Published May 25, 1943

Serial No. 353,551

ALIEN PROPERTY CUSTODIAN

GAS TURBINE

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No Drawing. Application filed August 21, 1940

This invention relates to a particularly heat resisting rotor and blades in gas turbines.

To make possible operation of gas turbines at high temperatures special materials, mostly containing greater or lesser amounts of alloying additions, as Ni, Cr, Mo, W, etc., have been developed for rotors and blades. Some of these materials show also additions of Ti, Ta and Nb, but all of them fail to give satisfaction in gas turbines which in continuous operation are capable of withstanding gas temperatures of 700° C and over and of maintaining proper circumferential speeds. In most instances, a temperature of 700° C is not attained, the maximum being 600° C. Furthermore, these materials are open to the objection that the alloying elements are quite expensive.

There are further materials available which disclose excellent creep strength without containing these expensive alloying elements, though temperatures in excess of 600° C are not permissible. They are also not non-scaling at high temperatures. It has been attempted to use ceramic materials for the production of turbine rotors and blades. They possess extraordinary refractoriness and, even at increasing temperature, do not lose strength to the very considerable degree observable in known turbine materials. Considering the problem concerned, it should be borne in mind, however, that a rotor is necessarily weakened by the provision of the grooves required for the reception of the blades, which is particularly serious with respect to ceramic materials in view of the high gas temperature.

According to the invention, the troubles mentioned can be overcome by producing the rotor and the blades in one piece from ceramic masses.

Although it has been tried to make rotor and blades in one piece from steel possessing high creep resistance, no satisfactory results could be obtained owing to the difficult machinability of this kind of steel. Ceramic masses, on the other hand, represent a material which, in addition to disclosing favorable properties at high temperatures, can be readily worked. The masses may be molded or, after having been preparatorily fired at moderate temperature, turned, drilled, milled, etc. and permit grinding after firing has been completed. By using ceramic masses according to the invention the turbine rotor and blade can be made integral and strength can be considerably enhanced without causing troubles for subsequent machining operations.

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