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(54) **Gas turbine cooled stationary blade**

Gekühlte Statorschaufel für Gasturbinen

Aube de guidage refroidie pour turbines à gaz

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(74) Representative: **HOFFMANN - EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

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(56) References cited:
EP-A- 0 698 723 **US-A- 5 320 483**

(73) Proprietor: **Mitsubishi Heavy Industries, Ltd.**
Tokyo 100-8315 (JP)

(72) Inventors:
• **TOMITA, Yasuoki**
c/o Takasago Machinery Works
2-chome Takasago-shi Hyogo-ken 676-8686 (JP)
• **AOKI, Sunao c/o Takasago Machinery Works**
2-chome Takasago-shi Hyogo-ken 676-8686 (JP)
• **SUENAGA, Kiyoshi**
c/o Takasago Res. & Devel. Center
2-chome Takasago-shi Hyogo-ken 676-8686 (JP)
• **ISHIGURO, Tatsuo**
c/o Takasago Res. & Devel. Center
2-chome Takasago-shi Hyogo-ken 676-8686 (JP)

• **PATENT ABSTRACTS OF JAPAN vol. 017, no. 379 (M-1447), 16 July 1993 (1993-07-16) -& JP 05 065802 A (TOSHIBA CORP), 19 March 1993 (1993-03-19)**
• **PATENT ABSTRACTS OF JAPAN vol. 017, no. 133 (M-1383), 19 March 1993 (1993-03-19) & JP 04 311604 A (TOSHIBA CORP), 4 November 1992 (1992-11-04)**
• **PATENT ABSTRACTS OF JAPAN vol. 018, no. 360 (M-1634), 7 July 1994 (1994-07-07) -& JP 06 093801 A (HITACHI LTD), 5 April 1994 (1994-04-05)**

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Description

BACKGROUND OF THE INVENTION

Technical Field of The Invention

[0001] The present invention relates to a steam cooled stationary blade for a gas turbine, and more particularly to a cooled stationary blade for a gas turbine for steam cooling both an inner shroud and the blade.

Description of The Related Art

[0002] Fig. 5 shows a typical conventional air cooled type gas turbine stationary blade. In this drawing, numeral 40 denotes a stationary blade, numeral 41 denotes an outer shroud and numeral 42 denotes an inner shroud. Reference characters 43A, 43B, 43C, 43D and 43E denote respective air passages. Numeral 45 denotes a trailing edge of the blade. Numeral 44 denotes air blowout holes at the trailing edge. Reference numeral 46 denotes turbulators provided in an inner wall of each air passage 43A to 43E for enhancing heat transmission by distributing the air flow.

[0003] In this air cooled type stationary blade, the cooling air 47 is introduced from the outer shroud 41 to the air passage 43A and flows to a base portion (at the inner shroud side). The cooling air is introduced from the base portion into the next air passage 43B. The cooling air flows to an upper end (at the outer shroud side) and into the next air passage 43C. The cooling air flows in the same way through the air passages 43D and 43E, in that order, to thereby cool the blade. Then, in the air passage 43E, the cooling air is blownout from the air blowout holes 44 of the trailing edge 45, and at the same time, the rest of the air flows out from the lower side of the inner shroud 42.

[0004] In the above air cooled type stationary blade, a serpentine cooling path is formed by the air passages 43A to 43E to cool the blade by means of the cooling air flowing through the path. However, there is no consideration of the cooling effect on the shrouds.

[0005] Fig. 4 shows an example of a cooled stationary blade in which the blade is cooled by steam and the shrouds are cooled by air. The steam cooling system used in this stationary blade has not yet been put into practical use. However, it is a technique which has been researched by the present applicant. In the drawing, reference numeral 30 denotes the stationary blade, from which the outer shroud at an upper portion thereof has been omitted, and in which a portion of the blade is shown. Numeral 31 denotes the inner shroud. Reference numerals 33A, 33B, 33C, 33D, 33E and 33F denote steam passages of the respective interiors of the stationary blade.

[0006] In the thus constructed stationary blade, the cooling steam 39 is introduced from a leading edge portion of the outer shroud (not shown) to the steam pas-

sage 33A and from a base portion thereof (inner shroud side) into the steam passage 33B. The cooling steam flows from an upper portion of the steam passage 33B (at the outer shroud side) into the next steam passage 33C and flows through the steam passages 33D and 33E in a similar manner. The steam flows from the base portion side of the steam passage 33E into the steam passage 33F on the trailing edge side to cool the interior of the blade. Thereafter, the steam is recovered from the steam recovery port of the outer shroud.

[0007] On the other hand, the inner shroud 31 is cooled by cooling air. The cooling air 37, introduced from the lower portion of the inner shroud 31, is introduced into air cooling passages in the interior of the inner shroud 31 from one end thereof. The air flows from one side to the other within these air cooling passages to cool the entire inner shroud 31 and is discharged from the air blowout holes 38 on the other side to air cool the entire blade.

[0008] As described above, in the conventional gas turbine stationary blade shown in Fig. 5, the air cooling system is mainly used to cool the blade, but not to cool the inner shroud at all. Also, in the air cooling system shown in Fig. 4, in an example made by the present applicant, the cooling air is introduced into the air cooling passages within the inner shroud 31 and flows from one side to the other in the inner shroud to cool the surface of the shroud from the interior. The air flows out from the air blowout holes 38 on the other side. Furthermore, although not shown in this case, a recess is formed in the inner surface of the inner shroud 31. An impingement plate is provided in parallel with the inner surface of the inner shroud. Another method also being developed by the present applicant is one in which the cooling air 37 fed from the lower portion impinges on the impingement plate and is blownout from a number of holes so that the interior of the shroud is uniformly cooled by the air.

[0009] However, in the air cooling system shown in Fig. 5 described above, a large amount of air is consumed for cooling and the air that has been used for cooling is discharged to the combustion gas passage. Consequently, the system suffers from a problem in that a relatively large amount of power is consumed by a compressor or a cooler. Also, since the air that has been used for cooling is discharged into the combustion gas passage, the cooling air is mixed with the combustion gas which lowers the gas temperature resulting in a reduction of turbine efficiency.

[0010] On the other hand, in the steam cooling system for the blade shown in Fig. 4, since the blade is cooled by using steam and the steam which has been used for cooling is recovered and returned to the steam feed source, it is possible to utilize the steam effectively. However, only the blade is cooled by the steam, and the air cooling system is used for the inner shroud. The air that has been used for cooling the inner shroud is discharged into the main stream of the combustion gas flowing through the gas turbine. Accordingly, compared

with the system of cooling the blade with air as shown in Fig. 5, it is possible to conserve and reduce the amount of cooling air. However, in any case, the turbine efficiency is towered because the cooling air is needed and the temperature of the combustion gas is towered by the mixture of the air into the combustion gas.

[0011] US 5,320,483 describes a cooled stationary blade assembly for a gas turbine. Steam is supplied from steam passages into a chamber in the outer side wall. After passing through a nozzle blade, the steam enters into the vanes which are subdivided into a plurality of individual compartments. The steam flows through a first cooling steam supply passage, a second return steam passage, a third leading edge cooling steam passage and a fourth steam passage. Moreover, there is an air passage. The steam passages lie in communication with a cooling channel disposed within the inner side wall. This cooling channel collects the steam and directs it to the downstream flow channel through the vane.

[0012] EP-A-0 698 723 describes a cooled stationary blade assembly for a gas turbine comprising an inner shroud, an outer shroud and a stationary blade provided between the outer shroud and the inner shroud with a leading edge and a trailing edge. There is an air-cooling system which serves both to cool the inner shroud and the vanes. In the inner shroud there are inner chambers which are interconnected by openings with the inner compartments of the vanes. These compartments serve for an impingement cooling of the inner shroud. The stator vane has a plurality of discrete cavities between the leading and trailing edges and extending lengthwise for flowing a cooling medium. The cooling medium air serves to cool both the stator vane and the inner shroud. It is also mentioned to use steam as a cooling medium.

[0013] JP-0-A-05065802 describes a steam cooling system for the stationary blade of a turbine. In the end wall of the outside diameter side of the stationary blade, there is a steam supplying cavity which is connected to the cooling passages for steam through the vane. There is a cooling duct formed in the inner shroud of the stationary blade assembly.

[0014] JP-A-06311604 refers to a blade assembly with a hollow vane which is subdivided into individual compartments by means of partition walls. The compartments are communicating with each other through a communicating passage in the inner shroud. The cooling steam is first guided to the center compartment of the vane and then, guided to those compartments in the leading edge part and the trailing edge compartment of the vane.

[0015] JP-A-06093801 describes a vane body having a hollow structure, the inside of which is sectioned into a vane internal cavities by partition walls. An insert having a plurality of jet holes is located in the cavities of the vane body. Cooling medium fed into an internal cooling medium passage is jetted onto the inner surface of the vane body through the jet ports at a high speed.

OBJECT OF THE INVENTION

[0016] Accordingly, in order to solve the above-noted problems, a primary object of the present invention is to provide a gas turbine cooled stationary blade in which not only cooling of an interior of a blade, but also cooling of an inner shroud is performed by steam cooling, and steam that has been used for cooling is completely recovered and returned to a steam feed source for effective utilization without the necessity of cooling air to thereby enhance the efficiency of the turbine.

[0017] Also, another object of the present invention is to provide a gas turbine cooled stationary blade in which the structure of a steam passage for cooling the inner shroud is simplified so that machining and assembly of the blade are also improved.

SUMMARY OF THE INVENTION

[0018] These objects are solved by a cooled stationary blade assembly according to claim 1. Preferred embodiments are characterized by the dependent claims.

[0019] A cooled stationary blade assembly for a gas turbine according to the present invention is characterized by comprising an outer shroud, an inner shroud, a stationary blade provided between the outer and inner shrouds with a leading edge and a trailing edge, a first steam cooling means provided in an interior of the stationary blade for cooling steam, and a second steam cooling means provided in the inner shroud and communicated with the first steam cooling means in order to flow a portion of the cooling steam.

[0020] The interior of the blade is cooled with the steam by the first and second steam cooling means, and at the same time, the inner shroud may also be cooled with steam, the conventional cooling air is dispensed with, the power consumption of the compressor or the cooler may be conserved, and the cooling air is not discharged into the combustion gas passage. As a result, the temperature of the combustion gas is not towered and a reduction in turbine efficiency is prevented.

[0021] The first steam cooling means and the second steam cooling means are communicated with each other at the leading edge and at the trailing edge of the stationary blade, a portion of the cooling steam is introduced from the first steam cooling means to the second steam cooling means at the leading edge of the stationary blade, and the cooling steam that passes through the second steam cooling means is returned to the first steam cooling means at the trailing edge of the stationary blade.

[0022] It is possible to effectively utilize the steam because the portion of the cooling steam that has been introduced to the second steam cooling means of the inner shroud from the leading edge is recovered from the trailing edge thereof at the first steam cooling means.

[0023] The cooled stationary blade assembly for a

gas turbine according to the above-described invention is preferably characterized in that the first steam cooling means is first steam passages, the cooling steam is introduced into the steam passages on the leading edge of the stationary blade through the outer shroud, and the cooling steam flows out of the steam passages on the trailing edge through the outer shroud.

[0024] Since the cooling steam flows through the steam passage, it is possible to effectively cool the blade. The cooling steam that has been introduced into the blade is used to cool the blade and the inner shroud so that its temperature increases. The steam is recovered through the outer shroud and returned to the steam feed source. The steam is effectively utilized so the efficiency of the turbine is increased.

[0025] The cooled stationary blade assembly for a gas turbine according to the above-described invention is characterized in that the second steam cooling means comprises channels arranged in both side end portions of the inner shroud.

[0026] The cooling steam flows through the periphery of the inner shroud to effectively cool the inner shroud.

[0027] The cooled stationary blade assembly for a gas turbine according to the above-described invention is preferably characterized in that the second steam cooling means of the inner shroud is composed of a groove provided along a peripheral side surface of the inner shroud and a side plate for covering the groove. The second steam cooling means is thus constructed so that its formation at the end portion of the inner shroud is facilitated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028]

Fig. 1 is a schematic view showing a cooled stationary blade for a gas turbine in accordance with an embodiment of the present invention.

Fig. 2 is a cross-sectional view of an interior of an inner shroud in the cooled stationary blade of the gas turbine according to the embodiment of the present invention.

Fig. 3 is cross-sectional views taken along the line A-A of Fig. 2, with portions (a), (b) and (c) each indicating examples of different structures.

Fig. 4 is a schematic view of a cooled stationary blade of a gas turbine according to an example made by the present applicant concerning the present invention.

Fig. 5 is an illustration of an interior of a conventional gas turbine stationary blade.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0029] An embodiment of the invention currently considered preferable and another embodiment that may be substituted therefor will now be described in detail

with reference to the accompanying drawings. In the following description, the same reference numerals are used for like components throughout the drawings. Also, in the following descriptions, the terms "right", "left", "upper" and "lower" are used for the sake of convenience, and these terms should not be interpreted in any limiting manner.

Embodiment 1

[0030] Fig. 1 is a schematic view of a cooled stationary blade for a gas turbine in accordance with an embodiment of the present invention. In the drawing, reference numerals 31 and 33A to 33F denote components having the same functions as those of the cooled stationary blade for the gas turbine shown in Fig. 4 now being developed by the present applicant, an explanation of which has been given so a detailed explanation will be omitted here. The characteristic portion of the present invention is a cooled stationary blade for a gas turbine which is under development by the present applicant and is further improved, and not only the interior of the blade 30, but also the end portion of the inner shroud 31 is steam-cooled.

[0031] In Fig. 1, the cooling steam 39 is introduced into the steam passage 33A from the outer shroud (not shown) of the leading edge side of the stationary blade 30 in the same way as in the example shown in Fig. 4. The steam is introduced from the steam passage 33A to the steam passage 33B to flow to the upper portion thereof (at the outer shroud side) to enter the steam passage 33C. In the same way, the steam flows through the steam passages 33C and 33D and is introduced from the lower portion of the steam passage 33E (on the inner shroud side) to the steam passage 33F of the trailing edge of the blade 30. The interior of the blade is cooled by the passage of the steam. The steam is recovered from the steam recovery opening of the outer shroud (not shown) at an upper portion.

[0032] On the other hand, a portion of the cooling steam 39 that has been introduced from the steam passage 33A at the leading edge is introduced into the inner shroud 31 from the lower portion of the steam passage 33A and flows from the steam introduction passage 22 to the steam passage 20 which is provided in the vicinity of an end portion of the inner shroud 31 and branches to the right and left sides from the steam introduction passage 22. The steam is introduced from both sides to the steam discharge passage 21 on the rear edge side through both end portions. The cooling steam that has been introduced into the steam discharge passage 21 is introduced into the steam passage 33F at the trailing edge communicated with the steam discharge passage, and merges with the cooling steam that is introduced into the steam passage 33F through the steam passages 33A to 33E in the interior of the blade. The (combined) steam flows upwardly and is recovered from the steam recovery opening of the outer shroud (not

shown). Thus, the cooling steam is used to steam cool the interior of the blade 30. Also, the end portion of the inner shroud 31 is cooled with a portion of the steam, thereby steam cooling the stationary blade as a whole.

[0033] Fig. 2 is a cross-sectional view showing an interior of the inner shroud 31 of the cooled blade according to the above-described embodiment. In the drawing, the steam passage 20 is provided in a rib 35 provided in the vicinity of the end portion of the inner shroud 31. The steam introduction passage 22 for communicating the steam passage 20 and the steam passage 33A with each other is provided at the leading edge side of the blade. Also, the steam discharge passage 21 for communicating the steam passage 33F and the steam passage 20 with each other is provided at the trailing edge side of the blade.

[0034] The cooling steam is introduced from the steam passage 33A on the leading edge side of the stationary blade 30 through the steam introduction passage 22, as indicated by the solid lines in the drawing, to enter the steam passage 20 and is separated to the right and left to pass through both side end portions of the inner shroud 31 and flow to the trailing edge side of the stationary blade to cool the periphery of the inner shroud 31. The steam is then discharged into the steam passage 33F from the steam discharge passage 21 at the trailing edge of the stationary blade.

[0035] Figs. 3(a), (b) and (c) are cross-sectional views taken along the line A-A of Fig. 2 and show steam passages 20 with different respective structures. In any one of the structures shown in Figs. 3(a), (b) and (c), a groove is first formed in a rib 35 provided at an end portion of the inner shroud 31. Then, in the structure shown in Fig. 3(a), a side plate 23 having a width which is substantially the same as that of the groove is inserted into and fixed to the groove to define the steam passage 20. Also, in the structure shown in Fig. 3(b), a side plate 24 having a projection with a width which is substantially the same as that of the groove and having a width which is substantially the same as an end width of the rib 35 and the inner shroud 31 is inserted into and fixed to the groove to define the steam passage 20. Furthermore, in the structure shown in Fig. 3(c), a side plate 25 having the same thickness as that of the end portion of the rib 35 and the inner shroud 31 is mounted and fixed so as to cover the entire groove formed in the rib 35 to thereby define the steam passage 20.

[0036] Incidentally, after the groove which serves as the steam passage 20 of the inner shroud 31 is covered by a side plate, it is preferable that a linear welding bond, a brazing bond or the like be effected to the contact portion between the groove and the side plate as indicated by reference numeral 36 to avoid steam leakage. Also, any one of these structures may be applied to the cooled stationary blade of the gas turbine according to the present invention. Furthermore, the structure of the steam passage 20 is not limited to these. It is also possible to cut the interior to form an integral structure. Also,

the shape is not limited to rectangular, but may be formed round.

[0037] According to the above-described embodiment, a structure is provided in which the steam passage 20 is formed at the peripheral portion of the end portion of the inner shroud 31, the steam is introduced from the steam passage 33A at the leading edge side of the blade into the steam passage 20 through the steam introduction passage 22, and the steam passes through both side end portions of the inner shroud 31 and flows through the steam discharge passage 21 at the trailing edge side of the blade from the steam passage 33F at the trailing edge. Accordingly, not only the interior of the stationary blade 30, but also the inner shroud 31 may be cooled by the steam to conserve the cooling air and to reduce the power consumed by the compressor or the cooler.

[0038] Furthermore, as the steam which has been used for cooling is recovered, the heat that has been absorbed by the steam due to the cooling effect may be reused in the steam feed source. Also since air is not used, it is possible to considerably enhance the efficiency of the turbine.

[0039] The embodiment of the invention, currently considered to be preferable, and another embodiment which may be substituted therefor have been described in detail with reference to the accompanying drawings. However, the present invention is not limited to these embodiments. Those skilled in the art readily understand that various modifications and additions to the gas turbine cooled stationary blade are included in the present invention without departing from the spirit and the scope of the present invention as defined by the appended claims. Also, those skilled in the art may realize these modifications and additions without any difficulty.

Claims

1. A cooled stationary blade assembly for a gas turbine, comprising an outer shroud, an inner shroud (31), a stationary blade provided between said outer shroud and said inner shroud (31) with a leading edge and a trailing edge, first steam cooling means (33A to 33F) provided in an interior of said stationary blade for cooling steam (39), and a second steam cooling means (20) provided in said inner shroud and communicated with said first steam cooling means in order to flow a portion of said cooling steam;

characterized in that

said first steam cooling means (33A to 33F) and said second steam cooling means (20) are communicated with each other at said leading edge and at said trailing edge of said stationary blade; the portion of the cooling steam (39) being introduced from said first steam cooling means to said second steam cooling means at said leading edge

of said stationary blade;
 said cooling steam that passes through said second
 steam cooling means being returned to said first
 steam cooling means at said trailing edge of said
 stationary blade; and
 the second steam cooling means comprising chan-
 nels leading the steam through both shroud side
 end portions of the inner shroud.

2. The cooled stationary blade assembly for a gas tur-
 bine according to claim 1, wherein said first steam
 cooling means comprises first steam passages
 (33A to 33F), said cooling steam is introduced into
 said steam passages at said leading edge of said
 stationary blade (30) through said outer shroud, and
 said cooling steam flows out of said steam passag-
 es at said trailing edge through said outer shroud.
3. The cooled stationary blade assembly for a gas tur-
 bine according to claim 1 or 2, wherein said second
 steam cooling means comprises a second steam
 passage (20) and is arranged in the vicinity of
 shroud side end portions of said inner shroud (31).
4. The cooled stationary blade assembly for a gas tur-
 bine according to claim 1, wherein said second
 steam cooling means (20) of said inner shroud (31)
 is composed of a groove provided along a periph-
 eral side surface of said inner shroud and a side
 plate for covering said groove.

Patentansprüche

1. Gekühlte, stationäre Schaufelanordnung für eine
 Gasturbine mit einer äußeren Ummantelung, einer
 inneren Ummantelung (31), einer zwischen der äu-
 ßeren Ummantelung und der inneren Ummante-
 lung (31) vorgesehenen, stationären Schaufel mit
 einer vorlaufenden Kante und einer nachlaufenden
 Kante, einer ersten Dampfkühleinrichtung (33A bis
 33F), die in einen inneren der stationären Schaufel
 zum Kühlen von Dampf (39) vorgesehen ist, und einer
 zweiten Dampfkühleinrichtung (20), die in der
 inneren Ummantelung vorgesehen ist und mit der
 ersten Dampfkühleinrichtung zum Fließen eines
 Abschnitts des Kühldampfes verbunden ist,
dadurch gekennzeichnet, dass
 die erste Dampfkühleinrichtung (33A bis 33F) und
 die zweite Dampfkühleinrichtung (20) miteinander
 an der vorlaufenden Kante und an der nachlaufen-
 den Kante der stationären Schaufel verbunden
 sind;
 der Abschnitt des Kühldampfes (39) von der ersten
 Dampfkühleinrichtung zu der zweiten Dampfkühl-
 einrichtung an der vorlaufenden Kante der stationä-
 ren Schaufel eingeführt wird;
 der Kühldampf, der durch die zweite Dampfkühlein-

richtung passiert, zu der ersten Dampfkühleinrich-
 tung an der nachlaufenden Kante der stationären
 Schaufel zurückgeführt wird; und
 die zweite Dampfkühleinrichtung Kanäle aufweist,
 welche den Dampf durch beide ummantelungssei-
 tigen Endabschnitte der inneren Ummantelung
 führt.

2. Gekühlte, stationäre Schaufelanordnung für eine
 Gasturbine nach Anspruch 1, wobei die erste
 Dampfkühleinrichtung erste Dampfdurchgänge
 (33A bis 33F) aufweist, wobei der Kühldampf in die
 Dampfdurchgänge an der vorlaufenden Kante der
 stationären Schaufel (30) durch die äußere Um-
 mantelung eingeführt wird, und der Kühldampf
 strömt aus den Dampfdurchgängen an der nachlau-
 fenden Kante durch die äußere Ummantelung.
3. Gekühlte, stationäre Schaufelanordnung für eine
 Gasturbine nach Anspruch 1 oder 2, wobei die
 zweite Dampfkühleinrichtung einen zweiten Dampf-
 durchgang (20) aufweist und in der Nähe umman-
 telungsseitiger Endabschnitte der inneren Umman-
 telung (31) angeordnet ist.
4. Gekühlte, stationäre Schaufelanordnung für eine
 Gasturbine nach Anspruch 1, wobei die zweite
 Dampfkühleinrichtung (20) der inneren Umman-
 telung (30) aus einer Nut, die entlang einer umfangs-
 seitigen Oberfläche der Ummantelung vorgesehen
 ist, und einer Seitenplatte zum Abdecken der Nut
 aufgebaut ist.

Revendications

1. Assemblage d'aube fixe refroidie, pour turbine à
 gaz, comprenant un talon externe, un talon interne
 (31), une aube fixe placée entre ledit talon externe
 et ledit talon interne (31) avec un bord d'attaque et
 un bord de fuite, un premier moyen de refroidisse-
 ment à la vapeur (33A à 33F), prévu à l'intérieur de
 ladite aube fixe pour de la vapeur de refroidisse-
 ment (39), et un second moyen de refroidissement
 à la vapeur (20) placé dans ledit talon interne et
 communiquant avec ledit premier moyen de refroi-
 dissement à la vapeur afin de permettre l'écoule-
 ment d'une partie de ladite vapeur de
 refroidissement ;
caractérisé en ce que
 ledit premier moyen de refroidissement à la vapeur
 (33A à 33F) et ledit second moyen de refroidisse-
 ment à la vapeur (20) sont en communication l'un
 avec l'autre audit bord d'attaque et audit bord de
 fuite de ladite aube fixe ;
 la portion de la vapeur de refroidissement (39) est
 introduite à partir dudit premier moyen de refroi-
 dissement à la vapeur vers ledit second moyen de re-

froidissement à la vapeur, audit bord d'attaque de ladite aube fixe ;

ladite vapeur de refroidissement qui traverse ledit second moyen de refroidissement à la vapeur est renvoyée audit premier moyen de refroidissement à la vapeur, audit bord de fuite de ladite aube fixe ; et

le second moyen de refroidissement à la vapeur comporte des canaux conduisant la vapeur à travers les deux parties d'extrémités latérales du talon interne.

2. Assemblage d'aube fixe refroidie, pour turbine à gaz, selon la revendication 1, dans lequel ledit premier moyen de refroidissement à la vapeur comporte des premiers passages pour la vapeur (33A à 33F), ladite vapeur de refroidissement est introduite dans lesdits passages pour la vapeur audit bord d'attaque de ladite aube fixe (30) à travers ledit talon externe, et ladite vapeur de refroidissement s'écoule hors desdits passages pour la vapeur audit bord de fuite à travers ledit talon externe.

3. Assemblage d'aube fixe refroidie, pour turbine à gaz, selon la revendication 1 ou 2, dans lequel ledit second moyen de refroidissement à la vapeur comporte un second passage (20) pour la vapeur, et est agencé au voisinage des parties d'extrémités latérales dudit talon interne (31) .

4. Assemblage d'aube fixe refroidie, pour turbine à gaz, selon la revendication 1, dans lequel ledit second moyen de refroidissement à la vapeur (20) dudit talon interne (31) est constitué d'une rainure réalisée le long d'une surface latérale périphérique dudit talon interne, et d'une plaque latérale pour recouvrir ladite rainure.

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FIG. 1

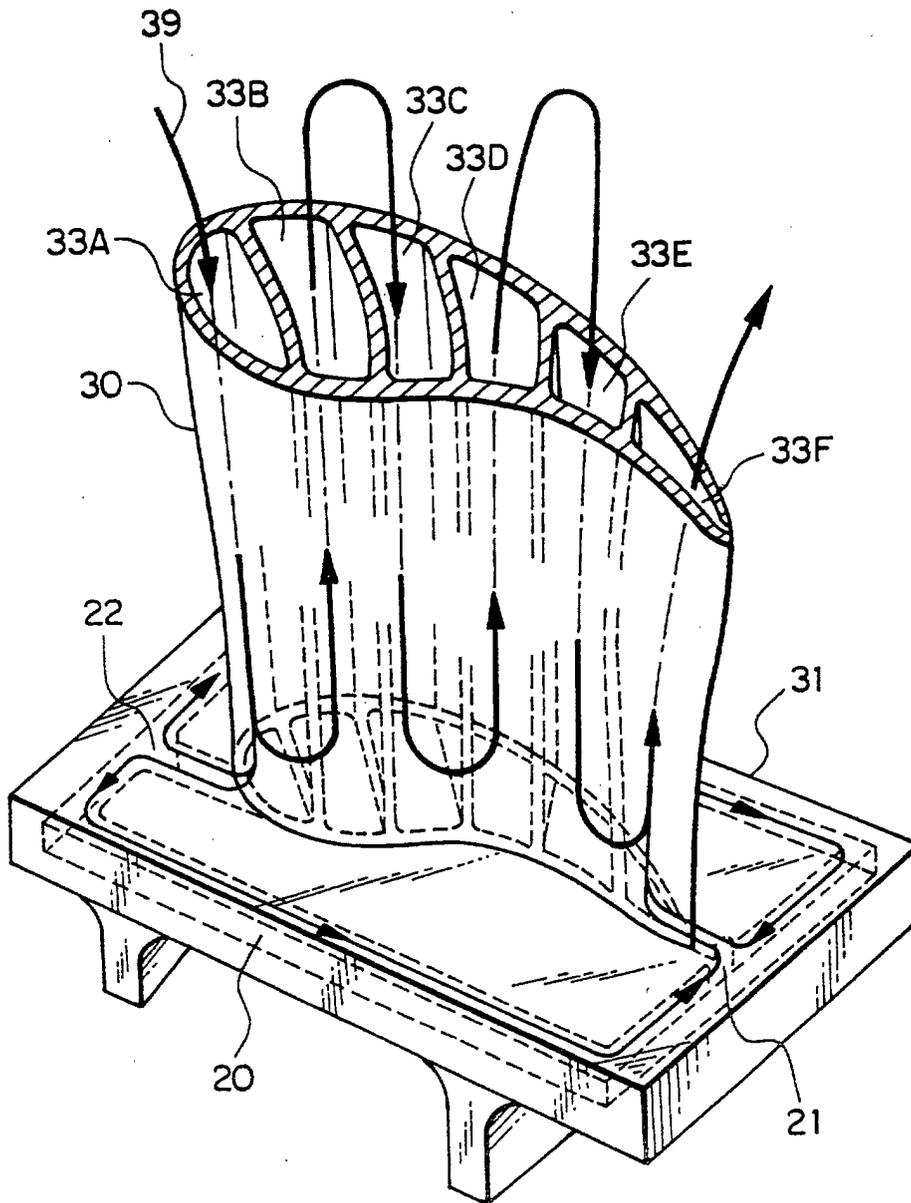


FIG. 2

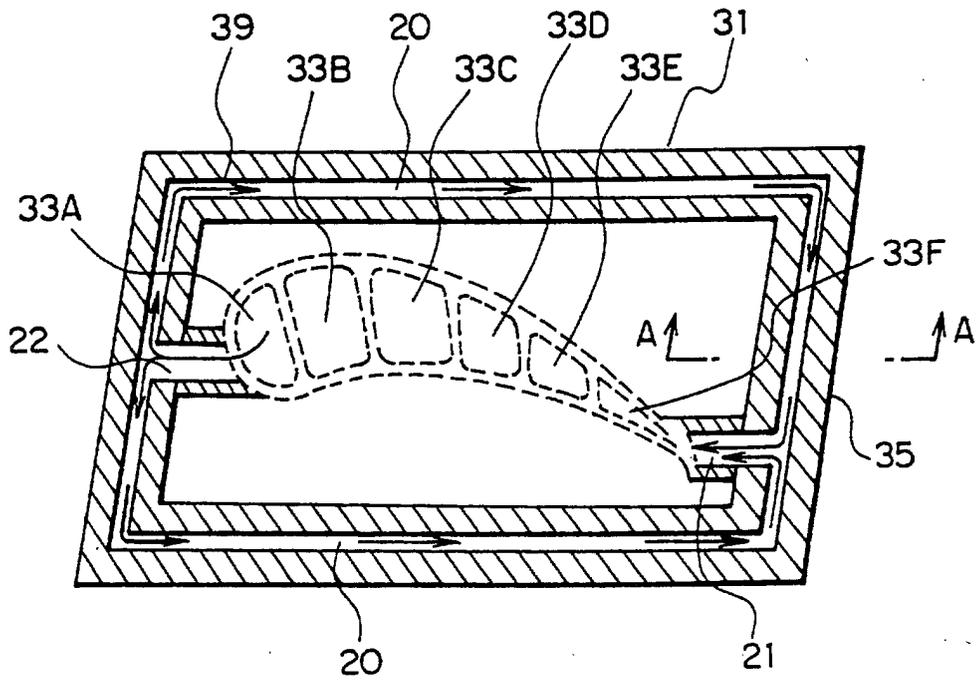


FIG. 3

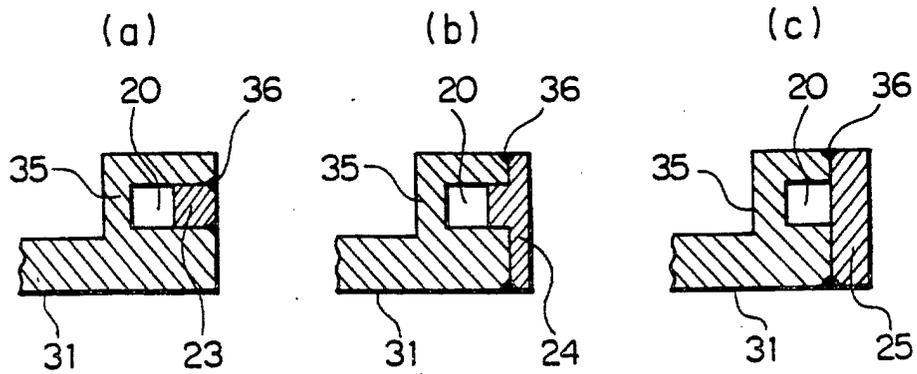


FIG. 4

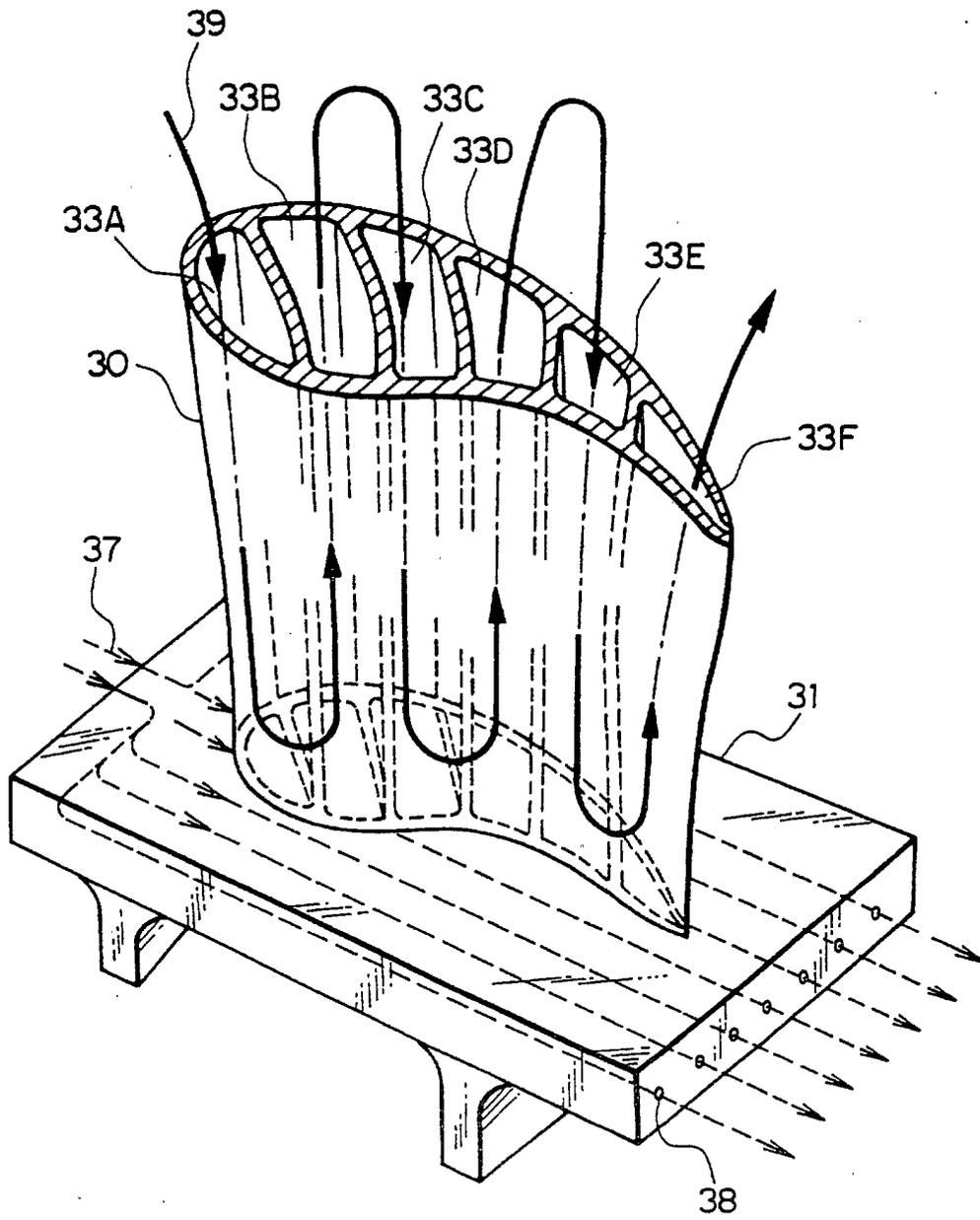


FIG. 5
PRIOR ART

