

J. A. BECKLUND.
STEAM TURBINE ENGINE.
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1,346,292.

Patented July 13, 1920.
2 SHEETS—SHEET 1.

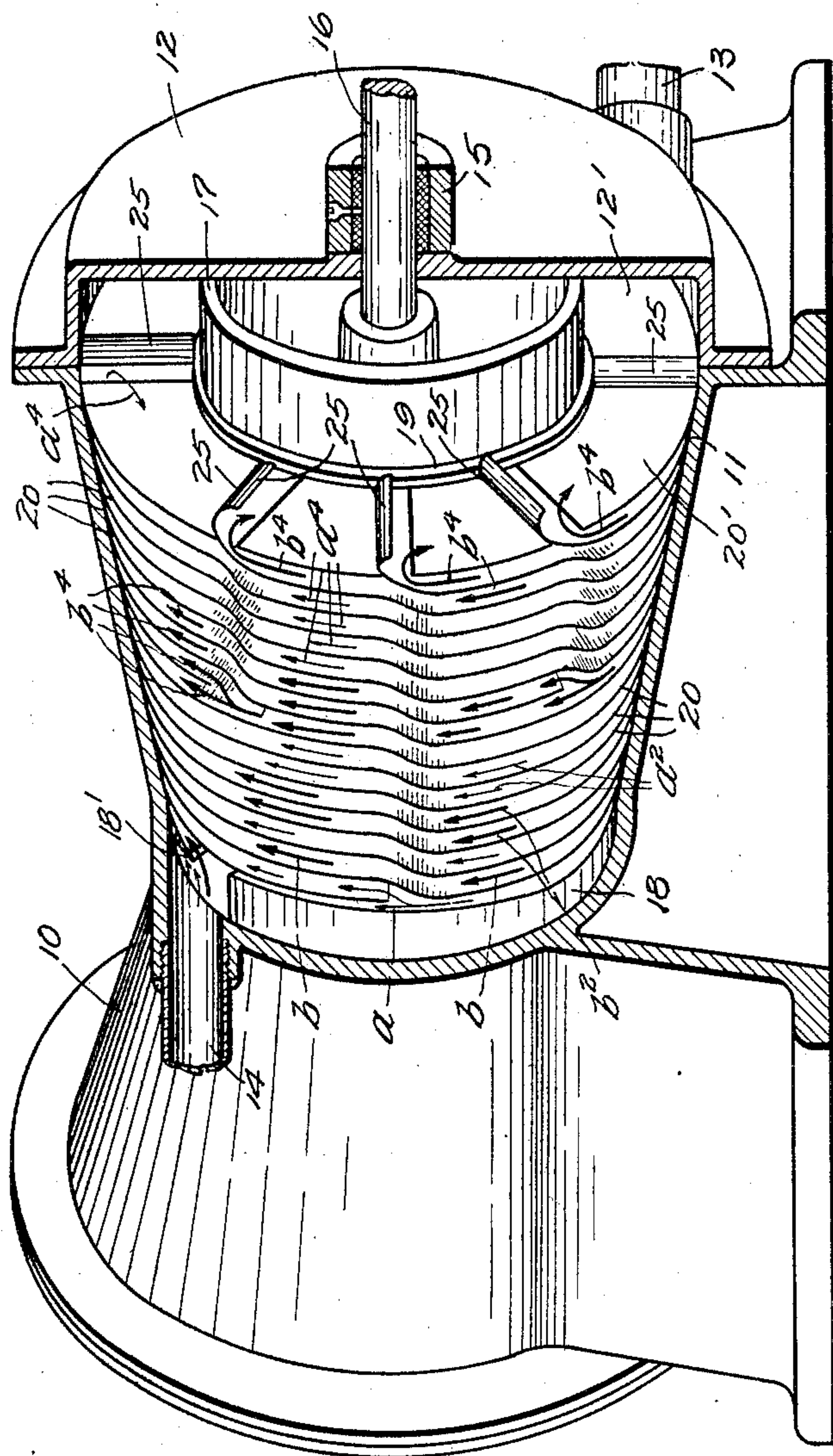
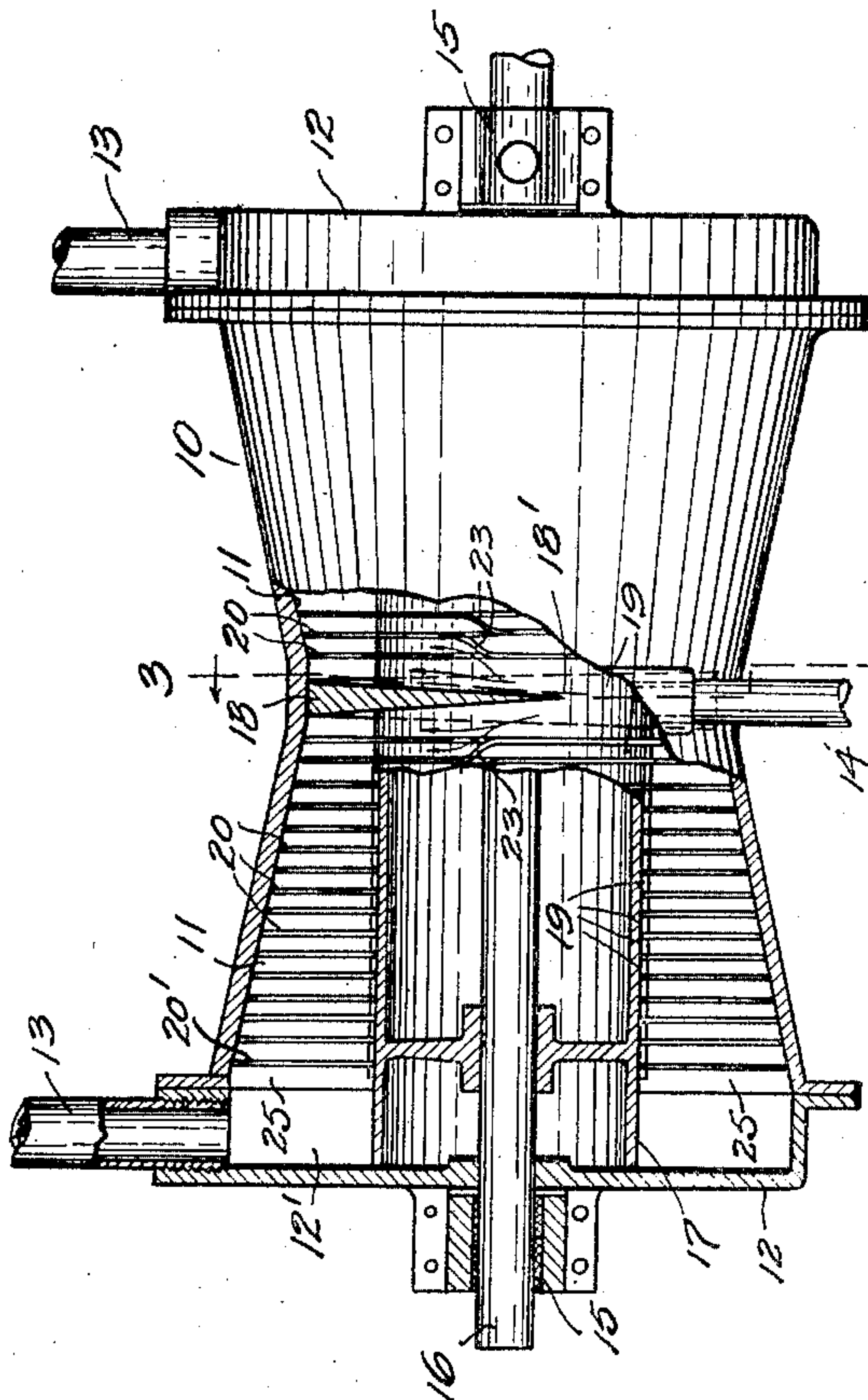


FIG. 1.

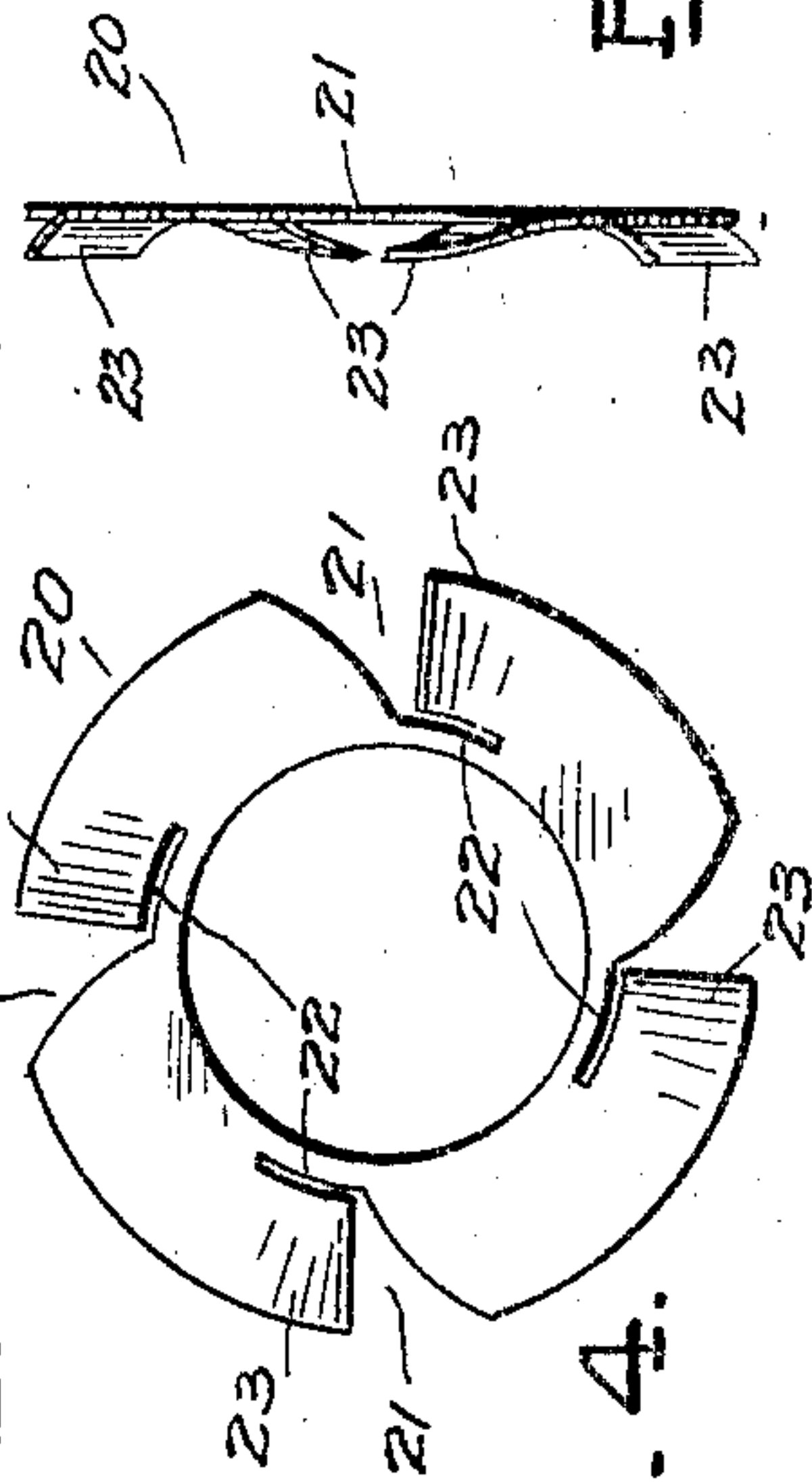
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FILE 3.



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5-17-5.

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UNITED STATES PATENT OFFICE.

JOHN A. BECKLUND, OF CENTRALIA, WASHINGTON.

STEAM TURBINE-ENGINE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN A. BECKLUND, a citizen of the United States, residing at Centralia, in the county of Lewis and State of Washington, have invented certain new and useful Improvements in Steam Turbine-Engines, of which the following is a specification.

This invention relates to steam turbine engines; and its object is the improvement of this character of engines to enable their more fully utilizing the power of the steam.

In carrying out my invention I provide a casing of peculiar form in which operates a rotor comprising a plurality of circular blades with intervening passages which are connected in series to afford convolving channels in which the steam is most efficiently employed.

By the present invention steam is used expansively and, to accommodate the differences in steam densities, the various steam passages of the rotor are in effect increased in size by dividing and subdividing the streams of the power medium to enable their traveling at approximately twice the speed of the adjacent rotor blades without requiring the latter to be spaced so far apart as to reduce the effective energy of the steam.

The expanding of the steam furthermore increases its velocity and in order that the steam may be applied as nearly uniformly as practical throughout the length of a rotor, the blades of the same are of progressively larger diameters to afford at similar rotative speeds greater peripheral speeds to the blade elements.

The invention consists in the novel construction, adaptation and combination of parts as will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a perspective view of an engine embodying the present invention, part of the casing being broken away. Fig. 2 is a plan view, shown partly in horizontal section, of the same. Fig. 3 is a transverse vertical section through 3—3 of Fig. 2.

Fig. 4 is an end elevational view of one of the rotor blades in a form now preferred by me. Fig. 5 is an edge view of Fig. 4.

The embodiment of my invention is illustrated as of the duplex type wherein duplicate units are employed upon a single shaft

in opposed relations for the purpose of overcoming axial thrusts by balancing end pressures of the steam.

Referring to the drawings, the numeral 10 represents a casing having two axially alined conical cylinders 11, so called, having their smallest diameters at the midlength of the casing.

For convenience in manufacture, the ends of the casing are provided with removable heads 12 having tangentially disposed outlets for exhaust pipes 13.

As shown, the casing is provided centrally of its length with a single tangentially disposed opening for a steam supply pipe 14. Journaled in suitable bearing boxes, such as 15, is a shaft 16 extending axially through the casing and having mounted thereon a drum 17 which is preferably cylindrical. Secured to or made integral with the casing at its midlength is an arcuate wedge shaped wall 18 dividing the interior of the casing into the cylinders 11 above referred to. The pointed end 18¹ of such wall is located in proximity of and is directed toward the axis of the pipe 14 and serves to divide the steam delivered therefrom into two streams, one for each of said cylinders.

Mounted upon the drum 17 between spacing rings 19 is a plurality of annular blades 20 with outside diameters corresponding to the diameters of the cylinder bore at their respective stations. In Figs. 4 and 5 I show a typical blade which is formed of a circular plate of suitable outside diameter and having an internal diameter to fit upon said drum. The plate is desirably provided with peripheral notches 21 and from one side of each of the latter, the plate is cut as at 22 to afford a plurality of circumferentially directed tongues 23. These tongues are bent, as shown in Fig. 5, to one side of a blade and arranged to extend in inclined directions (Fig. 2) to have the tongue ends secured to the adjacent blade.

Said tongues serve as deflecting walls whereby the streams of steam are caused to be transferred through the respective openings of the successive blades in the travel of the steam through the engine cylinders. Such openings and deflecting tongue or wall elements are provided and arranged with respect to the various blades so that the steam in its progressive travel is divided and

subdivided into a number of branch streams. This characteristic of the invention will be understood by reference to Fig. 1 showing two initial streams, indicated respectively
 5 by darts a and b , which in their continued travel are divided into two branch streams a^2 and b^2 , which in like manner are divided to afford four branch streams a^4 and b^4 . Where the last branches or passages open
 10 into a head chamber 12^1 , the terminal blade, such as 20^1 is provided with curved buckets 25 which act to direct the streams in an opposite circumferential direction to that at which the blades are driven whereby the
 15 greater part of the energy of the steam is more fully utilized before escaping from the rotor.

From the foregoing it is apparent that by the present invention the steam acts ex-
 20 pansively through a series of stages and without restricting its flow more than is sufficient to transmit motive power to the rotary member. The blades may be made with smooth surfaces or with corrugations
 25 or projections at opposite sides.

The construction and operation of my invention will be understood from the foregoing description.

What I claim, is—

30 1. In a turbine of the class described, a rotary member having interconnected peripheral blades to afford a primary series of convoluting passages and a secondary series of convoluting passages constituting
 35 branches of the first named series.

2. In a turbine of the class described, a casing having a conical chamber, a rotary member therein having a plurality of interconnected peripheral blades affording
 40 convoluting passages between the spaces at the ends of said chamber, said blades being of diameters corresponding to the diameters of the chamber at the stations of the respective blades, and curved bucket attachments

for the blade adjacent to the larger end of 45 said chamber.

3. In a turbine of the class described, a casing having a conical chamber, a shaft extending axially therethrough, a drum carried on said shaft, series of peripheral 50 blades mounted in spaced relations upon said drum, said blades having portions thereof extended obliquely to the adjacent blades to afford communication between the spaces 55 intermediate said blades and serving to provide convoluting passages between the ends of said chamber.

4. In a turbine of the class described, the combination with the casing, of a rotary power member comprising a shaft, a cylindrical drum thereon, a plurality of circular 60 blades mounted in spaced relations upon the drum, said blades being of successively greater diameters and provided with circumferentially spaced apertures, and ob- 65 liquely arranged wall elements located between the adjacent blades in proximity of the respective apertures for directing the fluid power medium progressively through the spaces between the successive blades. 70

5. In a turbine of the class described, the combination of a casing having axially alined conoidal chambers and a tangentially arranged steam inlet located in a plane be- 75 tween said chambers, a rotary member comprising a plurality of spaced circular blades in the respective chambers, and a circumferentially tapering partition provided in the casing to direct streams of steam from said inlet to the blades in both of the casing 80 chambers.

Signed at Centralia, Washington, this 11 day of October, 1919.

JOHN A. BECKLUND.

Witnesses:

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 C. E. WEAVER.