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MULTIPLE TRUNCATED CONICAL ELEMENT COMBUSTION CHAMBER

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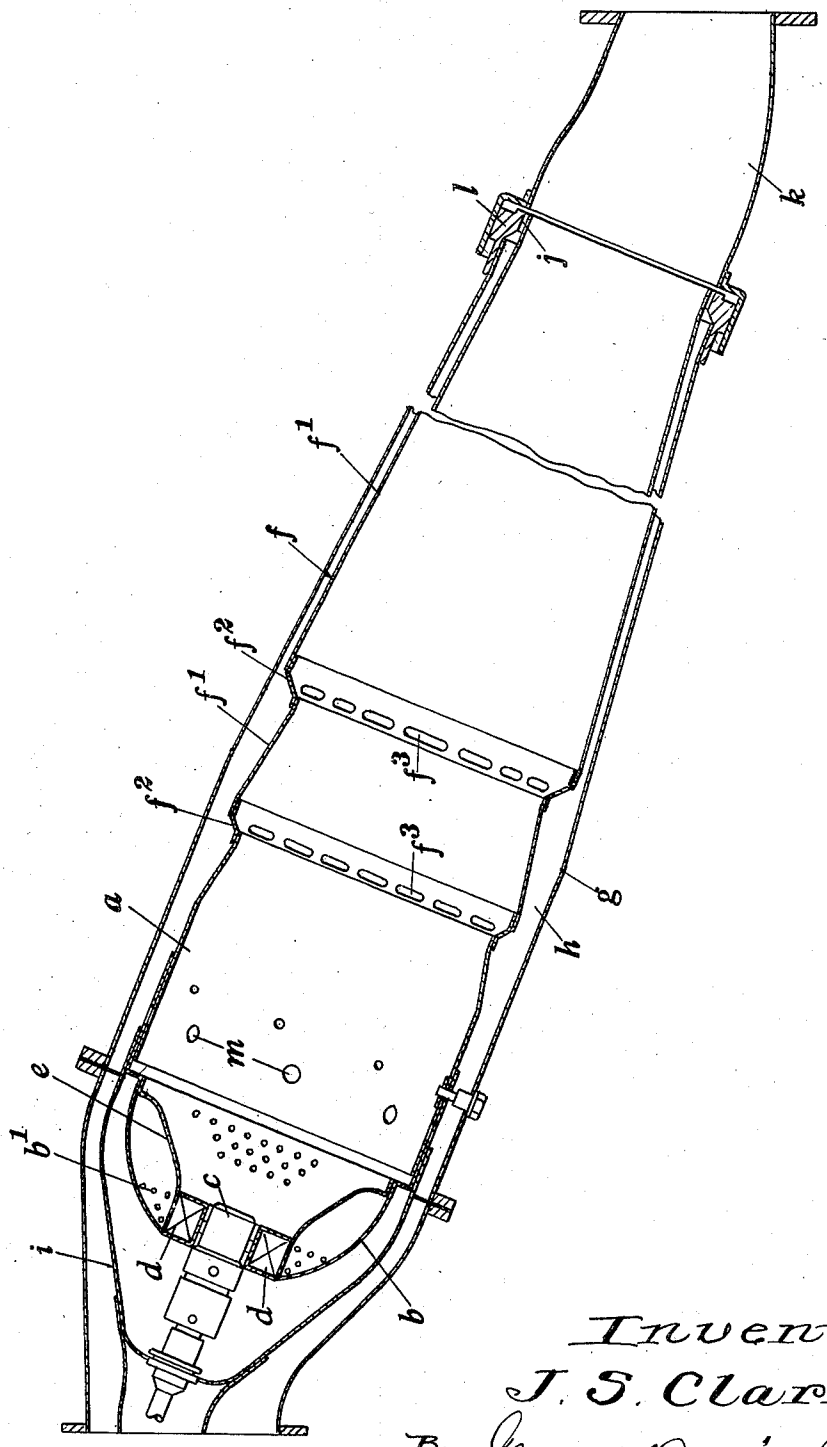

Inventor
J. S. Clarke
By Glascock Downing Rutter
Attys.

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MULTIPLE TRUNCATED CONICAL ELEMENT COMBUSTION CHAMBER

John Stanley Clarke, Birmingham, England, assignor to Joseph Lucas Limited, Birmingham, England

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1 Claim. (Cl. 60—44)

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This invention relates to internal combustion prime movers, of the kind adapted to utilise the energy of a continuous stream of hot gases. The object of the invention is to provide improved means for generating the hot gas stream.

The invention comprises the combination of a combustion chamber, a coaxial mixing chamber for mixing the products of combustion with diluent air, and a jacket which surrounds the said chambers and is closed (or substantially closed) at the end remote from its inlet end, the mixing chamber consisting of a series of annular components of truncated conical form which are connected to each other and to the combustion chamber by junctions formed with perforations, for the admission of diluent air from the jacket.

The accompanying drawing is a sectional side view of means constructed in accordance with the invention.

In carrying the invention into effect as shown, I employ a sheet metal combustion chamber *a* of substantially cylindrical form and provided with a perforated domed end cover *b*. The latter carries an axially arranged liquid fuel nozzle *c* surrounded by stationary guide vanes *d* past which air from any convenient source can enter the combustion chamber *a*, the guide vanes being adapted to impart a uniform rotary motion to the air. The perforations b^1 in the end cover *b* also enable air from the said source to enter the combustion chamber *a*. Moreover, there may be provided in the interior of the end cover *b* a perforated baffle *e* adapted to ensure proper distribution of the air entering the end cover around the fluid jets issuing from the nozzle *c*.

The open end of the combustion chamber *a* terminates in a coaxial mixing chamber *f* in which the products of combustion are mixed with diluent air. The mixing chamber *f* consists of a series of two or more annular sheet metal elements f^1 of truncated conical form. The larger end of the first element f^1 is adjacent to the exit end of the combustion chamber *a* (which latter may terminate as shown in a short portion of truncated conical form), and the smaller end of the first element is adjacent to the larger end of the second element. When only two elements f^1 are used, the second is made considerably longer than the first. The elements f^1 are connected to each other and to the combustion chamber *a* by annular junction pieces f^2 the latter being formed with perforations f^3 for the admission of diluent air. Alternatively each junction piece may be formed integrally with one end of one of the parts to be connected.

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Around the combustion and mixing chambers *a*, *f* is arranged a sheet metal casing *g* which forms an annular air jacket *h* around the said chambers. The jacket *h* receives air from the same source as the combustion chamber *a*, the diluent air being directed into the jacket by an annular deflector *i* adjacent to the closed end of the combustion chamber. The end of the jacket *h* adjacent to the discharge end of the mixing chamber *f* is closed or substantially closed by a ring *l* which slidably supports the adjacent end of the mixing chamber *f* and which may be formed with longitudinal grooves *j* through which air flow can occur to effect a cooling action in the region of the said end. The ring *l* also forms part of an expansion joint between the adjacent ends of the casing *g* and an outlet connection *k* communicating with the discharge end of the mixing chamber *f*.

When the apparatus is in operation, primary combustion of the fuel occurs in the region of the closed end of the combustion chamber *a*, and the combustion is completed by the admission of secondary air from the jacket *h* through perforations *m* adjacent to the said region. On issuing from the combustion chamber *a* the products of combustion meet a stream of diluent air entering from the jacket *h* through the perforations f^3 between the combustion chamber and the first element f^1 of the mixing chamber *f*, and at the junction of this element with the second element of the mixing chamber a further admission of diluent air from the jacket is effected through the other perforations f^3 the process being repeated when more than two mixing chamber elements are used. Finally the mixture of hot gases emerges from the mixing chamber *f* and is thence conveyed from the outlet connection *k* by a pipe to a turbine or elsewhere where it is required to utilise the energy of the stream.

By this invention I am able to effect the mixing of diluent air with the products of combustion in a manner which involves a minimum of energy loss. The invention is not, however, limited to the example above described as constructional details may be varied to suit different requirements.

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

For use with an internal combustion prime mover of the kind specified, means for generating the hot gas stream, comprising the combination with a combustion chamber, a coaxial mixing chamber composed of a series of annular com-

ponents of truncated conical form for mixing the products of combustion with diluent air, and a jacket which surrounds the said chambers and is at least substantially closed at the end remote from its inlet end, of annular junction pieces which directly connect the annular components of the mixing chamber to each other and to the combustion chamber, and which are formed with perforations for the admission of diluent air from the jacket.

JOHN STANLEY CLARKE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,107,365	Bray	Feb. 8, 1938
2,268,464	Seippel	Dec. 30, 1941
2,398,654	Lubbock	Apr. 16, 1946