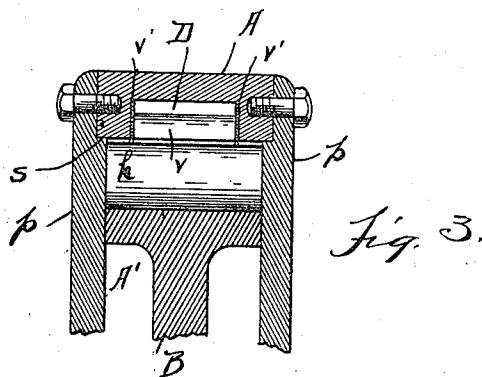
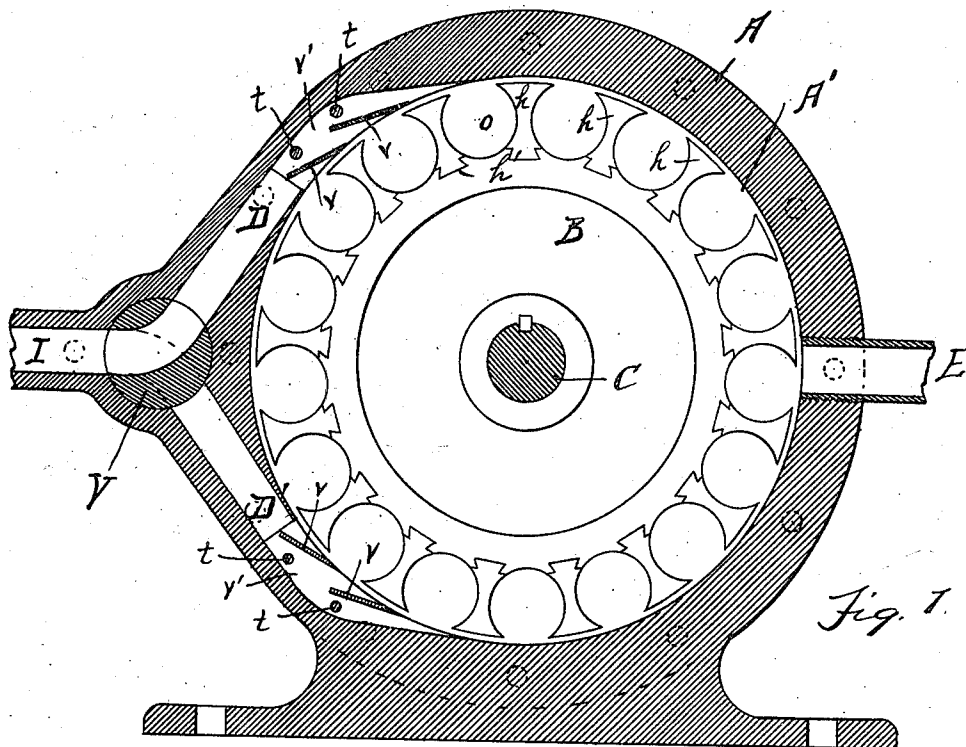


948,916.

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TURBINE.
APPLICATION FILED JUNE 11, 1909.

Patented Feb. 8, 1910.
2 SHEETS—SHEET 1.



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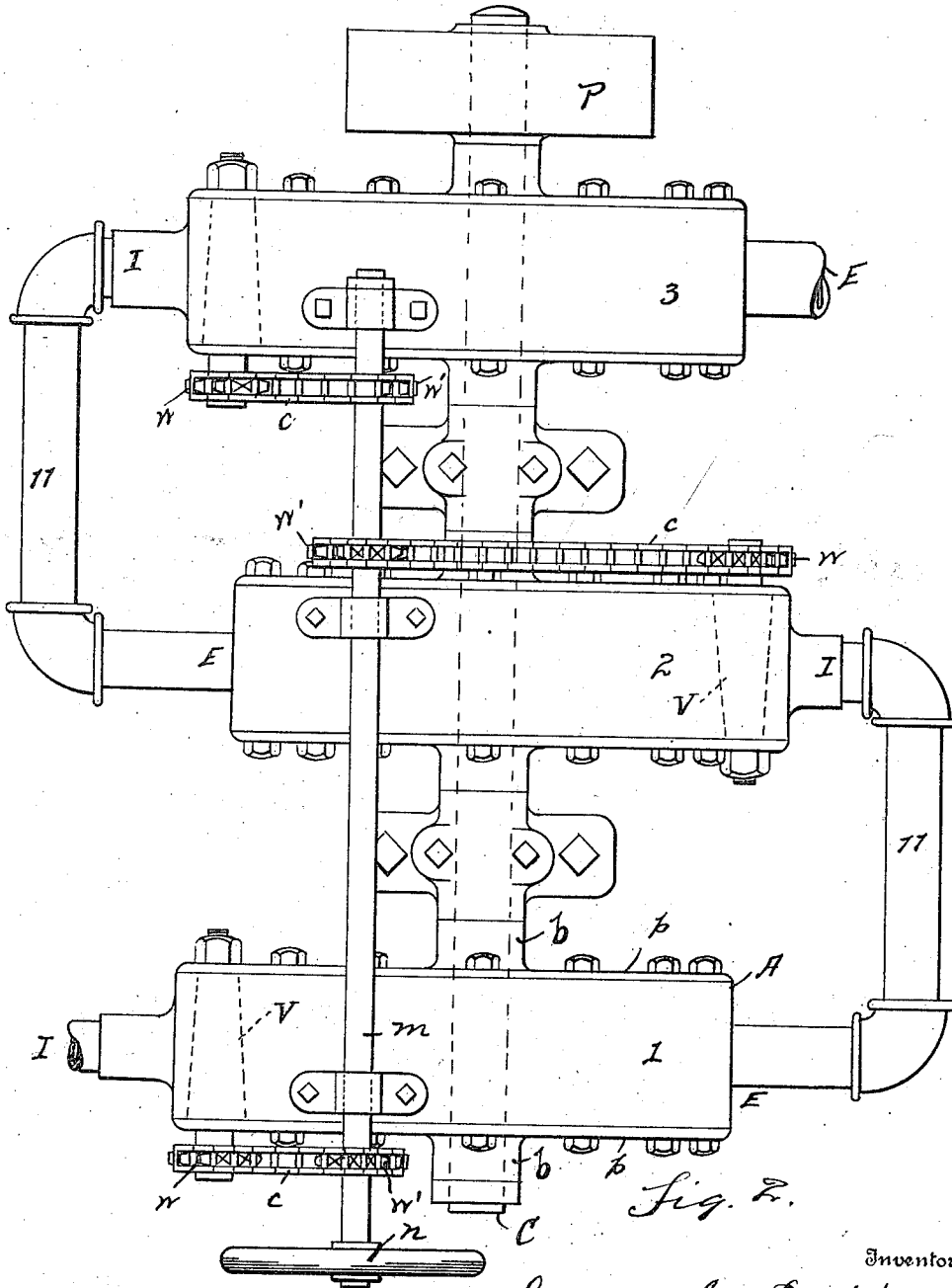


Fig. 2.

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UNITED STATES PATENT OFFICE.

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TURBINE.

948,916.

Specification of Letters Patent.

Patented Feb. 8, 1910.

Application filed June 11, 1909. Serial No. 501,657.

To all whom it may concern:

Be it known that I, GEORGE A. BODDY, citizen of the United States, residing at River Rouge, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Turbines, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to steam turbines and its object is a turbine that may be reversed and the shaft rotated in either direction, and its novelty consists in the peculiar form of the blades against which the steam is directed and also of the means in the ports for directing the steam against the blades at the proper angle. These and other features are fully shown in the accompanying drawings and hereinafter more fully described and claimed.

In the drawings—Figure 1 is a sectional elevation of a turbine embodying my invention. Fig. 2 is a plan view of an engine having several elements combined on one shaft and showing a means of simultaneously operating the valves. Fig. 3 is a cross section of a portion of the turbine wheel, showing one of the inlet ports.

Similar characters refer to similar parts throughout the drawings and specification.

A is a casing having a chamber A' in which is located the turbine wheel B, keyed to the shaft C. The casing is provided with plates *p, p*, on each side thereof and the plates are provided with bearings *b, b* for the shaft C. The plates are provided with an annular shoulder *s* as shown in Fig. 3. This shoulder centers the bearings with the circular chamber A' and suspends the wheel B in its proper position in the chamber. The casing is provided with two inlet ports D and D' and an exhaust port E. The flow of steam into the ports is controlled by a valve V which is adapted to direct steam into either port from the inlet I. When so set as to direct steam into the port D, the port D' is completely closed as shown by the full lines in Fig. 1. The dotted lines indicate the position of the valve when open to the port D'. The inlet ports are provided with vanes *v, v* set at a tangent to the

circular wall of the chamber A'. These vanes are held between two plates *v', v'*, forming a framework that is inserted in the port and held by two pins *t, t*. The method of fastening, however, is not essential, the particular feature being that the vanes are fastened in a framework at the proper angle for effective work and that all the vanes in a port may be removed by simply detaching the frame.

The wheel B is provided with blades *h, h*, etc., which have the same form on both sides, making a somewhat circular pocket therebetween which is open to the chamber A' between the edges of the blades. The blades *h* may be integral with the wheel or may be detachable as shown at *h'* in Fig. 1. The blades are set across the face of the wheel parallel with the shaft like the teeth of a spur gear. The pocket *e* between the blades is greater in width than the opening between the blades. There is a passageway for steam between the outer edges of the blades and the wall of the chamber A' and the distance from either inlet port to the exhaust port is less than half the circumference of the wheel B.

To utilize all the available force of the steam, several elements may be mounted on the same shaft as shown in Fig. 2, the exhaust port of one element being connected to the inlet of the next succeeding one by piping 11. Element 2 has the intake port on the opposite side of the shaft from that of elements 1 and 3. This arrangement requires less piping than an arrangement having all the inlet ports on the same side of the shaft. It is also evident that if the valves of the elements 1 and 3 are set to allow steam to flow through inlet ports D, the valve of element 2 must be set to allow steam to flow through the inlet port D' in order that all the rotating wheels shall act on the shaft in the same direction. The valves should be operated in conjunction and as a means of so operating them I have provided each valve stem with a small sprocket wheel *w* connected by a chain *c* with a sprocket wheel *w'* on the shaft *m* mounted on the casings of the several elements. This shaft is provided with a hand wheel *n* whereby the shaft may be turned and the engine reversed. A drive pulley is shown at P.

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

1. A turbine engine comprising a casing having an annular chamber provided with two inlets and an outlet, the inlets being provided with vanes held in a frame in position to direct steam into the chamber at the desired angle, a wheel in said chamber having curved, detachable blades on its periphery adapted to be acted upon by steam entering either inlet, cover plates for said chamber having bearings for a shaft, a shaft in said bearings to which the wheel is keyed, and a valve controlling the flow of steam to the inlet ports, substantially as shown and described.

2. A turbine engine comprising a casing having an annular chamber provided with two inlets and an outlet, the inlets being provided with vanes held in a frame in position to direct steam into the chamber at an angle, a wheel in said chamber having blades on its periphery adapted to be acted upon by steam entering either inlet, cover plates for said chamber provided with bearings for a shaft, a shaft in said bearings to which the wheel is keyed, and a valve adapted to control the flow of steam to the inlet ports, substantially as shown and described.

3. A turbine engine comprising a casing having an annular chamber provided with two inlets and an outlet, the inlets being provided with vanes held in a detachable frame in position to direct steam into the chamber at the desired angle, a wheel in said chamber having curved, radially disposed, detachable blades on its periphery, the opposite sides of the blades being curved in opposite directions forming pockets between said blades whose diameter is greater than the distance between the free ends of the blades, cover plates for said chamber having

bearings for a shaft, a shaft in said bearings to which the wheel is keyed, and a valve arranged to allow steam to flow into either inlet, substantially as shown and described.

4. A turbine engine having several elements on a shaft, each of said elements comprising a casing having an annular chamber provided with two inlets and an outlet, the inlets being provided with vanes held in a detachable frame in position to direct steam into the chamber at the desired angle, a wheel in said chamber having blades on its periphery adapted to be acted upon by steam entering either inlet, cover plates for said chamber having bearings for a shaft, a shaft in said bearings to which the wheel is keyed, and a valve adapted to control the flow of steam to the inlet ports, substantially as shown and described.

5. A turbine engine having several elements on a shaft, each of said elements comprising a casing having an annular chamber provided with two inlets and an outlet, the inlets being provided with vanes held in a detachable frame in position to direct steam into the chamber at the desired angle, a wheel in said chamber having curved, radially disposed blades on its periphery adapted to be acted upon by steam entering either inlet, cover plates for said chamber having bearings for the shaft, the wheel being keyed to said shaft, a valve arranged to allow steam to flow into either inlet, and means for simultaneously actuating the valves of all the elements, substantially as shown and described.

In testimony whereof, I sign this specification in the presence of two witnesses.

GEORGE A. BODDY.

Witnesses:

JOHN B. KESSLER,
CHAS. E. WISNER.