

[54] **COMBUSTION CHAMBER ASSEMBLY  
FOR A GAS TURBINE ENGINE**

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[58] Field of Search .... **60/39.65, 39.32, 39.66**

[56] **References Cited**

**UNITED STATES PATENTS**

|           |         |                     |          |
|-----------|---------|---------------------|----------|
| 2,876,622 | 3/1959  | MacKay.....         | 60/39.32 |
| 3,307,354 | 3/1967  | McCaulay et al..... | 60/39.65 |
| 2,773,709 | 12/1956 | Smith.....          | 60/39.32 |
| 3,589,128 | 6/1971  | Sweet .....         | 60/39.65 |
| 2,547,619 | 4/1951  | Buckland.....       | 60/39.32 |

2,658,337 11/1953 Clarke et al. ....60/39.65

**FOREIGN PATENTS OR APPLICATIONS**

558,324 6/1958 Canada.....60/39.32

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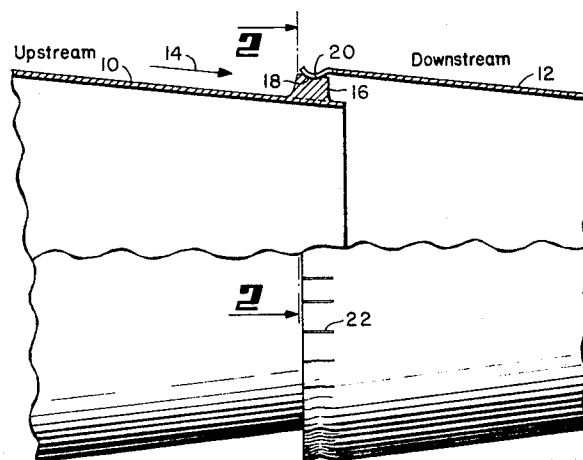
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[57] **ABSTRACT**

A combustion chamber liner is comprised of two telescoping sections, the leading edge of the downstream section overlapping the trailing edge of the upstream section. The end of the upstream section is provided with a plurality of peripherally spaced bosses. The outer peripheral surface of each of the bosses is grooved to accept the complementary depressed ring in the end of the larger downstream section. When cool, the dimensions of the upstream and downstream sections are such that there is a loose connection between the sections. However, the upstream section is heated more than the downstream section and causes its expansion to provide a tight fit.

**7 Claims, 3 Drawing Figures**



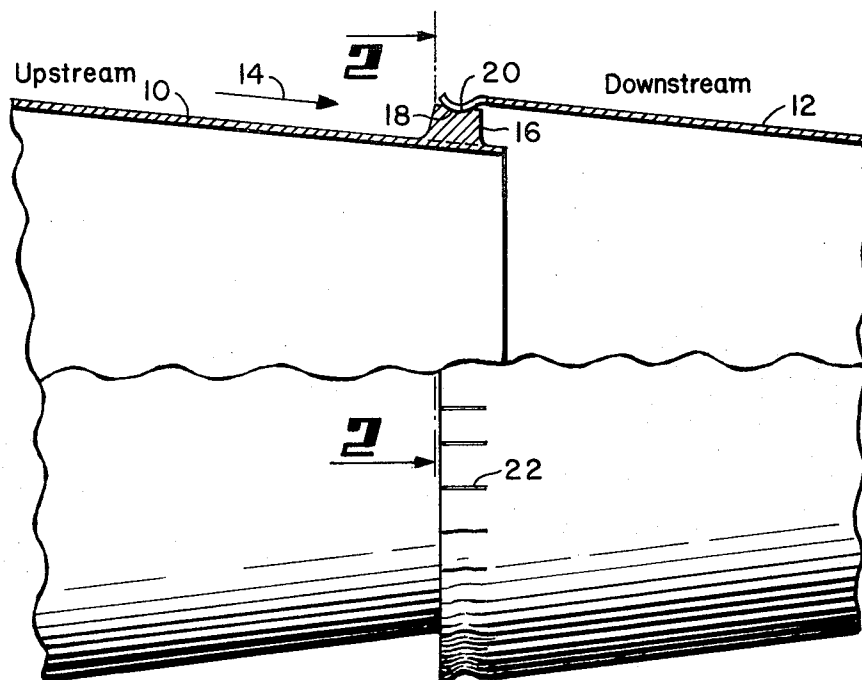


**Fig 1**

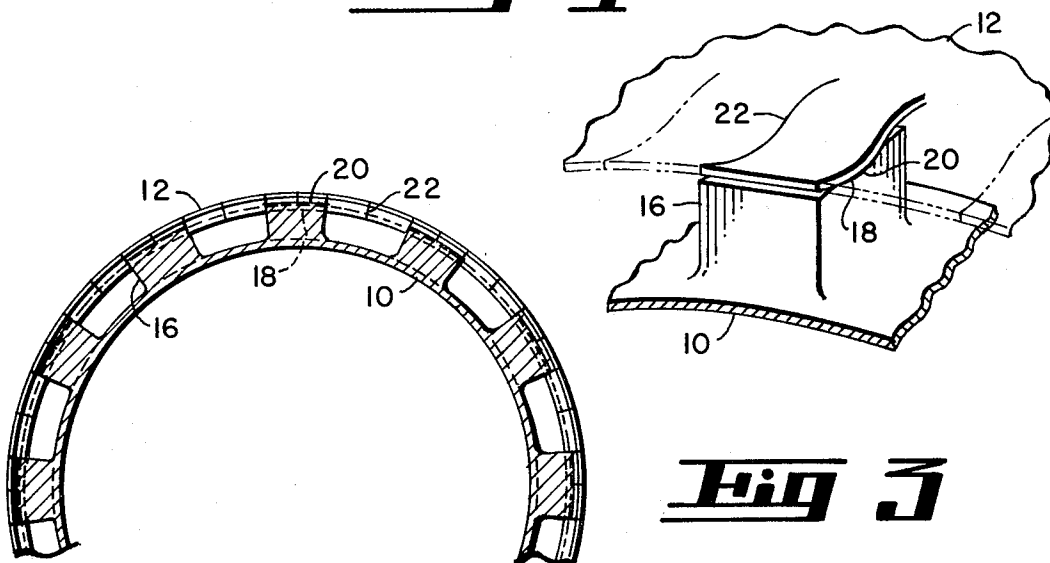


**Fig 2**

**Fig 3**

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# COMBUSTION CHAMBER ASSEMBLY FOR A GAS TURBINE ENGINE

## BACKGROUND OF THE INVENTION

The combustor for the conventional gas turbine engine is often made of telescoped generally cylindrical combustor sections. A common method for manufacturing these combustors is to telescope a number of sections and spotweld them together at circumferentially spaced points along their overlapping edges. The assembly of such telescoping sections is often difficult and frequently requires complex joints for providing a firm construction while at the same time admitting cooling air. Moreover, the telescoping sections are subjected to different temperatures, and hence the stresses introduced by relative expansion of the sections can cause fatigue leading to premature failure of the metals.

The combustion chamber of this invention provides a simple and efficient means for supporting the telescoping sections of the combustor while at the same time permitting expansion of the combustor sections. Briefly stated, the overlapping sections of the combustor are interconnected by a snap fit between the grooves in the elevated bosses in one section and a circumferential ring depressed into the other section, the space between the bosses providing for the admission of coolant air into the combustor chamber. The dimensions of the overlapping sections are chosen so that the fit between the sections when cool is loose. When heated, the upstream section is subjected to greater heat and its expansion with respect to the downstream section produces a rigid fit without introducing stresses sufficient to cause fatigue in the metals.

## THE DRAWINGS

FIG. 1 is an axial cross section of a combustor liner assembled in accordance with this invention;

FIG. 2 is a section taken through the line 2—2 in FIG. 1; and

FIG. 3 is an enlargement showing the detail of the bosses and ring.

## DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

FIG. 1 shows two overlapping sections 10 and 12 of a combustor suitable for use in a gas turbine engine. While only two sections are shown, it will be understood that the combustor may comprise several additional sections and that the sections in practice have other configurations; that is to say, the walls may have more complex shapes, may include perforations for the admission of cooling air, and may be grooved in the direction of gas flow.

Compressed air is delivered to the combustor from a compressor (not shown) in the direction of the arrow 14. The trailing edge of the upstream section 10 is provided with a plurality of peripherally spaced bosses 16, all of which have peripherally aligned grooves 18.

The end of the downstream section 12 is provided with a peripheral ring 20 depressed into the end of the section. The ring 20 has a configuration which is generally complementary to the groove 18. In addition, the downstream section is provided with longitudinal slots 22 at the grooved end, permitting the end to snap on to the bosses 16.

The dimensions of the bosses 16 and the grooves 20 are selected so that there is a loose fit between the sections when snapped together in a normal cool non-operating condition. Because of the direction of flow of the cooling air, the upstream section is subjected to more heat than the downstream section, and therefore, the upstream section expands more than the downstream section. When fully heated to operating temperature a tight fit results if the dimensions have been properly selected.

While a slotted downstream section permits a snap on connection, it will be understood that it is also possible to provide a joint between the two sections without the use of the longitu-

dinal slots. Under these circumstances it would be necessary to apply heat to the downstream section to expand it sufficiently to permit its fitting onto the bosses 16. The heat of operation will cause the tightening of the section in the same manner as with the slotted configuration.

While the upstream section of the illustrated embodiment is shown as including the bosses and the downstream section is provided with the ring, it is clear that these elements can be reversed so that the bosses are positioned on the inner surface of the downstream section. In either case, the area of the combustor between the overlapping sections and immediately downstream of the bosses provides an expansion area for the compressed air. This tends to improve the performance of the combustor and is one of the advantages of the invention.

## CONCLUSION

In summary, Applicants have devised a simple joint for securing the overlapping sections of a combustion chamber. In operation the joint is rigid, it produces no excessive stresses on the metals, and at the same time it permits the in-flow of cooling air to the combustion chamber.

We claim:

1. A combustor having upstream and downstream radially spaced telescoping sections, an end of said downstream section overlapping an end of said upstream section;

a plurality of peripherally spaced bosses on the outer surface of said upstream section at said end thereof;

a groove in each of said bosses, said grooves being peripherally aligned;

a peripheral ring on the inner surface of said downstream section at the end thereof, said ring being complementary to said groove;

the space between said bosses providing cooling air inlets to said combustor, said ring being dimensioned to sit loosely in said groove without sufficient clearance to permit separation of the sections under normal cool non-operating conditions, said fit becoming tight under normal hot operating conditions due to the difference in expansion of said sections.

2. The invention as defined in claim 1, and a plurality of longitudinal slots through the end of said downstream section to permit the upstream and downstream section to be snap fitted.

3. The invention as defined in claim 1 wherein said ring is integral with said downstream section.

4. A combustor having upstream and downstream radially spaced telescoping sections, and end of said downstream section overlapping an end of said upstream section, the outer surface of the end of the upstream section being surrounded by the inner surface of the end of the downstream section;

a plurality of peripherally spaced bosses on one of said surfaces;

a groove in each of said bosses, said grooves being peripherally aligned;

a peripheral ring on said other surface, said ring being complementary to said groove;

the space between said bosses providing cooling air inlets to said combustor, said ring being dimensioned to fit loosely in said groove without sufficient clearance to permit separation of the sections under normal cool non-operating conditions, said fit becoming tight under normal hot operating conditions due to the difference in expansion of said sections.

5. The invention as defined in claim 4, and a plurality of longitudinal slots through said other one of said surfaces to permit said sections to be snap fitted.

6. The invention as defined in claim 4 wherein said ring is integral with said other surface.

7. The invention as defined in claim 4 wherein said telescoping sections form an expansion area immediately downstream of said bosses.

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