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F. A. DOUSE.
STEAM TURBINE.
APPLICATION FILED MAR. 16, 1907.

PATENTED JAN. 14, 1908.

2 SHEETS—SHEET 1.

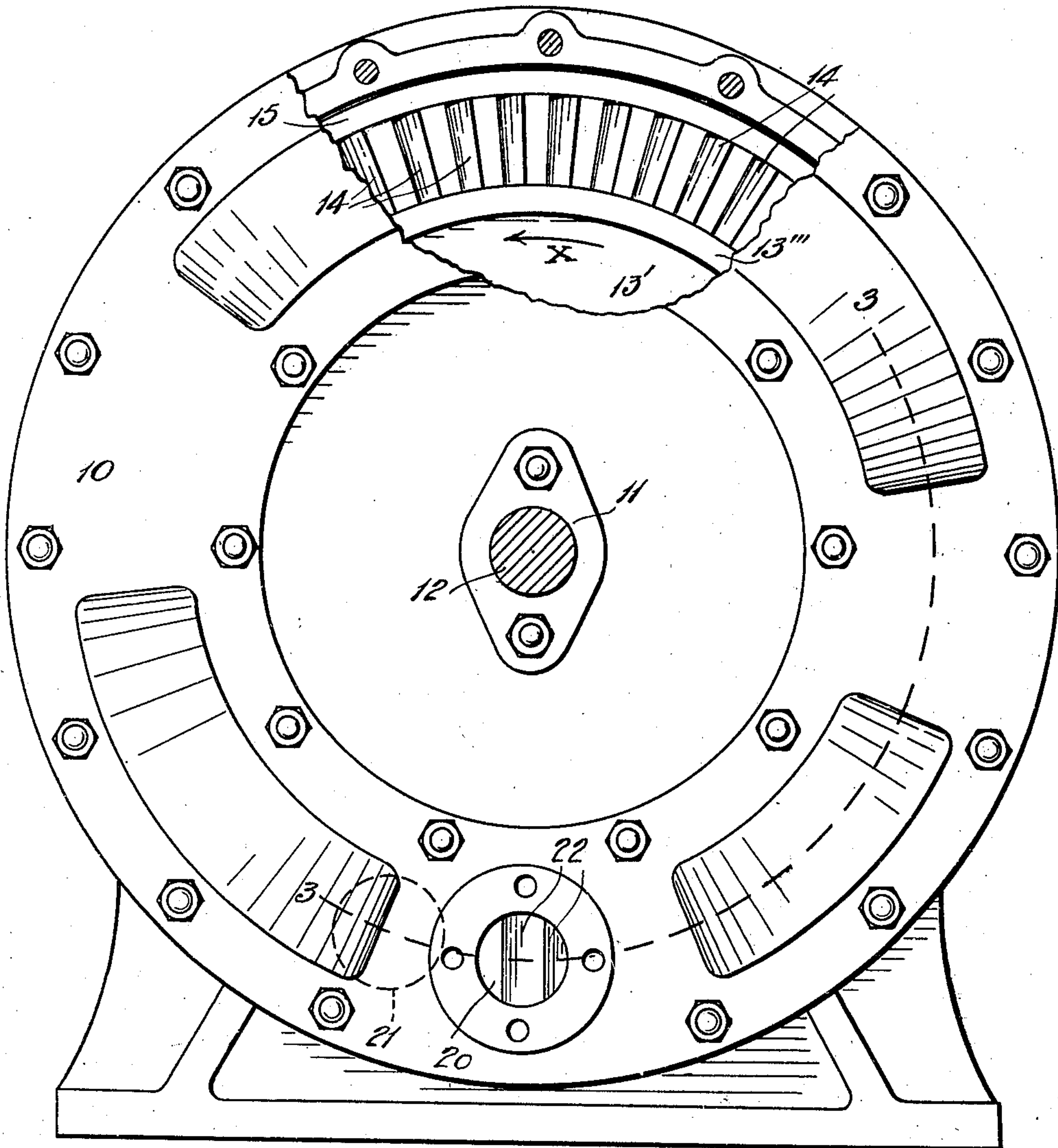


FIG. 1

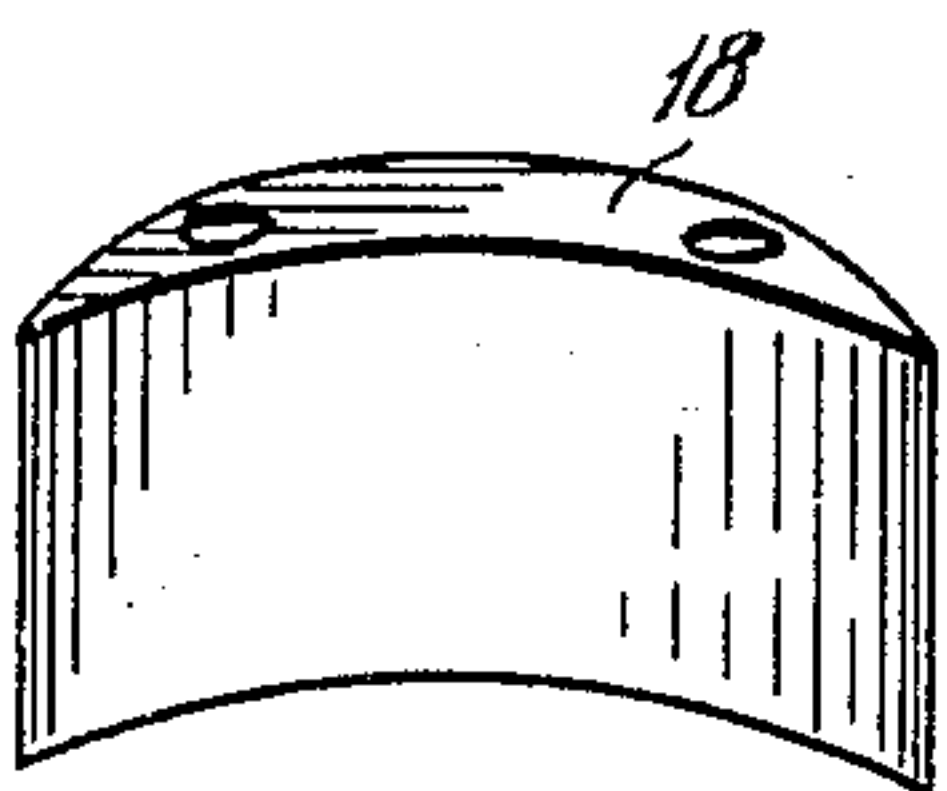


FIG. 5

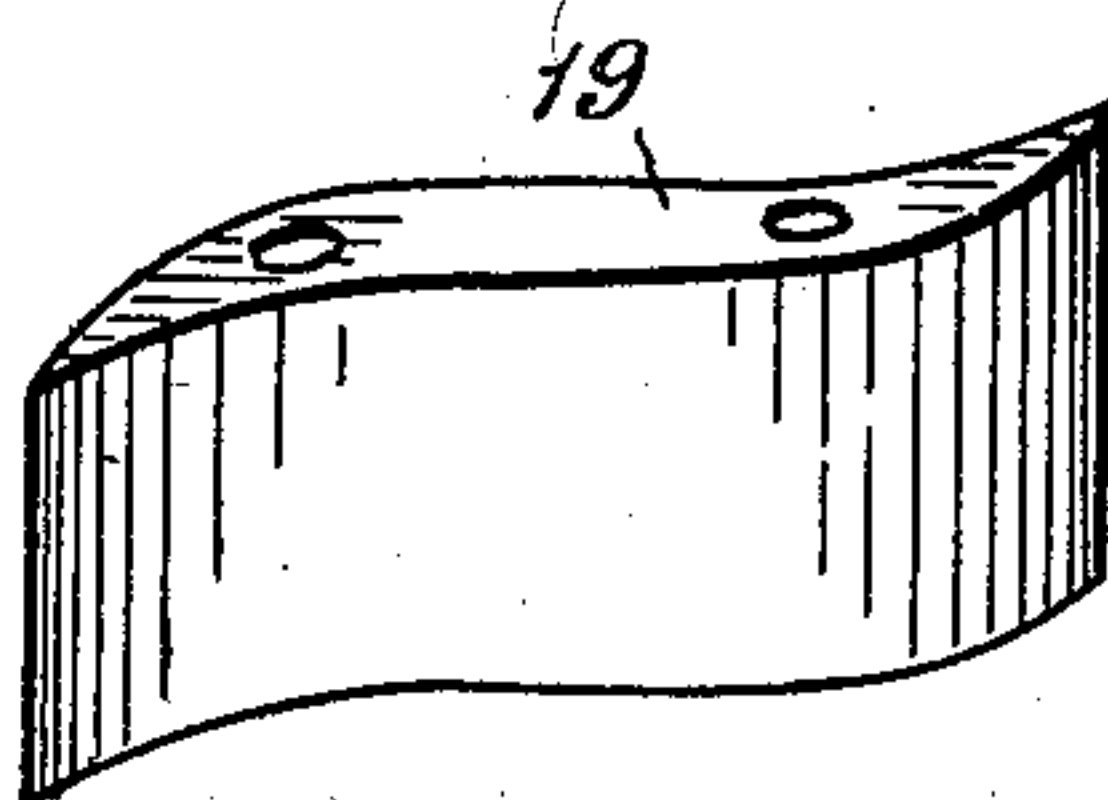


FIG. 6

WITNESSES:

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A. B. Smith.

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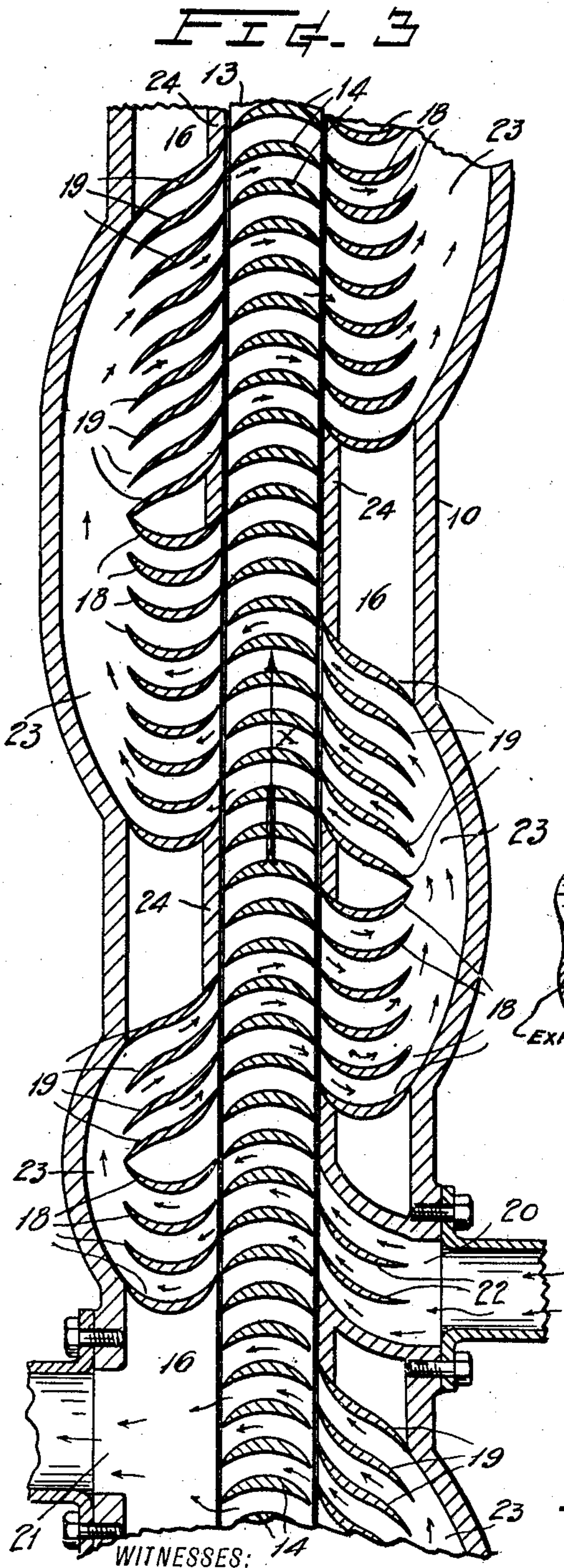
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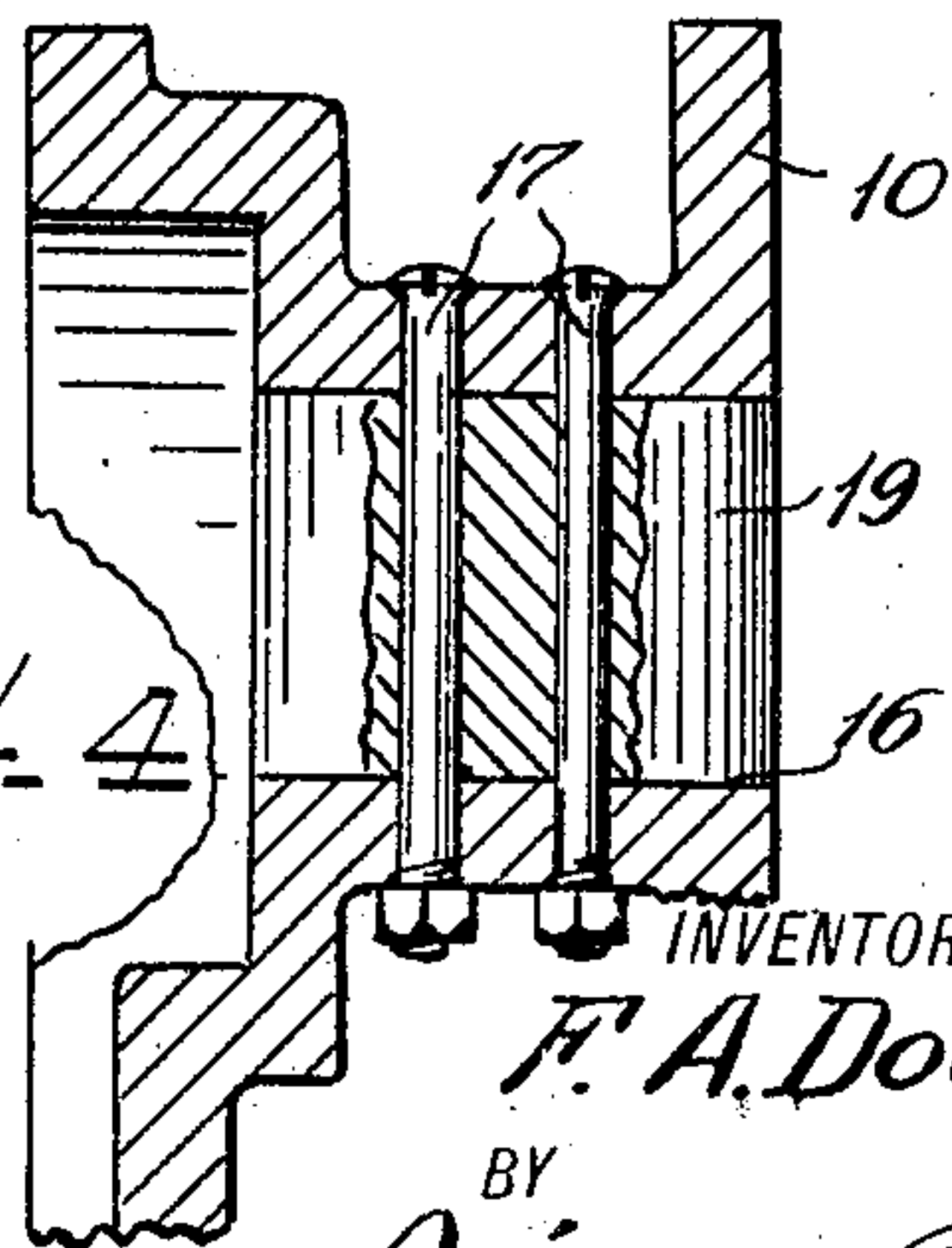
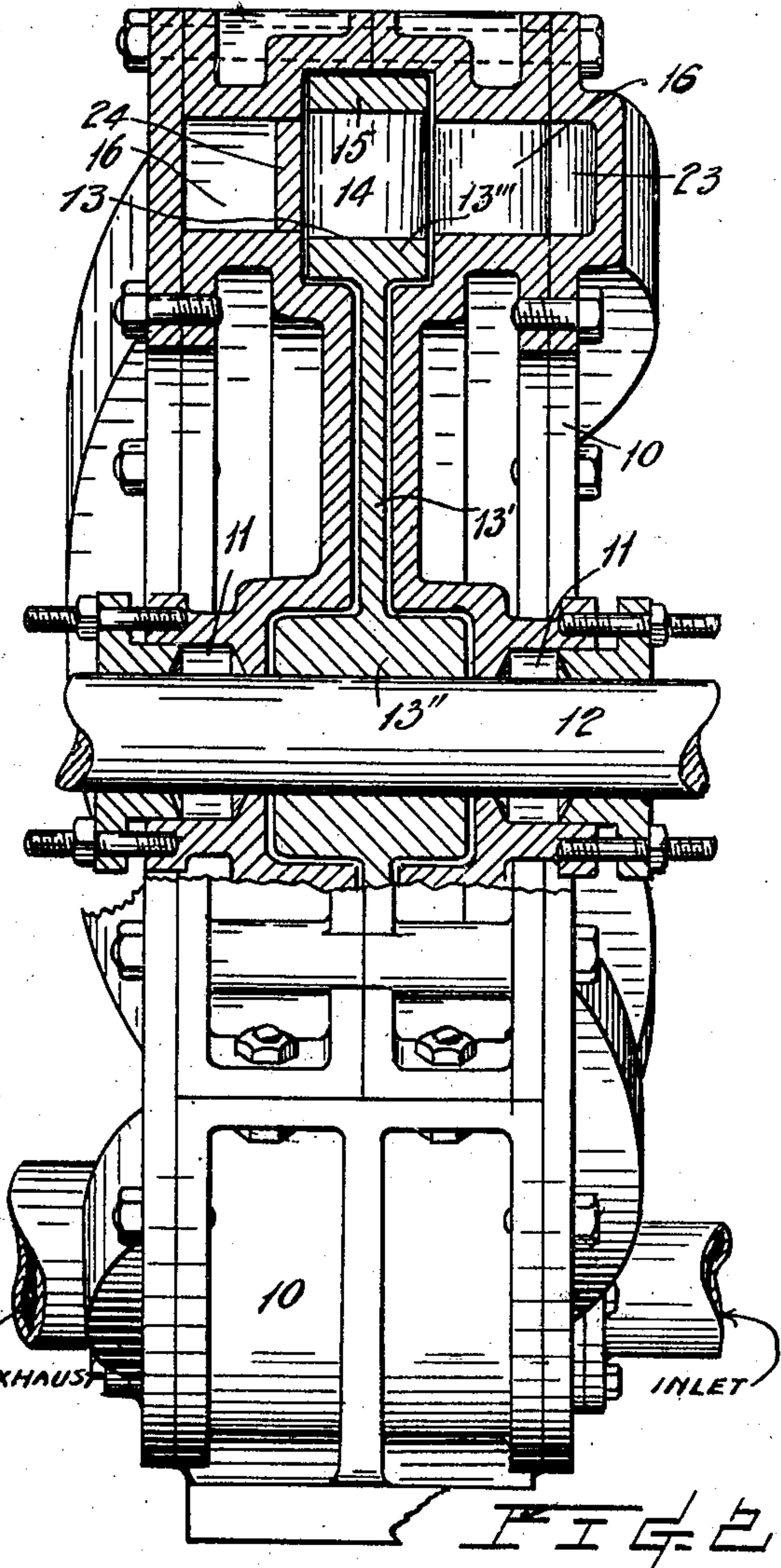
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

FREDERICK A. DOUSE, OF SEATTLE, WASHINGTON.

STEAM-TURBINE.

No. 876,530.

Specification of Letters Patent.

Patented Jan. 14, 1908.

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To all whom it may concern:

Be it known that I, FREDERICK A. DOUSE, citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Steam-Turbines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to steam turbines; and has for its object the improvement in this class of motors whereby the power medium is utilized to deliver a repetition of impulses to the wheel and thus increase the efficiency of the motor.

15 The invention consists in the peculiar adaptation and construction of the various operative parts, and the combinations thereof, as will be hereinafter described and claimed.

20 In the drawings, showing an embodiment of my invention, Figure 1 is a side elevation of a turbine with the casing partly broken away; Fig. 2, an end elevation of the same, partly in section; Fig. 3, a section view taken on line 3—3 of Fig. 1; Fig. 4, a detail cross sectional view of a portion of the turbine casing; and Figs. 5 and 6, perspective views of the detached directrix-blades.

30 The reference numeral 10 represents a casing provided with stuffing boxes 11 through which extend the power shaft 12 for the wheel 13. As illustrated, this wheel is formed with a web 13' connecting the hub 13'' with a rim 13''' concentric of the wheel axis and of suitable width to accommodate the peripherally disposed buckets 14 which are severally of concavo-convex form, in cross section, with their convex surfaces arranged in the direction of their revolution, as indicated by arrow X in Figs. 1 and 3.

40 15 is a band secured, as by being shrunk while hot upon the outer extremities of the wheel buckets, and serves to strengthen the wheel and, with the aforesaid rim, as shrouds for the buckets.

50 Within the casing at each side of the buckets is an annular chamber 16 which is desirably of a depth slightly less than the distance between the wheel-rim and the band. Secured by bolts 17, Fig. 4, or their equivalent, to the casing and with in these chambers are pluralities of blades 18 and 19 of which the former, 18, are severally made of a

crescent shape and the others, 19, of a compound curved contour. These two types of blades are respectively assembled in groups of successively increasing numbers and alternately in the chambers upon the opposite sides of the wheel progressively from the intake opening 20 to the discharge opening 21 of the casing. The blades 18 are disposed to present the convex faces in a direction opposite to that which the wheel rotates; and the blades, 19, in diagonal planes, so as to have their inner edges disposed in the direction of the revolution of the buckets, as illustrated in Fig. 3. A number of blades 22, of an approximately crescent shape, are interposed in the chamber between said intake opening and the wheel and are arranged in oblique planes to direct the incoming steam to impinge effectively against the buckets as the latter pass successively thereby.

75 The manner of arranging the two types of blades 18 and 19 is to position a group of the former opposite the blades 22 of the intake, to be followed in juxtaposition by a group of the other type of blades, 19, thence in the chamber upon the opposite side of the wheel buckets, a group of the blades 18 with a juxtaposed group of the blades 19, and so on with pairs of groups in such described relation, but alternately upon opposite sides of the wheel. Recesses are provided in the casing ends, such as 23, to form communicating passages for the steam between the spaces intermediate the blades 18 of each group thereof with the spaces between the blades 19 of the adjacent group.

90 24 are barriers adapted to close the cavities between the adjacent pairs of blade groups.

The operation of the invention may be described as follows: Reference being particularly had to Fig. 3, steam is admitted under pressure and at a high velocity through the intake opening 20 and is directed by the blades 22 to impinge the buckets 14 whence the steam is deflected into the spaces between the opposite group of blades 18 and thence through the communicating passage 23 and the spaces between the blades 19 to again act against the wheel buckets, and therefrom by the next group of blades 18 upon the opposite side, and so on by a sinuous course and through consecutively greater sized passages until such fluid is exhausted from the motor,

meanwhile repeatedly acting upon the wheel buckets to impel the same and generate the available power.

What I claim, is—

5 1. In a steam turbine, in combination, a casing having inlet and outlet openings and having annular chambers in each side provided with recesses, a wheel rotatably mounted within the casing and provided
10 with a rim, buckets of concavo-convex form disposed on said rim with their convex surfaces disposed in the direction of rotation of the wheel, a band secured to the outer extremities of the wheel buckets, a plurality of
15 blades of substantially crescent shape and a plurality of blades of compound curved contour arranged in said annular chambers, the said different types of blades arranged in groups of successively increasing numbers in
20 each chamber, the said blades of crescent shape disposed to present the convex faces opposite to the direction of the wheel and the other blades arranged in diagonal planes with their inner edges disposed in the direction of
25 the revolution of the buckets.

2. In a steam turbine, in combination, a casing having inlet and outlet openings and having annular chambers in each side provided with recesses, a wheel rotatably
30 mounted within the casing and provided with a rim, buckets of concavo-convex form disposed on said rim with their convex surfaces disposed in the direction of rotation of the wheel, a band secured to the outer extremities of the wheel buckets, a plurality of
35 blades of substantially crescent shape and a plurality of blades of compound curved contour arranged in said annular chambers, the said different types of blades arranged in groups of successively increasing numbers in
40 each chamber and alternating upon the opposite sides of the wheel progressively from the intake opening to the discharge.

3. In a steam turbine, in combination, a
45 casing having inlet and outlet openings and having annular chambers in each side provided with recesses, a wheel rotatably mounted within the casing and provided with a rim, buckets of concavo-convex form disposed on said rim with their convex surfaces
50 disposed in the direction of rotation of the wheel, a band secured to the outer extremities of the wheel buckets, a plurality of blades of substantially crescent shape and a plurality of blades of compound curved contour arranged in said annular chambers, the said
55 different types of blades arranged in groups of successively increasing numbers in each chamber and alternating upon the opposite sides of the wheel progressively from the intake opening to the discharge, and blades of approximately crescent shape interposed in one of said annular chambers between the intake opening and the wheel and arranged

in oblique planes to direct the incoming
65 steam against the buckets.

4. In a steam turbine, in combination, a casing having inlet and outlet openings and having annular chambers, one at each side, provided with recesses, a wheel rotatably
70 mounted within the casing and provided with circumferentially and transversely disposed steam passages that form rim buckets, a plurality of blades of a definite curvature arranged in one of the annular chambers, and a plurality of blades of another
75 definite curvature arranged in the other annular chamber, one set of said shaped blades being disposed to present their impacting faces opposite to the direction of
80 the wheel, and the other set of blades being arranged in diagonal planes with their inner edges disposed in the direction of the revolution of the buckets.

5. In a steam turbine, in combination, a
85 wheel, a casing formed of two sections, each section having an annular chamber, the two sections incasing the wheel, one of the casing sections having an inlet, the other section having an outlet, the said wheel having tran-
90 versely disposed steam passages in its periphery, the impacting faces of which are disposed in the direction of rotation of the wheel, and a plurality of oppositely disposed sets of blades having a compound contour, the said
95 blades being arranged in each annular chamber, the said annular chambers having recesses to receive the said several sets of blades.

6. In a steam turbine, in combination, a
100 wheel, a casing formed of two sections, each of which has an annular chamber, the two sections incasing the wheel, one of the casing sections having an inlet, the other casing section having an outlet, the said wheel having
105 transversely disposed steam passages in its periphery, the impacting faces of which are disposed in the direction of rotation of the wheel, and a plurality of oppositely disposed sets of blades of compound contour arranged
110 in each chamber, the annular chambers having recesses to receive the several sets of blades, the said opposing sets of blades alternating on opposite sides of the wheel progressively from the intake to the discharge.
115

7. In a steam turbine, in combination, a casing formed of two like sections, each of which constitutes an annular chamber, each annular chamber having recesses, the recesses at one side alternating with the re-
120 cesses at the other side, a wheel rotatably mounted between the casing sections, the said wheel having transversely disposed steam passages that form rim buckets, a plurality of blades of a substantially crescent
125 shape, and a plurality of blades of compound curved contour arranged within the annular chambers and disposed alternately on oppo-

site sides of the wheel, and means within the intake opening of the casing for directing the incoming steam in oblique streams against the bucket passages of the wheel.

5 8. In a steam turbine, in combination, a casing having two oppositely disposed annular chambers, and an inlet and an outlet, a wheel rotatably mounted within the casing and between the two oppositely disposed
10 chambers, said wheel having transversely and peripherally disposed steam passages that constitute steam buckets, each of said chambers having recesses, two sets of transversely disposed blades fixedly held within
15 each recess, one set of blades being shaped to direct the steam from the wheel into the annular chambers, the other set of blades being shaped to direct the steam from the annular chamber to the wheel, each of the said annular chambers having recesses to receive their
20 respective two sets of blades, the said recesses being of a width at the opposite ends equal the length of the blades and of gradually increasing depth midway their ends.

25 9. In a steam turbine, in combination, a casing provided with inlet and outlet openings, the said casing having two opposing

annular chambers, one of which has the inlet and the other the outlet, a wheel rotatably mounted within the casing between the annular chambers and having peripherally disposed buckets that communicate with the annular chambers, groups of blades within each annular chamber for projecting the steam in a sinuous course through the annular chamber and the wheel buckets, the said casing having closure members in each chamber that extend parallel with and adjacent the bucket rim of the wheel. 30 35

10. In an engine, a rotator having steam impacting passages combined with a casing having steam pockets and inlet and outlet ports, means within the said steam pockets and coöperating with the rotator passages for directing the steam in a continuous curve
45 from the inlet to the outlet ports of the casing and alternately from one side of the rotator to the other.

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

FREDERICK A. DOUSE.

Witnesses:

PIERRE BARNES,
E. H. ALVORD.