June 3, 1952 R. H. GODDARD 2,599,104

VALVE MECHANISM FOR ROTATING FEEDING HEAD FOR COMBUSTION CHAMBERS

Filed Jan. 6, 1950

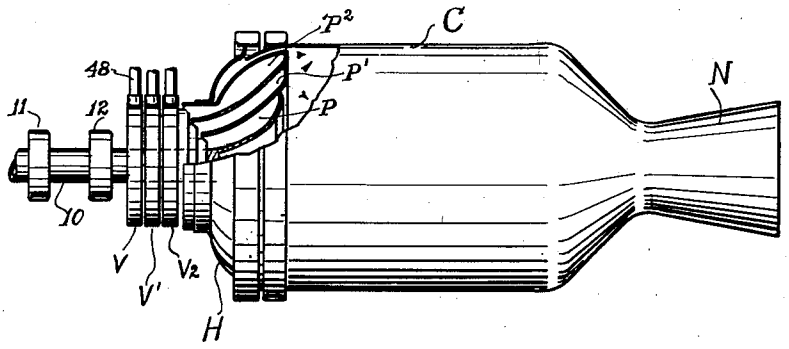

Fig. 1

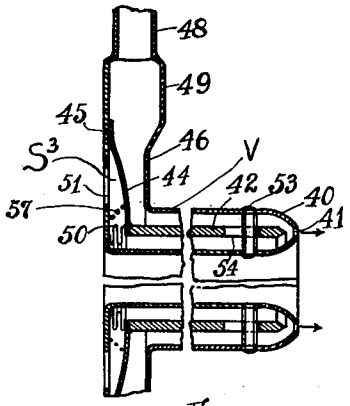

Fig. 2

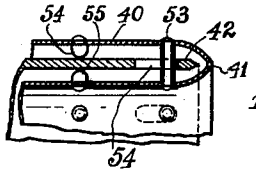

Fig. 3

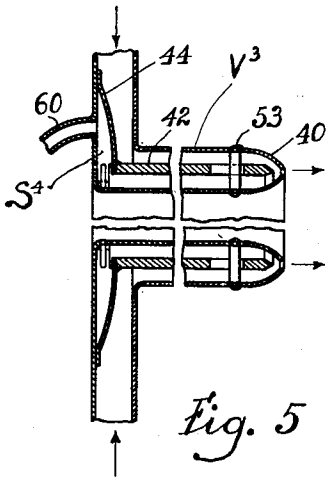

Fig. 5

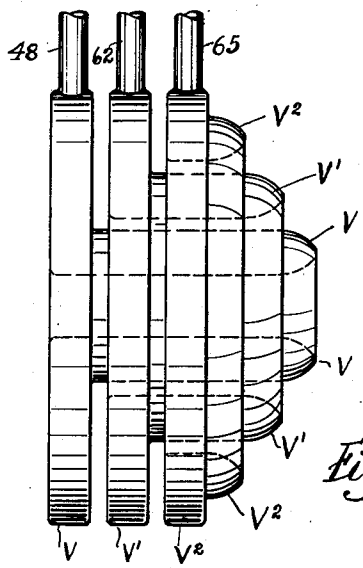

Fig. 4

INVENTOR.
ROBERT H. GODDARD, DEC'D.
ESTHER C. GODDARD, EXECUTRIX.
BY
Chas. T. Hawley
ATT'Y.

Patented June 3, 1952 2,599,104

UNITED STATES PATENT OFFICE

2,599,104

VALVE MECHANISM FOR ROTATING FEEDING HEAD FOR COMBUSTION CHAMBERS

Robert H. Goddard, deceased, late of Annapolis, Md., by Esther C. Goddard, executrix, Worcester, Mass., assignor of one-half to The Daniel and Florence Guggenheim Foundation, New York, N. Y., a corporation of New York

Application January 6, 1950, Serial No. 137,113

4 Claims. (Cl. 299—150)

1

This invention relates to valve mechanism for a rotating feeding head in a non-rotating rocket-type combustion chamber, and is a continuation-in-part of prior application Serial No. 7016, filed February 7, 1948, now Patent No. 2,536,600.

It is the general object of the present invention to provide valve mechanism having exceptionally large annular valve openings, and to provide pressure-controlled means for opening and closing the valves. A valve structure is also provided which is so constructed that a plurality of annular valves may be conveniently nested about a common axis.

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 drawings, in which

Fig. 1 is a side elevation of a combustion chamber and associated valve mechanism;

Fig. 2 is a partial vertical sectional view of one of the valves;

Fig. 3 is a detail view showing a slight modification;

Fig. 4 is a side elevation showing a plurality of nested valves; and

Fig. 5 is a view similar to Fig. 2 but showing a modified construction.

The invention is shown as embodied in combustion apparatus including a non-rotating combustion chamber C and nozzle N, and a rotating feeding head H positioned adjacent a plurality of nested annular valves V, V1 and V2.

The feeding head H is mounted on a hollow shaft 10 rotatable in bearings 11 and 12 and may be rotated from any convenient source of power. The feeding head includes a series of annular sleeves or partitions which define passages P, P1 and P2 through which combustion liquids, such as oxygen, gasoline and water may be delivered to the combustion chamber C, the water being used mainly for cooling purposes.

The present invention relates particularly to the specific construction of the valves V, V1 and V2 by which the feed of liquids to the passages P, P1 and P2 is effected and controlled.

The details of construction of the valve V which controls the feed of liquid oxygen to the passage P are shown in Fig. 2. The valve comprises a double-walled annular tube or sleeve 40 having an end slot 41 which may be closed by an annular valve member 42 mounted within the sleeve 40 and having its outer end beveled and adapted to enter and close the slot 41.

2

The valve member 42 is supported on a diaphragm 44 which is mounted between flanges or discs 45 and 46 extending outward from the inner and outer walls of the valve sleeve 40 and which is secured at its periphery to the flange 45. A pipe 48 supplies liquid oxygen under pressure through a volute 49.

The opening between the free inner edge of the diaphragm 44 and the inner face of the flange or disc 45 is closed by an annular bellows member 50, and a hole 51 vents the space S3 enclosed between the parts 44, 45 and 50.

The diaphragm 44 is resilient and is so shaped and proportioned that it normally forces the valve member 42 into the slot 41 and thus closes the valve V. A reenforcing spring 57 may also be provided.

When it is desired to admit liquid oxygen to the combustion chamber C, the pressure in the supply pipe 48 is increased, thus withdrawing the valve member 42 and permitting flow through the annular slot 41.

The inner and outer walls of the sleeve 40 are held in spaced relation by cross-pins 53 which extend through slots 54 in the annular valve member 42. These slots 54 also provide communication between the valve spaces inside and outside of the valve member 42. Guide-pins 54 and 55 (Fig. 3) may be provided to guide the valve member 42 as it slides toward and away from the end slot 41.

If the liquid oxygen is maintained continuously under pressure, the construction shown in Fig. 5 may be adopted, in which liquid or gas under pressure is supplied through a pipe 60 to the space S4 outside of the diaphragm 44. This pressure is normally sufficient to overcome the pressure of the liquid oxygen and to close the valve V. When it is desired to feed oxygen, the pressure in the pipe 60 and space S4 is temporarily reduced. Otherwise, the construction and operation is as previously described in detail in connection with Figs. 2 and 3.

The construction of the valve V1 for gasoline and V2 for water is similar to the construction of the valve V, except for differences in diameter and in axial length which are necessary to permit nesting as shown in Fig. 4. The valve V1 receives gasoline or other liquid fuel through a pipe 62 and the valve V2 receives water or other cooling liquid through a pipe 65.

With the valve construction herein disclosed, highly efficient provision is made for feeding combustion liquids through a rotating head to a stationary combustion chamber and for ef-

fectively cooling all surfaces exposed to high combustion temperatures.

The invention is also adapted for use in feeding combustion liquids to a rotating feeding head which is associated with a rotating combustion chamber.

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 fixed combustion chamber and a rotating feeding head, that improvement which comprises, a fixed annular feeding conduit which is axially extended adjacent said feeding head and which has an open axial passage therethrough, and said conduit having an annular slot in the conduit end adjacent said head, a sleeve valve axially slidable in said annular conduit, and pressure-operated means to move said sleeve valve, and said axially open annular conduit and annular valve structure facilitating nesting of a plurality of separate and concentric valves.

2. In combustion apparatus having a fixed combustion chamber and a rotating feeding head, that improvement which comprises, a fixed annular feeding conduit which is axially extended adjacent said feeding head and which has an open axial passage therethrough, and said conduit having an annular slot in the conduit end adjacent said head, a sleeve valve axially slidable in said annular conduit, a supply passage for said conduit, and a member connected to said sleeve valve and exposed to fluid pressure in said passage and effective to withdraw said sleeve valve on increase of said fluid pressure, and said axially open annular conduit and annular valve structure facilitating nesting of a plurality of separate and concentric valves.

3. In combustion apparatus having a fixed combustion chamber and a rotating feeding head, that improvement which comprises, a fixed annular feeding conduit which is axially extended adjacent said feeding head and which has an open axial passage therethrough, and said conduit having an annular slot in the conduit end adjacent said head, a sleeve valve axially slidable in said annular conduit, a supply passage for said conduit, and a bellows member connected to said sleeve valve and exposed to fluid pressure in said passage and effective to withdraw said sleeve valve on increase of said fluid pressure, and the inside of said bellows member being vented to the atmosphere, and said axially open annular conduit and annular valve structure facilitating nesting of a plurality of separate and concentric valves.

4. In combustion apparatus having a fixed combustion chamber and a rotating feeding head, that improvement which comprises, a fixed annular feeding conduit which is axially extended adjacent said feeding head and which has an open axial passage therethrough, and said conduit having an annular slot in the conduit end adjacent said head, a sleeve valve axially slidable in said annular conduit, a supply passage for said conduit, and a bellows member connected to said sleeve valve and exposed to fluid pressure in said passage and effective to withdraw said sleeve valve on increase of said fluid pressure, and the inside of said bellows member being exposed to pressure in excess of the fluid pressure in said passage, whereby said sleeve valve may be moved to closed position while said passage remains under pressure, and said axially open annular conduit and annular valve structure facilitating nesting of a plurality of separate and concentric valves.

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:

UNITED STATES PATENTS

Number	Name	Date
1,865,390	Ballard	June 28, 1932
2,071,143	Scott	Feb. 16, 1937
2,395,403	Goddard	Feb. 26, 1946
2,434,298	Truax	Jan. 13, 1948