Sept. 21, 1926. 1,600,734

J. KOENIG

HOT AIR TURBINE

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Fig. 1.

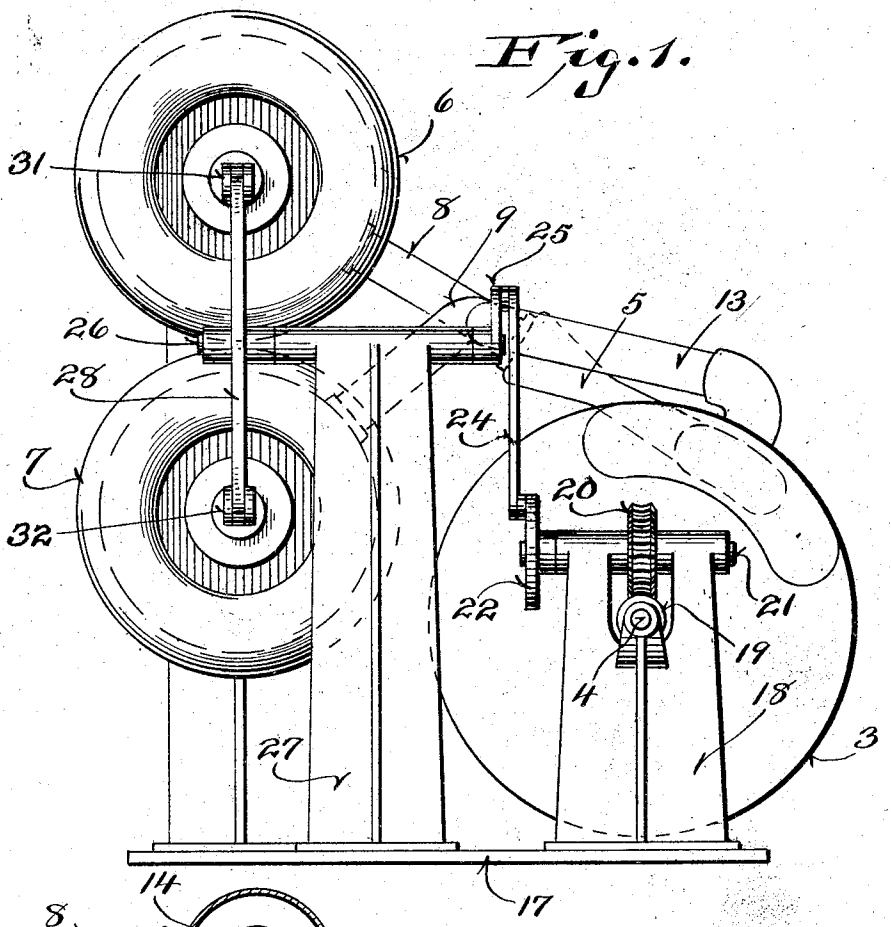

Fig. 2.

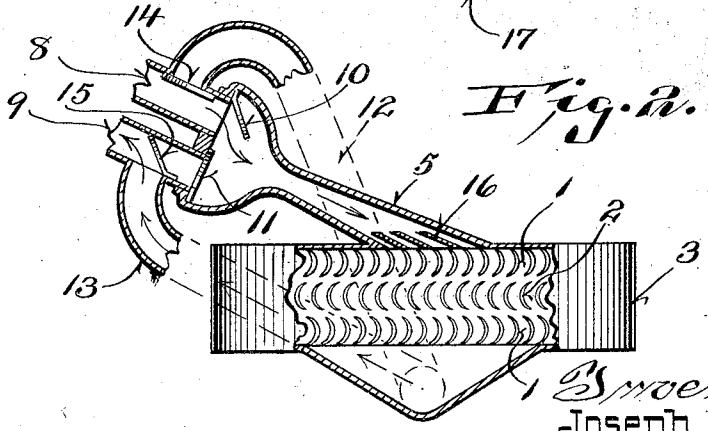

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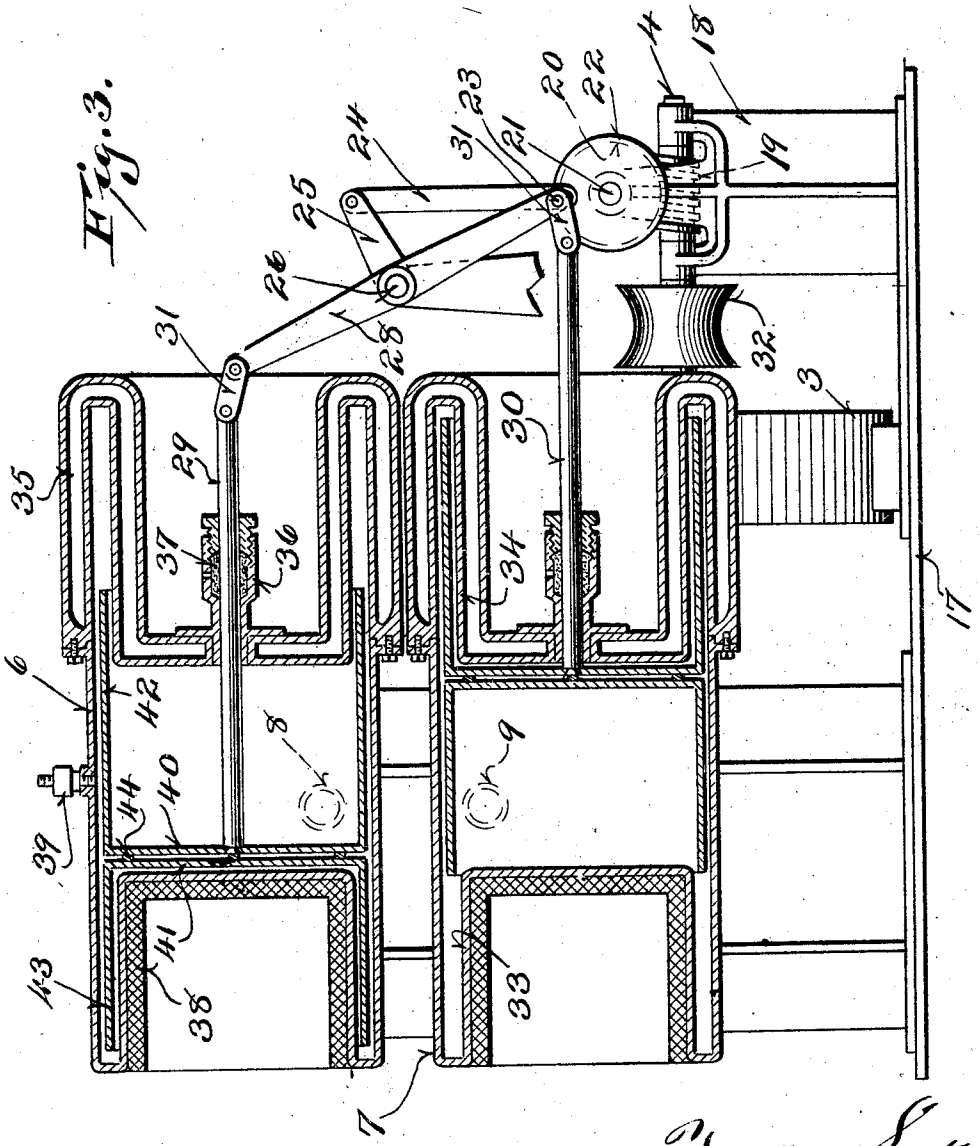
Fig. 3.



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UNITED STATES PATENT OFFICE.

JOSEPH KOENIG, OF MANITOWOC, WISCONSIN.

HOT-AIR TURBINE.

Application filed March 3, 1925. Serial No. 12,874.

This invention relates to hot air turbines, and is an improvement over that disclosed in my copending applications for hot air motor, Serial Number 741,634, filed October 4, 1924, and hot air motor, Serial No. 9,499 filed February 16, 1925.

Objects of this invention are to provide a hot air motor which, although adapted for a variety of uses, is also eminently suited for use as a toy.

Further objects are to provide a hot air motor in which a turbine is employed for the motive portion of the apparatus, in which the relatively rapid motion of this turbine is reduced and transmitted as reciprocatory motion to air heating and cooling cylinders, and in which a plurality of air heating and cooling cylinders are employed in such a manner that the turbine is supplied with air under pressure from the cylinders throughout substantially the entire cycle of operations.

Further objects are to provide a hot air motor of the turbine type which is of relatively simple construction, and which may be operated with the utmost facility without requiring the services of a skilled mechanic.

An embodiment of the invention is shown in the accompanying drawings, in which:—

Figure 1 is a front view of the motor.

Figure 2 is a fragmentary view partly in section of the turbine.

Figure 3 is a vertical sectional view through the air heating and cooling cylinders showing parts of the associated mechanism.

Referring to the drawings, it will be seen that a turbine is provided with a plurality of movable blades 1 which travel past stationary blades 2. Although only two sets of movable blades have been shown, it is obvious that any number may be employed.

The turbine is carried within a housing 3 and is mounted upon a main drive shaft 4. The supply nozzle 5 may be of any desired type, a schematic showing of such nozzle being given in Figure 2. This nozzle directs the air against the first section of the movable blades, as shown in Figure 2, and is supplied by both the air cooling and heating cylinders 6 and 7. These cylinders are connected with the nozzle 5 by means of pipes 8 and 9, respectively. Communication with the nozzle 5 is controlled by means of outwardly opening valves 10 and 11 for the pipes 8 and 9, respectively, as shown schematically in Figure 2. Further, it will be noted that the return pipes 12 and 13, from the turbine, communicate with the pipes 8 and 9 and communication with these pipes, is also controlled by inwardly opening check valves 14 and 15.

It is to be particularly emphasized that the shape of the nozzle and associated parts may be varied and that the showing is primarily as illustrative and diagrammatic rather than as a limiting application of the invention.

If it is found desirable, the nozzle 5 may be provided with a plurality of passages formed by vanes or similar members 16, as indicated in Figure 2, so as to have a plurality of points of inlet for the incoming heated air.

The entire apparatus is carried by a suitable base 17, as shown in Figures 1 and 3, and a bearing bracket 18 extends upwardly from the base as shown. This bearing bracket carries one end of the turbine shaft, as shown clearly in Figures 1 and 3, and is preferably provided with spaced bearings between which the worm 19, carried by such turbine shaft, is mounted. This worm 19 meshes with a worm wheel 20, such worm wheel being rigidly secured to a transverse shaft 21 carried by such bracket. One of the outer ends of this shaft 21 is provided with a crank plate 22 provided with a crank pin 23. The crank pin 23 is connected by means of a pitman 24 with a short arm lever 25. This lever is rigidly secured to a rock shaft 26 carried in suitable bearings formed in a bracket 27. A relatively longer lever 28 is also rigidly secured to the shaft 26 and is connected at opposite ends to the piston rods 29 and 30 of the cylinders 6 and 7, preferably short links 31 being provided between the crank and the piston rods.

Power may be taken from the apparatus at any desired point. For example, a pulley 32 may be secured to the turbine shaft 4 if desired.

Referring to the cylinders 6 and 7, it will be seen that they are of identical construction and are provided with inwardly extending heated ends 33 and with inwardly extending cooled ends 34. As shown in Figure 3, the cool ends of the cylinder may be maintained in a cool condition by means of a water jacket 35, although it is to be understood that other cooling means may be employed, if desired. Preferably also,

the stuffing boxes 36 for the piston rods 29 and 30 are provided with a cavity 37 within which oil is maintained preferably under pressure in any suitable manner. The showing of the stuffing boxes is intended merely as diagrammatic and may be varied, as desired.

The heated ends 33 of the cylinders are provided preferably with electrical heating members 38 which are slipped into such ends and are adapted for energization from any suitable source. These electrical heating elements for the cylinder render the device especially safe as a toy, although it is to be understood that other means may be provided for heating the hot ends of the cylinders. At any suitable point in the system an inwardly opening check valve diagrammatically indicated at 39, is provided. This check valve is designed to permit the entrance of air if the pressure should fall below atmospheric within the system. Further, it may be used to permit the introduction of air under pressure, so that the system may operate under an initial compression if it is found desirable.

The circulating pistons for the cylinders 6 and 7 are of identical construction and are preferably formed of two distinct units. These pistons comprise main piston members 40 and 41 from which extend the cylindrical sleeves 42 and 43, respectively.

It is to be noted from reference to Figure 3 that the two members of the pistons are spaced apart in any suitable manner preferably by means of spacers 44 to prevent heat conduction from one piston to the other.

The operation of the apparatus is as follows:—Assuming that the heating elements 38 are energized and the apparatus is running, it will be seen that the heated air passes to the turbine nozzle 5 by way of the valves 10 or 11, as the case may be. As shown in Figure 2, one of the valves, for instance the valve 10, is opened and the expanding air passes such valve and drives the turbine. The returning air passes the valve 15 through the pipe 9 into the appropriate cylinder. In the next cycle of operations, the valves 10 and 15 are closed and the valves 11 and 14 are opened. In this manner, due to the reciprocatory motion of the pistons which passes the air alternately over the cool portion of the cylinders and pistons and over the hot portion thereof, a substantially constant stream of air is furnished the turbine and such turbine is, therefore, driven in a substantially continuous manner.

It is again pointed out that the disclosure is intended as illustrative rather than limiting and is a diagrammatic embodiment of the invention. Further, it is to be distinctly noted that various changes may be made within the scope of the invention without affecting its essential parts. For example, the pistons may be provided with fluted cylinders and the apertures for the entrance of the pipes to the cylinders may be peripherally elongated, as disclosed in my copending application, and other changes in the precise details may be made without departing from the spirit of this invention.

I claim:

1. In a hot air motor, the combination of a turbine having a driving shaft, a worm carried by said driving shaft, a worm wheel meshing with said worm and rigidly secured to a transverse shaft, a crank carried by said transverse shaft, a rock shaft driven by said crank, a lever secured intermediate its ends to said rock shaft, a pair of cylinders having hot and cold ends, pistons mounted within said cylinders and connected with opposite ends of said lever, and means for placing said cylinders and said turbine in communication.

2. A hot air motor comprising a pair of air treating cylinders having hot and cold ends, displacing pistons in said cylinders, a turbine operated directly by the air from said cylinders and comprising a casing having an outlet portion, a rotor mounted within said casing and having vanes, a nozzle opening into said casing for discharging air against said vanes, a pipe leading from each of said cylinders and communicating with said nozzle and with the outlet portion of said casing, valves permitting the flow of air only from said pipes into said nozzle and from the outlet portion of said casing into said pipes, and mechanism operatively connecting said turbine and the displacing pistons for oscillating said pistons when said turbine rotates.

In testimony that I claim the foregoing I have hereunto set my hand at Two Rivers, in the county of Manitowoc and State of Wisconsin.

JOSEPH KOENIG.