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PRESSURIZED JACKET CONSTRUCTION FOR ROTATING COMBUSTION CHAMBERS

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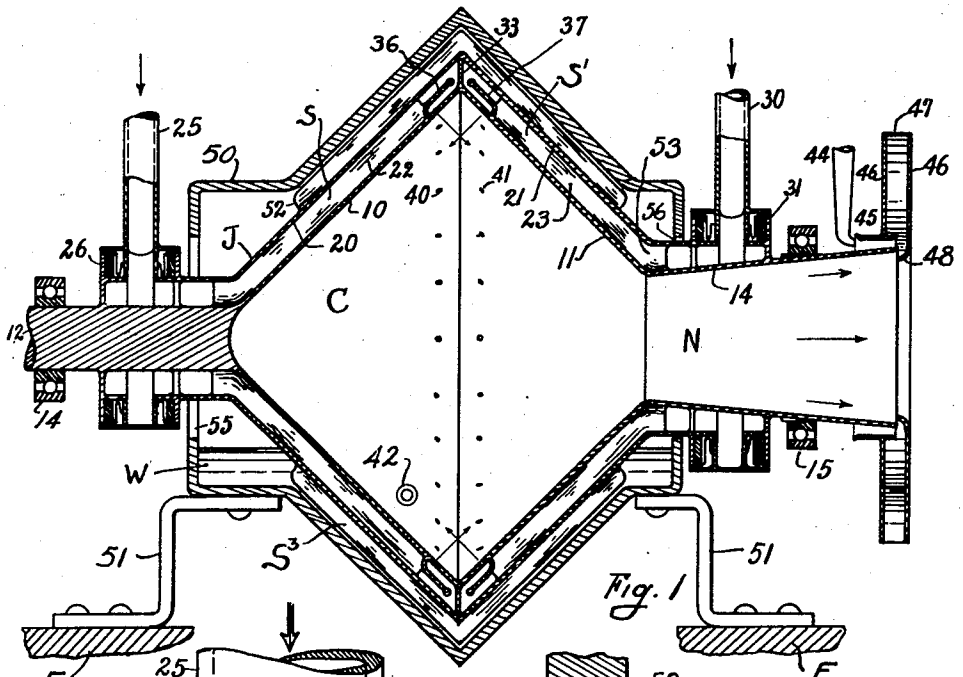

Fig. 1

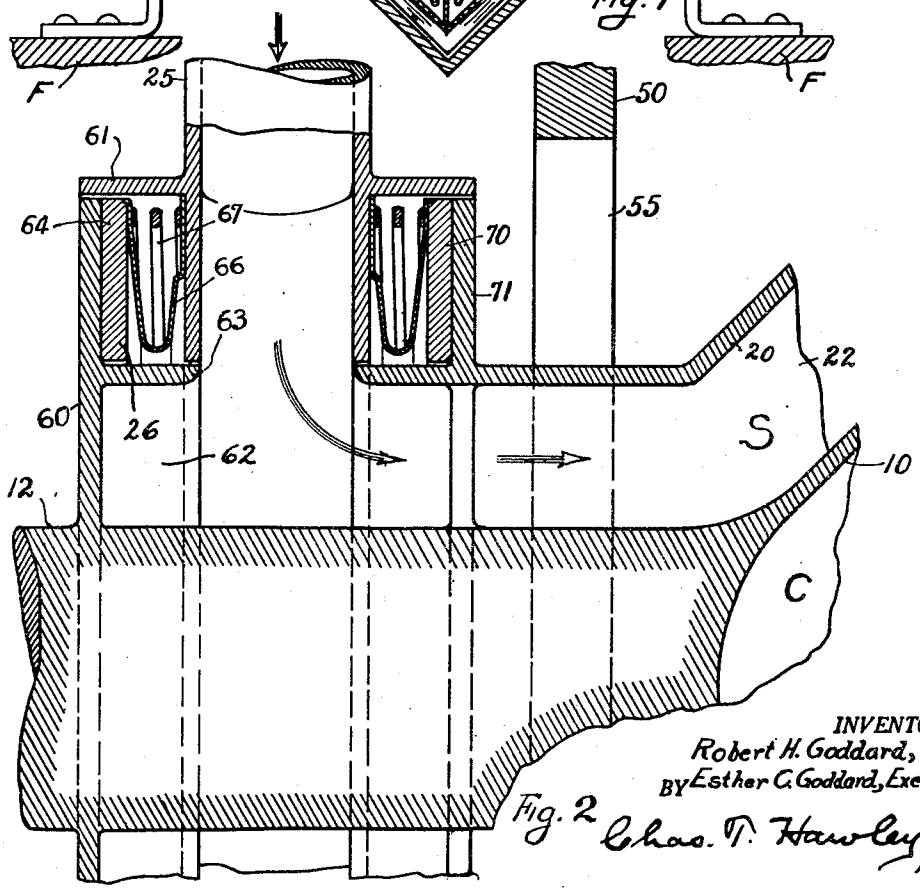

Fig. 2

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PRESSURIZED JACKET CONSTRUCTION FOR ROTATING COMBUSTION CHAMBERS

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4 Claims. (Cl. 60—44)

1

This invention relates to rotating combustion chambers to which a liquid fuel and a liquid oxidizer are supplied, and from which combustion gases are discharged through an outwardly expanding nozzle. Substantial pressures are developed in such combustion chambers, both by centrifugal force and also by expansion of the hot combustion gases formed therein.

It is the general object of this invention to provide improved means for jacketing such a rotating combustion chamber and for resisting the outward pressures developed therein.

To the accomplishment of this general object, a stationary outer jacket or casing is provided, in which counter-pressure is developed by a rapidly rotated mass of water or other suitable liquid. Improved means is also provided for sealing the intake connections for 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 claims.

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

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

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

Referring to the drawing, the rotating combustion chamber C comprises opposed conical wall portions 10 and 11. The wall portion 10 is mounted on a supporting shaft 12 and the wall portion 11 is mounted on a discharge nozzle N. The shaft 12 and nozzle N are rotatably supported in suitable bearings 14 and 15.

The chamber C is surrounded by a jacket J comprising opposed conical portions 20 and 21 held in spaced relation to the chamber walls 10 and 11 by outwardly extending vanes 22 and 23. The walls 10 and 20 enclose a jacket space S and the walls 11 and 21 enclose a jacket space S'.

Liquid fuel, as gasoline, is delivered through a pipe 25 and a sealing device 26 to the jacket space S, and a liquid oxidizer is delivered through a pipe 30 and sealing device 31 to the jacket space S'.

An annular partition 33 connects the chamber and jacket walls at their adjacent points of greatest diameter and this partition also separates the spaces S and S'. Annular conical flanges 36 and 37 are provided in the spaces S and S' at the outer ends of the vanes 22 and 23, and these flanges divide the outer portions of the spaces S and S' into outer and inner annular

2

passages. Spray openings 40 and 41 connect the inner annular passages with the combustion chamber.

As the liquid fuel enters the jacket space S through the supply pipe 25 and the sealing device 26, it is rapidly rotated by the vanes 22 and moves outward under centrifugal force. The pressurized liquid then passes around the conical annular flange 36 and through the spray openings 40 to the chamber C.

In similar manner, a liquid oxidizer supplied through the pipe 30 and the sealing device 31 is moved outward through the space S' and around the flange 37 to the spray openings 41. The sprays intersect as indicated in the drawing, and combustion may be started by any usual igniter, such as a sparkplug 42.

Preliminary rotation of the combustion chamber may be effected by compressed air, supplied through one or more nozzles 44 to an annular passage 45 which communicates with a turbine casing 46 having outwardly curved blades 47.

The casing 46 has a portion 48 which projects inwardly into the path of the peripheral portion of the combustion gases discharged through the nozzle N, and the chamber is thus kept in automatic rotation as soon as combustion is well started. The supply of compressed air through the nozzles 40 may then be discontinued.

In order to offset centrifugal outward pressure on the jacket walls 20 and 21, a fixed casing 50 is mounted outside of the walls 20 and 21 and in spaced relation thereto. The casing 50 may be supported on brackets 51 mounted on any suitable foundation F. The casing 50 is partially filled with water W in the space between the casing 50 and the jacket walls, and this mass of water is rapidly rotated by vanes 52 and 53 mounted on the rotating jacket walls 20 and 21. These vanes rotate with slight clearance inside of the casing 50. Substantial pressure is thus developed in the water space S3, and the outward pressure on the jacket walls 20 and 21 is effectively counterbalanced.

The stationary casing 50 has axial openings 55 and 56 which clear the axial portions of the jacket walls 20 and 21. The mass of water W in the casing 50 is limited to less than the amount which would overflow through the openings 55 and 56 when the combustion chamber is at rest.

The detail construction of the sealing device 26 is clearly shown in Fig. 2. The device 26 in part comprises a disc 60 rotating with the shaft 12 and clearing a fixed cylindrical flange 61 associated with the supply pipe 25. A cylin-

drical flange 62 on the inside of the disc 60 extends into but clears the wall of a circular opening 63 in the fixed casing of the sealing device 26. A flat ring 64 of carbon or carbon-impregnated material engages the inner face of the rotating disc 60, and the ring 64 is connected with the sealing device 26 by a bellows member 66. A suitable coil spring 67 holds the carbon ring 64 against the disc 60.

Liquid fuel supplied under pressure through the pipe 25 to the sealing device 26 can escape only between the ring 64 and the disc 60, but the pressure of the liquid acts with the spring 67 to firmly seat the ring against the disc. Fuel leakage is thus effectually prevented.

On the other side of the pipe 25 an identical sealing construction prevents fuel leakage between a carbon ring 70 and a rotating disc 71. The sealing devices for the supply pipe 30 at the nozzle end of the combustion chamber are identical with those just described and need not be further described.

The invention having been thus set forth, the operation and advantages thereof will be readily apparent. Combustion liquids fed to the spaces S and S' build up centrifugal pressures in said spaces to offset the pressure developed within the walls 10 and 11 by the expanding combustion gases. The centrifugal forces developed in the spaces S and S' and exerted outward against the jacket walls 20 and 21 are offset by the centrifugal pressure of the water which is rapidly rotated by the vanes 52 and 53 between the walls 20 and 21 and the stationary outer casing 50. This casing 50 may be of any desired thickness to withstand this centrifugal pressure.

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 having a reversed conical rotating combustion chamber, an inner casing rotating therewith and enclosing separated jacket spaces, means to supply combustion liquids to said spaces, means to develop hydraulic pressures by centrifugal force in said spaces, and means to feed said liquids from said spaces to said combustion chamber, that improvement which comprises a fixed outer casing defining an outer jacket space about said inner casing and adapted to contain a portion of liquid, and means to rotate said liquid in said outer jacket space and to thereby develop hydraulic pressure by centrifugal force against said inner casing.

2. The combination in combustion apparatus at set forth in claim 1, in which the fixed outer casing is substantially spaced from the rotating inner casing at its end portions, thereby providing annular drain openings adjacent said inner casing, which annular openings prevent overfilling of the fixed outer casing when the rotating chamber is at rest.

3. The combination in combustion apparatus as set forth in claim 1, in which the inner and rotating jacket casing has a plurality of vanes which rotate in the outer jacket spaces but clear the outer jacket casing.

4. In combustion apparatus having a reversed conical rotating combustion chamber, an inner casing rotating therewith and enclosing separated jacket spaces, means to supply combustion liquids to said spaces, means to develop hydraulic pressures by centrifugal force in said spaces, and means to feed said liquids from said spaces to said combustion chamber, that improvement which comprises a fixed outer casing defining an outer jacket space about said inner casing, and centrifugal means to develop hydraulic pressure between said outer and inner casings.

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

No references cited.