

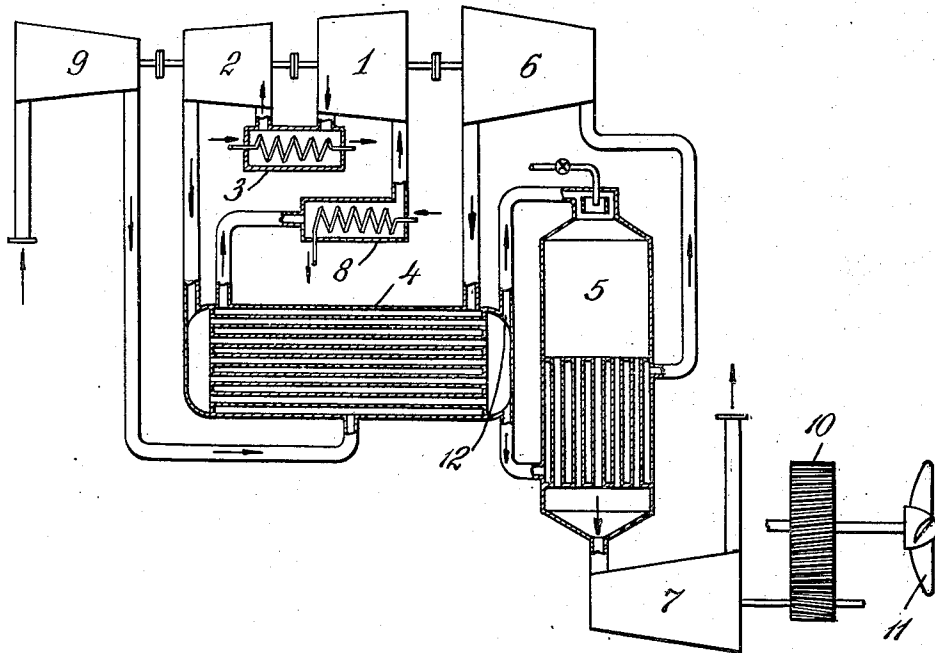
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GAS TURBINE PLANT

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GAS TURBINE PLANT

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The invention relates to a gas turbine plant and consists in that the quantity of working medium required for producing at least the greater part of the effective work is led away from the plant through the turbine producing the effective work, whilst the rest of the working medium, which drives the auxiliary machines, remains within the plant.

The quantity of working medium necessary for producing the effective work may be led away continually from the plant. Preferably this quantity of working medium producing the effective work and continually led away from the plant is replaced by a quantity of working medium continually led into the plant.

The invention is described with the help of the accompanying drawing.

The working medium compressed in the low-pressure compressor 1 passes through the intermediate cooler 3 into the high-pressure compressor 2 and then, after being compressed to the highest service pressure, is preheated in the tubes of a heat-exchanger 4. At the outlet 12 of the heat-exchanger the stream of working medium divides into two parts, one of which flows round the heat-exchanger tubes of the combustion heater 5, being thereby brought to its highest service temperature.

The compressed and heated working medium is expanded in the turbine 6 and then passes into the space surrounding the heat-exchanger tubes in the heat-exchanger 4 where it gives up a part of its remaining heat to the working medium coming from the compressor 2. A further part of the remaining heat is led away to a cooling-medium in the primary cooler 8, after which the working medium flows again to the low-pressure compressor 1.

In the described plant, there is no closed circuit, in so far that a part of the stream of working medium is taken at the outlet 12 of the heat-exchanger 4 and lead as combustion air to the burner of the heater 5. The combustion gases flow through the heat-exchanger tubes therein and then pass into the work turbine 7, from where, after expanding, they can be led direct to atmosphere.

To the stream of working medium present in the plant, a make-up quantity is introduced through the make-up compressor 9, sufficient not only to replace the quantity removed but also to cover all losses. This make-up quantity is introduced into the heat-exchanger 4 at a place where the working medium flowing back from the tur-

bine 6 has approximately the same temperature as the compressed make-up quantity.

The turbine 6, driven by the stream of working medium circulating in the plant, drives the compressors 1, 2 and 9, whilst the work turbine 7, driven by the quantity of working medium removed from the plant, gives up effective work by driving for instance a ship's propeller 11 through a gear 10.

Preferably the turbine 6 and the compressors 1 and 2 are driven at a constant speed in order to have the best efficiency over a wide range of load, the pressure or the density of the stream of working medium being suitably adjusted to the effective work done by the plant.

I claim:

1. A gas turbine plant which comprises a turbine, a low-pressure compressor, a high-pressure compressor, a make-up compressor, means for driving the low-pressure compressor, the high-pressure compressor and the make-up compressor by the turbine; an intermediate cooler between the low and high pressure compressors, a heater, a heat-exchanger and a work turbine, means for introducing air into the make-up compressor and passing it in a compressed state into the heat-exchanger, means for passing expanded air from the first-mentioned turbine into the heat-exchanger and mixing it with the make-up air, a primary cooler connected between the heat-exchanger and the low-pressure compressor, conduit, means for passing the mixed air through the primary cooler into the low-pressure compressor wherein it is compressed, means for passing the compressed air from the low-pressure compressor through the intermediate cooler and then through the high-pressure compressor wherein it is further compressed and passed through the heat-exchanger, means for passing part of the compressed air from the heat-exchanger through the heater and into the work turbine wherein it expands and is discharged from the plant, means for passing the other part of the compressed air through the heater to the first-mentioned turbine, and then into the heat-exchanger wherein it is admixed with the make-up air and passed in heat-exchange contact with the compressed air from the high-pressure compressor.

2. A gas turbine plant according to claim 1 which comprises combustion means in the heater for using a part of the air from the heat-exchanger for combustion, and means for passing the combustion gases through the heater in heat-exchange contact with the compressed air

passing to the first mentioned turbine and then to the work turbine.

3. A gas turbine plant which comprises a turbine, a compressor means including a make-up compressor, means for driving the compressor means by the turbine, a combustion heater, a heat-exchanger and a work turbine, means for introducing air into the make-up compressor and passing it in a compressed state into the heat-exchanger, means for passing expanded air from the first mentioned turbine into the heat-exchanger and mixing it with compressed make-up air, a cooler means for passing the mixed air from the heat-exchanger into the cooler and from the cooler into the compressor means wherein it is compressed and passed back through the heat-exchanger in heat exchange contact with the mixed air, means for passing part of the compressed air from the heat-exchanger into the heater as combustion air, means for introducing fuel into the heater to be burned with the combustion air, means for passing the products of combustion from the heater to the work turbine wherein they are expanded and then discharged from the plant, means for passing another part of the compressed air from the heat-exchanger through the heater in heat-exchange contact with the products of combustion, and means for passing the heated compressed air from the heater into the first-mentioned turbine.

4. A gas turbine plant which comprises a tur-

bine, compressor means including a make-up compressor, means for driving the compressor means by the turbine, a combustion heater, a heat-exchanger, a cooler and a work turbine, means for passing expanded air from the first-mentioned turbine into the heat-exchanger and then through the cooler and into the compressor means wherein it is compressed and passed back through the heat-exchanger in heat-exchange contact with the expanded air, means for passing part of the compressed air from the heat-exchanger through the heater and into the first-mentioned turbine, so as to form a circuit of air flowing through the compressor means, the heat-exchanger, the heater and the first-mentioned turbine, means for passing another part of the compressed air from the heat-exchanger into the heater as combustion air, means for introducing fuel to the heater to be burned with the combustion air, means for bringing the products of combustion of the heater in heat-exchange contact with the part of the air passing through the heater to the first-mentioned turbine, means for passing the products of combustion from the heater to the work turbine wherein they are expanded and then discharged, means for introducing air into the make-up compressor, and means for conducting compressed air from the make-up compressor into the circuit of the air.

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