Dec. 5, 1950 R. H. GODDARD 2,532,712

VANE STRUCTURE FOR ROTATING COMBUSTION CHAMBERS

Filed March 24, 1948

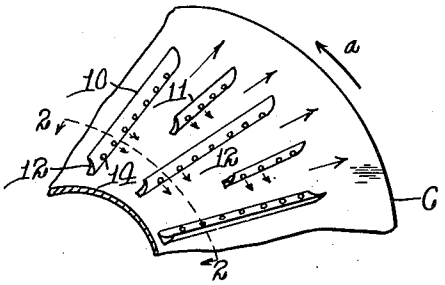

Fig. 1.

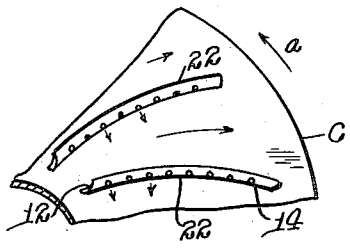

Fig. 3.

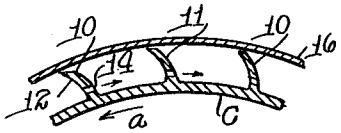

Fig. 2.

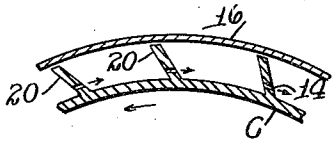

Fig. 4.

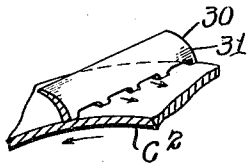

Fig. 5.

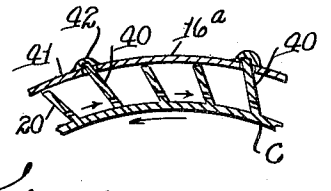

Fig. 6.

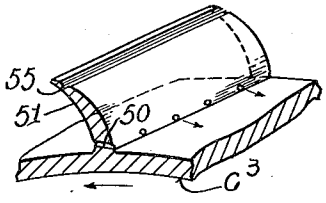

Fig. 7.

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2,532,712

VANE STRUCTURE FOR ROTATING COMBUSTION CHAMBERS

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Application March 24, 1948, Serial No. 16,865

9 Claims. (Cl. 60—44)

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This invention relates to propulsion apparatus and more particularly to jacketed rotating combustion chambers as used in such apparatus.

In a jacketed combustion chamber, as shown for instance in prior Goddard Patent No. 2,395,114 issued February 19, 1946, spaced vanes or partitions are customarily provided in the jacket space. Such vanes accelerate the rotating motion of the liquid in the jacket space and keep the chamber wall and the jacket casing in definite spaced relation. The liquid in the jacket space is provided to cool the thin metallic wall of the combustion chamber, which is exposed to the high temperatures of the combustion gases.

It is found, however, that rapid rotating movement of the jacket vanes or partitions tends to leave a narrow strip of chamber wall surface behind each vane which is partially or wholly uncovered and which may thus easily be burned.

It is the general object of this invention to provide a novel vane or partition structure by which such undesirable burning is avoided and by which substantially uniform cooling of the entire chamber wall surface is attained.

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

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

Fig. 1 is a perspective view of a portion of a rotating combustion chamber wall having this improved vane structure associated therewith;

Fig. 2 is a transverse sectional elevation of the improved vane structure, taken along the line 2—2 in Fig. 1;

Fig. 3 is a view similar to Fig. 1 but showing a modified form of vane;

Fig. 4 is a view similar to Fig. 2 but showing a slight modification thereof;

Fig. 5 is a partial perspective view showing an additional modification;

Fig. 6 is a view similar to Fig. 4 but showing a modification thereof; and

Fig. 7 is an enlarged perspective view of a vane to be described.

Referring to Figs. 1 and 2, a portion of a combustion chamber wall C is shown as provided with outwardly extending vanes 10 and 11. The vanes 11 are similar to the vanes 10 but are of only partial length and are provided to effect more uniform coverage of the surface to be protected.

Each vane 10 or 11 has a concave forward face 12 which provides an elongated pocket in which a portion of a cooling liquid will be retained as

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the chamber C rotates in the direction of the arrow *a*.

A plurality of small holes 14 extend through the base of each vane 10 or 11, so that the liquid retained in each pocket 12 will be sprayed through these holes 14. This water will then cover and protect the chamber wall surface directly rearward of the vane, and damage to the chamber wall by burning will thus be substantially avoided. The jacket casing is shown at 16.

The vanes 10 and 11 may be forwardly curved as shown in Fig. 2, or may provide forwardly-inclined plane surfaces as shown at 20 in Fig. 4.

The vanes may be straight lengthwise as shown at 10 in Fig. 1, or may be curved lengthwise as shown at 22 in Fig. 3. Radiating or outward movement of the cooling liquid is somewhat slower with the curved vanes 22 than with the straight vanes 10.

A convenient means of forming the vanes and spray openings is shown in Fig. 5, in which each vane 30 is made as a separate unit, with spray openings 31 pre-formed in its lower edge. Each vane 30 may be secured to the outer surface of the chamber C2 by spot welding to the chamber at selected points along the lower edge of the vane.

Certain of the vanes 40 in Fig. 6 may be secured to the jacket casing 16*a* by extending these vanes through slots 41 in the jacket casing and by welding these extended vanes to the jacket casing as indicated at 42.

In Fig. 7 a slight further modification is shown, in which the holes 50 in the vane 51 are inclined toward the outer surface of the chamber C3 to effect more direct engagement of the cooling liquid with the chamber surface. The outer edge of the vane 51 is also shown as notched at 55 to provide a spacing surface for a jacket casing to be seated and secured thereon.

In all forms of the invention, the essential feature is the provision of a pocket or recess in the front face of each vane in which cooling liquid may collect, and the provision of spray holes or openings through the bases of the vanes by which the collected liquid will be sprayed over all closely adjacent surfaces of the combustion chamber wall.

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. A combustion chamber having a rotating wall, a casing enclosing a jacket space for a

cooling liquid outside of said wall but adjacent thereto, and a plurality of vanes mounted on said wall and in said jacket space, which vanes assist in circulating said liquid and have their leading faces positioned to provide pockets extending lengthwise of said vanes, and each vane having a plurality of small transverse feed passages extending therethrough near the base thereof, which passages are effective to deliver portions of the cooling liquid to the combustion chamber wall directly at the rear of each vane.

2. The combination in a combustion chamber as set forth in claim 1, in which the leading face of each vane is concavely recessed lengthwise.

3. The combination in a combustion chamber as set forth in claim 1, in which the leading face of each vane is flat and forwardly inclined.

4. The combination in a combustion chamber as set forth in claim 1, in which each vane is a separate preformed unit and has a series of preformed transverse feed passages in its base edge portion.

5. The combination in a combustion chamber as set forth in claim 1, in which the transverse feed passages are inclined to direct the liquid streams toward the adjacent combustion chamber wall.

6. The combination in a combustion chamber as set forth in claim 1, in which each vane is longitudinally straight.

7. The combination in a combustion chamber as set forth in claim 1, in which each vane is longitudinally curved.

8. The combination in a combustion chamber as set forth in claim 1, in which portions of the vanes extend through and are welded to the jacket casing.

9. The combination in a combustion chamber as set forth in claim 1, in which the vanes have longitudinal notches near their tips which provide locating seats for the jacket casing.

ESTHER C. GODDARD.

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

REFERENCES CITED

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

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Number	Name	Date
2,286,909	Goddard	June 16, 1942
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