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TURBINE TYPE HOT AIR ENGINE

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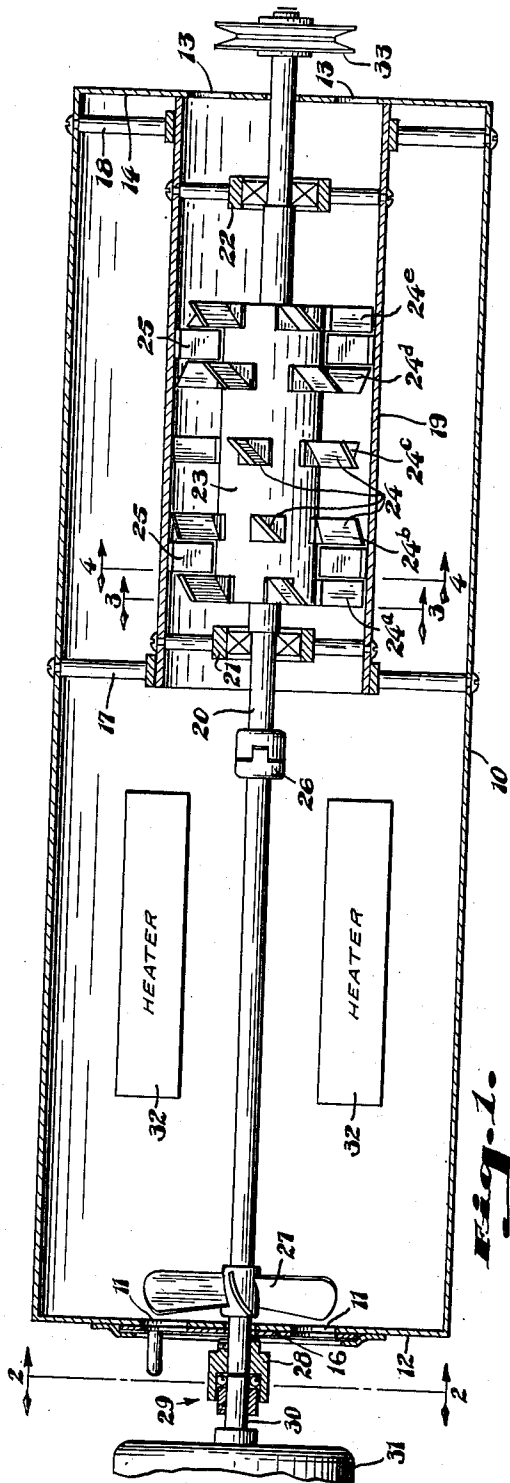


Fig. 1.

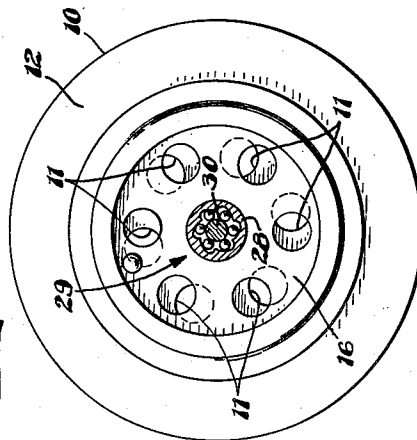


Fig. 2.

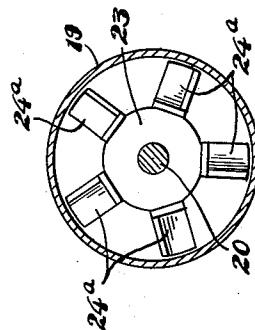


Fig. 3.

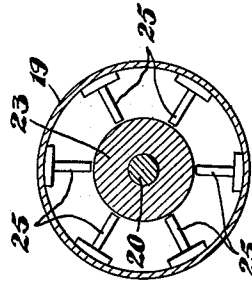


Fig. 4.

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## TURBINE TYPE HOT AIR ENGINE

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1 Claim. (Cl. 60—59)

The present invention relates to an engine and specifically to a mechanism deriving its motive power from the expansion of atmospheric air reacting against a turbine-like element.

The object of the present invention is to provide a mechanism which can effectively convert waste heat into usable mechanical power.

A further object of the invention is to provide an engine which, after being set in motion by a prime mover, will thereafter remain in motion, deriving its power solely from the application of heat, from an external source, to the interior of the engine.

Further objects of the invention will become apparent as the description proceeds.

To the accomplishment of the above and related objects, our invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific construction illustrated and described, so long as the scope of the appended claim is not violated.

Fig. 1 is a more or less diagrammatic sectional view through the axis of our engine;

Fig. 2 is a transaxial sectional view through the clutch of Fig. 1, taken substantially on line 2—2 thereof, and showing certain details of our invention; and

Figs. 3 and 4 are further transaxial sectional views taken substantially on lines 3—3 and 4—4, respectively, of Fig. 1.

Referring more particularly to the drawings, we have shown an engine comprising an elongated hood 10 having one or more inlet ports 11 in an end wall 12 thereof, and one or more outlet ports 13 in an end wall 14 thereof. Preferably, we provide means for varying the effective area of ports 11 from a fully closed position to a fully open position. In one embodiment, this means can take the form of a rotating disc having a series of ports 16 therein corresponding in number and spacing to the ports 11, said disc being suitably mounted for rotation on end wall 12.

Suitably supported within hood 10, as, for instance, by means of spider elements 17 and 18, is a cylindrical tube 19, open at both ends and registering at one end with outlet ports 13 so that egress from the interior of hood 10 through ports 13 must necessarily be by way of tube 19.

A shaft 20 is coaxially journaled in tube 19 in suitable spider-supports 21 and 22 and supports a hub 23 therein, fixed to shaft 20 for rotation therewith. Hub 23 carries a series of radially projecting fins 24 thereon extending from the periphery of said hub and terminating just short of the internal periphery of tube 19.

Fins 24 are arranged upon hub 23 in axially spaced sets 24a, 24b, 24c, 24d and 24e. The fins of each set are equi-angularly spaced about hub 23, and the fins of the entire series are each disposed at a common acute angle relative to a plane normal to the axis of shaft 20. The fins of each set are further angularly offset from the fins of the adjacent sets, as is most clearly shown in Fig. 1.

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Preferably, we provide one or more further sets of fins 25, each set being fixed to the inner periphery of tube 19 and projecting radially inwardly toward the axis of shaft 20, between adjacent sets of fins 24. The fins of the sets 25 are equi-angularly spaced about shaft 20 and terminate just short of the periphery of hub 23. Each fin of set 25 further lies substantially in a plane including the axis of shaft 20 and said fin.

In the illustrated embodiment of our invention, there are five fins to each set 24 and six fins to each set 25. Air flowing past fins 24, strikes the angularly disposed surface of each fin thereby imparting a rotary motion to shaft 20. Fins 25 tend to keep the air, passing through tube 19, flowing in a line parallel to the axis of shaft 20. If desired, a set of fins 25 could be placed between each set of fins 24 and, in some embodiments, that practice has been found more effective. However, in our illustrated embodiment, we have found two sets, placed as shown in Fig. 1, to be quite satisfactory.

Preferably, but not necessarily, we provide a universal joint 26, intermediate the ends of shaft 20, between the hood end wall 12 and the adjacent end of tube 19.

Fixed to shaft 20, closely adjacent the inlet ports 11, is a fan-type impeller 27 which, upon rotating shaft 20, draws air through ports 11 into the interior of hood 10. While we have shown impeller 27 as being in the interior of hood 10, whether the impeller is mounted in its illustrated position or in a position on the exterior of hood 10, is immaterial for our purpose, so long as the impeller is so placed as to force air through ports 11 into hood 10.

On the end of shaft 20, adjacent end wall 12, we mount one element 28 of an overrunning or one-way clutch 29. The other element of clutch 29 is fixed to a shaft 30 of an electric motor 31. Obviously, any type of prime mover could be used for driving shaft 20, but we have found the motor 31 most convenient for our purpose.

Within the hood 10, between end wall 12 and the adjacent end of tube 19, we mount one or more heater elements 32—32. These elements may take any suitable form as, for instance, electric heater coils, steam or hot water coils, or simply hot air radiators. The only requirement is that the heaters be of such type and location that the air drawn through ports 11, by impeller 27, be passed over the heater elements and receive a decided increase in temperature.

### Operation

In operation, the heater elements 32 are activated, to raise their temperature to the required point, at which time motor 31 is energized. Air is drawn through inlet ports 11, by impeller 27, and passed over heater elements 32 where its temperature is raised, causing the air to expand. Such expansion accelerates the flow of air toward the tube 19. As the accelerated air passes through tube 19, it strikes the fins 24 imparting an additional rotary velocity to shaft 20. The spent air then exhausts through outlet ports 13.

As the velocity of air through tube 19 increases, shaft 20 will turn faster than the motor 31, this being possible because of the provision of the one-way clutch 29.

On the end of shaft 20 remote from motor 30, we provide, in this instance, a belt pulley 33, whereby power may be taken from shaft 20.

Should the power demand on the engine not exceed that obtainable from the heat elements 32 alone, motor 31 may be deenergized after the engine has been started and the engine will continue to run under the impetus of the air acting on the fins of hub 23. However, should the power demand be greater than obtainable from the heater elements alone, motor 31 may be left running to supplement the power from heater elements 32.

To prevent heat loss from the hood 10, we provide suit-

able insulation about the hood. Such an expediency has not been illustrated in the drawings, however, since we feel that such an expedient is obvious and its illustration would unnecessarily complicate the disclosure.

It will be apparent that, as the impeller 27 rotates, a stream of air from outside the hood 10 is drawn into the inlet end of the hood, and there comes into contact with air previously heated by the units 32. The stream of relatively cold air thus contacts the mass of relatively hot air and, through the action of the impeller 27 and the action of the fins 24, the two masses of air are agitated as they move together through the tube 19.

It is our present belief that these conditions set up, within the mechanism disclosed, a miniature and controlled cyclone, just as analogous conditions, when they arise in the atmosphere, create uncontrolled and destructive cyclones in the atmosphere. The tremendous power of natural cyclones is recognized; and we believe that comparable power is created within the apparatus of the present application to do the above-described work.

I claim as my invention:

In a turbine engine comprising an elongated closed hood having inlet ports at one end and outlet ports adjacent the central portion of the other end, means to control the effective area of the inlet ports, said control means including a rotatable disk mounted exteriorly of said hood and having a handle by means of which such disk may be adjusted, said disk having apertures for registry with the inlet ports and having portions for closing the inlet ports, an elongated shaft rotatably mounted in said hood and having portions extending outwardly from each end thereof, a motor adjacent the inlet end of said hood and connected to the adjacent portion of the projecting shaft by a one-way clutch for starting said engine, a cylindrical tube within said hood spaced from the inlet end of said hood and fixedly connected to the other end wall with said cylindrical tube being of a size to extend around all of

the outlet openings, means to support said cylindrical tube concentrically with respect to said shaft in fixed position and in spaced relation to the periphery of said hood, the end of said cylindrical tube adjacent the inlet end of the hood being spaced a substantial distance from the inlet end of the hood and providing free communication between the space surrounding said cylindrical tube and the elongated hood, heating means in the portion of said hood between said inlet openings and said cylindrical tube for heating gases passing through said inlet openings, a pump adjacent said inlet openings for moving gases through said inlet openings into contact with said heating means while compressing said gases in said hood and moving the heated gases into the cylindrical tube, and cooperating turbine means on the inner periphery of said cylindrical tube and on the portion of the shaft within said cylindrical tube for producing power by the action of the heated gas passing through the cylindrical tube and means on the end of the shaft exteriorly of the hood transmitting power to a machine.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |               |               |
|-----------|---------------|---------------|
| 667,744   | Stolze        | Feb. 12, 1901 |
| 710,884   | Parsons       | Oct. 7, 1902  |
| 834,558   | Bonom         | Oct. 30, 1906 |
| 900,853   | Holly         | Oct. 13, 1908 |
| 2,280,835 | Lysholm       | Apr. 28, 1942 |
| 2,379,452 | Nettel et al. | July 3, 1945  |
| 2,405,723 | Way           | Aug. 13, 1946 |
| 2,409,176 | Allen         | Oct. 15, 1946 |
| 2,531,761 | Zucrow        | Nov. 28, 1950 |
| 2,548,858 | Benedict      | Apr. 17, 1951 |
| 2,564,042 | Walker        | Aug. 14, 1951 |

##### FOREIGN PATENTS

|         |               |               |
|---------|---------------|---------------|
| 666,857 | Great Britain | Feb. 20, 1952 |
|---------|---------------|---------------|