July 18, 1950 R. H. GODDARD 2,515,645

FEEDING MEANS FOR ROTATING COMBUSTION CHAMBERS

Filed March 22, 1947

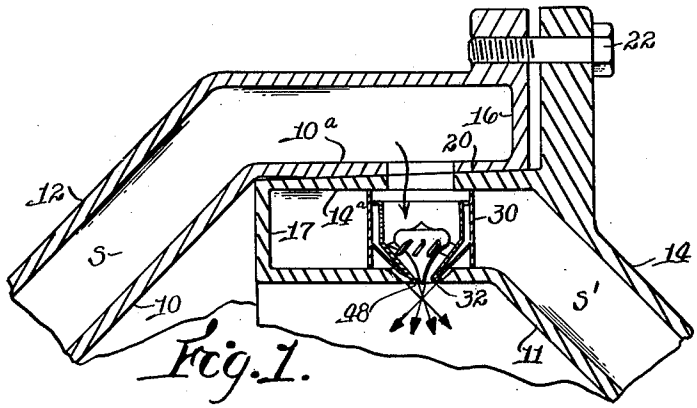


Fig. 1.

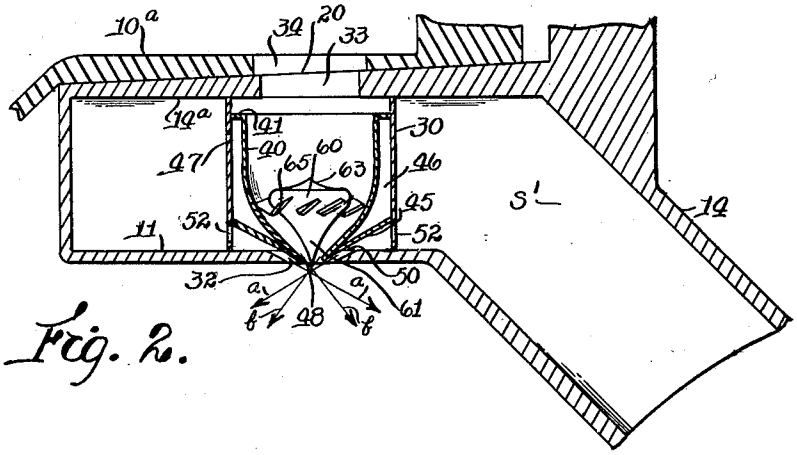


Fig. 2.

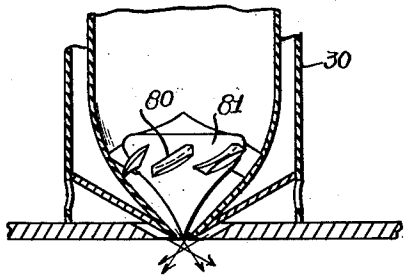


Fig. 3.

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Patented July 18, 1950

2,515,645

UNITED STATES PATENT OFFICE

2,515,645

FEEDING MEANS FOR ROTATING COMBUSTION CHAMBERS

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Application March 22, 1947, Serial No. 736,444

3 Claims. (Cl. 60—44)

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This invention relates to means for feeding liquid combustion elements, such as gasoline and liquid oxygen, to a combustion chamber of the type used in propulsion apparatus. The invention is capable of somewhat general application in combustion chambers, but is particularly designed for use in combustion chambers of the rotating type.

It is the general object of the invention to provide improved means for injecting combined sprays of two different combustion liquids to a combustion chamber.

More specifically, the invention relates to an improved spray head by which two different liquids may be concentrically fed and effectively intermingled.

In the preferred form, the liquid which is fed nearer the axis of the spray head is given a whirling motion while the outer liquid is fed without rotation. Impact of the whirling liquid on the enclosing and straight-moving liquid produces most effective intermingling.

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 sectional elevation of a portions of a rotating combustion chamber having this invention applied thereto;

Fig. 2 is an enlarged sectional elevation of certain parts shown in Fig. 1; and

Fig. 3 is an enlarged partial sectional elevation of a slightly modified construction.

Referring to Fig. 1, a portion of a combustion chamber wall is indicated at 10 and a second chamber wall portion is shown at 11. An outer casing 12 coacts with the wall portion 10 to enclose a jacket space S, and an outer casing 14 similarly coacts with the wall portion 11 to enclose a jacket space S'. These jacket spaces are closed at their adjacent ends by wall portions 16 and 17.

The two chamber units contain combustion liquids under pressure and have areas which abut along a slightly conical surface 20. The chamber units may be secured in assembled relation by clamping bolts 22.

A sleeve 30 (Fig. 2) extends across the space S' between the chamber wall portion 11 and the outer casing portion 14a. The sleeve 30 is firmly secured in position coaxially with a spray opening 32 in the wall portion 11, which opening is aligned with passages 33 and 34 in the abutting

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portions 14a of the casing 14 and 10a of the chamber wall 10.

An inner and bell-shaped sleeve 40 is mounted within the sleeve 30 but is spaced therefrom by an outwardly projecting flange 41 at its upper end. The sleeve 40 is contracted toward its lower end, and its lower end portion is held in spaced relation to the sleeve 30 by a conical brace member 45. An annular air space 46 is thus provided between the sleeves 30 and 40, which air space may be vented through a small hole 47. The sleeve 40 has a spray opening 48 at its lower end, concentric with the spray opening 32 previously described.

An annular conical slot 50 is formed between the beveled upper annular surface surrounding the spray opening 32 and the conical under surface of the brace member 45. Openings 52 are provided in the lower end portion of the sleeve 30, so that a combustion liquid from the space S' may be sprayed through the annular slot 50. This spray will tend to assume a conical form, as indicated by the arrows *a*, but will have no substantial rotation or whirling motion.

A substantially conical plug 60 is mounted in the lower portion of the inner sleeve 40, and the pointed lower end 61 of the plug 60 extends into the inner spray opening 48 but is spaced therefrom. The plug 60 is preferably streamlined at its upper end, as indicated at 63, to reduce friction.

The plug 60 is provided with angularly disposed vanes 65, the outer ends of which engage and are secured to the inner surface of the sleeve 40. The plug 60 is thus secured in position and acts to impart a substantial whirling motion to the second combustion liquid, which is fed under pressure from the space S through the passages 33 and 34 to the upper end of the sleeve 40. The second combustion liquid thus enters along lines indicated by the arrows *b* but with a substantial whirling motion.

The two combustion liquids thus cross each other as they enter the combustion chamber, and, furthermore, one combustion liquid, as oxygen, is rapidly whirling while the other combustion liquid, as gasoline, tends to travel in straight lines. Most effective and rapid intermingling of the combustion liquids thus takes place, particularly if the combustion chamber itself is also rotating.

It will be understood that any desired number of spray heads may be provided in a combustion chamber.

In the slightly modified construction shown in

Fig. 3, the vanes 80 on the plug 81 are set at a smaller angle, so that the rate of rotation of the liquid passing the vanes will be correspondingly increased.

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

1. In a combustion chamber, feeding means for two different combustion liquids comprising a casing supplied with a first combustion liquid and having an opening into said chamber, a partition structure having an axial spray opening, said structure being mounted in said casing and spaced from the edge of said first opening to provide an annular feeding slot for said first combustion liquid, means to supply a second combustion liquid within said partition structure, a conical plug mounted within said partition structure and in coaxial and spaced relation therewith, and means to rapidly rotate said second liquid as it approaches said axial spray opening in said partition structure.

2. The combination in feeding means for a combustion chamber as set forth in claim 1, in which the liquid-rotating means comprises a series of angularly disposed vanes mounted between said plug and said partition structure and imparting a whirling motion to said second liquid.

3. In a combustion chamber, feeding means for two different combustion liquids comprising a casing supplied with a first combustion liquid and

having a lower wall with an opening into said chamber, a cylindrical partition member mounted in said casing concentric with said opening, a conical member mounted in said partition member and spaced from the lower wall of said casing to provide an annular feeding slot for said first liquid at said opening, an inner partition member mounted within said first partition member and which is substantially bell-shaped and with an axial spray opening in its contracted lower end, a conical plug positioned above said axial opening but spaced therefrom, and a plurality of short angularly disposed vanes secured between said plug and said inner partition member and imparting a whirling motion to a second combustion liquid as it approaches said axial opening.

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

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