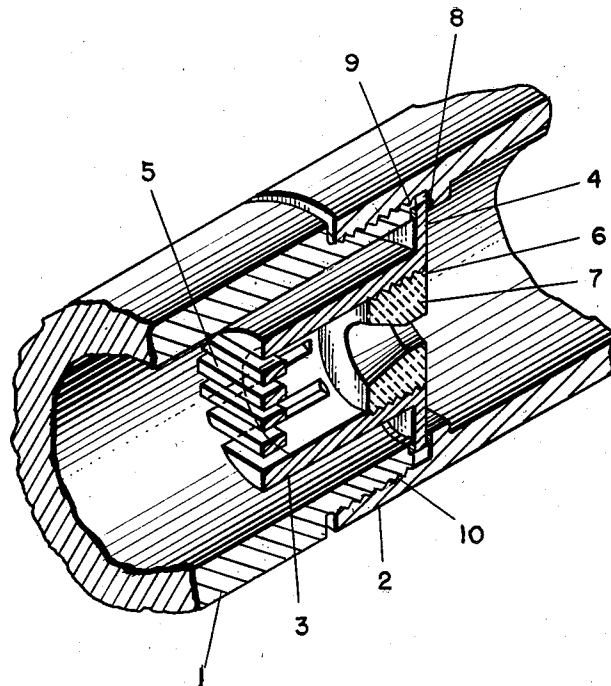


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PRESSURES OF SELF-COMBUSTIBLE SOLID FUELS
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DEVICE FOR DELIVERING UNDER RELATIVELY DIMINISHED PRESSURE GASEOUS PRODUCTS OF COMBUSTION AT HIGH PRESSURES OF SELF-COMBUSTIBLE SOLID FUELS

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3 Claims. (Cl. 60—39.1)

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The present invention is concerned with a new and improved form of device for enabling pressure gases generated in a combustion chamber by the combustion of a self-combustible solid fuel, especially one based on a single or double base gelatinised nitrocellulose composition, to pass into another chamber under reduced pressure, and comprising a pressure reducing throat member guarded by a filter member adapted to retain particles of the solid self-combustible fuel, and thus prevent them from choking the orifice of the throat member.

In generating power gases for the operation of mechanical devices or for rocket propulsion by the combustion of self-combustible solid fuels such as for instance gelatinised nitrocellulose compositions, it is often found that the combustion of the solid fuel will only take place satisfactorily at a pressure substantially higher than that at which it is desired to utilise the power gases, and for this purpose it is customary to provide a communication from the combustion chamber into an expansion chamber through a pressure reducing throat member, which must be guarded against choking by fragments of the solid fuel by a filter usually of gridlike construction adapted to retain particles of solid fuel of any considerable magnitude projected against it. It is also customary to provide an emergency pressure release means through the wall of the combustion chamber to the exterior, consisting of a disc adapted to burst at a predetermined pressure in excess of the pressure normally used for the combustion of the fuel, the external wall of the combustion chamber being modified so that a normally gas-tight seating can be provided for this safety disc. While a safety disc so positioned is effective in preventing the disruption of the combustion chamber should an excessive pressure develop within the latter owing to any interference with the discharge of the power gases therefrom, the bursting of the safety disc and the emergence of the thereby released power gases to the exterior might constitute a certain hazard of injury and fire.

This hazard and the inconvenience of modifying the contour of the wall of the combustion chamber, are avoided by the provision of the improved form of device according to the present invention for enabling the pressure gases generated in the combustion chamber to pass into the lower pressure chamber.

According to the present invention a pressure reducing device adapted for use in a combustion chamber which is so constructed that the forward

end of its wall can be threaded to the rearward end of the wall of an expansion chamber and can form with said rearward end a seating for the circumferential portion of a flange comprises a metal flange adapted to burst at a predetermined pressure and to be held in said seating, a pressure reducing throat member and a filter member, wherein said flange is in the vicinity of the low pressure end of said throat member, wherein said filter member is in position to guard the other end of said throat member, and wherein said flange is adapted to support the combination of said throat member and said filter member.

The present invention also includes an assembly comprising a combustion chamber having a threaded end portion, an expansion chamber having a threaded end portion, a metal flange, a pressure reducing throat member, and a filter member, wherein said chambers are adapted to be screwed together to form a seating for the circumferential portion of a flange, wherein said flange is held in said seating, is adapted to burst at a predetermined pressure and is in the vicinity of the low pressure end of said throat member, wherein said filter member is in position to guard the other end of said throat member, wherein said flange is adapted to support the combination of said throat member and said filter member, and wherein said combination is positioned within said combustion chamber.

The pressure at which the flange is adapted to burst is lower than the pressure at which the external wall of the combustion chamber would rupture, so that if by any chance the flow of gases from the interior of the combustion chamber through the pressure reducing throat should become interrupted and a pressure greater than is desirable be built up in the combustion chamber, the resulting bursting of the flange member will cause the discharge of the power gases to take place into the lower pressure chamber instead of to the atmosphere outside and the need for a bursting disc or other pressure release member to the exterior is avoided.

The filter member and the flange of metal that is adapted to yield under the said predetermined pressure may advantageously be formed as a unit from the same piece of metal, the pressure reducing throat member being threaded to the filter member in order to locate the latter in such a position that all the gases passing the filter must pass through the throat member. The flange however can otherwise be formed integral with the pressure reducing throat member, the

filter in this case being threaded on to the throat member. Alternatively the throat member and the filter member can each be flanged and the throat member threaded in the filter member to form a double layered flange member.

If desired the circumferential portion of the flange of the aforesaid device can be held in the seating formed by the threading together of the combustion chamber and the expansion chamber with the assistance of annular gaskets so as to improve the efficiency of the gas-tight joint.

The invention will be further understood by reference to the diagrammatic drawing accompanying the specification, which represents an isometric view of a longitudinal axial section illustrating an improved device in accordance with the invention in operating position between the forward portion of a combustion chamber and the rearward portion of a lower pressure chamber.

In the drawing 1 is the external wall of the combustion chamber externally threaded as shown at 10. 2 is an internally threaded end portion of the wall of a lower pressure chamber, the shoulder leading into this threaded portion and the forward end of the wall 1 being accurately cut so as to provide a seating for flange 4 of the filter member 3 with the aid of gasket rings 8 and 9. The filter member 3 is slotted on its cylindrical and rearward end surfaces as shown at 5 for a portion of its length, the annular flange portion 4 being formed continuously with the latter of the same steel 5. The forward unslotted portion of the wall of the filter member is internally threaded as shown at 6 and therein is screwed an externally threaded pressure reducing throat member 7 providing a throat through which the gases from the combustion chamber pass into the other chamber at a reduced pressure. It will be understood that the pressure at which the annular flange 4 bursts is considerably below the safety limit of pressure for the wall 1 of the combustion chamber.

I claim:

1. In combination, a combustion chamber for generating combustion gases, said combustion chamber having a gas outlet end, an expansion chamber having an inlet end for receiving gases from the outlet end of said combustion chamber, means connecting the inlet end of said expansion chamber to the outlet end of said combustion chamber, said means forming a seat about the entire periphery of the connection, a pressure reducing throat member having a high pressure

end within said combustion chamber and a low pressure end opening into said expansion chamber permitting passage of gas from said combustion chamber into said expansion chamber at reduced pressure, a filter member positioned within said combustion chamber to guard the high pressure end of said throat member and a metallic flange positioned about said throat member, adjacent the low pressure end thereof, and held in said seating to form a fluid-tight separating wall between said combustion chamber and said expansion chamber, said flange being adapted to burst at a predetermined pressure to permit gases within said combustion chamber to exit into said expansion chamber when said pressure is exceeded.

2. A pressure reducing device adapted for use in a combustion chamber which is so constructed that the forward end of its wall can be threaded to the rearward end of the wall of an expansion chamber and can form with said rearward end a seating for the peripheral portion of a flange, said device comprising a pressure reducing throat member having a high pressure and a low pressure end, a filter member threaded onto said high pressure end of said throat member and having an exterior flange portion, said flange portion having a predetermined bursting pressure lower than the bursting pressure of the external wall of the combustion chamber and being held in said seating adjacent the low pressure end of said throat member so that the filter member filters the gases generated in the combustion chamber and passing through the said throat member into the said expansion chamber.

3. A device according to claim 2 wherein the filter member is in the form of a cylinder having its rearward end partially closed by a slotted portion, the slots in which are continued along a portion of the cylinder wall.

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