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(72) Inventor: **FRANZOLIN, Enrico  
35010 Vigodarzere PD (IT)**

(74) Representative: **Modiano, Guido, Dr.-Ing. et al  
Dr. Modiano & Associati SpA  
Via Meravigli, 16  
20123 Milano (IT)**

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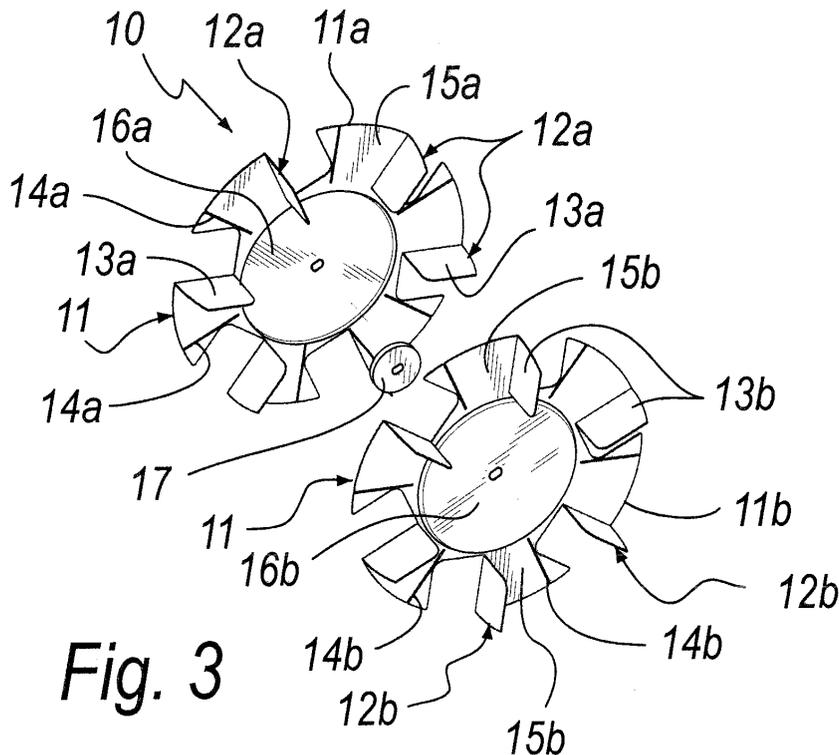
(71) Applicant: **Unox S.p.A.  
35010 Vigodarzere (Padova) (IT)**

(54) **A fan runner particularly for food cooking ovens**

(57) A fan particularly for food cooking ovens, comprising a runner (40,140) provided with a ring of vanes (12,112) and with an axial hole (20,120) for keying to a rotation shaft, the runner (40,140) being constituted by two coaxial and adjacent plate-like disks (11a,11b,111a,111b), a ring of vanes (12a,12b,112b) being provided on at least one of the two disks (11a,11b,111b); each one of the vanes (13a,13b,113) is obtained by cutting and

bending a portion of a corresponding annular sector (15a,15b,115) of at least one of the two disks (11a,11b,111b).

In order to increase the number of vanes, two runners may be stuck together to one conjoined runner as can be seen in fig. 3. The runner in the front (13b) therefore has slots (14b), through which the vanes of the rear runner (13) extend. The number of vanes is thus doubled.



**Fig. 3**

## Description

**[0001]** The present invention relates to a fan particularly for food cooking ovens.

**[0002]** Currently known fans for food ovens are constituted by a sheet metal disk provided with a ring of vanes, also made of sheet metal, and with an axial hole for keying to a rotation shaft.

**[0003]** The vanes of the ring are obtained separately with respect to the disk and are fixed thereto by means of spot welds provided at the root of said vanes.

**[0004]** Although these known fans are widely appreciated commercially and are in widespread use for the ventilation of ovens particularly for cooking food, they have aspects that can be improved.

**[0005]** Obtaining the vanes by cutting sheet metal in fact entails an important waste of material, while connecting the vanes to the disk that supports them by means of spot welds may lead to an incorrect inclination of the vanes with respect to the disk as well as to a deformation of the disk, with consequent imbalances and unwanted vibrations of the fan, all this being detrimental to the performance of the fan and to its quietness.

**[0006]** Moreover, the operation for welding the vanes to the disk requires a long time and a substantial use of specialized labor.

**[0007]** The aim of the present invention is to provide a fan particularly for food cooking ovens that solves the problems and drawbacks of known types.

**[0008]** Within this aim, an object of the present invention is to provide a fan that is easy and quick to assemble.

**[0009]** Another object of the present invention is to provide a fan that can be obtained at low cost by saving material with respect to known types.

**[0010]** Another object of the present invention is to provide a fan that can be made of sheet metal.

**[0011]** A further object of the present invention is to provide a fan that is at least as efficient as known types of fan.

**[0012]** A still further object of the present invention is to provide a fan particularly for food cooking ovens that can be manufactured with known systems and technologies.

**[0013]** This aim and these and other objects that will become better apparent hereinafter are achieved by a fan particularly for food cooking ovens, of the type that comprises a disk provided with a ring of vanes and with an axial hole for keying to a rotation shaft, characterized in that said disk is constituted by at least two coaxial and adjacent plate-like disks, a ring of vanes being provided on at least one of said two disks, each one of said vanes being obtained by cutting and bending a portion of a corresponding annular sector of said at least one of said two disks.

**[0014]** Further characteristics and advantages of the present invention will become better apparent from the following detailed description of two preferred but not

exclusive embodiments thereof, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

5 Figure 1 is a perspective view of a fan according to the invention, in a first embodiment;

Figure 2 is a front view of a fan according to the invention, as shown in Figure 1;

10 Figure 3 is an exploded perspective view of a fan according to the invention, as shown in Figures 1 and 2;

Figure 4 is a perspective view of a fan according to the invention in a second embodiment;

15 Figure 5 is a front view of a fan according to the invention, as shown in Figure 4;

Figure 6 is an exploded perspective view of a fan according to the invention, as shown in Figures 4 and 5.

20 **[0015]** With reference to the figures, a fan according to the invention, in a first embodiment, is generally designated by the reference numeral 10.

**[0016]** The fan 10 comprises a disk 40, which is constituted by two coaxial and adjacent plate-like disks 11.

25 **[0017]** The disks 11, referenced hereinafter as first disk 11a and second disk 11b, are provided respectively with a first ring 12a and a second ring 12b of vanes; the vanes are designated by the reference numerals 13a for the first disk 11a and 13b for the second disk 11b.

30 **[0018]** The second disk 11b, arranged in front of the first disk 11a, is provided with slots 14b for the insertion of the corresponding vanes 13a of the first disk 11a that is adjacent thereto.

35 **[0019]** The first and second disks 11a and 11b are made of sheet metal.

**[0020]** Each one of the vanes 13a and 13b is obtained by cutting and bending a portion of a corresponding annular sector 15a and 15b, respectively, of the first and second disks 11a and 11b.

40 **[0021]** The slots 14b are arranged in an intermediate position between two successive vanes 13b.

**[0022]** The fan 10 therefore has an alternate arrangement of a first vane 13a and of a second vane 13b.

45 **[0023]** The vanes 13a and 13b are bent at 90° with respect to the plane of arrangement of the first disk 11a and of the second disk 11b.

**[0024]** The bending line of each one of the vanes 13a and 13b has a radial direction.

50 **[0025]** A receptacle 16 for a keying shim 17 is formed between the first disk 11a and the second disk 11b at an axial hole 20 for keying to a rotation shaft, which is not shown.

**[0026]** The receptacle 16 is formed by a first camber 16a on the first disk 11a, which faces a mirror-symmetrical second camber 16b on the second disk 11b.

55 **[0027]** The shim 17 forms a surface that is suitable to prevent oscillations in an axial direction of the fan 10 on the shaft to which it is keyed.

[0028] The first disk 11a and the second disk 11b are joined to each other and to the shim 17 by means of spot welds 30.

[0029] The spot welds 30 are distributed in an annular fashion in the available regions between the vanes.

[0030] In this first embodiment, the first disk 11 a and the second disk 11b are provided with six vanes, respectively 13a and 13b, which are spaced by six slots, respectively 14a and 14b.

[0031] A second embodiment of a fan according to the invention is designated by the reference numeral 110 in Figures 4, 5 and 6.

[0032] The fan 110 is provided with a disk 140, which is constituted by a first disk 111a for reinforcing a second disk 111b provided with a ring of vanes 112.

[0033] In this embodiment also, the first disk and the second disk, respectively 111a and 111b, are made of sheet metal.

[0034] Each vane 113 is obtained by cutting and bending a portion of a corresponding annular sector 115 of the second disk 111b.

[0035] The second disk 111b therefore has twice as many vanes as one of the first and second disks 11a and 11b.

[0036] The vanes 113 are also bent at 90° with respect to the plane of arrangement of the two first and second disks 111a and 111b.

[0037] The bending line of each one of the vanes 113 has a radial direction.

[0038] A receptacle 116 for a keying shim 117 is formed between the first disk 111a and the second disk 111b at an axial keying hole 120.

[0039] The receptacle 16 is formed by a first camber 116a on the first disk 111a, which faces a mirror-symmetrical second camber 116b on the second disk 111b.

[0040] In a manner similar to the first embodiment of the present invention, the first disk 111a and the second disk 111b are joined to each other and to the shim 17 by means of spot welds 130.

[0041] The spot welds 130 are distributed in an annular fashion in the available regions between the vanes.

[0042] Both of the embodiments described above can be manufactured easily and cheaply by stamping the disks from sheet metal so as to obtain the cambers, the slots, the hole and the profile of the vanes.

[0043] The disks provided with vanes are then subjected to the operation for folding the vanes.

[0044] The rings of vanes are thus obtained so as to avoid the wastes of material that would have occurred by cutting each individual vane separately, and the assembly time and costs are also reduced with respect to known vanes, which are burdened by the operations for welding each individual vane to the supporting disk.

[0045] In practice, it has been found that the invention thus described solves the problems noted in conventional fans particularly for food cooking ovens.

[0046] In particular, the present invention provides a fan that is easy and quick to assemble.

[0047] Moreover, the present invention provides a fan that can be obtained cheaply, saving material with respect to known types.

[0048] Further, the present invention provides a fan that can be made of sheet metal.

[0049] Moreover, the present invention provides a fan that has at least the same efficiency as known types of fan.

[0050] Still further, the present invention provides a fan particularly for food cooking ovens that can be manufactured with known facilities and technologies.

[0051] In practice, the materials employed, so long as they are compatible with the specific use, as well as the dimensions, may be any according to requirements and to the state of the art.

[0052] The disclosures in Italian Utility Model Application No. PD2003U000104 from which this application claims priority are incorporated herein by reference.

[0053] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

#### Claims

1. A fan particularly for food cooking ovens, of the type that comprises a disk (40, 140) provided with a ring of vanes (12, 112) and with an axial hole (20, 120) for keying to a rotation shaft, **characterized in that** said disk (40, 140) is constituted by at least two coaxial and adjacent plate-like disks (11a, 11b, 111a, 111b), a ring of vanes (12a, 12b, 112) being provided on at least one of said two disks (11a, 11b, 111b), each one of said vanes (13a, 13b, 113) being obtained by cutting and bending a portion of a corresponding annular sector (15a, 15b, 115) of said at least one of said two disks (11a, 11b, 111b).
2. The fan according to claim 1, **characterized in that** it comprises two of said at least two disks (11a, 11b, 111a, 111b).
3. The fan according to one or more of the preceding claims, **characterized in that** it comprises a first disk (11a) and a second disk (11b), provided respectively with a first ring (12a) and with a second ring (12b) of vanes (13a, 13b), at least one of said first and second disks (11a, 11b) being provided with slots (14a, 14b) for the insertion of the corresponding vanes (13b, 13a) of the other disk (11b, 11a) that is adjacent thereto.
4. The fan according to one or more of the preceding claims, **characterized in that** said slots (14a, 14b)

are arranged in an intermediate position between two successive vanes (13a, 13b).

5. The fan according to claims 1 and 2, **characterized in that** it comprises a first reinforcement disk (111a) for a second disk (111b) provided with a ring (112) of vanes (113). 5
6. The fan according to one or more of the preceding claims, **characterized in that** a receptacle (16, 116) for a keying shim (17, 117) is formed between said first and second disks (11a, 111a; 11b, 111b) at said axial hole (20, 120). 10
7. The fan according to one or more of the preceding claims, **characterized in that** said vanes (13a, 13b, 113) are folded at 90° with respect to the plane of arrangement of said at least two disks (11a, 11b, 111b), the bending line of said vanes (13a, 13b, 113) having a radial direction. 15 20
8. The fan according to one or more of the preceding claims, **characterized in that** said at least two disks (11a, 11b, 111b) are made of sheet metal. 25
9. The fan according to one or more of the preceding claims, **characterized in that** said first disk (11a, 111a) and said second disk (11b, 111b) are joined to each other and to said shim (17, 117) by means of spot welds (30, 130). 30

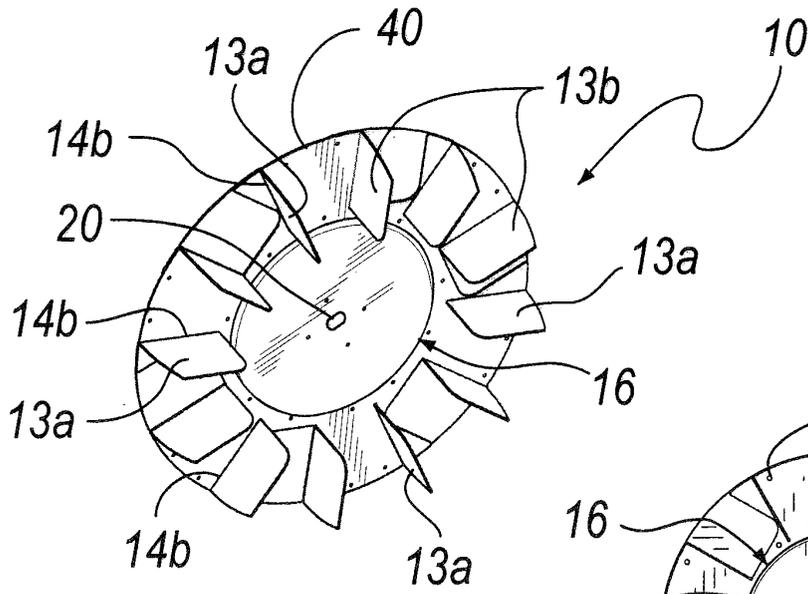
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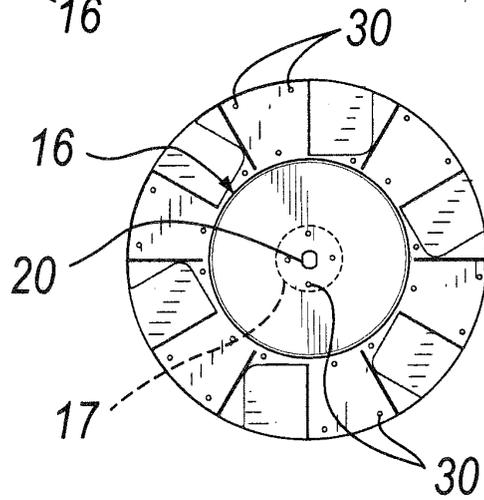
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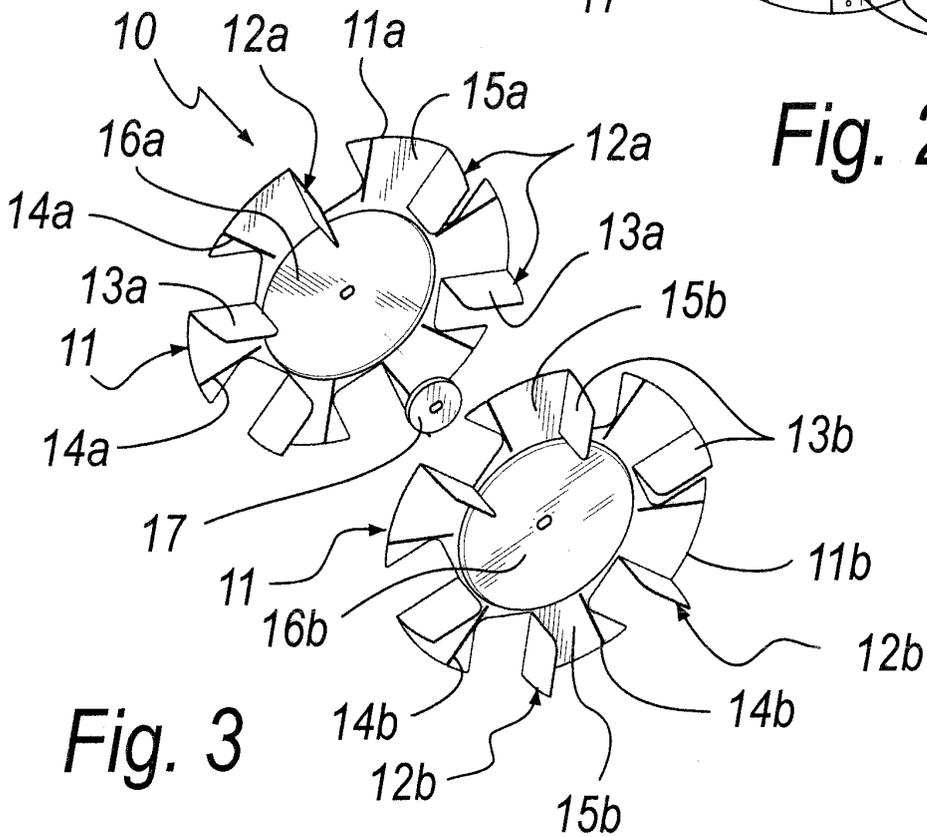
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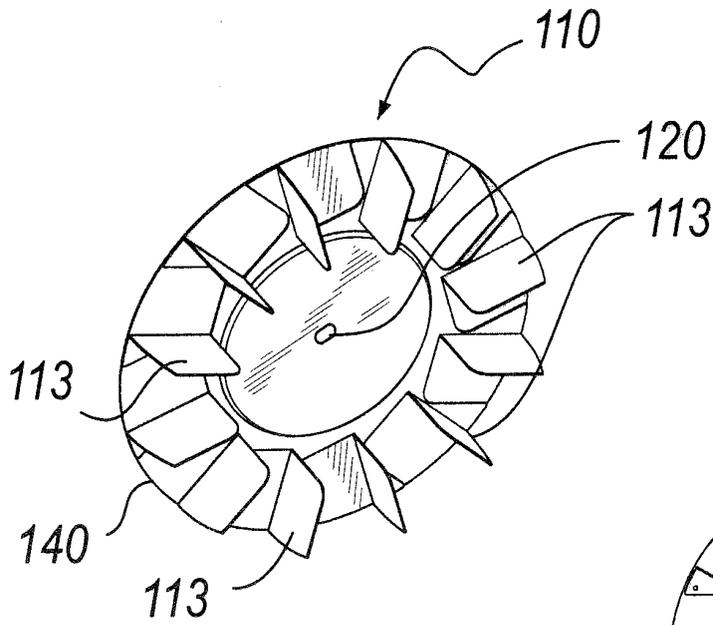
**Fig. 1**



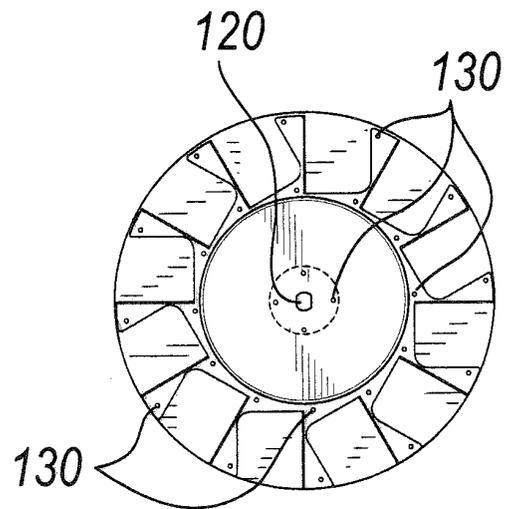
**Fig. 2**



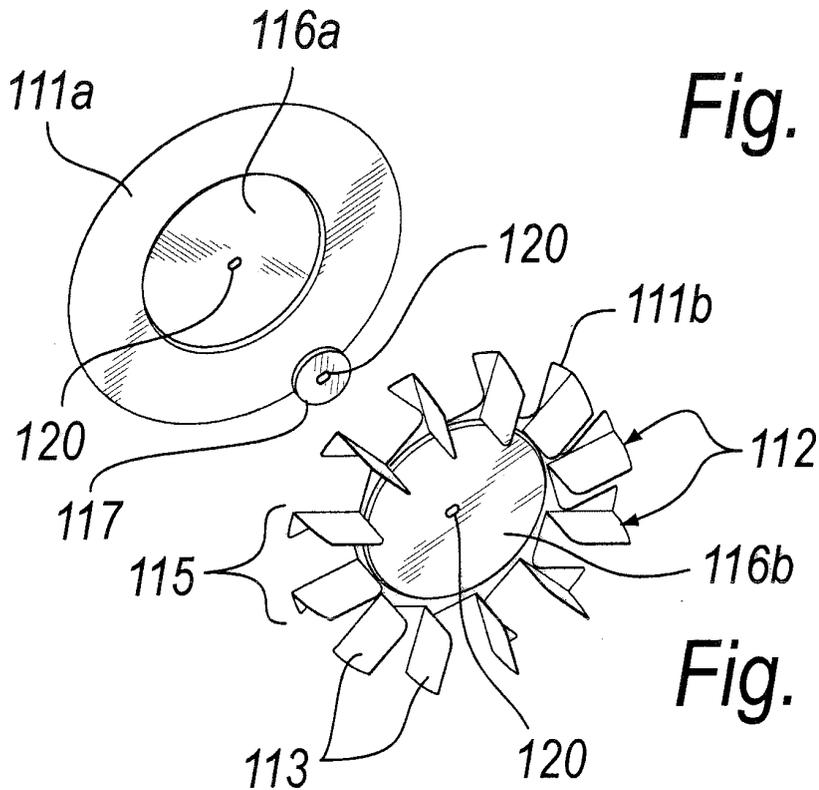
**Fig. 3**



**Fig. 4**



**Fig. 5**



**Fig. 6**



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.7)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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Place of search <b>Munich</b>		Date of completion of the search <b>22 February 2005</b>	Examiner <b>von Mittelstaedt, A</b>
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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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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