GAS TURBINE MOTOR OF REDUCED DIMENSIONS

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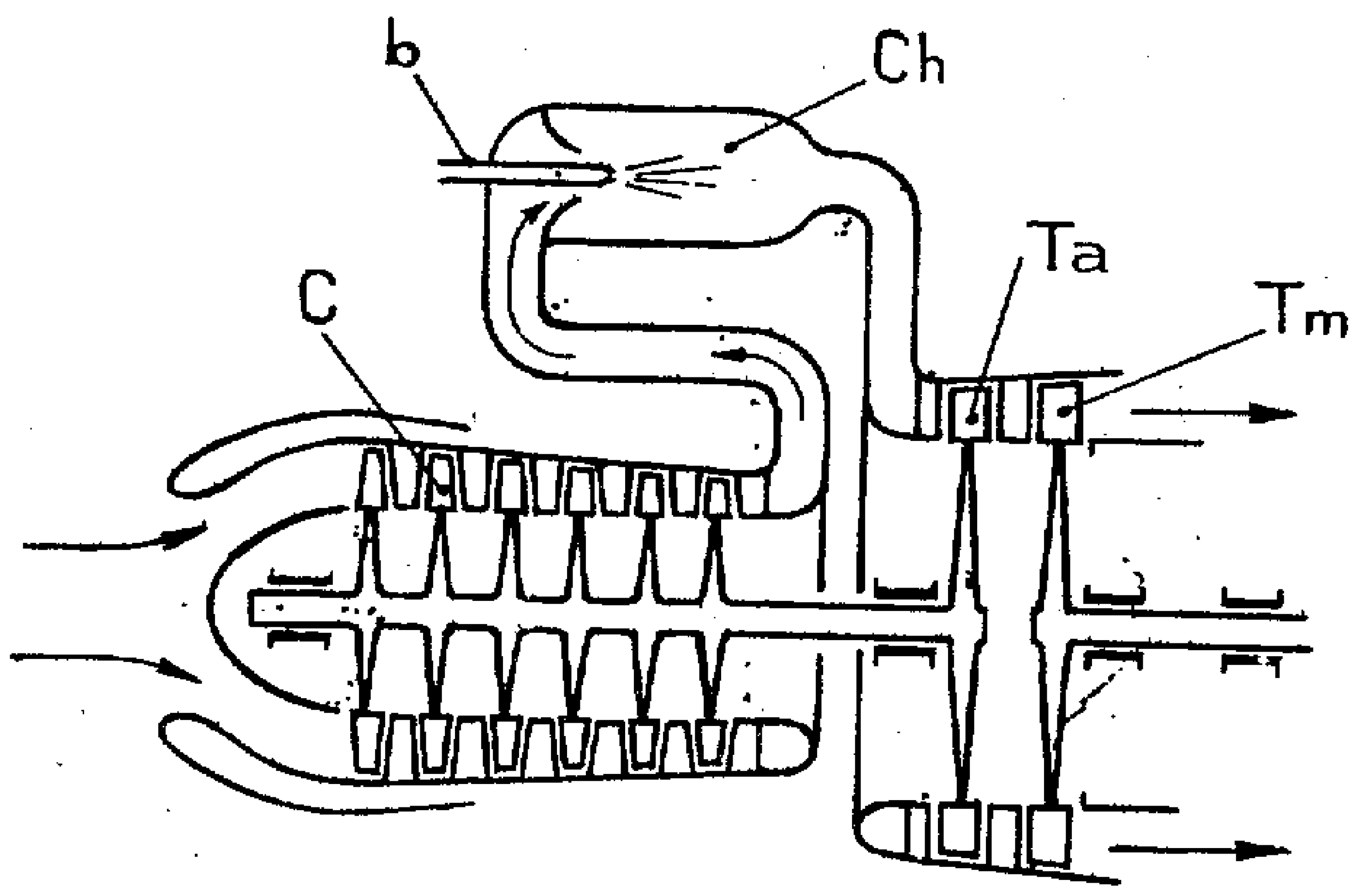

fig. 1

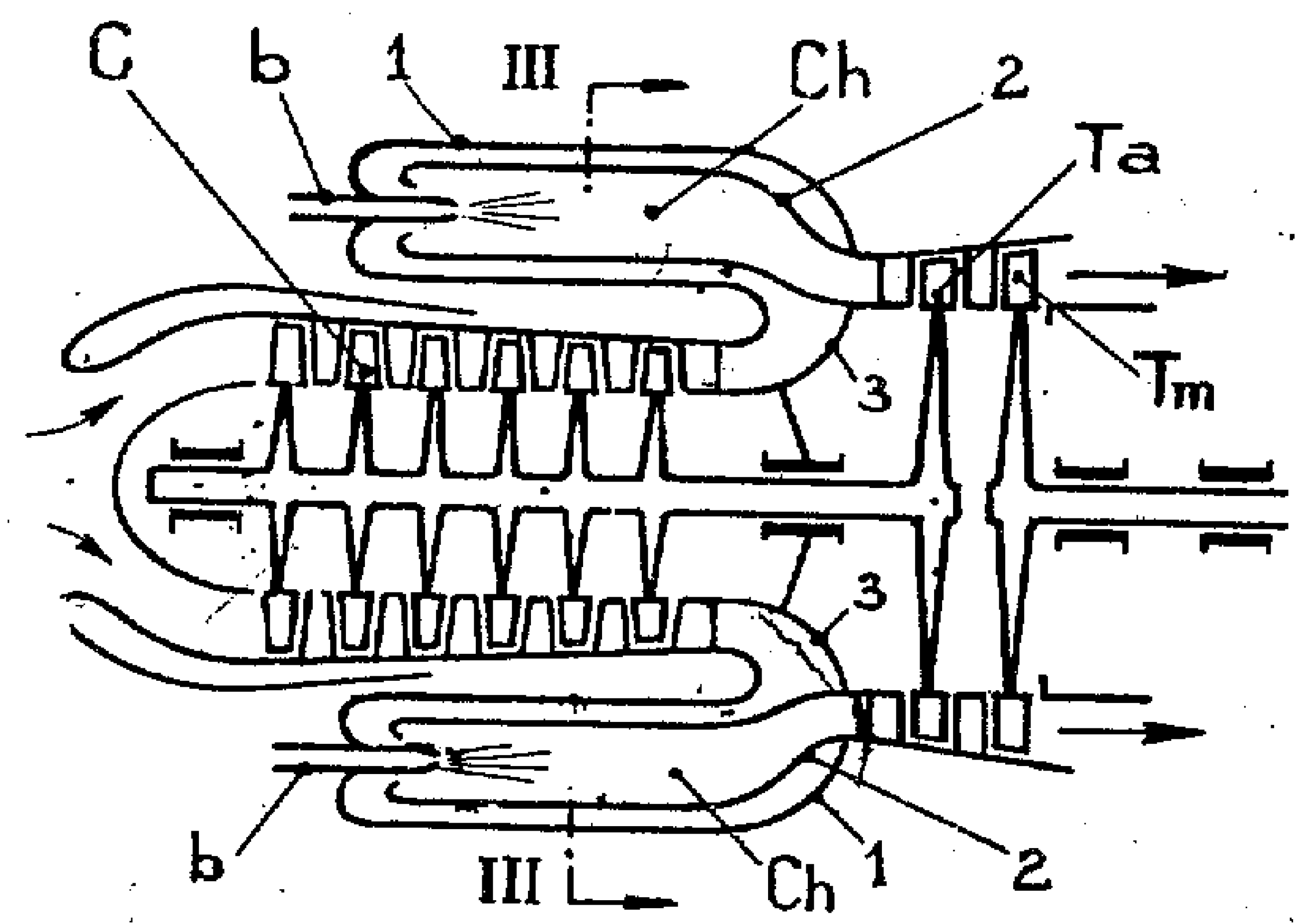

fig. 2

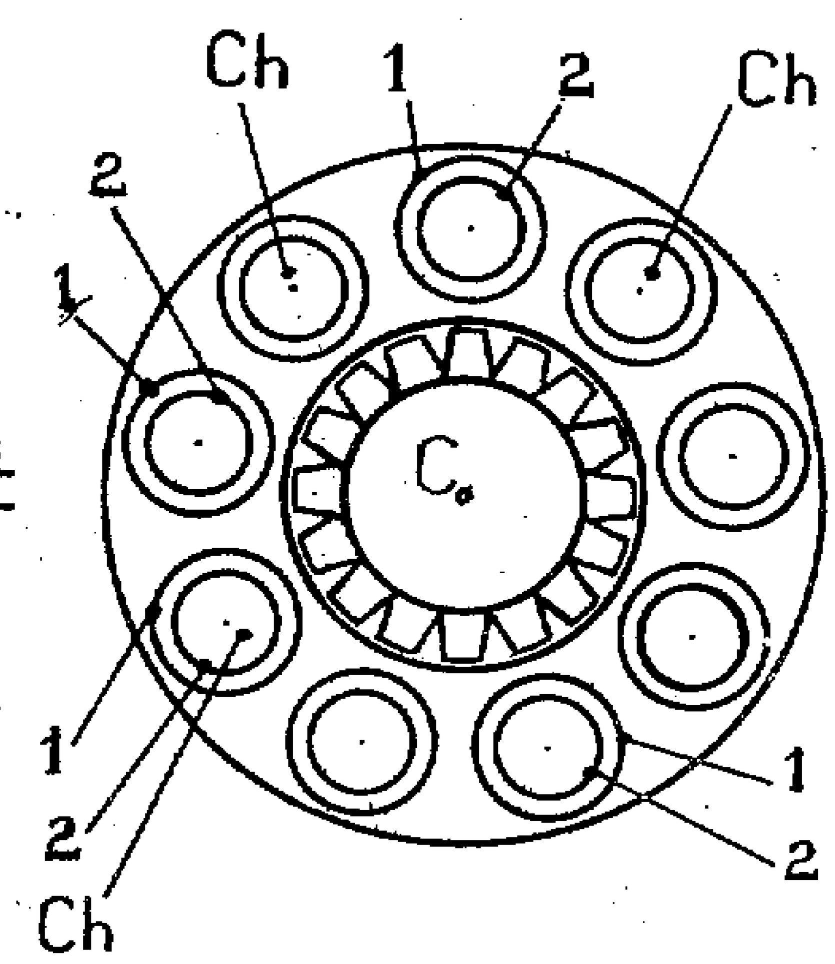

fig. 3

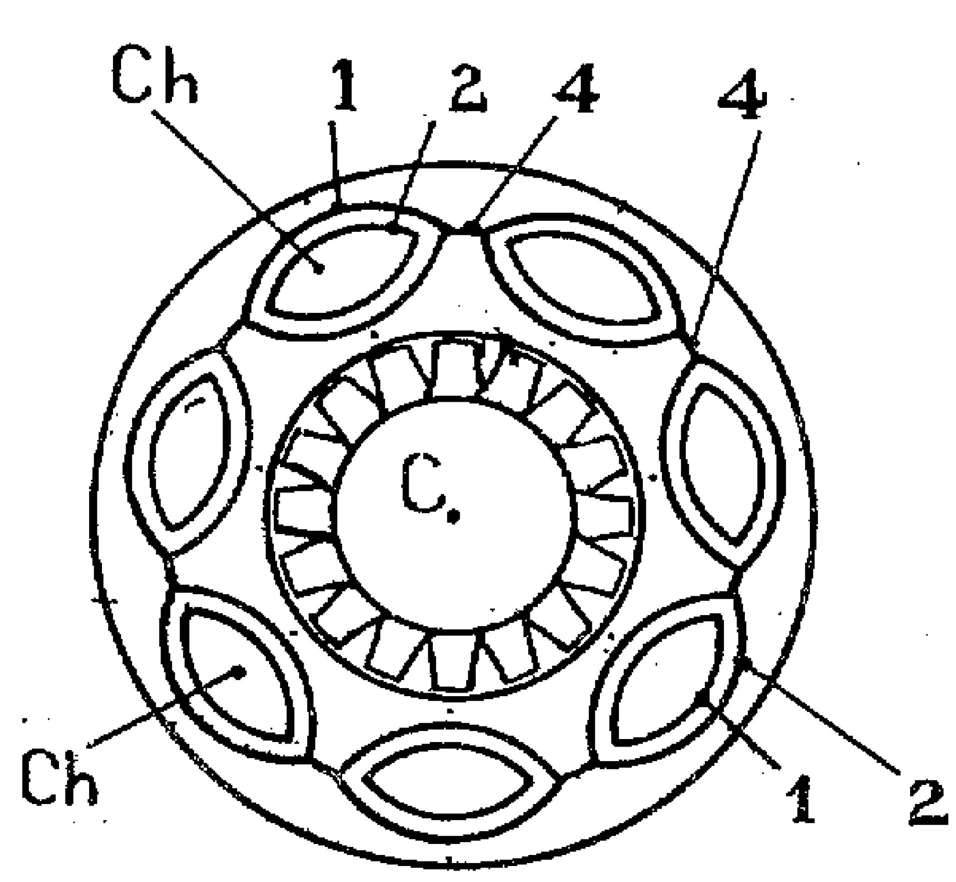

fig. 4

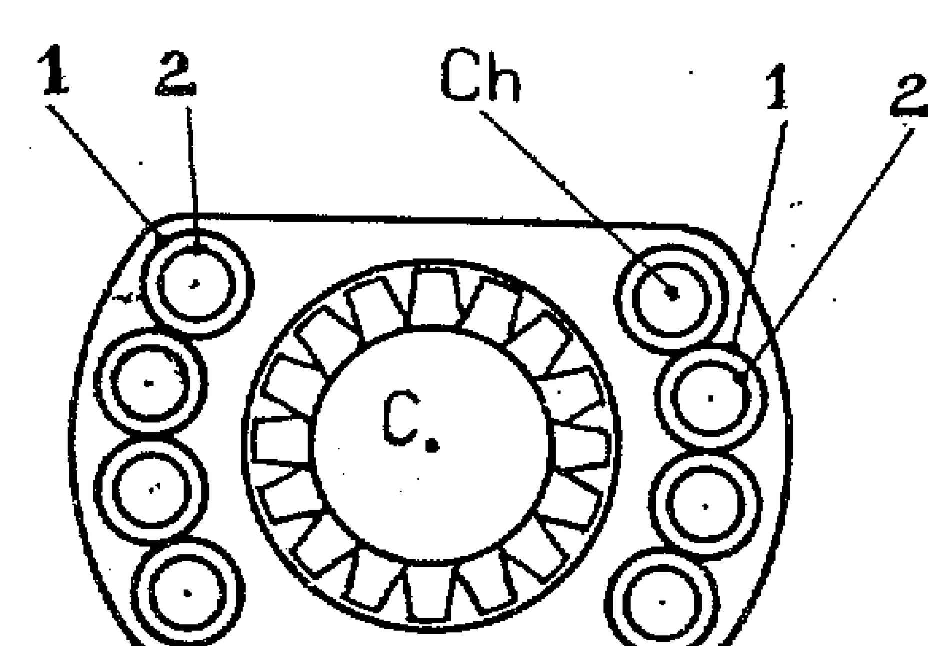

fig 5

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2,601,612

GAS TURBINE MOTOR OF REDUCED DIMENSIONS

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3 Claims. (Cl. 60—39.37)

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For certain problems it is of interest to have available motors having dimensions as small as possible particularly in diameter.

Gas turbine motors are particularly satisfactory from this point of view. Nevertheless the arrangement of the combustion chamber may cause an inconvenient increase in dimensions and the object of the present invention is to reduce this increase.

According to the invention the combustion chamber is subdivided into several chambers connected in parallel between the compressor and the turbine and distributed around the axis of the motor or of the compressor.

The following description with reference to the accompanying drawing, given by way of non-limiting example, will explain how the invention may be carried into effect, the features apparent both from the drawing and the description forming, as will be understood, a part thereof.

Fig. 1 is a schematic view in section of a gas turbine motor of a known type.

Fig. 2 is an axial section of a motor in conformity with the invention.

Fig. 3 is a transverse section on line III—III of Fig. 2.

Figs. 4 and 5 are transverse sections of two modifications.

A gas turbine motor is constituted essentially, as shown in Fig. 1, by an air compressor C, by one or more combustion chambers *Ch* and by an expansion turbine T which is for example divided into two elements, one of which, T*a*, controls the compressor, and the other of which, T*m*, provides the motive power properly so-called.

The arrangement of the combustion chambers forming the subject of the present invention permits of housing the whole of the motor in a volume having a diameter as small as possible, whilst at the same time maintaining conditions which are necessary for the good operation of these chambers and comprising in particular:

1. A length of chamber sufficient for obtaining a combustion which is as complete as possible.

2. A double circulation, cold air outside-hot gas inside, in such a way as to recuperate a maximum quantity of calories lost externally by convection and radiation. This arrangement permits likewise of not putting to work the internal hot wall, the pressure being supported by the cold external wall.

3. A satisfactory accessibility of the burners.

According to Figs. 2 and 3, the motor comprises a certain number of combustion chambers *Ch* disposed around the compressor. These combustion chambers have cylindrical walls in such a way as to obtain maximum lightness of the casing for a given pressure. They have double walls 1, 2, the cold air coming from the compressor circulating externally of the chambers between the envelopes 1 and 2, the hot gases internally. The burners or atomisers *b* disposed in the heads are particularly accessible and easy to inspect and to dismantle. Finally the length dimension being free within the limit of that of the compressor, a length necessary for the development of the flame and for complete combustion may easily be provided. The external diameter of the turbine T*a* necessary for driving the compressor being greater than the diameter of the compressor, the connection of such chambers at the inlet of the turbines is particularly favourable, and the external diameter may be equal to or only slightly greater than that of the turbines. From the point of view of expansion it is of interest that the chambers are connected to the compressor only by connecting tubes 3 supplying air under pressure, the chambers then being able to expand freely.

In order to obtain a minimum diameter it is of advantage to increase the number of chambers to such a point that they substantially touch one another laterally. In doing this, however, the total weight is increased, as also the number of burners or atomisers, and their dimensions are decreased, which may increase difficulties in supplying the combustible.

When a small dimension in one direction is more important than in the other, the chambers may be arranged only on a portion of a circle which surrounds the compressor, or better on two oppositely disposed sectors, as illustrated in Fig. 5.

Fig. 4 relates to another particular construction of the invention comprising combustion chambers which have a lenticular cross-section in such a way as to obtain a very small volume with a moderate number of chambers. By reason of the increase in the radius of curvature of the walls it would be necessary to make them of greater thickness than in the case of Fig. 3, and therefore to increase the weight. According to the present invention this disadvantage may be remedied by providing a connection between the different chambers by small bars 4. The arrangement can still expand freely diametrically and lengthwise.

What we claim is:

1. A gas turbine power plant comprising in combination an axial-flow multi-stage air com-

pressor having a discharge passage, an axial-flow gas turbine coaxial with said compressor, adjacent thereto and adapted to drive same, said turbine having a gas-intake passage, the over-all diameter of said turbine being greater than the over-all diameter of said compressor, and a plurality of separate, elongated combustion chambers of lenticular cross-section, each having an air inlet connected to said discharge passage and a gas outlet connected to said gas-intake passage, said elongated chambers being located around said compressor, in the vicinity thereof, and extending in a direction substantially parallel to the axis of the compressor.

2. A gas turbine power plant comprising in combination an axial-flow multi-stage air compressor having a discharge passage, an axial-flow gas turbine coaxial with said compressor, adjacent thereto and adapted to drive same, said turbine having a gas-intake passage, the over-all diameter of said turbine being greater than the over-all diameter of said compressor, and a plurality of separate, elongated combustion chambers, each including a tubular outer casing of lenticular cross-section connected at one end to said discharge passage and a tubular inner casing of lenticular cross-section inside said outer casing and spaced therefrom, connected at one end to said gas-intake passage, said ends being in the vicinity of one another, the combustion chamber being supported from said ends, the other ends of said outer casing and said inner casing being respectively closed and open, said elongated chambers being located around said compressor, in the vicinity thereof, and extending

in a direction substantially parallel to the axis of the compressor.

3. A gas turbine power plant comprising in combination an air compressor having a discharge passage, a gas turbine coaxial with said compressor and adjacent thereto, said turbine having a gas-intake passage, and a plurality of separate, elongated combustion chambers of lenticular cross-section, each having an air inlet connected to said discharge passage and a gas outlet connected to said gas-intake passage, said elongated chambers extending substantially parallel to the axis of the compressor.

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