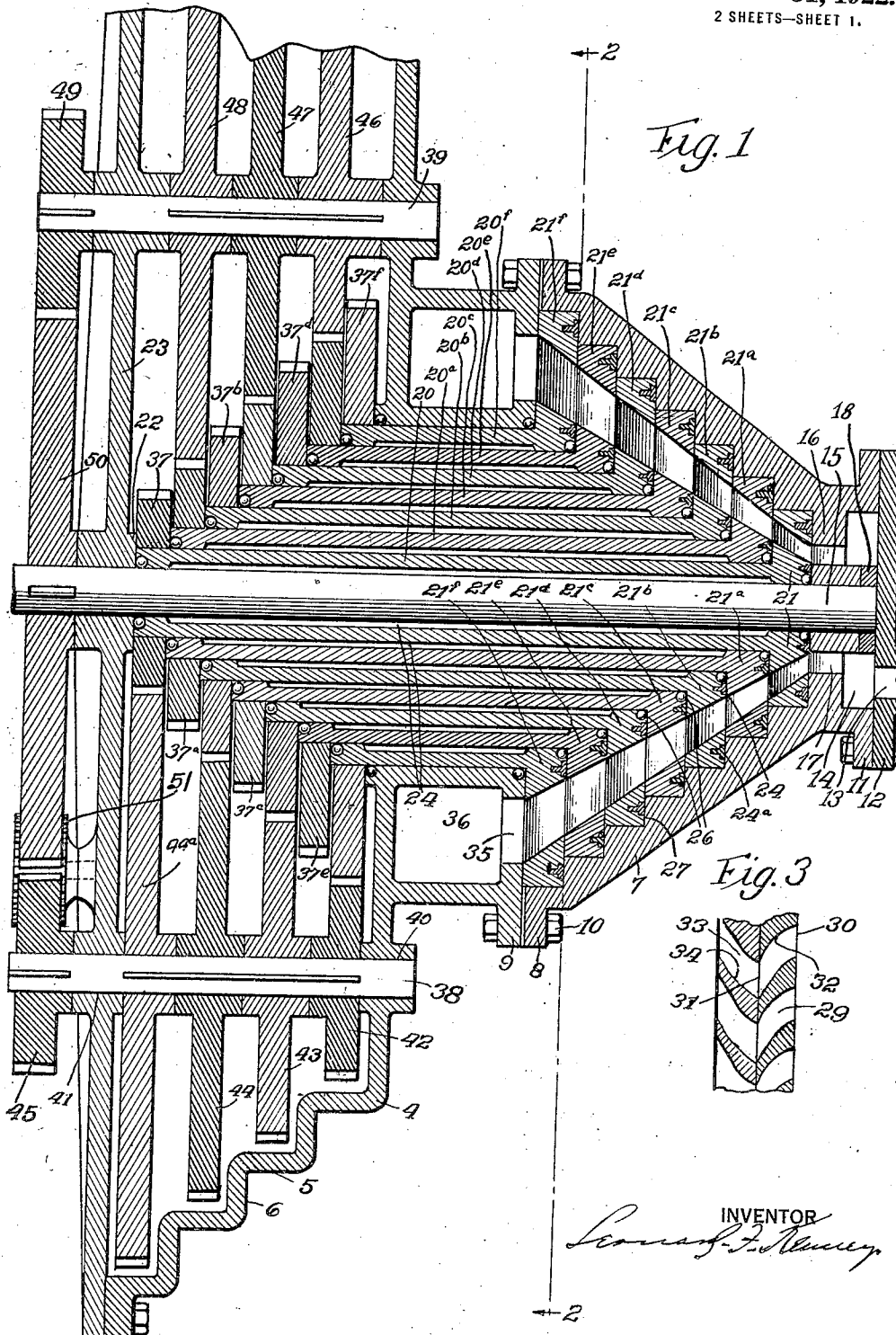


1,433,950.

Patented Oct. 31, 1922.
 2 SHEETS—SHEET 1.

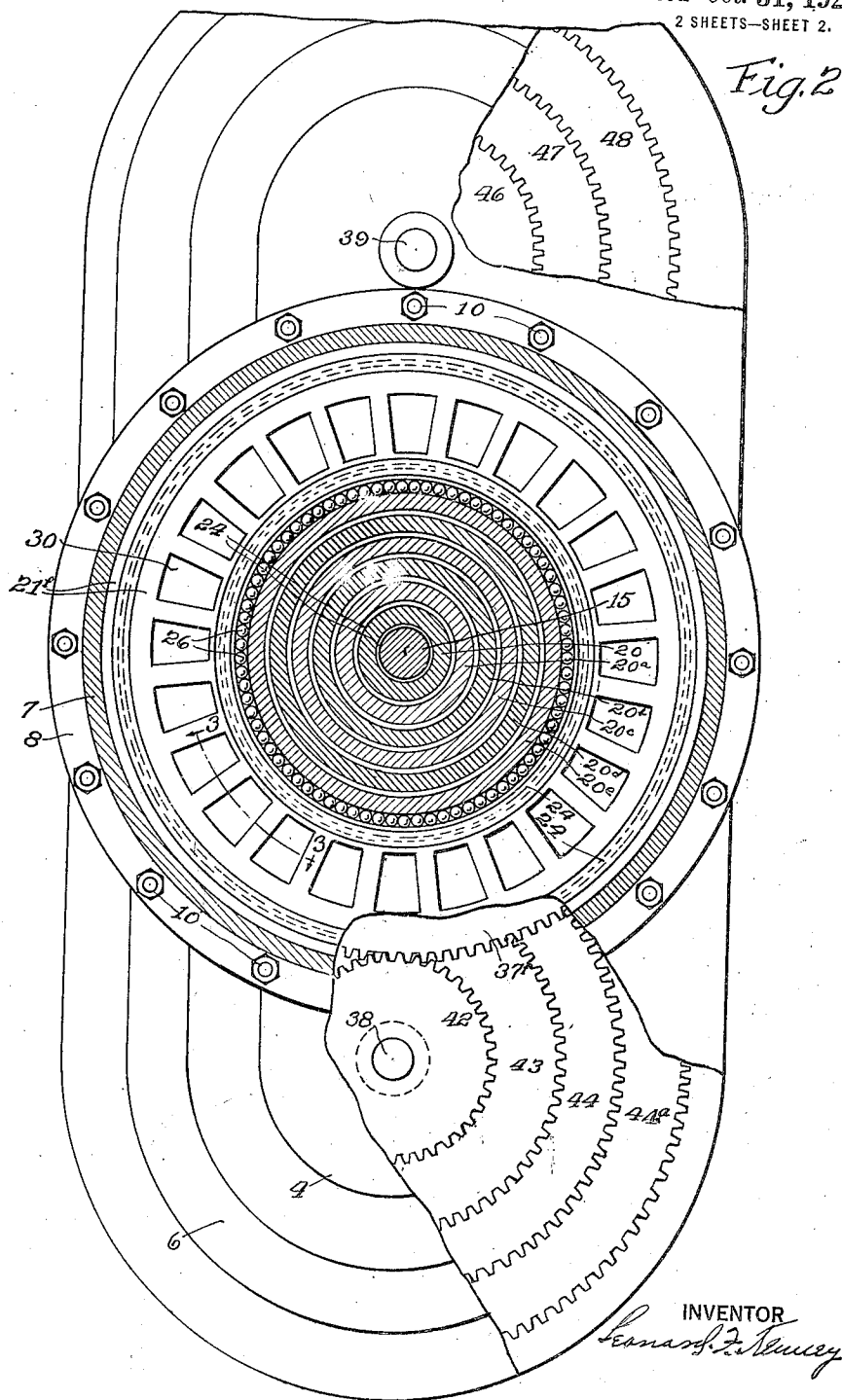


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L. F. KENNEY.
TURBINE ENGINE.
APPLICATION FILED DEC. 16, 1918.

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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

LEONARD F. KENNEY, OF CHICAGO, ILLINOIS.

TURBINE ENGINE.

Application filed December 16, 1918. Serial No. 287,023.

To all whom it may concern:

Be it known that I, LEONARD F. KENNEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Turbine Engines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in turbine engines and has for its object, the production of an expansion, compound condensing turbine engine in which a maximum of efficiency is obtained with a minimum of fuel consumption.

A further object is the production of a turbine motor or engine in which the entire main effective liquid pressure of the steam or air admitted to the turbine is supplemented by a vacuum created in the exhaust chamber, whereby both main effective pressure and vacuum are utilized, and the power generated thereby is transmitted by a series of helical gearings in compound formation.

A further object is the production of a motor or engine in which a vacuum chamber is included, designed to receive and filter the exhaust or condensation and return it to the boiler or generator for reheating and re-use.

A further object is the production of a motor or engine in which its members may be made interchangeable and so constructed that its movable parts operate in sliding engagement with a minimum of friction and wear.

A further object is the production of a motor or engine of simple and efficient construction and one not liable to breakage or disarrangements of parts.

These and such other objects as may hereinafter appear are attained by my device, an embodiment of which is illustrated in the accompanying drawings in which—

Fig. 1 represents a sectional view of my improved turbine with portions broken away.

Fig. 2 represents a sectional view on the line 2—2 of Figure 1, looking in the direction indicated by the arrows.

Fig. 3 represents a fragmentary sectional view through a portion of two adjacent discs or rotors.

Like numerals of reference indicate like parts in the several figures of the drawing.

Referring now to the drawing—

My device as a whole is contained in a main shell or casing 4, stepped as indicated at 5 and 6 to accommodate the configuration of the gear wheels and having a shell 7, with a circumferential flange 8 bolted to a flange 9, on the gear casing by means of bolts 10. A circumferential flange or nozzle plate 11, is provided at the end to which is bolted a cover plate 12, having a steam nozzle or aperture 13. The nozzle plate is cut away at the end forming a steam chamber 14 surrounding the main driving shaft 15; this plate is also provided with a plurality of passage ways or channels, 17, placed at an angle to the line of the shaft with openings from the steam chamber or chest 14.

The end of the central portion, serves as a journal bearing for the outer end of the shaft or drive 15 and a steam packing 18 is provided between the shell and the cover plate.

Positioned between the shell and casing 7, are a plurality of tubular sleeves 20, 20^a, 20^b, 20^c, 20^d, 20^e, and 20^f, on the ends of which are apertured discs or rotors, 21, 21^a, 21^b, 21^c, 21^d, 21^e, and 21^f. The tubular sleeve 20 extends to the end of the casing and is suspended on anti-friction ball-bearings. It will be noted that the inner periphery of the central portion of the sleeves is cut away as indicated at 24, so as to eliminate friction between the sleeves and the shaft 15 and to permit proper lubrication of the parts.

It will be noted that as the tubular sleeves decrease in length the diameters of the discs or rotors, 21, 21^a, 21^b, 21^c, 21^d, 21^e and 21^f increase, each disc or rotor being in sliding engagement with the adjacent disc, but having interposed there between steam tight packing rings 24 and 24^a preferably inset in one of the discs or rotors, the discs being suspended on anti-friction ball-bearings 26, inserted at the corners. The packing rings 24, and 24^a, are preferably of metallic substance and one 24, is designed to engage tightly the adjacent surface of the adjacent disc and the surface of the ring 24^a presses snugly against the inner surface 27, of the housing.

The discs 21, 21^a, 21^b, 21^c, 21^d, 21^e and 21^f

are provided with a plurality of circumferentially disposed passages, the entrances to which in each disc occupy the same vertical plane when the discs are assembled in line.

5 The passage through the disc however, is curved and increases in area, and the discharge end of each opening occupies a position within a larger annular ring than that of the entrance but is latterly disposed
10 with respect thereto. This feature is shown in Figure 3, in which the passage 29 is shown as curved outwardly, the entrance 30, being latterly disposed with respect to the discharge 31. The sides of the passage are
15 curved, one side 32, serving as a bucket or vane against which the steam impinges when admitted into the turbine.

It will be noted that the passages in the adjacent discs or rotors extend in opposite
20 direction as shown in Figure 3, in which the passage 33, has a curved wall 34, against which the steam impinges when entering into the passage. It will be noted by this construction, when steam is admitted under
25 pressure striking against the wall 32, of the disc, it tends to force the disc to revolve in one direction and when the steam passes into the next disc, and strikes against the opposite wall 34, that disc is driven in the
30 opposite direction to that of the first disc.

It will be noted that similar passage ways with curved walls are similarly positioned in each of the discs or rotors and the last series of channels discharge through the exhaust
35 ports 35 into the exhaust chamber 36, positioned in the upper portion of the main casing 4.

Rigidly secured to the lower ends of the sleeves 20, 20^a, 20^b, 20^c, 20^d, 20^e, and 20^f are
40 pinions 37, 37^a, 37^b, 37^c, 37^d, 37^e and 37^f.

Positioned within the main casing and on either side of the main driving shaft are power shafts 38 and 39, one end of the shaft
45 38 being mounted on journal bearings 40 and 41, and having keyed thereon, gear wheels, 42, 43, 44 and 44^a and the end main gear wheel 45.

The power shaft 39, has keyed thereon, a plurality of gear wheels 46, 47 and 48.
50 On the outer end of 39, is keyed a main gear wheel 49.

The teeth of the gear wheels 42, 43, 44, 44^a, 46, 47 and 48 are adapted to engage the pinions 37, 37^a, 37^b, 37^c, 37^d, 37^e and 37^f
55 and the gear wheels 45 and 49 drive the main gear wheel 50 keyed on the end of the driving shaft 15, the gear 45 meshing with an idler gear 51 which in turn meshes with gear 50.

The drawing shows the main driving gear outside the housing but if desired, all of the gears can be enclosed within the housing.

Referring now to the operation of my engine or motor, steam being admitted to the
65 steam chamber from any source (not shown)

passes through the nozzle plate and into the buckets or vanes of the first disc or rotor 21, forcing that disc to revolve. As the disc revolves the steam is immediately forced
70 into the buckets or vanes of the next disc 21^a, striking against the opposite curved face of the vane and causing that disc to revolve in an opposite direction. The steam passes successively through the different discs or
75 rotors causing adjacent discs to revolve in opposite directions.

As soon as the steam is admitted and the first disc or rotor moved, as all of the discs are connected together through the pinions and gears, all the discs commence to move
80 at the same time bringing the openings in adjacent discs in proper position to receive the discharge of steam from the channel in the disc before. It will be noted by referring to the drawings that the discs revolving
85 in one direction, transmit their power to one of the side shafts, say shaft 39, and the discs moving in the opposite direction transmit their power to the other side shaft 38, but moving in an opposite direction.
90 These shafts in turn through the gear wheels 49 and 45, transmit all their power in one direction to the main driving gear 50, and consequently to the main driving shaft 15 from which it is taken off in any desired
95 manner.

The steam after it has passed through all of the discs, enters the exhaust chambers 36. By means of a vacuum pump
100 not shown, I maintain a vacuum within the exhaust chamber 36, drawing the steam through the passages in the discs, thereby increasing greatly the efficiency of the engine and (by means not shown) convey the
105 waters of condensation back to the boiler and as the water is ordinarily quite hot, much economy in fuel results from this operation.

By the use of the metallic packing between the discs, I provide absolutely steam
110 tight joints so that there is no danger of any of the steam escaping in its passage through the discs and by the use of the ball bearings, I eliminate friction to as great an extent as is possible in a machine of this
115 character.

By the use of my device, I develop a greater degree of efficiency than any of the machines on the market and at the same time, have produced a machine that is
120 absolutely balanced, thus doing away with the tremendous wear and tear due to pounding in the ordinary machine.

While I have shown the supplemental power shafts 38 and 39 with gears extend-
125 ing considerably outside the line of the shafts it is evident that I may, by decreasing the size of the pinion and gear wheels, bring the power shaft closer to the main drive and make a more compact machine without im- 130

pairing to any great extent the efficiency of my engine.

By this construction, I obtain an expansion, condensing compound steam engine that has a higher degree of efficiency than any engine on the market and attains such efficiency by the utilization of the mechanism and principles illustrated and described in these specifications.

It will be noted that in my device each separate disc is a rotor and transmits power to the shaft individually, and the position of the discs are so harmonized as to obtain positive control—that is, when the parts are assembled the relative position of the discs with respect to the openings are so arranged as to secure positive results. The discs or rotors being rigidly secured to or integral with the sleeves at one end and the other end of the sleeve being connected through a series of gearing with the supplemental power shaft, and the supplemental power shaft itself being geared to the main driving shaft in such a manner that the power transmitted in opposite direction through the revolution of the rotor is compounded on to the main driving shaft.

While I have referred to steam as the means of obtaining pressure, it is of course understood that compressed air or any other liquid may be used with good results and thus do not limit myself to steam as a motive power.

By reason of the fact that the discs or rotors revolve in opposite directions, I eliminate any tendency to gyroscopic action.

I claim—

1. In an engine of the class described, the combination with a casing, a main driving shaft, a plurality of channelled discs, sleeves secured to said discs forming a power transmitting means, both discs and sleeves being mounted on said driving shaft, means whereby steam entering within said casing is caused to revolve adjacent discs in opposite direction, and means for transmitting all the power deriving from such revolution to the main driving shaft.

2. In an engine of the class described, the combination with a casing, a main driving shaft, a plurality of curved channels extending therethrough, means whereby steam entering in said casing is caused to revolve adjacent discs in opposite direction and means for transmitting all the power derived from such revolution to the main driving shaft and cause such driving shaft to revolve in one direction, said means including supplemental power shafts on either side of said main driving shaft and in operative connection therewith, and gear connection between said power shafts and said sleeves.

3. In an engine of the class described, the combination with a casing, a main driving shaft, a plurality of discs mounted thereon,

each disc having a plurality of curved channels extending therethrough, the channels in adjacent discs extending in opposite directions, whereby steam entering in said casing is caused to revolve adjacent discs in opposite direction and means for transmitting all the power derived from such revolution to the main driving shaft and cause such driving shaft to revolve in one direction, said means including supplemental power shafts on either side of said main driving shaft and in operative connection therewith, and gear connection between said power shafts and said sleeves.

4. In an engine of the class described, the combination with a casing, a main driving shaft, a plurality of discs mounted thereon, each disc having a plurality of curved channels extending therethrough, the channels in adjacent discs extending in opposite directions, the walls of said channels forming in effect a plurality of buckets or vanes, whereby steam entering in said casing is caused to revolve adjacent discs in opposite direction and means for transmitting all the power derived from such revolution to the main driving shaft and cause such driving shaft to revolve in one direction, said means including supplemental power shafts on either side of said main driving shaft and in operative connection therewith, and gear connection between said power shafts and said sleeves.

5. In an engine of the class described, the combination with a casing, a main driving shaft, a plurality of channelled discs, sleeves secured to said discs, both discs and sleeves being mounted on said driving shaft, means whereby steam entering within said casing is caused to revolve adjacent discs in opposite direction, a vacuum chamber in open communication with the discharge from the last disc, and means for transmitting all the power deriving from such revolution to the main driving shaft, said means including supplemental power shafts on either side of said main driving shaft and in operative connection therewith, and gear connection between said power shafts and said sleeves.

6. In an engine of the class described, the combination with a casing, a main driving shaft, a plurality of discs or rotors mounted thereon, each disc or rotor having a plurality of curved channels extending therethrough, the channels in adjacent discs extending in opposite directions, the walls of said channels forming in effect a plurality of buckets or vanes, whereby steam entering in said casing is caused to revolve adjacent discs in opposite direction and means for transmitting all the power derived from such revolution to the main driving shaft and cause such driving shaft to revolve in one direction, said means including supplemental power shafts, suitably positioned to

compound the power on either side of said main driving shaft and in operative connection therewith, and gear connection between said power shafts and said sleeves.

5 7. In an engine of the class described, the combination with a casing, a main driving shaft, a plurality of channelled discs, sleeves secured to said discs, both discs and sleeves being mounted on said driving shaft, means
10 whereby steam entering within said casing is caused to revolve adjacent discs in opposite direction, a vacuum chamber in open communication with the discharge from the last disc, and means for transmitting all
15 the power deriving from such revolution to the main driving shaft, said means including supplemental power shafts on either side of said main driving shaft and in operative connection therewith and gear connections
20 between said sleeves and said supplemental

power shafts, and gear connection between 25 said supplemental power shaft and said main power shaft.

8. In an engine of the class described, the combination with a casing, a main driving shaft, a plurality of channelled discs, sleeves 30 secured to said discs, both discs and sleeves being mounted on said driving shaft, means whereby steam entering within said casing is caused to revolve adjacent discs in opposite direction, and means for transmitting all the 35 power deriving from such revolution to the main driving shaft, said means including supplemental power shafts on either side of said main driving shaft and in operative connection therewith, and gear connection 40 between said power shafts and said sleeves.

In witness whereof, I have hereunto subscribed my name.

LEONARD F. KENNEY.