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R. H. GODDARD

2,544,418

DRIVING MEANS FOR ROTATING COMBUSTION CHAMBERS

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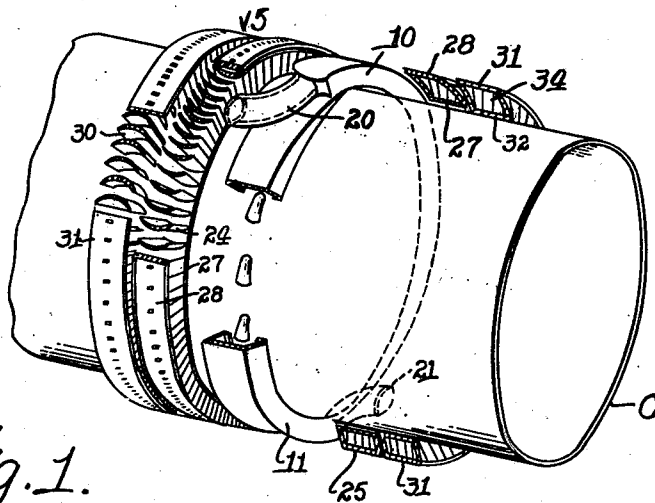


Fig. 1.

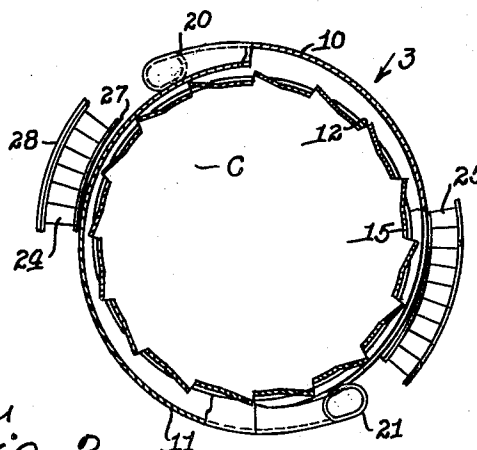


Fig. 2.

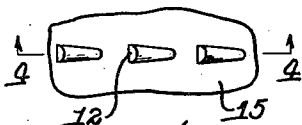


Fig. 3.

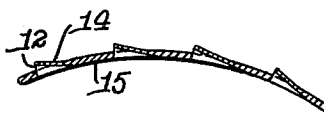


Fig. 4.

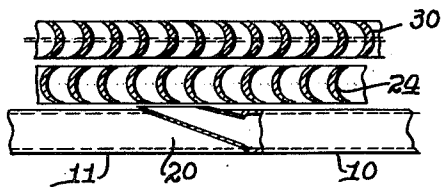


Fig. 5.

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2,544,418

DRIVING MEANS FOR ROTATING COMBUSTION CHAMBERS

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1 Claim. (Cl. 60—41)

1

This invention relates to combustion chambers as used in propulsion apparatus, and relates more particularly to combustion chambers of the rotating type.

It is the general object of the present invention to provide improved means for rapidly rotating such combustion chambers.

To the attainment of this general object in the preferred form, provision is made for utilizing a portion of the combustion gases in two reactive stages. More specifically, the invention contemplates the use of separate sets of fixed and rotating turbine blades coacting with auxiliary reaction nozzles mounted on and rotating with the combustion chamber.

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

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

Fig. 1 is a perspective view of portions of a rotating combustion chamber having this invention applied thereto;

Fig. 2 is an irregular transverse sectional view of the apparatus shown in Fig. 1;

Fig. 3 is a detail view of a portion of the combustion chamber wall, looking in the direction of the arrow 3 in Fig. 2;

Fig. 4 is a detail sectional elevation, taken along the line 4—4 in Fig. 3; and

Fig. 5 is a diagrammatic sectional plan view, looking in the direction of the arrow 5 in Fig. 1.

Referring to the drawing, a combustion chamber C is mounted to rotate about its longitudinal axis, and combustion gases at relatively high pressure are developed within the chamber C in the usual manner, as shown generally in the prior Goddard Patent No. 2,395,403, issued Feb. 26, 1946.

A two-part volute manifold 10—11 is mounted on the combustion chamber C and receives combustion gases under pressure from the chamber C through a series of peripheral outlets 12 (Fig. 3). These outlets are preferably formed in outwardly displaced portions 14 of the cylindrical wall 15 (Figs. 3 and 4) of the combustion chamber C.

The volute manifold portions 10 and 11 terminate in auxiliary nozzles 20 and 21, each of which is curved transversely with respect to the manifold to discharge its combustion gases against an adjacent series of turbine blades 24 or 25. The nozzle 20 is curved to the left, as viewed in Fig. 1, and discharges against the

2

blades 24, while the diametrically opposite nozzle 21 is curved to the right and discharges against the blades 25.

Each set of blades 24 and 25 is mounted between shroud rings 27 and 28 and the outer rings 28 are rigidly supported in any convenient manner, while the inner rings 27 have clearance with respect to the rotating cylinder C.

A set of movable turbine blades 30 is mounted on the cylinder C to rotate with the cylinder and adjacent the fixed blades 24. These blades are provided with an outer shroud ring 31 and an inner shroud ring 32. A similar set of movable blades 34 are mounted on the cylinder C to rotate closely adjacent the fixed blades 25 previously described.

The operation of the device is as follows: Combustion gases under pressure are delivered through the openings 12 to the volute manifolds 10 and 11 which rotate with the chamber C. The gases are discharged from these manifolds through the auxiliary nozzles 20 and 21, which divert the gases and discharge them more or less parallel to the axis of the combustion chamber C.

The discharged gases strike the fixed turbine blades 24 and 25, producing a strong rotational reaction, and the discharge of the nozzles 20 and 21 in opposite axial directions balances the axial thrust. As the gases leave the fixed blades 24 and 25, they encounter the blades 30 and 34 which rotate with the chamber C. The speed of rotation of the chamber C is thus further increased by the reaction which then takes place between the redirected gases and the movable blades 30 and 34.

Operating as above set forth, the driving mechanism herein shown rotates the combustion chamber efficiently and at high speed by the use of relatively simple devices, all parts of which are fixed to the combustion chamber or occupy fixed positions coaxial therewith.

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 claim, but what is claimed is:

In propulsion apparatus, a rotatably mounted combustion chamber, and driving means for rotating said chamber comprising a two-part manifold mounted on and encircling said chamber, a pair of auxiliary nozzles rotating with said chamber and manifold and spaced substantially 180° apart and separately terminating the two parts of said manifold and angularly posi-

3

tioned to discharge the combustion gases at substantial axially-inclined lateral angles, reversed with respect to the plane of rotation of said nozzles, a separate annular set of fixed turbine blades mounted axially adjacent the path of rotation of each nozzle outlet and coaxial with said rotating chamber, said fixed blades receiving the gases discharged by said nozzles and reacting with said gases to rotate said chamber, and means to supply combustion gases under pressure from said chamber to said manifold, the nozzles of each auxiliary pair discharging in opposite axial directions and thereby balancing the axial thrusts of said nozzles, and a separate set of blades rotatable with said combustion chamber being provided adjacent each set of fixed blades and coacting therewith.

ESTHER C. GODDARD,

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

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,279,128	Lake -----	Sept. 17, 1918
1,348,103	George -----	July 27, 1920
1,960,810	Gordon -----	May 29, 1934
2,154,481	Vorkauf -----	Apr. 18, 1939
2,424,610	Goddard -----	July 29, 1947

FOREIGN PATENTS

Number	Country	Date
445,550	Great Britain -----	Apr. 9, 1936
469,180	Great Britain -----	July 20, 1937
536,238	Great Britain -----	May 7, 1941
476,033	Germany -----	May 8, 1929