Aug. 7, 1951 R. H. GODDARD 2,563,026

OPPOSED CONICAL JACKET WALL ROTARY COMBUSTION CHAMBER

Filed Aug. 23, 1947

Fig 1

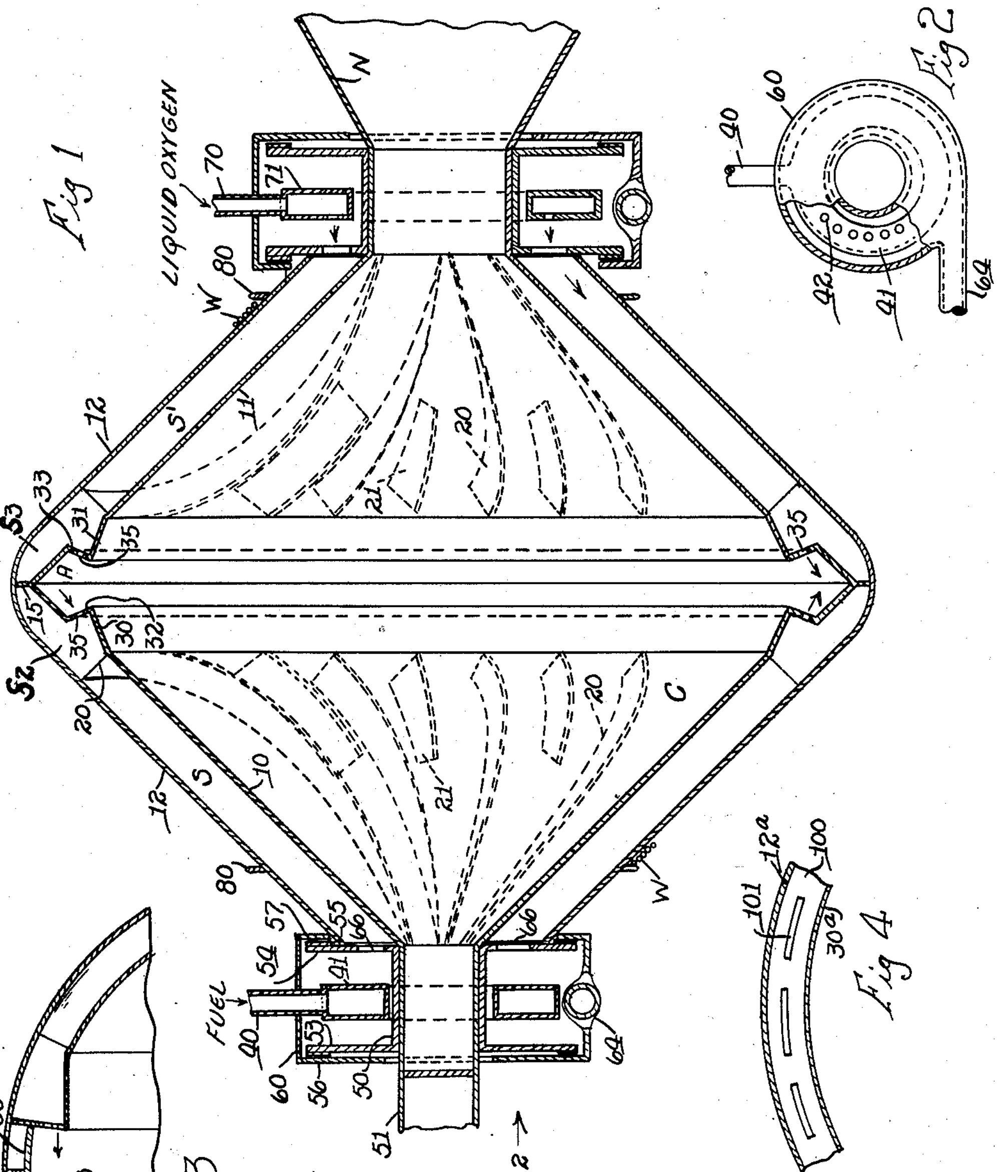

Fig 2

Fig 3

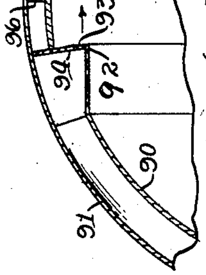

Fig 4

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OPPOSED CONICAL JACKET WALL ROTARY COMBUSTION CHAMBER

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1 Claim. (Cl. 60—44)

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This invention relates to rotating combustion chambers of the general type shown in Robert H. Goddard Patent No. 2,395,114, issued February 19, 1946 and which are adapted for use in aircraft of the rocket type.

In such a combustion chamber, combustion liquids are supplied at opposite ends of the rotating chamber axis to jacket spaces within a jacket casing surrounding said chamber and rotating therewith. The two liquids are introduced to the combustion chamber itself near the periphery thereof and adjacent the largest diameter of said chamber.

An important feature of the present invention relates to the provision of a plurality of spirally disposed vanes in each jacket space, by which vanes the combustion liquids are held in close cooling contact with all portions of the combustion chamber walls.

A further feature of the invention relates to the provision of improved constructions for introducing the liquids to the combustion chamber and for effecting intermingling of said liquids. Special provision is also made for securing uniform feed of the liquids to the jacket spaces and for preventing leakage or loss of the combustion liquids.

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

Preferred forms of the invention are shown in the drawing, in which

Fig. 1 is a sectional front elevation of a rotating combustion chamber embodying this invention;

Fig. 2 is an end view of certain parts, partly in section and looking in the direction of the arrow 2 in Fig. 1;

Fig. 3 is a partial sectional front elevation of a modified construction; and

Fig. 4 is a detail view of a further modification of that portion of the structure shown in Fig. 1 which is seen when looking in the general direction of the arrow A in the upper part of said figure.

Referring to Figs. 1 and 2, a combustion chamber C is shown comprising opposed conical chamber walls 10 and 11 enclosed within a jacket casing 12 which defines jacket spaces S and S' separated by an annular partition 15 which is associated with the opposed and abutting conical peripheral portions of said chamber walls.

The chamber walls 10 and 11 are spaced from the jacket casing 12 by a plurality of spirally curved vanes or partitions 20 and short inter-

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mediate curved vanes 21. These partitions not only hold the casing walls 10 and 11 spaced from the jacket casing 12 but also subdivide the jacket spaces S and S' into spirally arranged expanding passages through which the combustion liquids are fed to continuous annular spaces S2 and S3 (Fig. 1) at the outer ends of the spiral vanes 20 and 21.

The edge portions 30 and 31 of the chamber walls 10 and 11 are inwardly offset to receive annular flaring rings 32 and 33 having spray openings 35.

One of the combustion liquids, as gasoline, is fed through a pipe 40 to an annular member 41 disposed about the axis of the combustion chamber C and provided with an annular series of feed openings 42 (Fig. 2).

A sleeve 50 is mounted on the tubular extension 51 of the chamber C and is provided with discs 53 and 54 having radial vanes or projections 55 which rotate closely adjacent inwardly flanged portions 56 and 57 of a casing 60, mounted on and centered by the pipe 40. A drain pipe 64 is provided for the casing 60. A plurality of large feed openings 66 provide communication from the inside of the casing 60 to the jacket space S.

At the opposite end of the combustion chamber, a feed pipe 70 and an annular member 71 provide liquid oxygen, which is delivered to the combustion chamber through the jacket space S'. Sealing devices of exactly similar construction are provided and do not require separate description.

A discharge nozzle N is connected to the chamber wall portion 11 and rotates therewith.

With the construction shown, gasoline under slight pressure is supplied through the pipe 40 and member 41 to the jacket space S, where the spiral vanes 20 and 21 induce outward flow by centrifugal force. These vanes insure that all portions of the combustion chamber wall 10 are effectively cooled by liquid in contact therewith, and that no portions of said wall are left uncovered by liquid. Burning of the chamber wall 10 is thus effectively prevented.

Any combustion liquid supplied through the member 41 and not entering the jacket space S is prevented from escaping from the casing 60 by the discs 53 and 54 and the vanes 55, and any liquid which accumulates in the casing 60 may be drawn off through the pipe 64, so that no combustion liquid is wasted.

The jacket wall 12 may be reenforced by wires W, criss-crossed over the surface of the jacket casing and prevented from axial displacement by annular flanges 80.

In the construction shown in Fig. 3, a portion of a spherical rotating combustion chamber is shown, having a spherical chamber wall 90 which takes the place of the double conical walls 10 and 11 of Fig. 1. The spherical chamber is surrounded by a jacket casing 91 and has inwardly offset portions 92 connected to the jacket by rings 93 having spray openings 94. A band 95 may be interposed between the plates 94 to stiffen the construction, and a ring 96 may be added to brace the band 95.

In Fig. 4 a modified construction of end plates, as 32 and 33, is shown in which a chamber wall portion 30*a* and jacket casing 12*a* are connected by an end plate 100 having circumferentially extending slots 101, which slots take the place of the perforations 35. The construction and operation is otherwise the same.

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:

A rotated combustion chamber having opposed and abutting conical chamber walls increasing in diameter from the opposite and small ends of said chamber to a medial plane, a double conical jacket casing rotating with said combustion chamber and providing two opposed jacket spaces for a liquid fuel and a liquid oxidizer respectively, an annular partition member in said medial

plane and radially interposed between said jacket casing and the abutting conical peripheral portions of said conical chamber walls and closing the adjacent ends of said jacket spaces, said conical chamber walls having inwardly offset portions adjacent said medial plane but spaced therefrom by the extreme outer edge portions of said walls, and said conical chamber walls having outwardly-flaring annular rings connecting said offset wall portions to said outer edge portions of said walls and defining with said outer edge portions an outwardly-expanding peripheral mixing area, and said annular rings having feed openings therein which are directed into said mixing area, and means to feed liquid fuel and a liquid oxidizer under pressure to said jacket spaces and through said feed openings into said mixing area from opposite sides thereof and along intersecting lines.

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

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