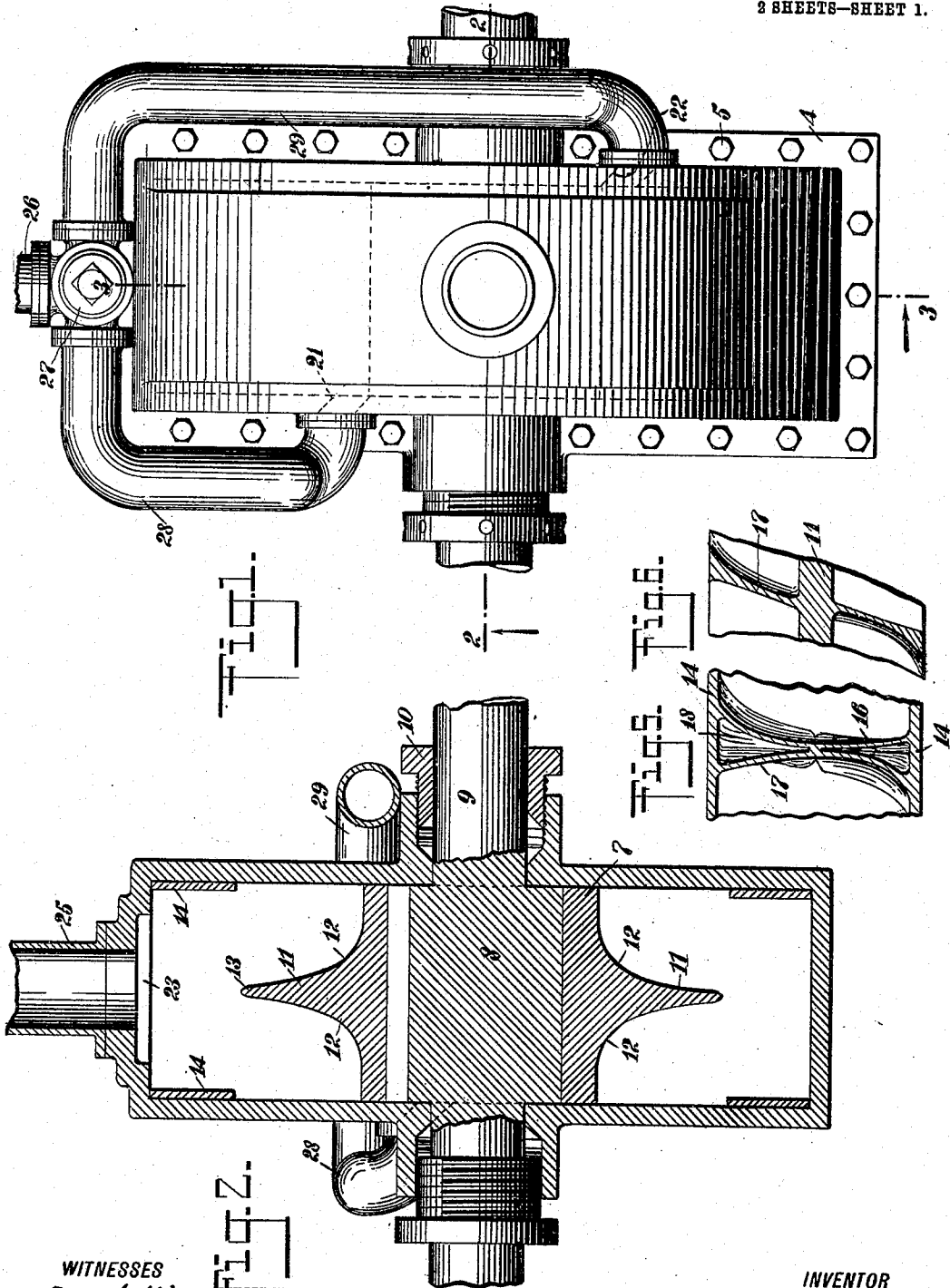


H. T. WERBER.
REVERSING TURBINE.
APPLICATION FILED JUNE 12, 1909.

937,492.

Patented Oct. 19, 1909.
2 SHEETS—SHEET 1.



WITNESSES
Ben. L. Laffey
J. R. Chamberlain

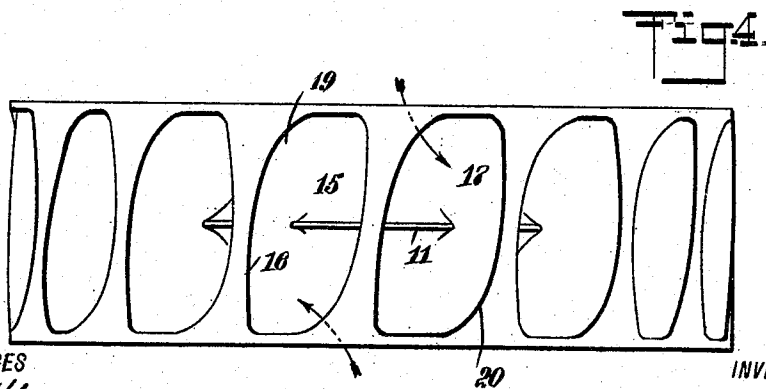
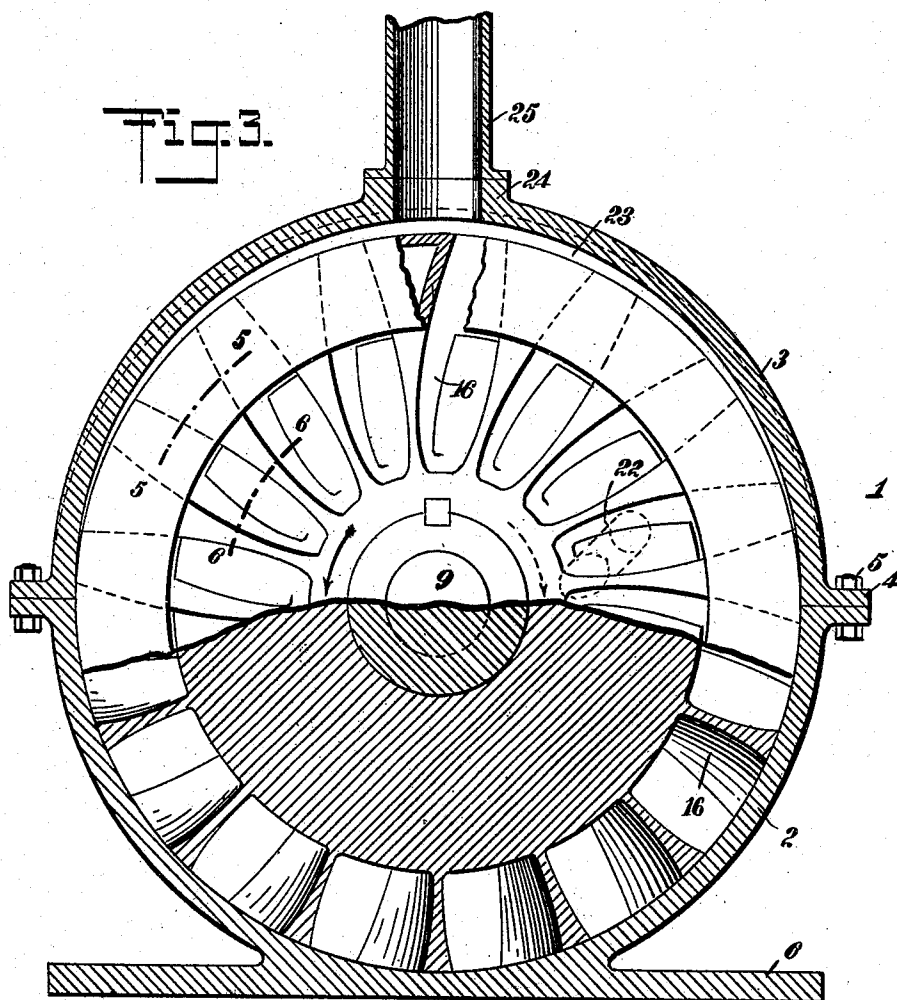
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ATTORNEYS

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WITNESSES
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UNITED STATES PATENT OFFICE.

HERMANN T. WERBER, OF NEW YORK, N. Y.

REVERSING TURBINE.

937,492.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed June 12, 1909. Serial No. 501,724.

To all whom it may concern:

Be it known that I, HERMANN T. WERBER, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Reversing Turbine, of which the following is a full, clear, and exact description.

This invention relates to turbines, and especially to such as are operated by steam or compressed air.

The object of the invention is to produce a turbine of simple construction which will operate efficiently and which will be capable of being rotated in either direction.

More specifically the invention resides in the construction of the rotor which enables it to be driven by steam admitted on either side. Admitting it on one side drives the rotor in one direction, and admitting it on the other side drives it in the opposite direction.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan of the turbine, the ends of the shaft being represented broken away; Fig. 2 is a section through the turbine taken on the line 2—2 of Fig. 1; Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1, certain parts of the rotor being shown in elevation, and other parts being broken away; Fig. 4 is a plan of the rotor; Fig. 5 is a section through a pair of buckets taken on the line 5—5 of Fig. 3; and Fig. 6 is a similar section taken on the line 6—6 of Fig. 3.

Referring more particularly to the parts, 1 represents the case or stator which is in the form of a cylinder or short barrel, having a curved base section 2 and a curved cover section 3. These sections are formed with flanges 4 which are connected together by bolts 5, as indicated. The base section 2 is formed integral with a base plate 6, as shown in Fig. 3. In this stator there is mounted a rotor 7, the body of which is in the form of a hub rigidly secured to a shaft 8, said shaft having reduced necks or journals 9 running in stuffing boxes 10 formed at

the center of the stator. The hub of the rotor is provided in its middle with an outwardly projecting circular comb 11 which extends continuously around the same, and this comb is enlarged in width or thickness at its base and connects with the hub on the concaved or curved lines of cheeks 12. The edge 13 of the comb extends about half the distance to the periphery of the rotor. The sides of the rotor are formed into annular plates or cheeks 14, and these plates are located at the outer edge or periphery of the rotor, and they are disposed against the inner sides of the side walls of the case or stator.

The rotor between the hub and the periphery is formed into a plurality of buckets. These buckets are formed by means of openings 15 which present curved walls 16 and 17 on opposite sides thereof and extending in the same general direction as the axis of the shaft. These walls 16 and 17 may be considered as vanes or buckets. At the points where they diverge from each other near the sides of the rotor, pockets or chambers 18 are formed by means of cores where the rotor is of cast iron.

Referring to Fig. 4, it will be noted that the walls 16 are intended to receive the forward impulse from the steam admitted on one side of the wall, whereas the wall 17 receives the impulse from the steam admitted on the other side. The direction of the steam jet is indicated approximately by the arrows. The outline or edge of the wall 16 runs nearly parallel to the axis of the shaft on the side of the rotor where the steam is admitted to drive the rotor in a left-hand direction, and the wall 17 has a similar relation with respect to the opposite side of the rotor. The wall 16 beyond the comb extends rearwardly in a curved line 19 with respect to the direction of rotation when the walls 16 are operating. Likewise the wall 17 has a curved extension 20 which extends toward the rear with respect to the direction of rotation when the walls 17 are receiving the impulse.

On the left side of the turbine case, as viewed in Fig. 1, an admission port 21 is provided which inclines downwardly and inwardly, and this port is disposed near the edge of the hub of the rotor, as shown. This port may be formed by drilling through the wall of the case to form an opening, the axis of which makes an angle of 45° with

the horizontal plane, and an angle of 45° with a vertical plane passing through the longitudinal axis of the shaft. A similar port 22 is provided on the opposite side of the case or stator, as indicated in Fig. 1, and this port inclines downwardly and inwardly, as indicated in Fig. 3. This port is similarly arranged to the port 21, that is, its longitudinal axis makes an angle of 45° with the horizontal plane, and an angle of 45° with the vertical plane passing through the axis of the shaft. When the steam is admitted through the port 21, the direction of rotation will be that indicated by the arrow shown in full lines on Fig. 3, that is, the rotor will turn in a left-hand direction as viewed in Fig. 3. If the steam is admitted through the port 22 the rotor will be turned in the direction indicated by the dotted arrow shown in Fig. 3, that is, it will rotate in a right-hand direction. In either case the steam strikes against the central comb 11 and is deflected outwardly toward the periphery of the wheel, at the same time it is directed against the walls 16 or 17, respectively. After the steam passes beyond the comb 11 on the upper side of the case, it passes from the bucket openings 15 into a crescent-shaped exhaust space 23. This exhaust space is formed by bowing the cover 3 up slightly at this point. The upper side of the cover is provided with an exhaust seat 24 upon which an exhaust pipe 25 is seated.

It will be evident that with a turbine constructed as described, the rotor may be driven in either direction. In either case the steam passes through substantially three-quarters of a circle and then passes out through the exhaust. The live steam is admitted through a main pipe 26 which is connected to a valve 27 having branch pipes 28 and 29 extending therefrom. The pipe 28 leads to the port 21, and the pipe 29 leads to the port 22.

Having thus described my invention, I claim as new and desire to secure by Letters Patent,—

1. A turbine having a rotor with a plurality of buckets formed thereupon, a dividing wall passing through said buckets and disposed in a plane substantially at right angles to the axis of rotation of said

rotor, means for admitting an operating fluid at only one side of said rotor, and means for simultaneously excluding the operating fluid on the opposite side of said dividing wall.

2. A turbine comprising a stator, a rotor rotatably mounted in said stator and having a plurality of buckets open at their sides and opening onto the periphery of said rotor, a circular comb extending continuously around said rotor in the middle plane thereof dividing said buckets and disposed in a plane substantially at right angles to the axis of rotation, and means for admitting an operating fluid through the wall of said stator and opposite to said comb.

3. In a turbine, in combination, a stator, a rotor rotatably mounted therein having bucket openings on the periphery thereof and opening on the sides of said rotor, a comb dividing the inner portions of said buckets and lying in a plane substantially at right angles to the axis of said rotor, said stator having an admission port on one side thereof opposite said comb and adapted to revolve said rotor in one direction, and an admission port on the opposite side of said stator opposite said comb adapted to revolve said rotor in an opposite direction.

4. In a turbine, in combination, a stator, a rotor rotatably mounted therein having buckets opening on the sides of said rotor and opening on the periphery thereof, said rotor having a comb extending outwardly from the inner portion thereof and lying substantially in a plane at right angles to the axis of rotation of said rotor, said stator having admission ports on opposite sides thereof cooperating with said buckets to revolve the rotor in opposite directions, and an exhaust pipe leading from said stator, the wall of said stator adjacent said exhaust pipe being removed from the periphery of said rotor whereby an exhaust space is formed to receive steam from said buckets.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERMANN T. WERBER.

Witnesses:

F. D. AMMEN,
PHILIP D. ROLLHAUS.