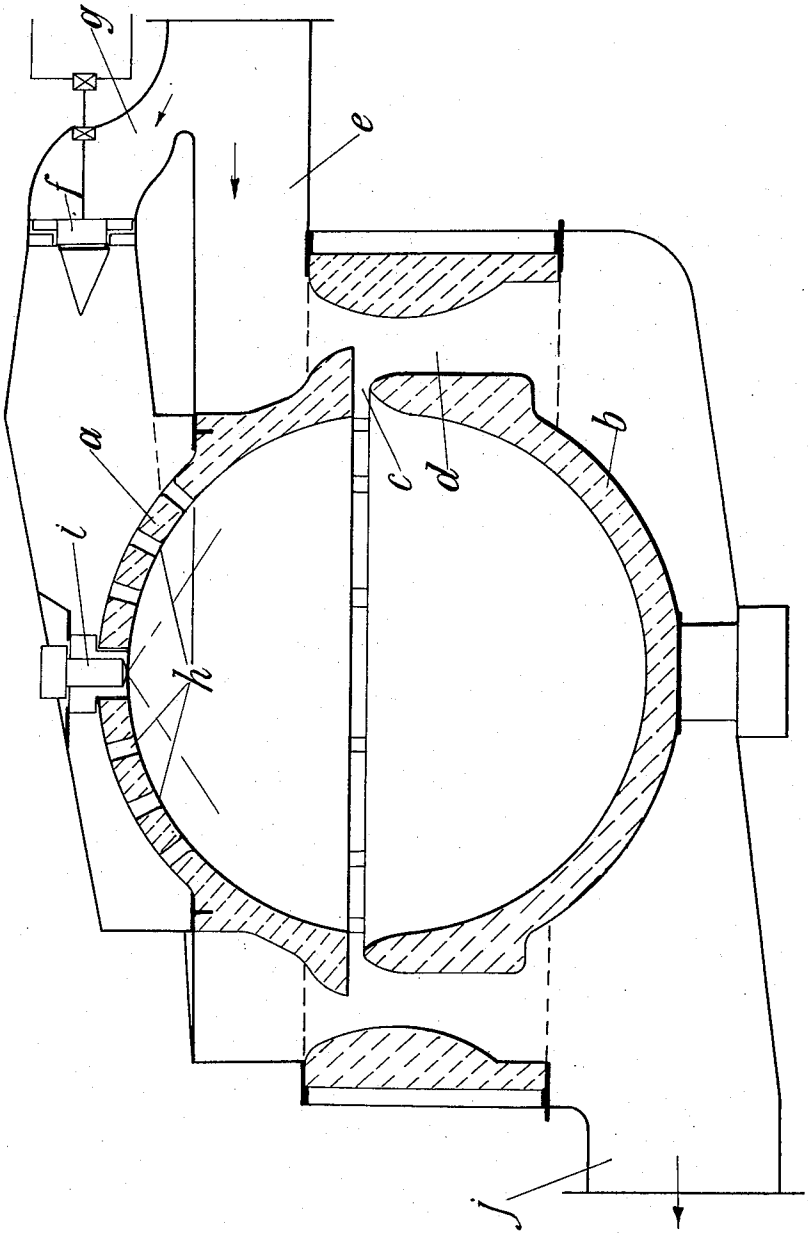
Jan. 24, 1950 E. P. PEREGRINE 2,495,386

COMBUSTION UNIT

Filed April 8, 1947



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COMBUSTION UNIT

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This invention relates to combustion units such for example as are incorporated in gas turbine and jet propulsion engines or open hearth furnaces.

The proportion of air to fuel in certain combustion units, such as those incorporated in gas turbine and jet propulsion engines, is considerably greater than that required for complete combustion. High combustion efficiencies are attained in combustion zones having high rates of heat release by imparting a high degree of turbulence to the air. This turbulent flow is achieved at the expense of a loss of total pressure, which in turn affects adversely the efficiency and working capacity of the engine.

One object of the present invention is to provide constructions of combustion unit in which the above pressure loss is reduced.

A further object of the invention is to provide a combustion system for an open hearth furnace.

The invention consists in a combustion system incorporating the features set out in the claims appended hereto.

The accompanying diagrammatic drawing illustrates a vertical sectional view of one convenient construction of combustion unit embodying the present invention.

In carrying the invention into effect according to one convenient form illustrated by way of example in the accompanying drawing, a combustion chamber is provided having a hemispherical top *a* and a hemispherical base *b*, an annular opening *c* being provided between the top and base. This annular opening communicates with a mixing annulus *d* to which one portion of an air supply is passed from an air supply branch pipe *e*. The other portion of the air supply is conveyed by way of an auxiliary motor-driven fan *f* from a branch pipe *g* to the top of the combustion chamber which is entered by a series of openings *h* in the top *a*, the arrangement being such that the air is directed towards the axis or is off-set to give whirl. A fuel sprayer *i* is provided at the centre of the top and the exit gases from the combustion chamber are led away through the annulus *c* and the discharge pipe *d*. The remaining air portion arriving from the inlet duct mixes with this combustion air and both are discharged through the duct *j*.

The combustion chamber may thus be operated at the maximum possible temperature.

The pressure augmentation can be obtained from the compressor or any external drive such as a turbine or electric motor, the energy for such being derived from the machine of which the combustion chamber is part or from external sources.

The weight of refractory necessary for such a

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construction is minimised by maintaining an approximately spherical shape and tile or monolith construction may conveniently be employed.

If desired the pressure augmentation may be achieved by dividing the flow before the last stage of an axial flow compressor of an engine embodying no heat exchanger, this last stage having capacity for the combustion air only.

What is claimed is:

1. A combustion system wherein the air is divided into two portions, one portion, amounting to the quantity necessary to secure complete or substantially complete combustion of the fuel, being fed to a combustion chamber the interior of which has the form of two hemispherical, or approximately hemispherical members, separated by an annular outlet opening, a fuel sprayer being provided at one end of the diameter normal to the plane containing said opening encircled by openings for the admission of said portion of air, the resulting hot gas issuing from said outlet opening being caused to mix with a second portion of the air, which latter portion is not subjected to any substantial pressure drop.

2. A combustion chamber as claimed in claim 1 wherein the hot gas is discharged in a radial direction from the spherical chamber in such a way as to preserve the symmetry of flow inside the combustion chamber.

3. A combustion system as claimed in claim 1 wherein means is provided for dividing the flow before the last stage of an axial flow compressor of an engine embodying no heat exchanger, this last stage having capacity for the combustion air only, whereby pressure of the first portion of air is augmented so as to exceed that of the second portion by an extent necessary to permit the conditions of combustion.

EDGAR PHILLIPS PEREGRINE.

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