May 1, 1951 R. H. GODDARD 2,551,111

REVOLVING COMBUSTION CHAMBER

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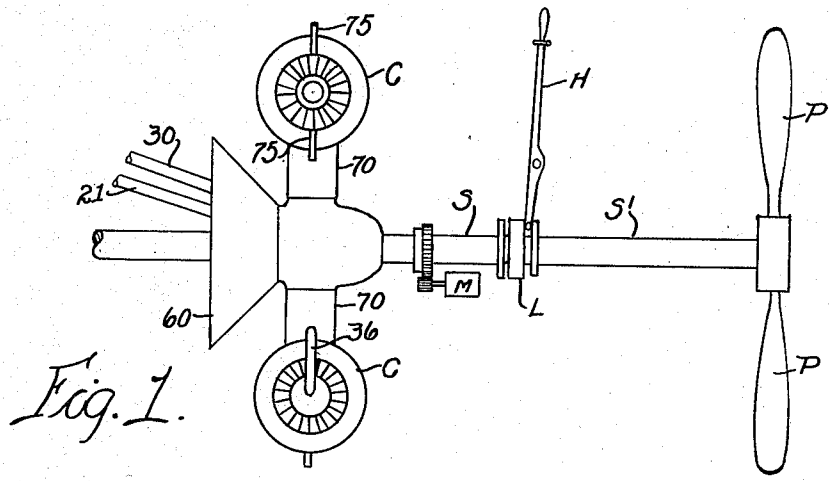


Fig. 1.

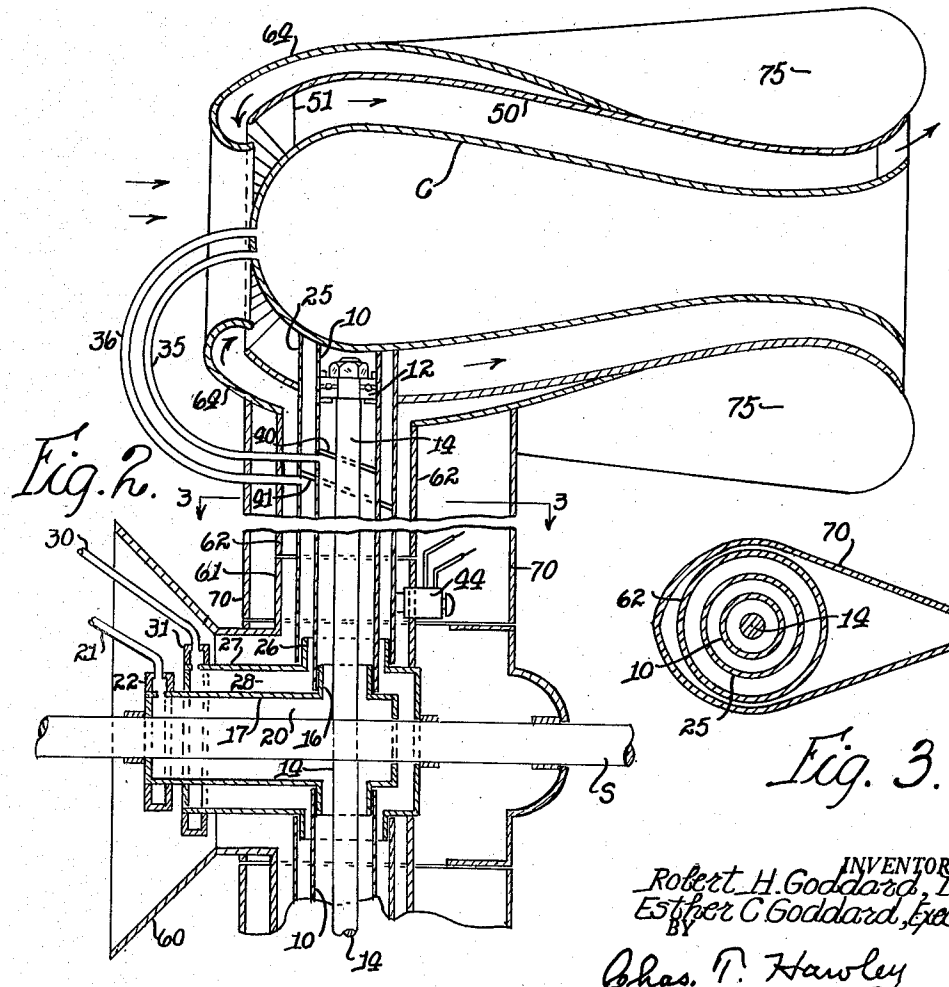


Fig. 2.

Fig. 3.

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REVOLVING COMBUSTION CHAMBER

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4 Claims. (Cl. 60—41)

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This invention relates to aircraft propulsion mechanism in which a propeller is rotated by a plurality of small combustion chambers of rocket type which are mounted to revolve in a circular path about the axis of the propeller and to supply power to rotate the propeller.

It is the general object of the invention to provide an improved construction in such propulsion mechanism, in which the revolving combustion chambers will present a minimum air resistance and will most effectively apply power to turn the propeller.

To the attainment of this general object, a construction is provided in which the combustion chambers are self-adjusting to air resistance and automatically orient themselves to positions of minimum resistance. Means is also provided to prevent such automatic adjustment during the starting up of the apparatus, and also for disconnecting the propeller from the revolving chambers so that the chambers may be started in operation and may be brought up to the desired speed of revolution with minimum resistance.

The invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawing, in which

Fig. 1 is a side elevation of the improved construction;

Fig. 2 is an enlarged sectional side elevation of one combustion chamber; and

Fig. 3 is a transverse sectional view, taken along the line 3—3 in Fig. 2.

Referring to the drawing, a pair of combustion chambers C are shown mounted on a shaft S which is rotatable in suitable bearings in an aircraft and which is aligned with a shaft S' which is similarly mounted and which is provided with propeller blades P. A clutch L is provided by which the propeller shaft S' may be connected or disconnected with respect to the shaft S by shifting a handle lever H.

The details of construction of the chamber C and the means for supplying fuel thereto and for cooling the chamber are best shown in Figs. 2 and 3.

Each chamber C is mounted at the outer end of a tube 10, which tube is rotatably supported by a thrust bearing 12 at the outer end of a cross shaft 14 secured to and rotatable with the shaft S.

The lower end of each tube 10 is open, and the

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tube rotates freely about a sleeve 16, projecting outward from a casing 17 mounted on and rotatable with the shaft S. Liquid fuel for the combustion chamber may be fed to the space 20 within the casing 17 through a feed pipe 21 connected to a hollow ring 22 mounted on the casing 17 but non-rotatable therewith.

A second tube 25 is mounted in spaced relation outside of the tube 10, and the open lower end of the tube 25 surrounds a sleeve 26, supported on a casing 27 concentric with and spaced from the casing 17 previously described. A liquid oxidizer is fed to the annular space 28 between the casings 17 and 27 through a feed pipe 30 and a hollow ring 31 mounted on but non-rotatable with the casing 27.

Feed pipes 35 and 36 connect the tubes 10 and 25 with the combustion chamber C, and spacing partitions 40 and 41 are provided within the tubes 10 and 25 and just above the points at which the feed pipes 35 and 36 enter the tubes. The liquid combustion agents are fed through the tubes 10 and 25 by centrifugal force.

Provision is thus made for continuous feed of liquid fuel and a liquid oxidizer to the combustion chamber C, while at the same time the chamber C is free to rotate about the axis of the cross shaft 14 and is also free to revolve bodily about the axis of the shaft S.

In order to prevent angular movement of the combustion chambers about the axis of the shaft 14 while the combustion chambers are being placed in operation, a magnetic or solenoid type brake 44 may be provided.

Special provision is made for cooling the combustion chambers and comprises a jacket casing 50 surrounding the combustion chamber C and held in spaced relation thereto by axially extending spaced partitions 51. Both ends of the jacket space between the casing 50 and the chamber C are open, and the rush of air through this jacket space when the aircraft is in flight effectively cools the combustion chamber.

If additional cooling effect is desired, a funnel 60 is mounted concentric with the shaft S and is spaced outwardly from the sleeve 27. A sleeve 61 projects radially from the funnel 60 and is aligned with a tube 62 concentric with the tube 25 previously described and rotatable therewith.

The tube 62 communicates with a supplementary jacket casing 64, spaced from the jacket casing 50 and having its rear end portion reentrant, as clearly shown in Fig. 2. Air entering the funnel 60 travels outward through the sleeve 61 and tube 62 to the auxiliary jacket space, where its

direction of movement is reversed and it enters the open front end of the main jacket space between the jacket casing 60 and the combustion chamber C. The flow of air through this auxiliary jacket space is much increased by centrifugal force in the tubes 62 as high speeds of rotation are attained.

In order to reduce the air resistance of the tubes which support the combustion chambers, a streamlined casing 70 (Fig. 3) is provided outside of each sleeve 61 and tube 62. This casing is mounted on the outer jacket casing 64 and turns with the combustion chamber about the axis of the shaft 14.

Vanes 75 are mounted on the combustion chambers outside of the jacket casings and act to orient the chamber C with respect to the resultant air resistance due to movement of the aircraft through the atmosphere and to revolution of the combustion chambers about the axis of the shaft S.

In starting this propulsion mechanism in operation, the chambers are held from movement about the axis of the cross shaft 14 by the magnetic or solenoid device 44 and the clutch L is disengaged so that the chambers may revolve freely about the axis of the shaft S until full operation of the chambers is attained. The brake is then released and the clutch L is engaged, whereupon the propeller blades are positively rotated and the combustion chambers are correctly and automatically oriented to minimize air resistance.

It will be noted that the propellers are quite independent of the combustion chambers, so that no modification of the propellers is necessary, and furthermore the combustion chambers may be located at any desired distance from the axis of the shaft S without regard to the length of the propeller blades. This permits selection of such radial position as will develop the desired centrifugal force for fuel feed.

Any suitable power means, such as a motor M, may be provided to produce initial revolution of the chambers, and any usual ignition means may also be provided.

Having thus described the invention and the advantages thereof, it will be understood that the invention is not to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what is claimed is:

1. In an aircraft propulsion mechanism, a propeller shaft, combustion chambers mounted to revolve bodily in a circular path and effective to supply power to thus revolve said chambers and also said propeller shaft, means to feed liquid combustion agents to said chambers, means to support said chambers for free rotation about radial axes, self-orienting means on said chambers effective to orient said chambers on said axes in response to air resistance, jacket means for air-cooling the combustion chambers and which jacket means are freely open at both the forward and rearward ends, and auxiliary air-cooling means, the effect of which is augmented by centrifugal force.

2. In an aircraft propulsion mechanism, a propeller shaft, combustion chambers mounted to revolve bodily in a circular path and effective to supply power to thus revolve said chambers and also said propeller shaft, means to feed liquid combustion agents to said chambers, means to support said chambers for free rotation about radial axes, self-orienting means on said chamber effective to orient said chambers on said axes in response to air resistance, braking means effective to selectively prevent free orientation of said combustion chambers during starting operations, and electrical means to render said braking means operative and inoperative.

3. In an aircraft propulsion mechanism, a rotatable shaft, a cross shaft mounted thereon, combustion chambers rotatably mounted on said cross shaft, an air-cooling jacket for each chamber, a funnel concentric with said rotatable shaft and open at its forward end, and radial tubes connecting said funnel to said jackets, each chamber having an air-passage between said air-cooling jacket and said chamber and open at both ends, and air from said outer air-cooling jackets being discharged into said inner air-passages near the entrance end thereof.

4. In an aircraft propulsion mechanism, a rotatable shaft, a cross shaft mounted thereon, combustion chambers rotatably mounted on said cross shaft, an air-cooling jacket for each chamber, a funnel concentric with said rotatable shaft and open at its forward end, and radial tubes connecting said funnel to said jackets, each chamber having an air-passage between said air-cooling jacket and said chamber and open at both ends, and air from said outer air-cooling jackets being discharged into each inner air-passage near the entrance end thereof, and means being provided to redirect said air rearward as so discharged.

ESTHER C. GODDARD,
Executrix of the Last Will and Testament of Robert H. Goddard, Deceased.

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