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HEAT RECOVERY IN GENERATORS

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FIG. 1

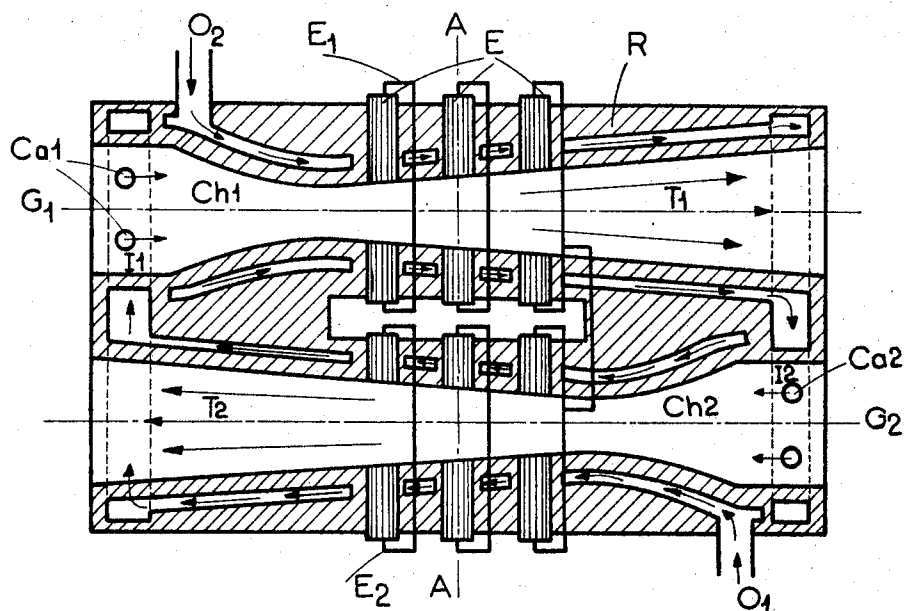
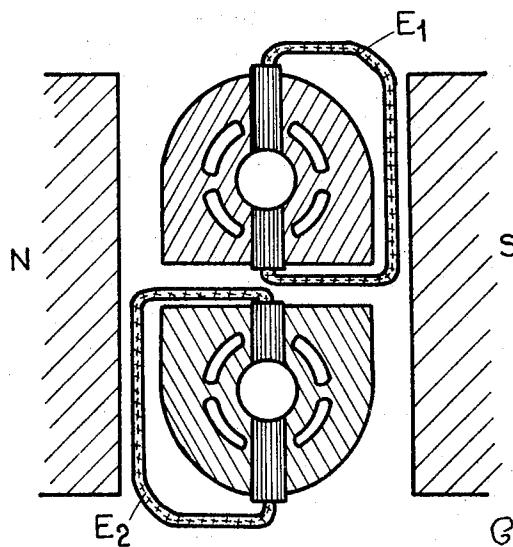


FIG. 2



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HEAT RECOVERY IN GENERATORS

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924,650

13 Claims. (Cl. 310—11)

The invention relates to a magnetoaerodynamic apparatus, comprising, for the hot gas circulation, a combustion chamber connected to a properly so called magnetoaerodynamic duct, and within the walls of which a coolant flows.

The function of this coolant, which can be the combustible component of the combustion mixture, is on the one hand to maintain the walls at a temperature permissible with the heat resistance characteristics of the materials known at present, on the other hand to recuperate the calories which pass through these walls and use them to preheat the combustible.

The object of the present invention is a magnetoaerodynamic apparatus using the above mentioned principles of the main patent, but comprising two magnetoaerodynamic conduits arranged side by side and head to tail in the magnetic field of a single electromagnet.

The coolant is compulsorily the combustible component used for the combustion, or an element of this combustible.

For each conduit, the coolant is fed into the wall, in the vicinity of the combustion chamber, and flows in the same direction as the conducting gases from which the electricity is drawn. At the end of its run, the coolant is directly injected into the combustion chamber adjacent to the other magnetoaerodynamic conduit.

Such method exhibits many advantages which can be classified into two categories: thermal advantages and electrical advantages.

From the thermal point of view, the antisystematic-type circulation, i.e. in which the coolant flows in the same direction as the gas to be cooled, has the advantage to maintain the whole surface of the cooled wall at a more homogeneous and more constant temperature.

Furthermore, when the coolant represents the total combustible component—this being the most frequent case—it will be therefore possible to use, as a means of control regarding the magnetoaerodynamic apparatus, the section available for the coolant between the two magnetoaerodynamic conduits so as to set the heat transfer coefficient to the correct value.

By applying this method, it is possible to raise the combustible component temperature to a value higher than that reached in the conventional heaters.

Moreover, arranging two inverted magnetoaerodynamic generators side by side eliminates, as regards the heated combustible component, a long path back to the combustion chamber, which would result in calorific losses.

From the electrical point of view, in the assumption—achieved in most cases—in which both generators are identical, the electric currents which originate in the two plasmas are of opposite direction. Consequently, their effects on the magnetic field, being equal and opposite, will have a nullifying action on each other.

In addition, in the particular instance of magnetoaerodynamic generators of the "Hall effect" type, and if the electric currents delivered by each of them are equal, both electric circuits can be series connected whence a compact apparatus delivering a voltage which will be twice that of a single generator. In other respects, since, in a generator of this type, the intermediate electrodes are interconnected, no problem of connection arises from the juxtaposition of both generators.

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The invention will be better understood by referring to the applications relating to the attached drawings which are merely illustrative and not limitative.

FIGURE 1 is a longitudinal section of a device according to the invention.

FIGURE 2 is a cross-section according AA of the same device.

According to FIGURE 1, two magnetoaerodynamic generators G1 and G2 are arranged in a same refractory unit R. Each of these two head-to-tail assembled generators comprises an inlet Ca1 or Ca2 for the fuel, a combustion chamber Ch1 or Ch2 and a nozzle T1 or T2. The electrodes are represented by E, E1 and E2 being the external connections.

The combustible component assigned to G1 generator is fed into O1 and flows along the whole G2 generator before being fed into I1 in Ch1 combustion chamber. In the same way, the combustible component assigned to G2 generator is fed into O2 and flows along the whole G1 generator before being fed into I2 in Ch2 combustion chamber.

The pole pieces which must create a field perpendicular to both electrodes and gaseous flow can not be shown in the figure, since they are parallel to the projection plane.

In FIGURE 2, it can be seen the fitting of pole pieces N and S and the arrangement of the cooling pipes around the magnetoaerodynamic conduit.

Of course, the arrangements and shapes shown in these figures are in no way limitative and can be altered without going beyond the limits of the present invention.

What is claimed is:

1. A power plant, comprising: a first housing defining a first combustion chamber portion and a fluid communicating first exhaust portion; a second housing defining a second combustion chamber portion and a fluid communicating second exhaust portion; said first and second housings being mounted closely adjacent to and substantially parallel to each other; said first combustion chamber portion being closely adjacent to and transversely aligned with said second exhaust portion; said second combustion chamber portion being closely adjacent to and transversely aligned with said first exhaust portion; first conduit means for conducting a coolant fluid from said first combustion chamber portion to said first exhaust portion in closely adjacent heat exchange relationship, and for discharging the thus heated coolant into said second combustion chamber portion; second conduit means for conducting a separate coolant fluid from said second combustion chamber portion to said second exhaust portion in closely adjacent heat exchange relationship, and for discharging the thus heated coolant into said first combustion chamber portion.

2. The power plant of claim 1, wherein each of said housings constitute an independent magnetohydrodynamic generator having electrodes; and including field means for producing a magnetic field for both of said magnetohydrodynamic generators.

3. The power plant of claim 2, wherein said magnetohydrodynamic generators are substantially identical.

4. The power plant of claim 3, wherein said first conduit means substantially surrounds said first combustion chamber portion and said first exhaust portion throughout substantially their entire extent; said second conduit means substantially surrounds said second combustion chamber portion and said second exhaust portion throughout substantially their entire extent.

5. The power plant of claim 4, wherein said housings are constructed of integrally joined common refractory material; and each of said conduit means consisting of passages formed in said refractory material of said housings.

6. The power plant of claim 5, wherein said field means

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produces only a single common magnetic field for both of said magnetohydrodynamic generators.

7. The power plant according to claim 2, wherein said first conduit means substantially surrounds said first combustion chamber portion and said first exhaust portion 5 throughout substantially their entire extent.

8. The power plant according to claim 7, wherein said housings are constructed of integrally joined common refractory material; and each of said conduit means consisting of passages formed in said refractory material of 10 said housings.

9. The power plant according to claim 8, wherein said field means produces only a single common magnetic field for both of said magnetohydrodynamic generators.

10. The power plant according to claim 2, wherein said 15 housings are constructed of integrally joined common refractory material; and each of said conduit means consisting of passages formed in said refractory material of said housings.

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11. The power plant according to claim 2, wherein said field means produces only a single common magnetic field for both of said magnetohydrodynamic generators.

12. The power plant according to claim 3, wherein said housings are constructed of integrally joined common refractory material; and each of said conduit means consisting of passages formed in said refractory material of said housings.

13. The power plant according to claim 3, wherein said field means produces only a single common magnetic field for both of said magnetohydrodynamic generators.

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