No. 860,712. PATENTED JULY 23, 1907.

W. A. WADDELL.

TURBINE.

APPLICATION FILED OCT. 9, 1906.

FIG. 1

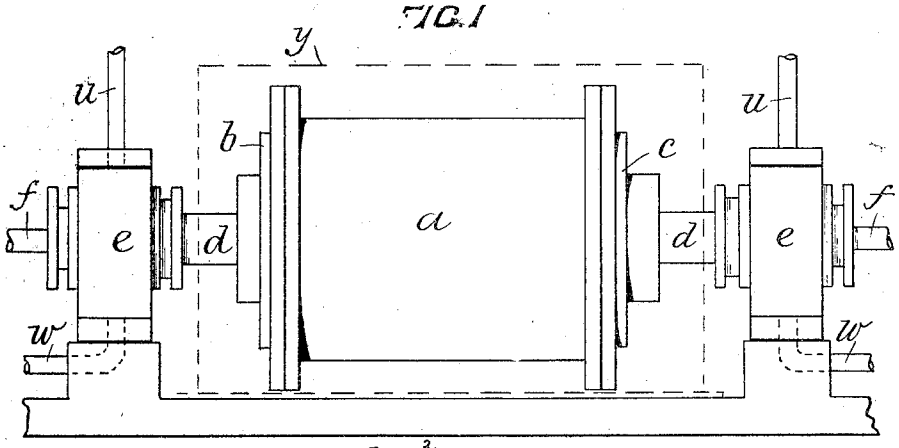


FIG. 2

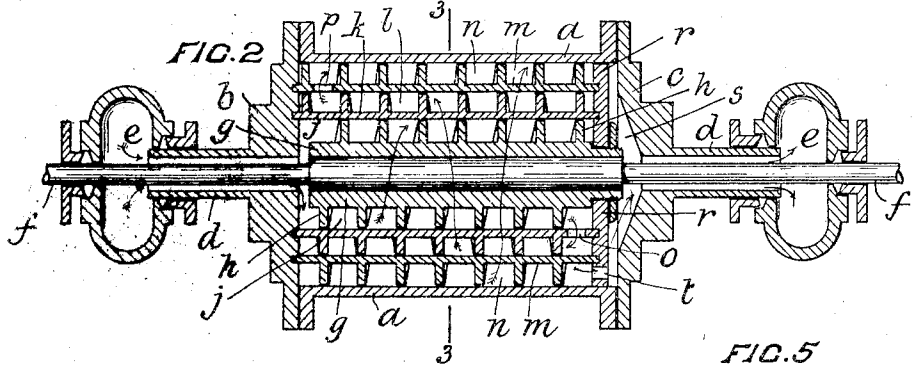


FIG. 3

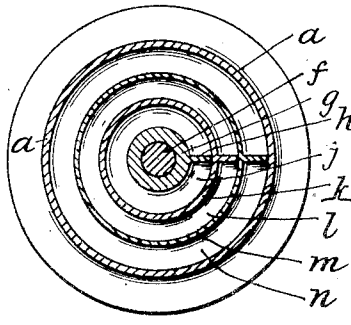


FIG. 4

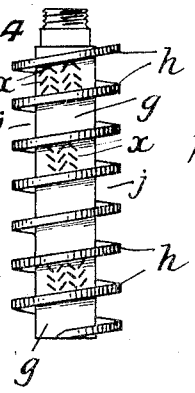
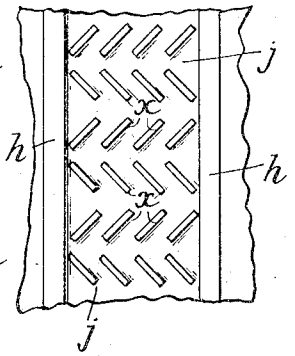


FIG. 5



WITNESSES;

Frank J. Hogan

A. Donnelly

INVENTOR,

WILLIAM ARTHUR WADDELL,

BY O. H. Berrigan,

Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM ARTHUR WADDELL, OF WELLINGTON, NEW ZEALAND.

TURBINE.

No. 860,712. Specification of Letters Patent. Patented July 23, 1907.

Application filed October 9, 1906. Serial No. 338,111.

To all whom it may concern:

Be it known that I, WILLIAM ARTHUR WADDELL, a subject of the King of Great Britain, residing at Wellington, in the Colony of New Zealand, have invented a new and useful Improved Turbine-Engine; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to an improved construction of turbine engine that is adapted for rotation in either direction. The principle of operation governing its construction, consists in causing the steam, or other motive power fluid, to travel in turn through a number of helical channels fixed one outside the other, within a cylinder mounted so as to be free to revolve. These channels are arranged alternately with right and left hand twists, so that the steam will enter the inmost channel at one end, will travel to its other end and pass up into the same end of the channel next in order, will travel back to the first end in such channel, and will then pass into the same end of the next one, and so on throughout the series. During its course, the steam will follow the same direction of rotation throughout all of the channels. In the channels, blades are fixed and so arranged that the steam, as it passes along the channels, will be caused to impinge upon their faces, and thus exert an impulse thereon, causing the whole cylinder to revolve upon its bearings.

In the accompanying drawings, I have illustrated a construction embodying the above principle of construction and operation, but it will be readily understood that the construction shown, may be departed from in a number of material respects, without affecting the important feature thereof. I wish it to be understood, therefore, that I do not desire to limit myself to the exact construction shown.

In such drawings:—Figure 1 is an elevation of the engine. Fig. 2 is a sectional plan of the same, with the blades removed. Fig. 3 is a cross section on the line 3—3 of Fig. 2. Fig. 4 is a plan of the inmost helical channel, showing the arrangement of some of the blades therein. Fig. 5 is a diagram illustrating a suitable arrangement of blades within the steam channel.

a is a cylindrical casing, to the respective ends of which, the covers *b* and *c* are attached in a suitable steam tight manner. Made in one with or attached to each cover, is a hollow sleeve *d* that extends outwards, and the outer end of which is supported in a pedestal or block *e*. The center of this block is made hollow, so as to form a steam chest within it. The outer ends of the sleeves *d* extend into the hollow spaces in their respective blocks, so that the spaces within the sleeves are in direct communication with the steam chests, while their inner ends open into the spaces within the respective covers.

Extending longitudinally through the cylinder, and projecting outwards through the sleeve and bearing block at each end, is the spindle *f*, which is made of such a diameter as to allow for annular spaces between it and the respective sleeves.

Fixed upon the portion of the spindle *f*, within the cylinder *a*, is the metal ring *g* that extends throughout the whole length of the cylinder. This ring is formed with a rib or projection *h* upon its outer periphery so formed thereon as to provide a helical channel or groove *j* encircling the ring from end to end thereof. Secured around the top of this channel is another ring *k* which is also formed with a rib inclosing a helical channel or groove *l*. This rib, however, is formed in a reverse direction to that in which the rib *h* is formed, so that the channel *l* will wind around the ring in a reverse direction to the channel *j*. A third ring *m*, likewise formed with a helical channel *n*, surrounds the top of the channel *l*, and this channel is formed in a reverse direction to the channel *l*, or in a similar direction to the inmost channel *j*. Any further number of rings so formed and arranged, may be employed if desired. These rings are all securely fastened together in any approved manner, so that the outer rings shall fit closely upon the tops of the ribs they respectively surround. For instance, the inside bore of each ring may be made slightly taper from one end to the other, and the periphery of the rib correspondingly tapered, so that the ring may be jammed thereon. Thus, the whole of the rings will be securely locked together, and upon the central spindle *f*.

The sleeve opening through the cover *b* opens into the end of the channel *j*. A port opening *o* is formed in the ring *k* at a point approximating to the other end of this channel *j*. In the same manner, a port opening *p* is formed in the ring *m* at a point corresponding to the reverse end of the channel *l*, to that at which the port *o* is formed. Thus a continuous passage is formed from the hollow block *e* at one end, through the corresponding sleeve *d* around the channel *j* to the opposite end of the cylinder, then through the port *o* into the channel *l*, back along such channel to the first end of the cylinder, then through the port *p*, into the channel *n* and along such channel to the other end of the cylinder. This passage throughout the whole of its length through the channels *j*, *l*, and *n*, encircles the spindle *f* in the one circular direction.

Secured upon the ends of the circular rings, adjacent to the cover *c*, is the plate *r* that forms a false cover, and is so arranged as to leave a space *s* between it and the cover *c*. This space is preferably increased in size towards the center, by dishing the inside face of the cover *c*, in the manner shown in Fig. 2. The opening through the sleeve *d* at this end, is thus in direct communication with the space *s*.

The plate *r* is provided with a port opening *t* therein, at

a point corresponding to the end of the helical channel *n*. Consequently, the continuous passage through the channels, is continued through this port, into the space *s*, and from it through the sleeve *d* at that end into the block bearing *e* also at that end. Thus a passage is formed from one block to the other, through the helical channels in the cylinder, in the one instance, passing from the inner channels to the outer, and in the other, from the outer to the inner, in a reverse direction. If steam, therefore, is admitted to the block at one end, it will pass through this passage to the block at the other end, from which it may be led to an exhaust. To provide for the passage of the steam in either direction, a steam inlet pipe *u* leads into each block and an exhaust pipe *w* leads away from each block.

The helical channels *j*, *l*, and *n*, are each filled with blades *x* arranged in rows and projecting radially from the bottom of the channel throughout the height thereof. These blades are omitted from Fig. 2 of the drawings, in order to allow for the clear illustration of the steam course, but an approved arrangement thereof, is shown in Figs. 4 and 5, where they are shown as arranged in parallel rows extending transversely across the width of the channel, and with those of each row arranged at an opposite or reverse angle to those of the row next in order to it. Any other approved arrangement, may, however, be employed.

It will be apparent that as the steam passes through the helical channels containing these blades, it will be caused to take a zig zag passage, and to impinge upon the faces of the blades, so as to give an impetus to the blades to travel with it. This impetus being imparted in the same direction throughout the whole of the steam's course through the channels, will result in a rotary motion being imparted to the several rings, and to the spindle and cylinder to which they are secured. Thus the whole will revolve, and power may be transmitted from the spindle or from the cylinder if so desired.

The cylinder may, if required, be surrounded by a cover or casing *y* shown in dotted lines in Fig. 1.

The various joints involved in the construction of the engine will be made steam tight to prevent any leakage of steam.

The engine may be caused to revolve in one direction by admitting the steam through one of the inlets *u*, and to revolve in the reverse direction by admitting steam through the other inlet.

What I do claim as my invention, and desire to secure by Letters Patent, is:—

1. The improved turbine engine comprising cylindrical members formed to provide a number of helical channels or grooves arranged concentrically one outside the other, and all fixed within a cylinder mounted as to be free to revolve, such channels being in communication with each other in such a manner as to form a continuous passage through them all, means for admitting motive power fluid alternatively to the inner or outer end of such passage, and for conveying it away therefrom, and blades secured radially within the channels, and so disposed and arranged as to present obstructions to the passage of the fluid, substantially as specified.

2. The improved turbine engine, comprising a rotatable spindle, a ring secured around said spindle and provided with a helical channel extending lengthwise of said ring and open at both ends thereof, and blades secured within the channel aforesaid, in combination with a rotatable cylindrical casing surrounding said ring.

3. The improved turbine engine, comprising a rotatable cylindrical member provided with a helical groove extending lengthwise of said member and having a supply opening and an exit opening, blades secured within said groove, and a cylinder mounted so as to be free to revolve and secured around, separate from and closing the groove of the cylindrical member aforesaid.

4. The improved turbine engine, comprising a rotatable cylindrical member provided with a helical channel extending lengthwise of said member and having a supply opening and a discharge opening, and blades secured radially within the channels and arranged in rows at reverse angles to each other across the width thereof, in combination with a cylinder mounted so as to be free to revolve and secured around, separate from and closing the groove of the cylindrical member aforesaid.

5. The improved turbine engine, comprising a rotatable cylindrical member provided with a helical channel extending lengthwise of said member and having a supply opening and a discharge opening connections for supplying motive power fluids to either opening of the channel, blades secured within the channel aforesaid, and a rotatable cylinder separate from, surrounding and driven by that first mentioned.

6. The improved turbine engine, comprising a spindle, a number of rings secured, one outside the other, concentrically around the spindle, a helical channel formed in and extending lengthwise of each ring and in communication with that next in order to it, blades within the helical channels, means whereby a motive power fluid may be admitted alternatively to the inmost or outmost helical channel and may be released therefrom, and a cylinder fitted around the outmost ring.

7. The improved turbine engine, comprising a cylinder having end covers provided with sleeves, pedestals supporting said covers and provided with steam-chests with which said sleeves communicate, a spindle within the cylinder and freely passing through the aforesaid sleeves, a number of rings secured, one outside the other, concentrically around said spindle, and all within the cylinder, a helical channel formed in and extending lengthwise of each ring and in communication with that next in order to it, the outmost ring communicating directly with one of the sleeves aforesaid and the inmost ring communicating directly with the other of said sleeves.

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

WILLIAM ARTHUR WADDELL.

Witnesses:
W. ALEXANDER,
W. BORTASE.