PUBLISHED	A. SCHÜTTE	Serial No.
MAY 25, 1943.	BLADE FASTENING FOR GAS TURBINES	385,333
BY A. P. C.	Filed March 26, 1941	

Fig. 1

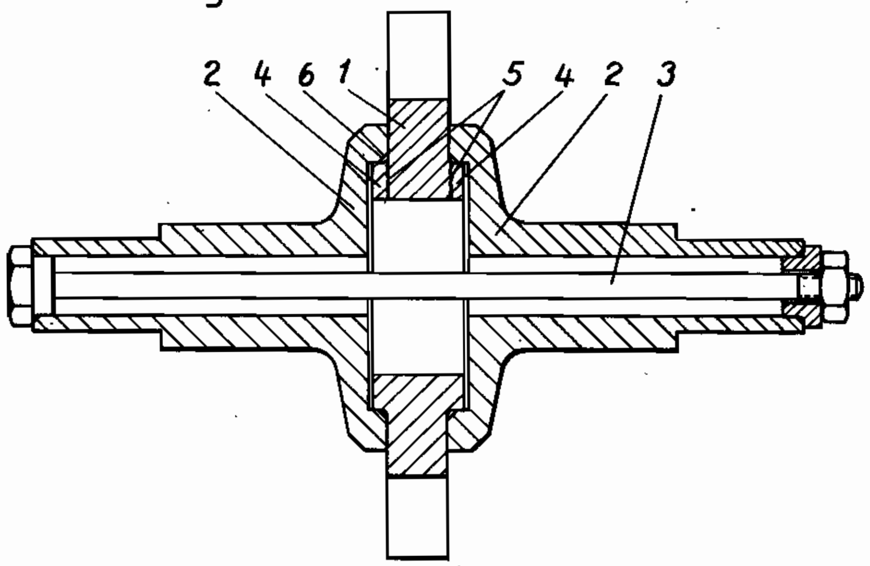
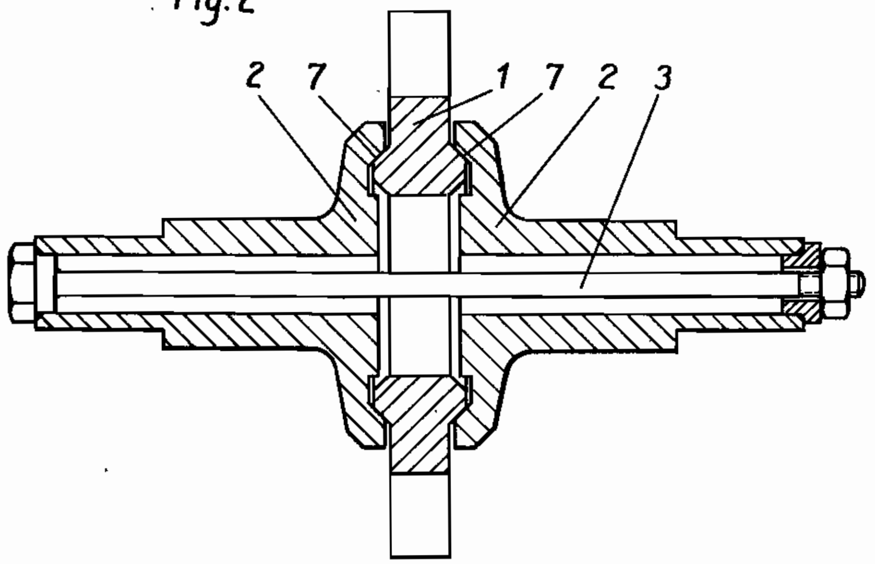


Fig. 2



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Published May 25, 1943

Serial No. 385,333

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BLADE FASTENING FOR GAS TURBINES

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Application filed March 26, 1941

This invention relates to a blade fastening for gas turbines.

In gas turbines, which are operated at very high gas temperatures, blades of ceramic masses are used, since metallic materials capable of withstanding the stresses due to the high temperatures are not available. The ceramic materials used for this purpose must moreover be carefully selected, because not all of them are suited for the high tensile stresses involved. Furthermore, as ceramic materials cannot be treated like steel to avoid interior shrinkholes and cavities, considerable difficulties present themselves when larger structures, such as entire turbine rotors with the blades, have to be manufactured, which possess the necessary strength properties. According to a known method the blades only are made from ceramic materials and provided with a so-called T-head base by means of which they are fixed between two discs produced from steel of high creep strength. In this construction the blades engage with two shoulders corresponding recesses of the discs so that the shoulders are subjected to bending stresses by centrifugal force. Furthermore, at the points of transition of the shoulders notch effects appear which should be absolutely avoided, since ceramic materials are particularly sensitive to notching and bending stresses.

According to the invention the disadvantages connected with the known constructions are eliminated by replacing the T-head base of the shoulders by a cone which abuts against corresponding conical surfaces of the steel discs, so that bending stresses are avoided and the base of the blades is subjected only to compressive stress due to the pressure of the steel discs. As the safe compressive stress in ceramic materials is extraordinarily high, the stress conditions of a blade according to the invention are quite favorable.

The invention is illustrated by way of example in the accompanying drawing, in which

Figure 1 is a longitudinal section of a rotor of known type and

Fig. 2, a longitudinal section of a rotor according to the invention.

In the drawing 1 designates the blades of ceramic material; 2, the lateral fixing disc of steel possessing high creep strength; and 3, a tension bolt or stay pressing the disc 2 against the blades 1. In the construction of the old art shown in Fig. 1 the blades 1 engage with two shoulders 4 in corresponding recesses of the discs 2, and the shoulders 4 are thus subjected to bending stresses due to centrifugal force at the faces 5. Notch effects appear at 6.

In Fig. 2 the contact faces 7 between the discs 2 and the blades 1 have conical shape, so that merely compressive stresses act on the blades 1 during application of the discs 2 as well as owing to centrifugal force.

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