Feb. 17, 1931. F. LANTERMAN ET AL 1,793,179

ELASTIC FLUID TURBINE

Filed June 17, 1927

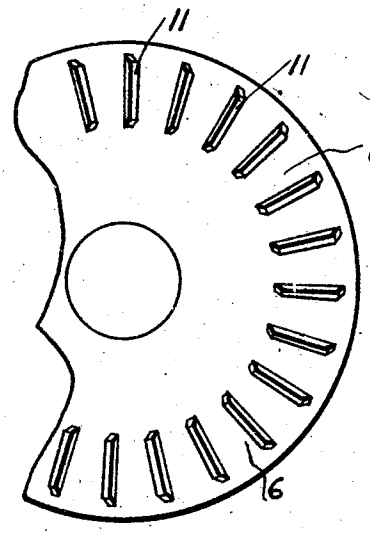


FIGURE 2.

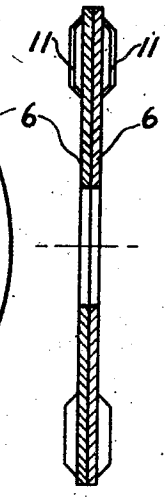


FIGURE 3.

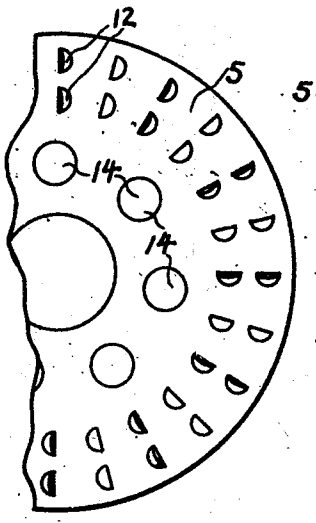


FIGURE 4.

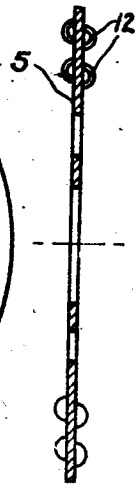


FIGURE 5.

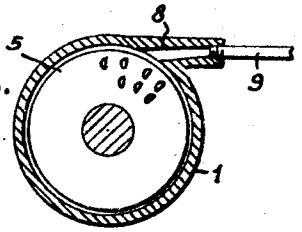


FIGURE.6.

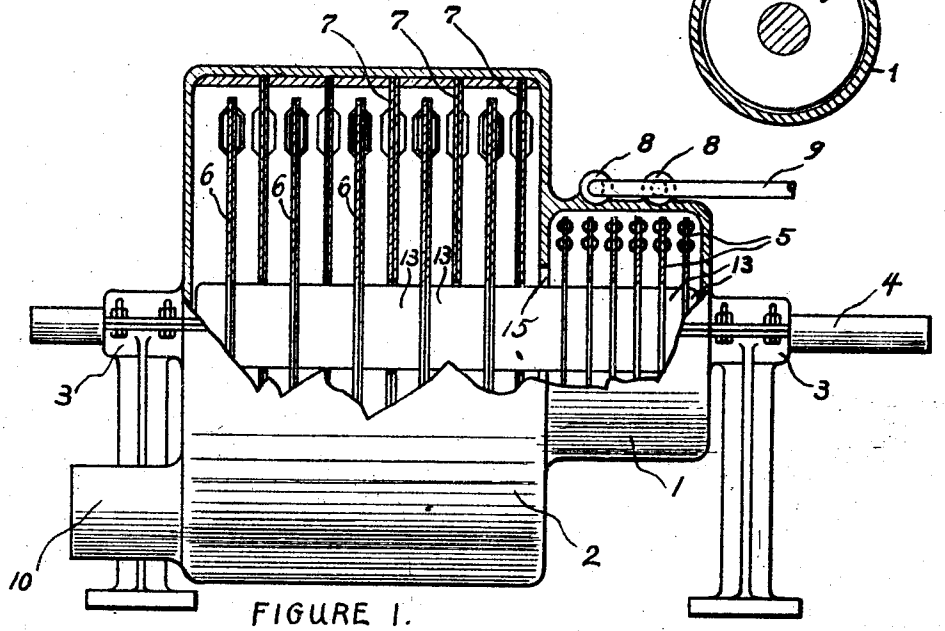


FIGURE 1.

Witness:
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UNITED STATES PATENT OFFICE

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ELASTIC-FLUID TURBINE

Application filed June 17, 1927. Serial No. 199,616.

The invention relates to improvements in rotor turbines using an elastic fluid under pressure as the motive force. Objects of the invention are to provide means to use the force of the steam or other motive fluid by impact, adhesion, viscosity and also expansion, thereby greatly increasing the efficiency. Another object is simplicity of construction.

In the accompanying drawings:

Figure 1 is an elevation in partial section, of a turbine comprising our invention. Figure 2 is one of the rotor discs showing the buckets or blading for using the expansive force of the motive fluid. Figure 3 is a diametral section of a rotor disc unit composed of two of the discs 6, 6 as shown in Figure 2 and is for using the expansive force of the steam. Figure 4 is one of the rotor discs 5, showing the projections on the face of said disc for utilizing the kinetic impact force of the steam or other motive fluid. Figure 5 is a sectional view across the diameter of the disc 5 shown in plan by Figure 4. Figure 6 is a vertical section through the expansion chamber of the turbine showing the relation of a nozzle to a rotor blade.

The discs 6, 6 as shown in Figure 2, are composed of sheet metal stampings, the buckets or blading 11, 11 being pressed out and raised from the surface of the discs. These buckets or blades extend radially as shown in Figure 2. Two of these discs, one stamped the reverse of the other, are placed back to back to each other so that the raised portions 11, 11 are directly opposite and form a complete set of blades or buckets as shown by Figure 3.

The discs 5, 5 illustrated by Figure 4 and Figure 5, may also be made of stamped sheet metal; and the projections 12, 12 as shown in Figures 4 and 5, while not limited to any specific shape, are punched or pressed so that they project from the surface of the discs 5, 5 and form an obstruction to the impinging steam or other motive fluid directed against the edges of the discs 5, 5. The projections, teeth, or cups 12, 12 are spaced and are preferably arranged in rows radially on the faces of said discs 5, 5, also 12, 12 may be pressed alternately on opposite sides of the discs 5, 5 so that each disc is inherently balanced. The cups or projections 12, 12 may be rounded, as shown, and so placed on the discs that the flat lips or sharp edges are faced toward the impinging steam or other motive fluid and in this way the projecting teeth or cups form the most formidable obstruction in the path of the impinging motive force. 14, 14 are holes of a suitable size in the face of the discs 5, 5; the holes in each disc being axially alined so as to form an outlet for the partially spent steam or other suitable motive fluid.

In Figure 1 is shown a complete turbine comprising our invention and in which 1 is the casing of the high pressure or impact end of the turbine, 2 is the casing of the low pressure or expansion portion of the turbine, 15 is the partition between the high and low pressure cases. The partition has a central opening of such size that it does not contact with the spacing sleeve 13 thus providing a passageway for the steam from the high pressure case to the low pressure case 2. 7, 7 are the stator discs and are fabricated in the same manner and of the same material as the rotor discs 6, 6. The stator discs 7, 7 fit into suitable grooves in the casing 2, and have the buckets or blades turned in the reverse direction to the buckets or blades 11, 11 on the discs 6, 6. The stator units 7 are formed in two halves, one half fitting into a groove in the lower half of the rotor casing and the other half fitting into a corresponding groove in the upper half of the rotor casing, as is shown in Figure 1. This causes a reversal of the steam that is exhausted from one set of buckets and redirects said motive fluid against the next rotor disc and its set of blading.

The shaft 4 extends through the turbine, being common to the high and low pressure portions of the complete rotor. 3, 3 are the bearings and supports of the rotor and its shafting 4. 5, 5 are the discs shown in detail by Figures 4 and 5, and with the spacing sleeves 13, 13 comprise the high pressure portion of the complete turbine rotor. 6, 6 are the discs shown in detail by Figures 2 and 3, and with spacing sleeves 13, 13 com-

prise the low pressure portion of the complete rotor. The discs 5, 5 and 6, 6 with the spacers 13, 13 are tightly clamped together by any suitable means such as rivets or bolts extending from end to end of the rotor and being close to and parallel to the shaft 4. The complete turbine rotor as described above and comprised of the spaced discs fabricated as described above and separated by spacing sleeves, is suitably keyed to the shaft 4, as will be readily understood by those versed in the art.

8, 8 are the expanding nozzles supplied with steam by the pipe 9 from any suitable source, the outlets of the nozzles 8, 8 are made tapered and expand from their inlet to the outlet being so placed that they direct the steam against the discs 5, 5 tangentially.

The steam expends its kinetic energy on the high pressure discs 5, 5 then passes through the partition 14 and is allowed to expand through the low pressure discs 6, 6 and the interposed stator discs 7, 7 expending its energy by expanding through them, and finally passes with all energy expended from the casing 2 by an exhaust opening 10.

Having thus clearly and fully described our invention, we claim:

1. In a turbine, a laminated rotor element comprising a pair of metal discs, each disc being provided with projections extending outwardly from one face thereof, said discs being secured together with their plain faces abutting the projections being arranged in pairs and forming a continuation of each other to provide a bucket.

2. In a turbine, a series of rotor discs, each disc being formed with a plurality of spaced cup shaped projections extending outwardly from the body thereof, said projections being alternately arranged on the opposite faces of the disc and extending in opposite directions, said projections being arranged to extend radially.

3. In a turbine, a casing, a shaft, means for supplying steam to said casing, means for utilizing the impact force of the steam comprising a series of rotor discs on said shaft and means for utilizing the expansive force of the steam, said last named means comprising a second series of rotor discs on said shaft, each of said rotor discs having outwardly radially extending projections on both faces thereof, and a partition having an opening therein between said two series of discs.

In testimony whereof we have hereunto set our hands this 27th day of May, 1927.

LLOYD S. LANTERMAN.
FRANK LANTERMAN.