No. 811,457. PATENTED JAN. 30, 1906.

T. S. TINCHER.

TURBINE STEAM ENGINE.

APPLICATION FILED JAN. 12, 1905.

2 SHEETS—SHEET 1.

Fig. 4.

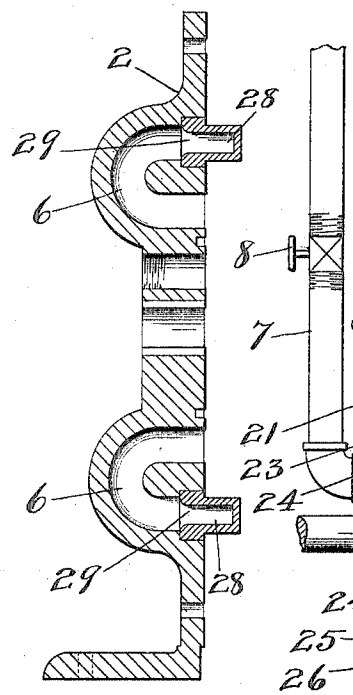


Fig. 1.

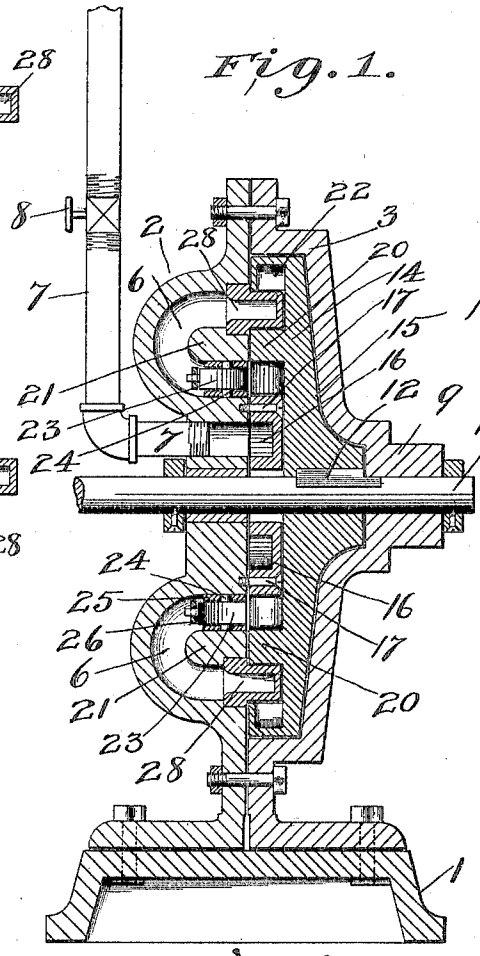


Fig. 5.

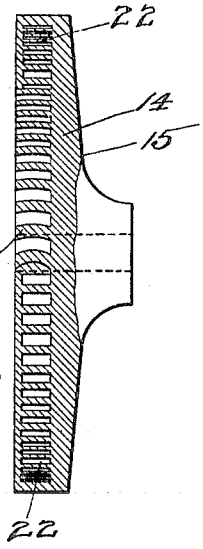
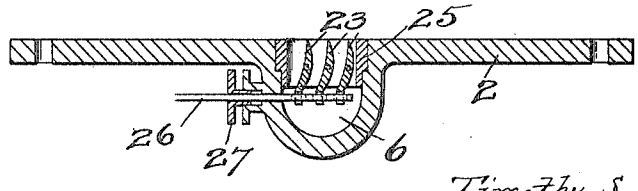


Fig. 6.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

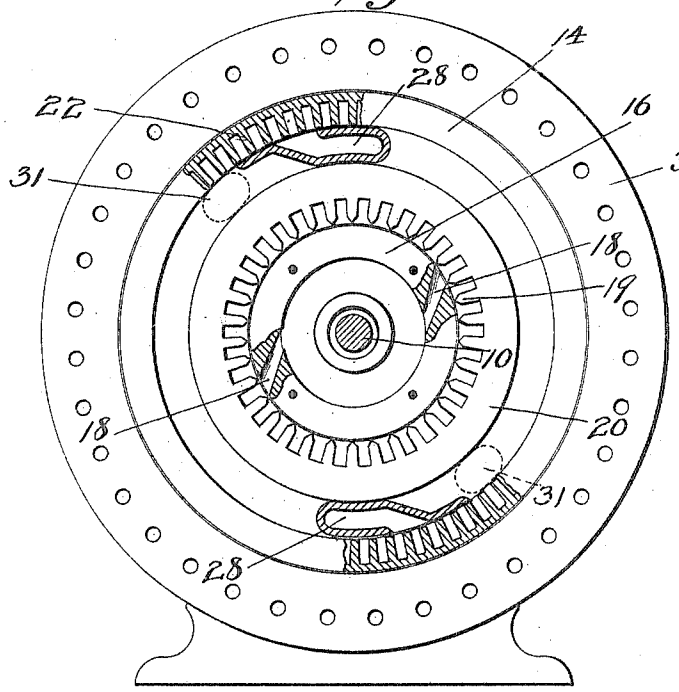


Fig. 7.

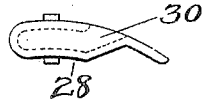


Fig. 3.

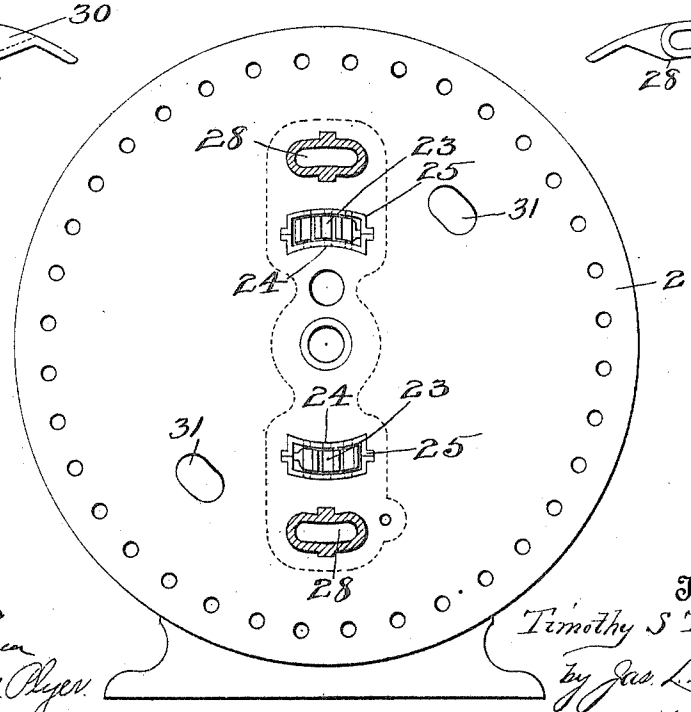
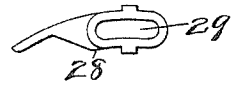


Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

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TURBINE STEAM-ENGINE.

No. 811,457. Specification of Letters Patent. Patented Jan. 30, 1906.

Application filed January 12, 1905. Serial No. 240,752.

To all whom it may concern:

Be it known that I, TIMOTHY S. TINCHER, a citizen of the United States, residing at Washington, District of Columbia, have invented new and useful Improvements in Turbine Steam-Engines, of which the following is a specification.

This invention relates to steam-turbines, and one of the principal objects of the invention is to simplify and improve the construction of this class of motors and attain increased efficiency without a corresponding increase in cost of manufacture.

Another object is to provide a steam-turbine of comparatively few parts which may be quickly taken apart for repairs and readily assembled and in which the wear on certain parts can be taken up in a short space of time.

Still another object is to provide a steam-turbine in which the admitted steam is first utilized as an impact medium and then as an expansive force.

A further object is to provide a turbine in which the steam is admitted at a point near the center or axis of the rotary element to expend its initial force by impact against a series of radial or tangential vanes or buckets and said steam to pass from thence to an expansion-chamber and then to utilize its expansive force upon buckets near the periphery of the rotary element to attain greater leverage, thus securing the benefit of all the inherent power of the steam by impact and expansion.

Still another object of the invention is to provide means whereby all the rotary parts are supported at the outer surface or periphery to insure strength and prevent breakage from centrifugal force while running at high speed.

These and other objects are attained by means of the construction illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of a steam-turbine made in accordance with my invention. Fig. 2 is a side elevation and partial section of the same with one member of the casing removed. Fig. 3 is a face view of the other member of the casing and showing certain parts in section. Fig. 4 is a vertical central section of the member of the casing shown in Fig. 3. Fig. 5 is a sectional view of the rotary element, the section being taken on a line crossing both sets of buckets or vanes. Fig. 6 is a sectional view of the speed accelerator and regulator. Fig. 7 is a side view of one of the by-pass nozzles. Fig. 8 is a plan view of the same.

Referring to the drawings for a more particular description of the invention, the numeral 1 designates a suitable base or support for the operative parts of the motor, while 2 and 3 are the two members of casing or cylinder, said two members being firmly connected together by a series of bolts 4, passing through registered bolt-holes 5 in the peripheral flanges of said members 2 3, and the latter being properly mounted upon or secured to the base or support 1. The member 2 of the casing is provided with two oppositely-disposed expansion-chambers 6, said chambers being of curved form, as shown, and each serving as a by-pass for the steam from its initial or impact port to the peripheral buckets or vanes upon which the steam expends its expansive force. A live-steam inlet-pipe 7 is fitted to an opening formed in the member 2 at a point near the axis of the cylinder and may be provided with a suitable cut-off cock 8. The member 3 of the casing is gradually enlarged from its periphery toward its center, and the inner wall of said member is made to substantially conform to the surface and periphery of the rotary element of the turbine to provide a reinforce or backing to said rotary element and to prevent breakage by centrifugal force in high speed. A central boss or hub 9 is formed on the member 3 and a main shaft 10 is journaled in said boss or hub. Keyed to the shaft 10 by a spline 12 or other suitable means is the rotary element 14, which consists of an annular casting, the rear surface 15 of which conforms to the inner wall of the member 3 of the casing and also is of the same contour as the member 3 at the periphery. Upon the steam side of the rotary element 14 an annular steam-admission chamber 16 is provided, said chamber surrounding the shaft 10 and being in line with the inlet-pipe 7. The chamber 16 is formed in a ring or annulus secured by bolts 17 to the member 2 of the casing. In said ring are formed

two oppositely-disposed outlet-ducts 18, said ducts extending tangentially through the wall of said ring and gradually increasing in size from the inlet to the outlet point, as shown in Fig. 2 of the drawings. Formed on the rotary element 14 is a series of vanes or buckets 19, which may be curved transversely of the element 14, as shown in Fig. 5, forming steam-spaces and intermediate vanes or buckets 19, as will be understood. Surrounding the vanes or buckets 19 is an annular flange or wall 20, which forms a partition in connection with the annular portion 21, formed on the member 2 of the cylinder-casing. At the periphery of the rotary element 14 a series of vanes or buckets 22 are provided, said vanes being acted upon by the expanded steam, as will be described.

At oppositely-disposed points in the expansion-chamber 6 are arranged a series of accelerator or regulator vanes 23, said vanes being concavo-convex in general contour, as shown in Fig. 6, and said vanes are provided with short pintles 24 at their edges, which are pivotally connected to a curved sleeve 25, fitted in the by-pass chamber 6. The vanes 23 are pivotally connected to a stem 26, which extends horizontally through the wall of the expansion-chamber 6 and through a stuffing box or gland 27, as shown in Fig. 6.

Secured within the expansion-chamber 6 at opposite points are the by-pass nozzles 28, said nozzles having each a flaring mouth 29, which communicates with the chamber 6, and an opening 30, which communicates with the expansion-vanes 22 of the rotary element 14. Exhaust-ports 31 are provided at oppositely-disposed points in the expansion-chamber 6.

The operation of my turbine may be described as follows: Live steam being admitted through pipe 7 to the vanes 19, the initial impact of the steam against said vanes starts the rotary element 14. The stem 26 of the speed accelerator or regulator may be moved in or out to retard or give more freedom to volume of steam as it passes from the vanes into the expansion-chamber 6. It will be understood that a ball-governor or other suitable type of governing device may be utilized to actuate or regulate the flow of steam by means of the vanes 23, the steam being admitted to the expansion-chamber 6 and permitted to expand and pass out through the by-pass nozzles 28 to the outer or peripheral vanes 22 of the rotary element 14, where greater leverage is effected by the expanded steam at a point some distance from the axis of the rotary element.

From the foregoing it will be obvious that my turbine is of simple construction, can be readily taken apart for repairs, that the steam first acts upon the vanes near the axis, is then expanded and acts expansively upon the vanes near the periphery of the rotary element.

Various changes in form and proportions may be resorted to without departing from the spirit and scope of my invention. Hence I do not desire to be limited to the exact details shown and described.

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

1. A steam-turbine comprising a casing, a rotary element therein having an inner and an outer set of vanes, a partition between said sets of vanes, and oppositely-disposed expansion-chambers spanning said partition.

2. In a steam-turbine, a casing, a rotary element mounted to revolve therein, and provided with two sets of vanes, an expansion-chamber between the two sets of vanes, and an accelerator within said expansion-chamber.

3. In a steam-turbine, a casing, a rotary element therein, the latter provided with two sets of vanes, an expansion-chamber between said sets of vanes, nozzles in said expansion-chamber and an accelerator in said expansion-chamber.

4. A steam-turbine comprising a casing, a rotary element therein having two sets of vanes, a partition between said sets of vanes, a semicircular expansion-chamber spanning said partition, nozzles in said expansion-chamber, and an accelerator in said chamber.

5. A steam-turbine comprising a casing, a rotary element therein having two sets of vanes, a partition between said sets of vanes, oppositely-disposed curved expansion-chambers spanning said partition, and an accelerator in one of said expansion-chambers, substantially as described.

6. A steam-turbine comprising a casing, a rotary element therein having two sets of vanes, and two oppositely-disposed expansion-chambers connecting the two sets of vanes.

TIMOTHY S. TINCHER.

In presence of—
JOHN LEETCH,
THOS. F. HOLDEN.