W. F. WEGNER.

TURBINE.

APPLICATION FILED JULY 10, 1908.

960,747.

Patented June 7, 1910.

Fig. 1.

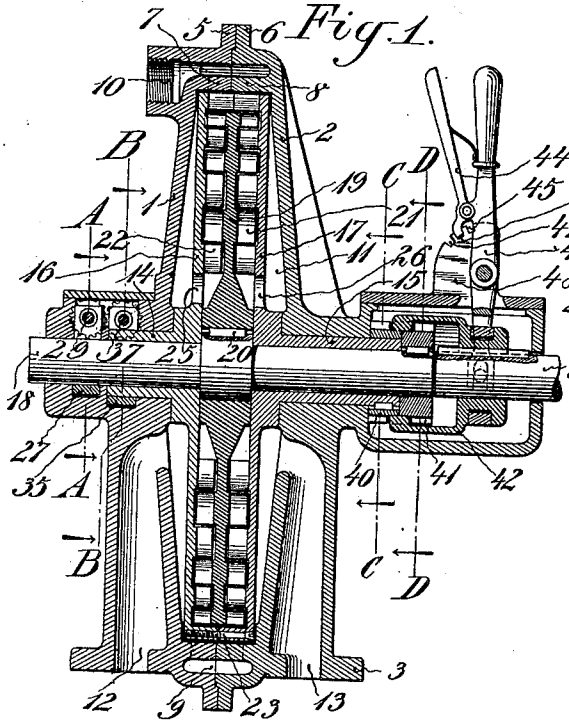


Fig. 2.

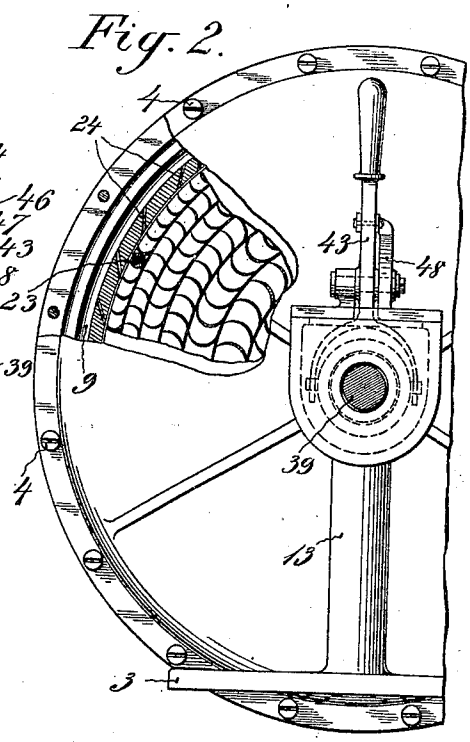


Fig. 3.

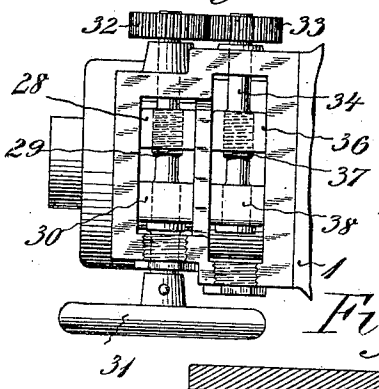


Fig. 4.

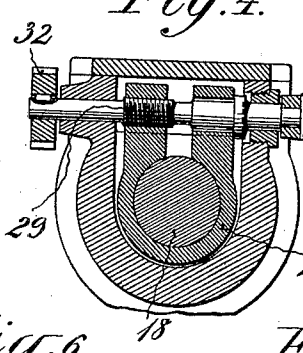


Fig. 5.

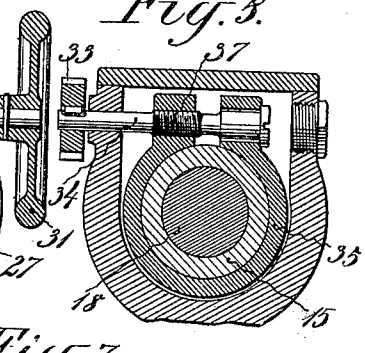


Fig. 6.

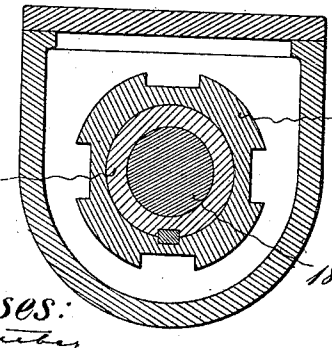
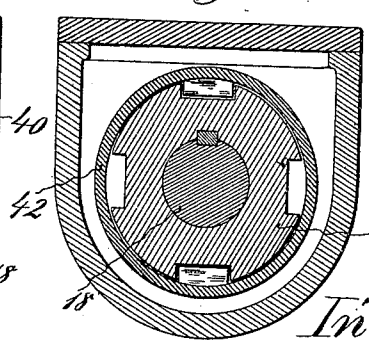


Fig. 7.



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UNITED STATES PATENT OFFICE.

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TURBINE.

960,747. Specification of Letters Patent. **Patented June 7, 1910.**

Application filed July 10, 1908. Serial No. 442,915.

To all whom it may concern:

Be it known that I, WILLIAM F. WEGNER, a citizen of the United States, and resident of the borough of Manhattan, in the city and State of New York, have invented a new and useful Improvement in Turbine-Engines, of which the following is a specification.

This invention is an improvement in turbine engines and relates more particularly to a reversible turbine engine.

The object of my invention is to provide an engine of this character which will be very simple in construction and which may be reversed with a very simple manipulation of the parts, novel means being provided for locking one of two vane carrying members to the engine casing and simultaneously releasing the other and vice versa.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical central section through the turbine with the clutch shown in its neutral position, Fig. 2 is a detail end elevation of the engine with portions of the casing broken away to more clearly show the parts within the same, Fig. 3 is an enlarged detail plan view of the device for clutching either of the two vane carrying members to the stationary casing at pleasure, Fig. 4 is an enlarged section taken in the plane of the line A—A of Fig. 1, looking in the direction of the arrows, Fig. 5 is an enlarged detail section taken in the plane of the line B—B of Fig. 1, looking in the direction of the arrows, Fig. 6 is an enlarged section taken in the plane of the line C—C of Fig. 1, looking in the direction of the arrows, and Fig. 7 is an enlarged section taken in the plane of the line D—D of Fig. 1, looking in the direction of the arrows.

The casing of the turbine engine is herein shown as comprising two half sections 1 and 2 having a suitable base 3 and secured rigidly together as, for instance, by screws 4 passing through the peripheral flanges 5, 6, of the said casing sections. This casing is provided with an inner annular ring formed by inwardly extending flanges 7, 8, an annular motive fluid supply chamber 9 being thus provided for between the inner ring and the periphery of the casing. This annular motive fluid supply chamber 9 is in open communication with a main supply port 10. The interior 11 of the casing is in open communication with two outlet ports 12, 13, formed in the casing sections 1 and 2, respectively. The sections 1 and 2 of the casing form bearings for the hubs 14, 15, of the two half sections 16, 17, of one of the two vane carrying members.

A shaft 18 extends through the hubs 14, 15, of the vane carrying member above referred to and the second vane carrying member 19 is fixed to rotate the shaft 18 as, for instance, by a key 20. This vane carrying member 19 is of disk form and is interposed between two sections 16, 17, of the outer vane carrying member. The opposite faces of this inner vane carrying member are each provided with a plurality of annular series of vanes 21 extending into close proxinity to the inner faces of the sections 16, 17, of the outer vane carrying member.

The inner faces of the sections 16, 17, are each provided with a plurality of annular series of vanes 22 which extend into close proximity to the face of the inner vane carrying member and will alternate with the annular series of vanes carried by said inner vane carrying member.

It is to be understood that the vanes of one vane carrying member are disposed in the opposite direction to the vanes of the other vane carrying member.

The number of vanes in each annular series of both vane carrying members is materially reduced from the outer series to the inner series so as to produce a gradually enlarging passage between each pair of successive vanes from the periphery of the vane carrying members to the center thereof.

The two sections of the outer vane carrying member are secured together beyond the periphery of the inner vane carrying member, as, for instance, by screws 23.

The inner ring 7, 8, of the casing is provided with an annular series of nozzles 4 arranged to direct the motive fluid from the annular chamber 9 into contact with the outermost annular series of vanes on the outer vane carrying member.

The sections 16, 17, of the outer vane carrying member are provided with holes 25, 26, therethrough for permitting the free escape of the motive fluid from the inner-

most annular series of vanes to the space 11 in the casing and from thence through the outlet port 12, 13.

The device which I have shown for locking either the outer vane carrying member or the inner vane carrying member to the casing and automatically releasing the other member at the same time, is constructed, arranged and operated as follows:—A band brake 27 surrounds the shaft 18 and has one of its ends, 28, in engagement with the screw threaded portion 29 of a hand screw and its other end 30 in engagement with a plain portion of said hand screw. The handle of this hand screw is denoted by 31. This hand screw is provided with a gear 32 which meshes with a gear 33 on another screw 34. A band brake 35 engages the hub 14 of the outer vane carrying member, which brake has one of its ends 36 in engagement with a screw threaded portion 37 on the screw 34 and its other end 38 in engagement with a plain portion on said screw. As the handle 31 is turned in one direction, the band brake 27 will lock the shaft 18 and thereby the inner vane carrying member to the casing and at the same time release the band brake 35 and thereby the outer vane carrying member from the casing. As the handle 31 is turned in the opposite direction, the band brake will be caused to lock the outer vane carrying member to the casing and at the same time releasing the inner vane carrying member therefrom.

The power transmitting shaft is denoted by 39 and is herein shown as in alinement with the shaft 18. This shaft 39 is clutched to the inner or outer vane carrying member according to the direction which it is desired to rotate the shaft 39, by the following clutch mechanism. A fixed clutch member 40 is carried by the hub 15 of one of the outer vane carrying member sections and a fixed clutch member 41 is carried by the shaft 18 of the inner vane carrying member. The movable member 42 of the clutch has a sliding movement upon the power transmitting shaft 39 but is fixed to rotate therewith, as, for instance, by a feather and groove connection, which movable clutch member 42 may be thrown into engagement with the fixed clutch member 40 or the fixed clutch member 42 or may occupy a position intermediate these two members. A hand lever 43 may be provided for throwing the clutch member 42 and a dog 44 may be engaged with one of three notches 45, 46, 47, in a segment 48 for holding the movable clutch member in any one of its three positions.

In operation, when it is desired to drive the power transmitting shaft 39 in one direction, the outer vane carrying member may be locked to the casing and the inner vane carrying member be permitted to rotate. The clutch may then be operated to clutch the inner vane carrying member to the power transmitting shaft 39 at pleasure. When it is desired to drive the power transmitting shaft 39 in the opposite direction, the inner vane carrying member may be locked to the casing thus permitting the outer vane carrying member to be rotated. The clutch may then be operated to lock the outer vane carrying member to the power transmitting shaft.

It will thus be seen that a very simple and effective reversible turbine engine is produced with a minimum number of parts.

It is to be understood that any number of pairs of vane carrying members might be employed without departing from the spirit and scope of my invention; one pair only being shown herein to illustrate the novel features of the invention.

What I claim is:—

1. In a turbine engine, vane carrying members fitted to rotate in opposite directions, means for locking either of the members against rotation, a power transmitting shaft and independently operated means for locking the free member to and releasing it from said shaft.

2. In a turbine engine, vane carrying members fitted to rotate in opposite directions, means for simultaneously locking either of the members against rotation and releasing the other member, a power transmitting shaft and independently operated means for locking the free member to and releasing it from said shaft.

3. In a turbine engine, a casing, vane carrying members therein having alternating annular series of vanes arranged in opposite directions, means for locking either of the members against rotation, a power transmitting shaft and independently operated means for locking the free member to and releasing it from said shaft.

4. In a turbine engine, a casing, vane carrying members therein having alternating annular series of vanes arranged in opposite directions, means for simultaneously locking either of the members against rotation and releasing the other member, a power transmitting shaft and independently operated means for locking the free member to and releasing it from said power transmitting shaft.

5. In a turbine engine, a casing having its interior open to exhaust and having an annular motive fluid inlet chamber, vane carrying members fitted to rotate in opposite directions within the casing, one of said members having annular series of vanes arranged in one direction and the other of said members having annular series of vanes arranged in the opposite direction alternating with the series of vanes on the first-named member, an annular ring surrounding said vane carrying members for separating the motive

fluid chamber therefrom, nozzles through said ring for feeding the motive fluid to the said vane carrying members, outlets for permitting the escape of the motive fluid from the said members to the interior of the casing, and means for locking either of the members to the casing against rotation.

6. In a turbine engine, a casing having its interior open to exhaust and having an annular motive fluid inlet chamber, vane carrying members fitted to rotate in opposite directions within the casing, one of said members having annular series of vanes arranged in one direction and the other of said members having annular series of vanes arranged in the opposite direction alternating with the series of vanes on the first-named member, an annular ring surrounding said vane carrying members for separating the motive fluid chamber therefrom, nozzles through said ring for feeding the motive fluid to the said vane carrying members, outlets for permitting the escape of the motive fluid from the said members to the interior of the casing, means for locking either of the members to the casing against rotation, and means for simultaneously locking either of the members against rotation and releasing the other member.

7. In a turbine engine, a casing having its interior open to exhaust and having an annular motive fluid inlet chamber, vane carrying members fitted to rotate in opposite directions within the casing, one of said members having annular series of vanes arranged in one direction and the other of said members having annular series of vanes arranged in the opposite direction alternating with the series of vanes on the first-named member, an annular ring surrounding said vane carrying members for separating the motive fluid chamber therefrom, nozzles through said ring for feeding the motive fluid to the said vane carrying members, outlets for permitting the escape of the motive fluid from the said members to the interior of the casing, means for locking either of the members to the casing against rotation, a power transmitting shaft and independently operated means for locking the free member to and releasing it from said shaft.

8. In a turbine engine, a casing having its interior open to exhaust and having an annular motive fluid inlet chamber, vane carrying members fitted to rotate in opposite directions within the casing, one of said members having annular series of vanes arranged in one direction and the other of said members having annular series of vanes arranged in the opposite direction alternating with the series of vanes on the first-named member, an annular ring surrounding said vane carrying members for separating the motive fluid chamber therefrom, nozzles through said ring for feeding the motive fluid to the said vane carrying members, outlets for permitting the escape of the motive fluid from the said members to the interior of the casing, means for locking either of the members to the casing against rotation, means for simultaneously locking either of the members against rotation and releasing the other member, a power transmitting shaft and independently operated means for locking the free member to and releasing it from said shaft.

9. In a turbine engine, vane carrying members fitted to rotate in opposite directions having alternating annular series of oppositely arranged vanes, gradually spaced farther apart from the periphery to the center of said members and means for locking either of the members against rotation.

10. In a turbine engine, vane carrying members fitted to rotate in opposite directions having alternating annular series of oppositely arranged vanes, gradually spaced farther apart from the periphery to the center of said members, and means for simultaneously locking either of the members against rotation and releasing the other member.

11. In a turbine engine, vane carrying members fitted to rotate in opposite directions having alternating annular series of oppositely arranged vanes, gradually spaced farther apart from the periphery to the center of said members, means for locking either of the members against rotation, a power transmitting shaft and independently operated means for locking the free member to and releasing it from said shaft.

12. In a turbine engine, vane carrying members fitted to rotate in opposite directions having alternating annular series of oppositely arranged vanes, gradually spaced farther apart from the periphery to the center of said members, means for simultaneously locking either of the members against rotation and releasing the other member, a power transmitting shaft and independently operated means for locking the free member to and releasing it from said shaft.

13. In a turbine engine, vane carrying members fitted to rotate in opposite directions, one of said members being interlocked with a shaft and the other member having a hub mounted on said shaft, and a pair of band brakes, one on the hub and the other on the shaft, for locking either of the members against rotation.

14. In a turbine engine, vane carrying members fitted to rotate in opposite directions, one of said members being interlocked with a shaft and the other member having a hub mounted on said shaft, and a pair of gear connected band brakes, one on the hub and the other on the shaft, for simultaneously locking either of the members against rotation and releasing the other member.

15. In a turbine engine, vane carrying members fitted to rotate in opposite directions, one of said members being interlocked with a shaft and the other member having a hub mounted on said shaft, a pair of band brakes, one on the hub and the other on the shaft, for locking either of the members against rotation, a power transmitting shaft, and independently operated means for locking the free member to and releasing it from said power transmitting shaft.

16. In a turbine engine, vane carrying members fitted to rotate in opposite directions, one of said members being interlocked with a shaft and the other member having a hub mounted on said shaft, a pair of gear connected band brakes, one on the hub and the other on the shaft, for simultaneously locking either of the members against rotation and releasing the other member, a power transmitting shaft, and independently operated means for locking the free member to and releasing it from said power transmitting shaft.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this twenty-fifth day of June, 1908.

WILLIAM F. WEGNER.

Witnesses:

F. GEORGE BARRY,

HENRY THIEME.