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AIR-JACKETED COMBUSTION CHAMBERS FOR JET PROPULSION ENGINES, GAS TURBINES AND THE LIKE

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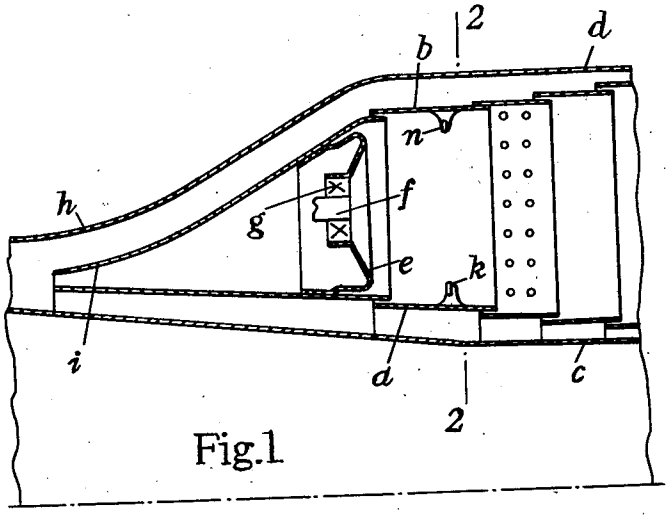


Fig.1

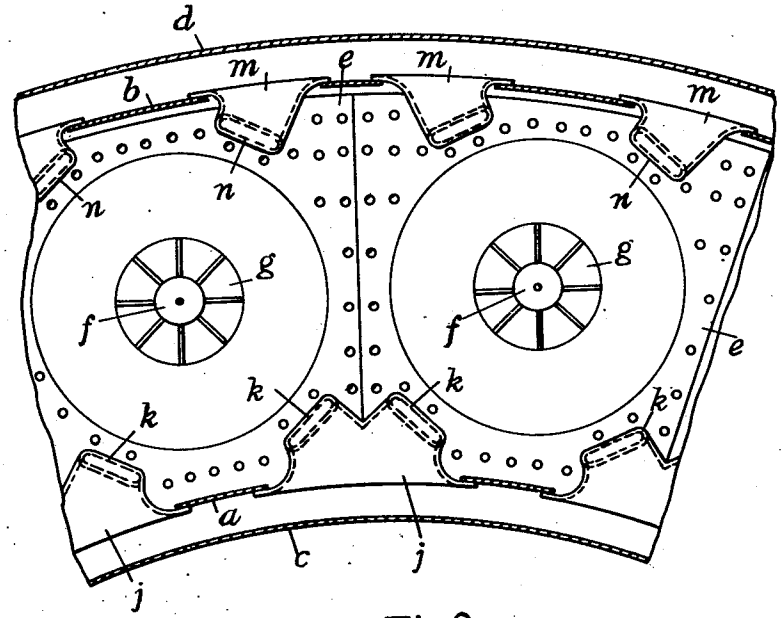


Fig.2

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AIR-JACKETED COMBUSTION CHAMBERS FOR JET PROPULSION ENGINES, GAS TURBINES AND THE LIKE

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1 Claim. (Cl. 60—39.65)

This invention relates to the combustion chambers of jet propulsion engines, gas turbines and the like, of the kind in which the chamber is of annular form and has air jackets around its inner and outer peripheral walls, an annular arrangement of equi-spaced fuel nozzles being mounted in the entrance end of the chamber.

The object of the invention is to provide a construction adapted to ensure uniform combustion of the fuel discharged from the nozzles.

The invention comprises a construction in which are provided in the inner and outer walls of the combustion chamber at positions between the fuel nozzles oppositely inclined air nozzles adapted to produce a swirling ring of air around each of the fuel jets.

In the accompanying drawings:

Figure 1 is a sectional side elevation illustrating a portion of an annular combustion chamber having inner and outer air jackets, and provided with the invention.

Figure 2 is a fragmentary sectional end view on the line 2—2 (Figure 1), Figure 2 being drawn to a larger scale than Figure 1.

Referring to the drawings, the combustion chamber is formed by inner and outer sheet metal walls *a*, *b* of substantially cylindrical shape, and around these walls are arranged inner and outer sheet metal air-jacket walls, *c*, *d*. The fuel-entrance end of the combustion chamber is constructed from a plurality of contiguous segmental plates *e* each of which at its centre is shaped to form a truncated conical, or other concave recess, and at the centre of the recess is formed a hole adapted to carry a burner nozzle *f* and a means *g* for swirling the air which enters the chamber around the nozzle. The parts of each of these plates around the said recess is preferably perforated as shown.

The ends of the jacket walls adjacent to the fuel-entrance end of the combustion chamber are connected to an annular air trunk *h* which receives air from a blower, and within this trunk is arranged another and smaller annular trunk *i*. The latter has a narrow entrance end and is shaped to a form of gradually increasing size, its delivery end being of approximately the same size as the combustion chamber. The space between the two trunks serves to convey air to the air jackets, and the inner trunk serves to convey air to the air inlets around the nozzles and the said perforations in the plates *e* carrying the nozzles.

For the purpose of the invention, it is desired to produce around the jet of atomized or vaporized fuel emerging from each nozzle, a toroidal ring of air in a swirling condition, and to achieve this purpose, there is formed in the inner wall of the combustion chamber at a position corresponding to the radial centre lines between the nozzles, a pair of adjacently placed air inlets *j*, and at each inlet is secured within the combustion chamber a pair of short air discharge nozzles *k*. Similarly air inlets *m* are formed in the outer wall, and at each inlet is secured a nozzle *n*. The adjacent nozzles in each wall are oppositely inclined to each other and are arranged to face the upstream end of the combustion chamber so as to direct radial jets of air towards the associated fuel nozzles. The arrangement is such that each fuel nozzle has associated with it four equi-spaced air nozzles, and these are so directed towards the fuel nozzles, that the air jets therefrom serve, in conjunction with the swirling air admitted to the combustion chamber around the fuel nozzle, to form a toroidal ring of swirling air around the emerging fuel jet. The effect of the said rings of swirling air is to produce a uniform mixture of fuel and air in the vicinity of each nozzle and so ensure the required uniformity of combustion.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

The combination with an engine combustion chamber of annular form having inner and outer peripheral walls, and an entrance at one end, of an annular arrangement of equispaced fuel nozzles in said entrance, air inlets corresponding in number to and respectively surrounding said fuel nozzles, air-swirling means in said air inlets, means supporting said air inlets and fuel nozzles and shaped to provide a recess around each of said air inlets, additional air inlets at circumferentially spaced positions in said inner and outer peripheral walls adjacent to said entrance, and air nozzles leading from said additional air inlets and situated in pairs within said chamber with the nozzles of each pair inclined away from each other, the number of pairs of air nozzles leading from the inlets in the inner peripheral wall of said chamber being equal to the number of pairs of air nozzles leading from the inlets in the outer peripheral wall of said chamber, and also equal to the number of said fuel nozzles, and the inner ends of said air nozzles being arranged to direct jets of air towards the nearest fuel nozzles so that each individual fuel nozzle has directed towards it the air jets from one nozzle of each of four adjacent pairs, whereby the air jets serve in conjunction with the swirling air entering said chamber through the first mentioned air inlets to form swirling rings of air around the individual fuel jets emerging from said fuel nozzles.

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