped vane-bases mounted in said groove provided with obtuse bearing edges and vanes, and a master-key provided with a wedge-shaped base adapted to exert lateral pressure to bind the vane-bases in position, with means for adjusting the master-key radially.

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

WILLIAM S. ELLIOTT.

Witnesses:
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C. M. CLARKE.