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54 Blade ring for a steam turbine.

57 A blade ring for a steam turbine having an outer cylindrical casing (5), an inner cylindrical casing (9) disposed within the outer casing (5) and supported by the outer casing and a blade ring (15) to which are affixed a plurality of circular arrays of stationary blades forming stationary blade rows (23), the blade ring (15) being disposed partially within the inner casing (9) and partially within the outer casing (5) and having a support arm (19) which extends outwardly to and is supported by the outer casing.

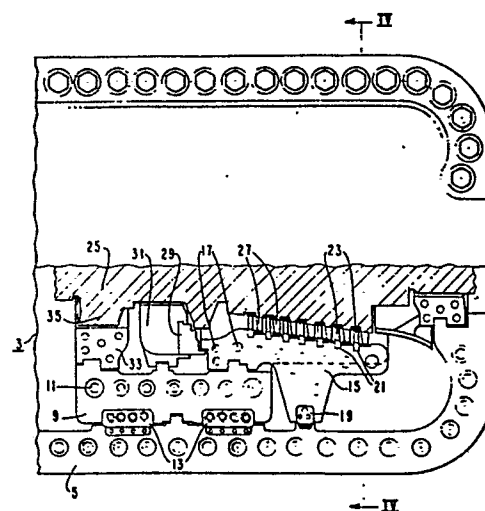


FIG. 3

BLADE RING FOR A STEAM TURBINE

This invention relates to steam turbines and in particular to steam turbines with inner casings and blade rings.

Steam turbines are built with an outer casing, an
5 inner casing disposed within the outer casing and supported from the outer casing, and blade rings supported within the inner casing. By moving the support for the blade ring from the inner casing to the outer casing, a reduction in size of both the outer and inner casings can be obtained.

10 According to the present invention a steam turbine comprises an outer horizontally split cylindrical casing, an inner horizontally split cylindrical casing disposed within the outer casing and supported from the outer casing, a blade ring disposed partially within the
15 inner casing and partially within the outer casing and having support arms which extend outwardly to and are supported by the outer casing, so that both the inner and outer casings can be made smaller in diameter and thinner.

Conveniently, an inner cylindrical casing is
20 disposed within the outer casing and supported from the outer casing, a blade ring is disposed partially within the inner casing and partially within the outer casing and having support arms, which extend outwardly to and are supported by the outer casing, whereby the inner and outer
25 cylindrical casings can be made smaller in diameter and the walls of the outer casing can be thinner.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a prior art steam turbine with upper casings, and various upper rings removed;

Figure 2 is a partial sectional view taken on line II-II of Figure 1;

Figure 3 is a partial plan view of a steam turbine, with upper casings and various upper rings partially removed, made in accordance with this invention; and

Figure 4 is a partial sectional view taken on line IV-IV of Figure 3.

Figures 1 and 2 are indicated as prior art and show a steam turbine 103 which is designed for the same operating temperature, pressure and steam throughput as the turbine 3 shown in Figures 3 and 4 and made in accordance with this invention. Reference numerals with a 100 prefix in the prior art, Figs. 1 and 2 indicate parts similar to those indicated by the reference numeral without the prefix in Figs. 3 and 4.

The turbine 3 comprises a horizontally split cylindrical outer housing or casing 5 held together by bolts 7, a horizontally split cylindrical inner housing or casing 9 held together by bolting 11 and disposed within the outer casing 5 and supported from the outer casing 5 by supports 13. Disposed partially within the inner casing 9 and partially within the outer casing 5 is a longitudinally split blade ring 15 which is also held together by bolting 17. The blade ring 15 is supported on an arm 19 which extends outwardly to and is supported by the outer casing 5. The blade ring 15 has a plurality of circumferential grooves 21 which receive annular arrays of stationary blades forming rows of stationary blades 23.

A rotor 25 having a plurality of annular arrays of rotating blades forming rows of rotating blades 27 is disposed within the blade ring 15 and the rows of rotating

blades 27 interdigitate with the rows of stationary blades 23.

5 A nozzle block 29 and nozzle chamber 31 are disposed on one end of the blade ring 15 and within the inner casing 5 for admitting steam to the blade path. Also disposed within the inner casing 5 is a dummy ring 30 which cooperates with an integral balance disc 35 on the rotor to balance the thrust produced by the steam acting on the rotating blades and rotor.

10 Supporting the blade ring 15 from the outer casing 5 rather than from the inner casing, advantageously increases the resisting momentum acting on the blade ring thus reducing the stresses; support is moved to a lower temperature region lowering the material requirements and
15 raising the allowable stresses; reduces inner and outer casing overall diameter, wall thickness and bolting requirements; and reduces inner casing support size as loading from the blade ring is transmitted directly to the outer casing, thus producing savings in material, manu-
20 facturing and handling.

CLAIMS:

1. A steam turbine comprising an outer horizontally split cylindrical casing, an inner horizontally split cylindrical casing disposed within the outer casing and supported from the outer casing, a blade ring disposed
5 partially within the inner casing and partially within the outer casing and having support arms which extend outwardly to and are supported by the outer casing, so that both the inner and outer casings can be made smaller in diameter and thinner.
- 10 2. A steam turbine as claimed in claim 1 wherein the blade ring has a plurality of circumferential grooves for receiving annular arrays of stationary blades which form rows of stationary blades.
3. A steam turbine as claimed in claim 1 or 2
15 including a nozzle chamber and a nozzle block disposed within the inner casing.
4. A steam turbine as claimed in any one of claims 1 to 3 including a rotor having a plurality of rows of blades disposed in circular arrays forming rows of
20 rotating blades, the rotor being disposed within the blade ring in such a manner that the rows of rotating blades interdigitate with the rows of stationary blades.
5. A steam turbine as claimed in any one of claims 1 to 4 and wherein a dummy ring is disposed within
25 the inner casing and a balance disc disposed on the rotor,

the dummy ring and balance disc cooperate to balance the thrust load created by the rotating blades and rotor.

6. A steam turbine including a cylindrical split casing, constructed and adapted for use, substantially as
5 hereinbefore described and illustrated with reference to the accompanying drawings.

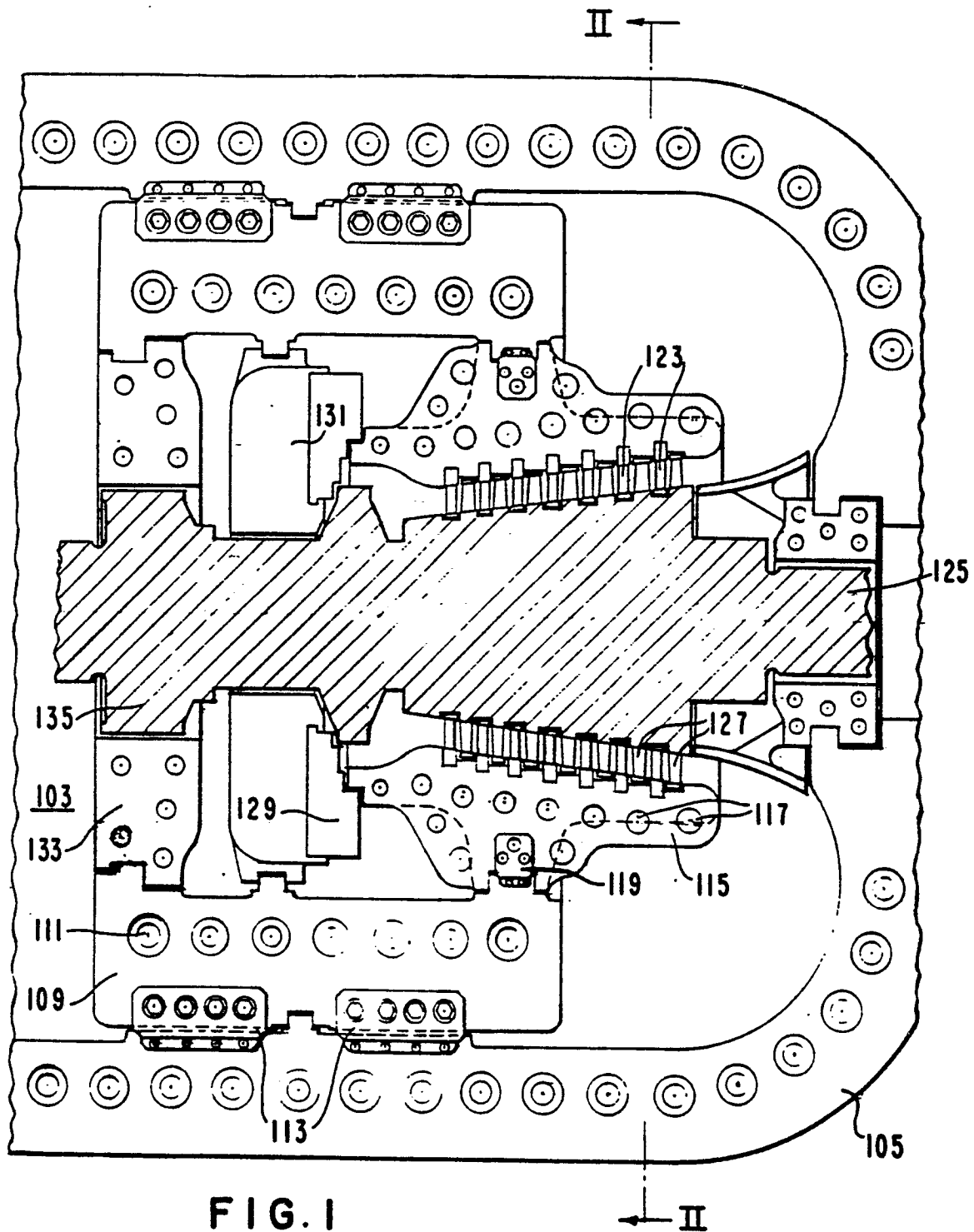


FIG. 1
PRIOR ART

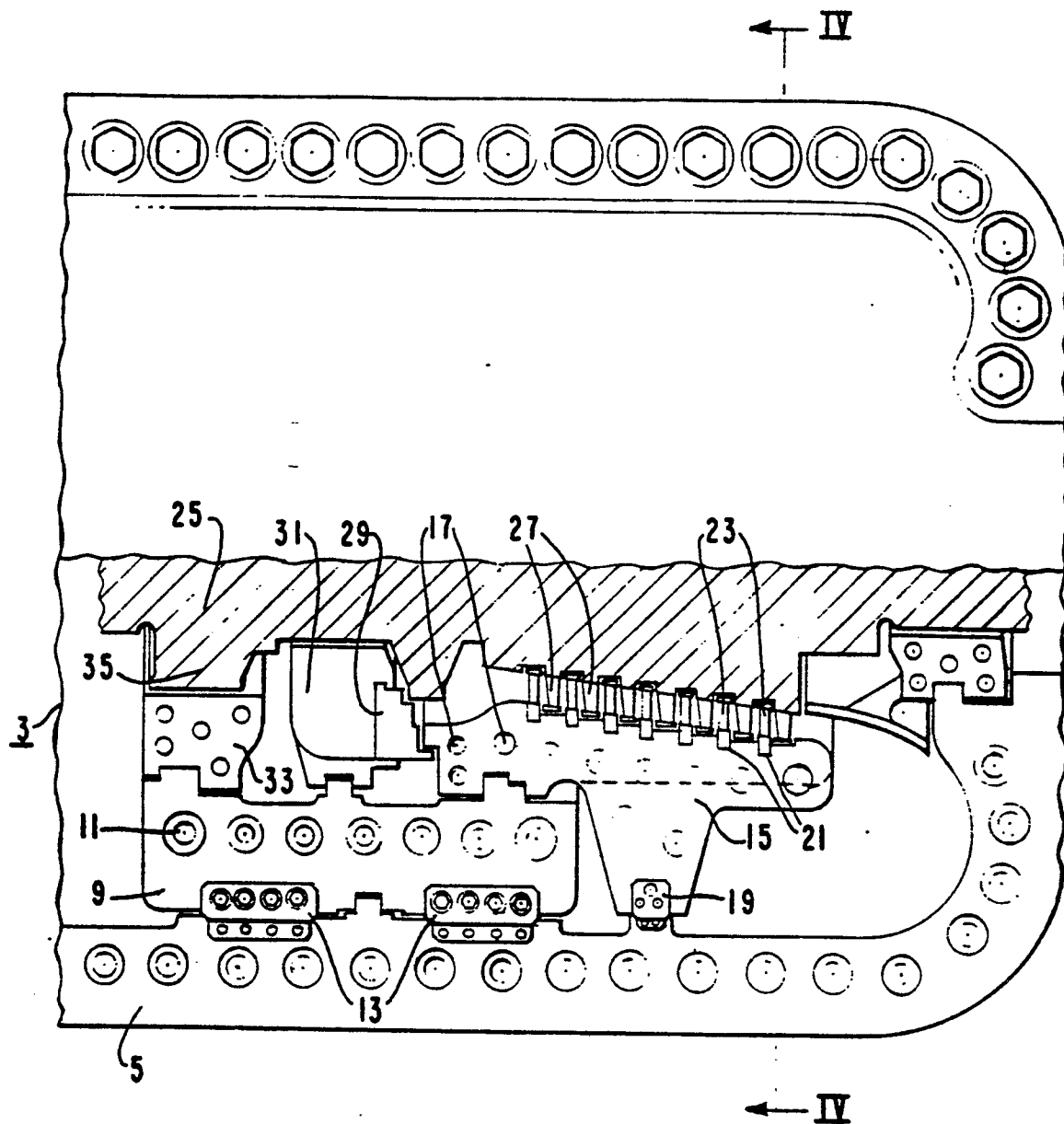


FIG. 3

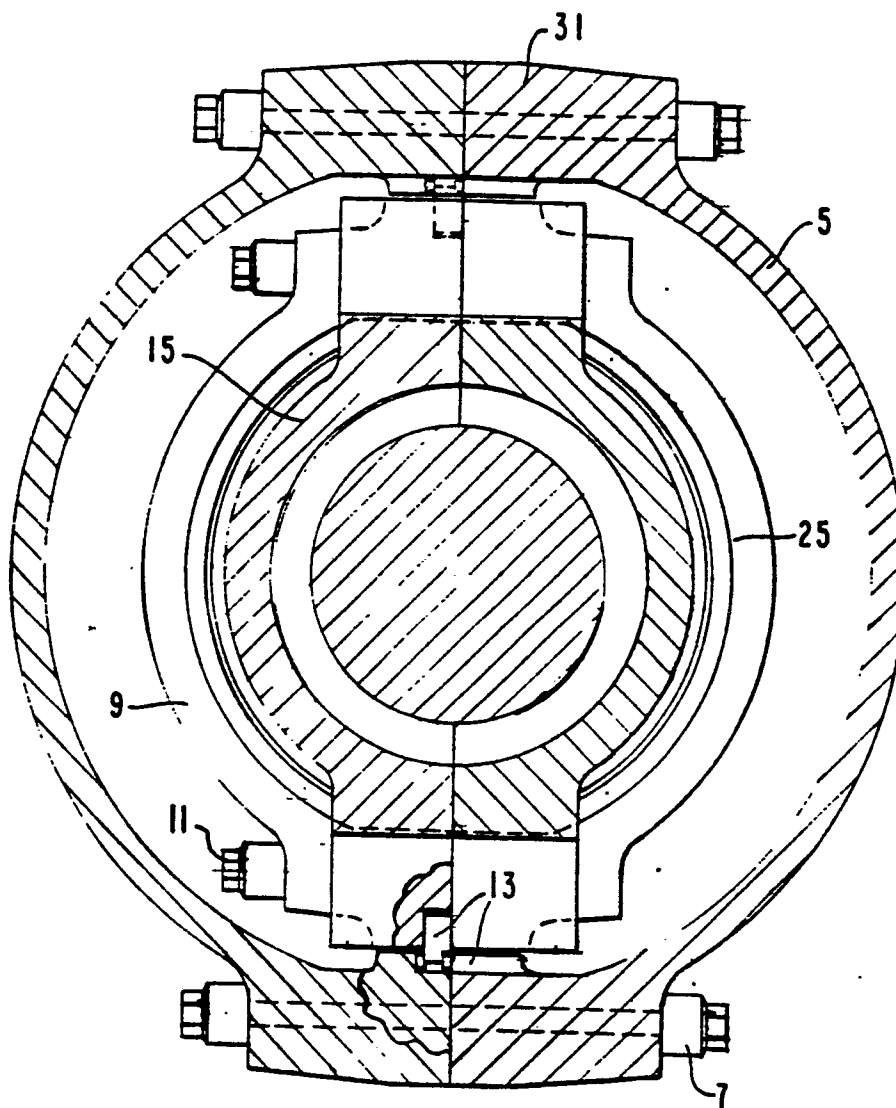


FIG. 4



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EUROPEAN SEARCH REPORT

0156619

Application number

EP 85 30 1915

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	FR-A-1 157 588 (BBC) * Whole document *	1,3,4,6	F 01 D 25/26 F 01 D 9/04
A	---	2	
A	US-A-2 304 994 (FRANCK) * Whole document *	1-6	
A	DE-A-2 003 954 (JERICHA) * Whole document *	1-6	
A	GB-A-1 077 105 (LICENTIA) * Whole document *	1-6	
A	CH-A- 429 769 (SONNEK) * Whole document *	1-6	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	GB-A- 662 371 (WESTINGHOUSE) * Whole document *	1-6	F 01 D
A	DE-C- 858 251 (RÖDER) * Whole document *	1	
A	DE-C- 724 321 (RÖDER)		
A	GB-A-1 024 844 (RYALL) --- -/-		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14-05-1985	Examiner IVERUS D.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	CH-A- 435 319 (STEINACK) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14-05-1985	Examiner IVERUS D.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	