Aug. 8, 1950 R. H. GODDARD 2,518,003

RING VALVE CONSTRUCTION FOR COMBUSTION CHAMBERS

Filed March 4, 1948

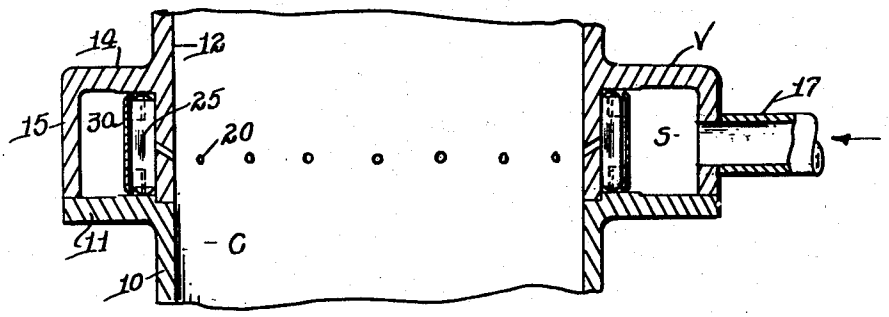


Fig. 1.

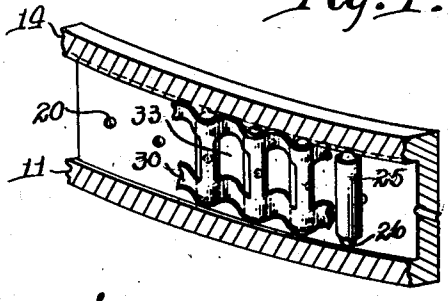


Fig. 2.

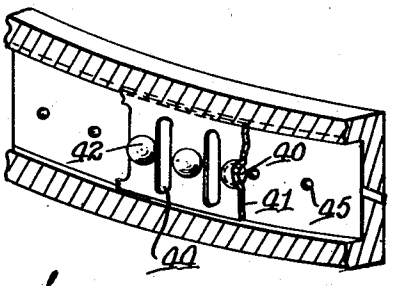


Fig. 3.

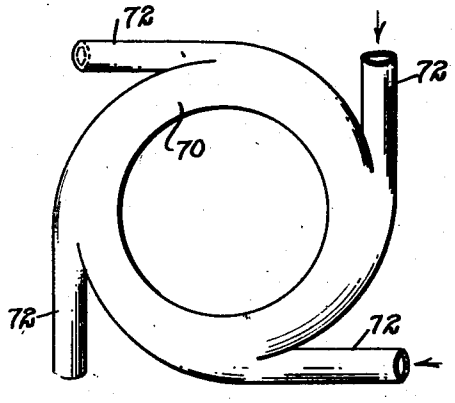


Fig. 5.

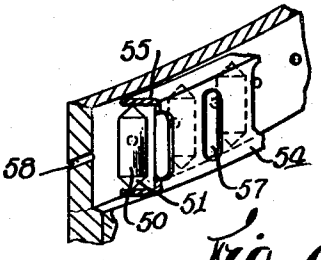


Fig. 4.

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Patented Aug. 8, 1950 2,518,003

UNITED STATES PATENT OFFICE

2,518,003

RING VALVE CONSTRUCTION FOR COMBUSTION CHAMBERS

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Application March 4, 1948, Serial No. 13,055

7 Claims. (Cl. 60—44)

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This invention relates to combustion chambers to which one or both combustion liquids are fed in a rapid succession of separated small portions or slugs. Such combustion chambers have particular utility in rocket apparatus and in other jet-propelled mechanism.

Apparatus of this general type is shown in the prior Goddard Patent No. 2,409,036 issued October 8, 1946.

It is the general object of the present invention to produce an improved ring valve construction for such combustion chambers, in which rotating or anti-friction valve elements are provided for opening and closing the admission ports in the combustion chamber wall.

A further object is to provide a ring valve so constructed that it may be rotated with slight friction by a combustion liquid supplied tangentially thereto.

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 sectional side elevation of a portion of a combustion chamber having the improved ring valve construction embodied therein;

Fig. 2 is a perspective view, partly in section and showing a portion of the valve construction disclosed in Fig. 1;

Figs. 3 and 4 are perspective views similar to Fig. 2 but showing modified constructions; and

Fig. 5 is a plan view of a volute to be described.

Referring to Figs. 1 and 2, a combustion chamber C is shown as having a lower cylindrical wall portion 10 provided with a flange 11, and as having an upper wall portion 12 provided with a flange 14 and with an outer casing portion 15. The flanges 11 and 14 and the outer casing 15 form a volute V enclosing a space S to which a combustion liquid is fed under pressure through a supply pipe 17.

The wall portion 12 of the chamber C is provided with an annular series of ports 20 extending through the chamber wall and preferably inclined downward or toward the discharge end of the chamber. A plurality of rolls 25 are mounted in the channel formed by the inner faces of the flanges 11 and 14 and the outer face of the cylinder wall portion 12.

The rolls 25 preferably have rounded end portions 26 which freely engage the inner faces of the flanges 11 and 14. The rolls 25 are held in spaced relation by a corrugated ring or band 30,

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which extends completely around the cylinder C and which loosely engages the rolls 25 and maintains them in circumferentially spaced relation, while at the same time permitting free rotation and rolling movement thereof.

The number of rolls 25 is neither a multiple nor a divisor of the number of holes 20, so that admission of the slugs of combustion liquid through the ports 20 will be progressive as the band 30 and rolls 25 rotate about the cylinder C. Consequently, there will be substantially continuous admission of combustion liquid to the chamber C, but the liquid will be admitted in the form of separate slugs which travel along a plurality of separate but converging paths.

The number of holes is commonly one or two less than the number of rolls. Openings 33 in the band 30 allow free flow of the combustion liquid to any uncovered port 20.

In the construction shown in Fig. 3, balls 40 are substituted for the rolls 25, and the spacing band 41 has outwardly cupped or displaced portions 42 to loosely receive and locate the balls 40. Slots 44 in the band 41 permit free access of the combustion liquid to ports 45 as they are successively uncovered by the balls 40.

In the construction shown in Fig. 4, rolls 50 having pointed ends 51 are substituted for the rolls 25 shown in Fig. 2, and these rolls 50 are circumferentially spaced in a U-shaped band 54 having flanges 55. Each flange 55 is provided with circumferentially spaced depressions adapted to receive the pointed ends of the rolls 50 and to thus space the rolls circumferentially. Slots 57 permit passage of liquid to ports 58 as the ports are successively uncovered.

In order that the bands and associated rollers or balls may be more effectively rotated, the enclosing volute may be constructed as shown at 70 in Fig. 5, with the combustion liquid supplied tangentially through a series of feed pipes 72. Such tangential feed of the combustion liquid to the volute produces rapid rotation of the liquid within the volute and correspondingly rotates the rollers or balls and their associated spacing bands.

With each of the constructions above described, a plurality of inlet ports may be rapidly opened and closed with a minimum of friction loss, and all moving parts are so constructed that maximum reliability is attained.

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 combustion apparatus comprising a combustion chamber having a cylindrical side wall and having an annular series of feeding ports in said wall for a combustion liquid, that improvement in valve means for said combustion chamber which comprises casing elements enclosing an annular passage for said liquid, a plurality of valve members mounted to roll in said annular passage and to successively coact with said feeding ports to open and close said ports, and means to hold said valve members circumferentially spaced from each other.

2. The combination in combustion apparatus as set forth in claim 1, in which the number of rolls differs from the number of ports by a very few units.

3. In combustion apparatus comprising a combustion chamber having a cylindrical side wall and having an annular series of feeding ports in said wall for a combustion liquid, that improvement in valve means for said combustion chamber which comprises casing elements enclosing an annular passage for said liquid, a plurality of valve members mounted to roll in said annular passage and to successively coact with said feeding ports to open and close said ports, a band in which said rolling members are mounted in circumferentially spaced relation, and means to supply said combustion liquid tangentially to said annular passage and to thereby effect rotation of said liquid and of said band and valve members in said passage and around said combustion chamber.

4. The combination in combustion apparatus as set forth in claim 3, in which the valve members are rolls, and in which the band is corrugated to receive said rolls and to hold said rolls loosely in circumferentially spaced relation.

5. The combination in combustion apparatus as set forth in claim 3, in which the valve members are rolls having pointed ends, and in which the band is U-shaped in section and has spaced depressions in its side flanges to receive said pointed ends and to thereby circumferentially space said rolls.

6. The combination in combustion apparatus as set forth in claim 3, in which the valve members are balls, and in which the band has spaced outwardly displaced portions to receive said balls and to hold them loosely in circumferentially spaced relation.

7. The combination in combustion apparatus as set forth in claim 3, in which the band has openings between adjacent valve members which afford free circulation of the combustion liquid in said passage and toward said feeding ports.

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REFERENCES CITED

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

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Number	Name	Date
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2,409,036	Goddard	Oct. 8, 1946