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(54) **Heating radiating resistance and packaging machine equipped with such resistance**

(57) A heating radiating resistance (1) for flows of gaseous substances, in particular of air is described, comprising at least one body (3) internally containing at least one electric resistance (5) and along an external surface thereof at least two series of dissipating tabs (7a, 7b), between each series of dissipating tabs (7a, 7b) at least one discontinuity groove (11) being externally arranged. A packaging machine equipped with such radiating resistance (1) is further described.

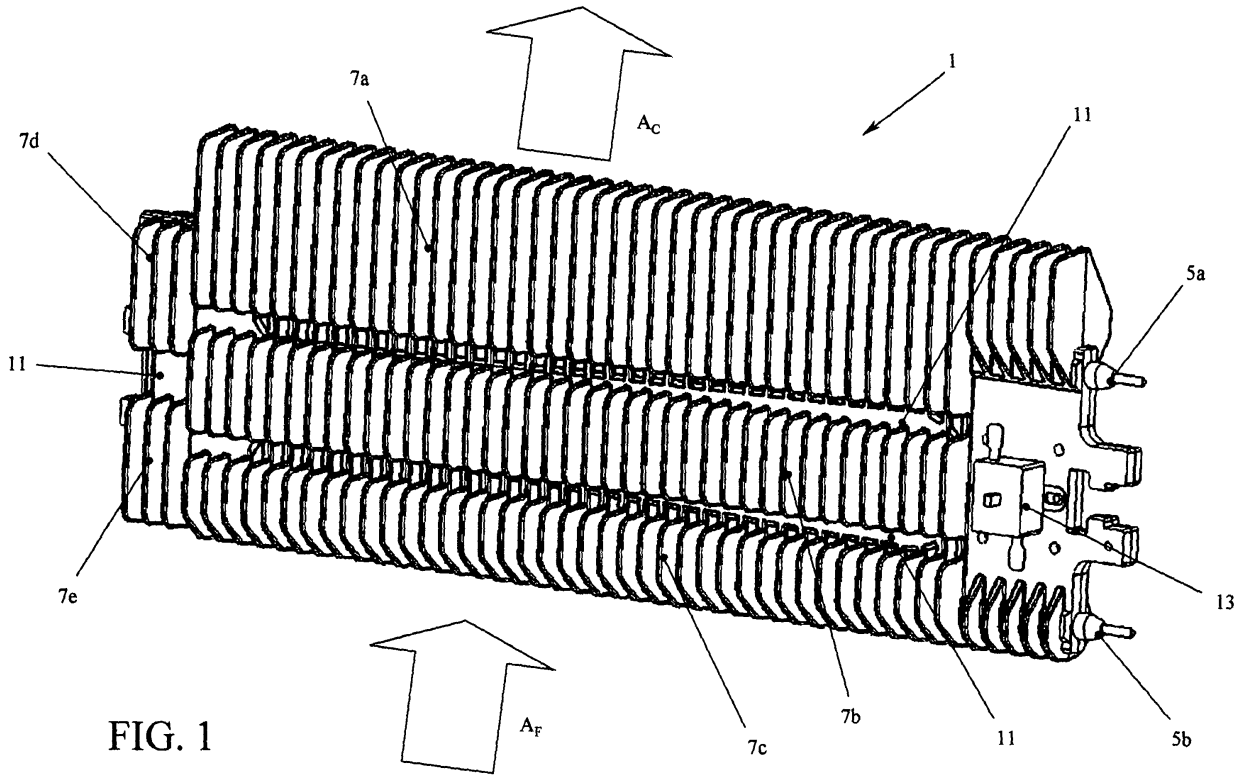

FIG. 1

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Description

[0001] The present invention refers to a heating radiating resistance for flows of gaseous substances, in particular air, and a packaging machine of vacuum products equipped with such resistance.

[0002] Known resistances, commonly called resistances of the "STRIP" type, are composed of a metallic box-shaped element inside which at least one heating spark plug with electric supply is arranged, surrounded by powder of insulating material, such as for example ceramics, and on whose external surface a plurality of metallic wings are arranged, inside which flows of air pass in order to be heated. In some cases, however, due to the delicate assembling steps that require such resistances, it can happen that inside the box-shaped element, the spark plug and the powder of material are mutually badly arranged, generating the premature breaking of the resistance itself.

[0003] Object of the present invention is solving the above prior art problems by providing a radiating resistance for heating flows of gaseous substances, in particular of air, that guarantees a higher efficiency and a better reliability with respect to what is proposed by the known prior art.

[0004] Another object of the present invention is providing a packaging machine for vacuum products equipped with at least one radiating resistance for heating flows of gaseous substances, in particular of air, that guarantees a better efficiency and a better reliability with respect to what has been proposed by the known prior art.

[0005] The above and other objects and advantages of the invention, as will result from the following description, are reached with a radiating resistance for heating flows of gaseous substances, in particular of air, as described in claim 1.

[0006] Moreover, the above and other objects and advantages of the invention are reached with a packaging machine for vacuum products equipped with at least one radiating resistance as described in claim 18.

[0007] Preferred embodiments and non-trivial variations of the present invention are the subject matter of the dependent claims.

[0008] It will be immediately obvious that numerous variations and modifications (for example related to shape, sizes, arrangements and parts with equivalent functionalities) can be made to what is described, without departing from the scope of the invention as appears from the enclosed claims.

[0009] The present invention will be better described by some preferred embodiments thereof, provided as a non-limiting example, with reference to the enclosed drawings, in which:

- FIG. 1 shows a front perspective view of a preferred embodiment of the heating radiating resistance according to the present invention;
- FIG. 2 shows a longitudinally sectional view of the radiating resistance of FIG. 1;
- FIG. 3a and 3b show perspective views of alternative embodiments of an electric resistance of the radiating resistance according to the present invention;
- FIG. 4 shows a perspective view of an embodiment of an electric resistance of the radiating resistance according to the present invention;
- FIG. 5a shows a front perspective view of a first preferred embodiment of a packaging machine for vacuum products according to the present invention;
- FIG. 5b shows an enlarged view of the parts contained in the dashed box of FIG. 5a; and
- FIG. 6 shows a front perspective view of a second preferred embodiment of a packaging machine for vacuum products according to the present invention.

[0010] With reference in particular to Figures 1 and 2, it is possible to note that the heating radiating resistance 1 for flows of gaseous substances, in particular of air, according to the present invention comprises at least one body 3 internally containing at least one electric resistance 5, described below, and comprising along its external surface at least two series, respectively 7a and 7b, of dissipating tabs: each series 7a, 7b is then composed of a plurality of dissipating tabs arranged mutually in parallel in such a way as to obtain, between every wing and the adjacent wing, at least one passing groove for flows of gaseous substances, in particular air, such groove being parallel to a direction defined by the movement of flows of gaseous substances heated by the radiating resistance 1, preferably such movement being determined by convective motions of the flows themselves and such direction being then pointed out as an example by arrows A_F and A_C, arrow A_F pointing out the convective motion of the flows of cold gaseous substance towards the wings 7a, 7b of the radiating resistance 1 and arrow A_C pointing out the convective motion of the flows of gaseous substance heated by the wings 7a, 7b and moving away from the resistance 1.

[0011] In particular, between each series 7a and 7b of dissipating tabs, the radiating resistance 1 according to the present invention further comprises at least one external discontinuity groove 11 arranged orthogonal to the passing grooves between the dissipating tabs, and preferably in an orthogonal position to the convective motion direction A_F - A_C of the flows of gaseous substances heated by the radiating resistance 1. The Applicant in fact has empirically detected that the presence of such discontinuity groove 11, adapted to stop the continuity of the dissipating tabs between series of nearby wings, advantageously avoids the detachment of threads of gaseous substance heated by the surface of the radiating resistance 1 before it has passed the whole radiating surface defined by the series of wings of the radiating resistance 1 itself, this making heating of gaseous substances, and in particular air, quicker and more efficient. Moreover, the Applicant has detected, always empirically, that the same mutual arrangement and the shape of

the series of wings and their related discontinuity grooves allow the maximum flow of passage of gaseous substance inside the dissipating tabs.

[0012] Obviously the number of series of dissipating tabs, and of related discontinuity grooves 11, and their mutual arrangement, can be various and above all depending on the sizes of the radiating surface that has to be conferred to the resistance 1, without thereby departing from the scope of the present invention.

[0013] Merely as an example, in fact, it can be noted that a preferred embodiment of the radiating resistance 1 shown in FIG. 1 and 2 comprises five series, respectively 7a, 7b, 7c, 7d and 7e, of dissipating tabs, the first three 7a, 7b e 7c being arranged mutually parallel and separated by two respective discontinuity grooves 11, and the last two 7d and 7e being also arranged mutually parallel and separated by the respective discontinuity groove 11, but flanked and offset with respect to the first three series 7a, 7b and 7c.

[0014] The body 3 can be, in a preferred embodiment thereof, composed of two halves, substantially similar one to the other, to be then afterwards mutually joined longitudinally through suitable fastening means, such as for example screws, to then form a single body. Inside body 3, at least one seat is arranged, adapted to receive the electric resistance 5.

[0015] The electric resistance 5 arranged inside the body 3 can obviously be of any type suitable for the purpose, Preferably, such as shown for example in FIG. 2, such electric resistance 5 is at least one heating spark plug composed of at least one tubular body inside which at least one electric resistor is contained, for example an electric conductor filament with a suitable diameter. The two opposite ends of the electric resistance 5 are then equipped with suitable electric connectors 5a, 5b adapted to allow the connection with electric supply means (not shown). Obviously, the length of the electric resistance 5 and its arrangement inside the body 3, for example with a serpentine as shown as an example in FIG. 2, can be various, and in particular depending on the electric power that has to be developed related to the dissipating surface of the radiating resistance 1 according to the present invention.

[0016] FIG. 3a and 3b show some possible alternatives of the electric resistance 5 made as a body of resistance shaped as a plane blade. In particular, as shown for example in FIG. 3a, the electric resistance 5 can comprise at least one support made of insulating material 51 resisting to heat, around which at least one resistance spiral 53 shaped as a plate is wound. Instead, with reference to FIG. 3b, the electric resistance 5 can comprise the support made of insulating material 51 resisting to heat around which at least one wire-shaped resistance spiral 55 is wound.

[0017] In both above-described cases, as shown for example in FIG. 4, the electric resistance 5 shaped as a plane blade is inserted inside at least one protection housing 57, made for example of at least one suitably bent metal sheet, by interposing at least one layer 59 made of an insulating material. The electric resistance 5 shaped as a plane blade is then placed inside the body 3 of the radiating resistance 1 and then possibly fastened through suitable fastening means, such as for example screws. Also in this case, obviously, the electric resistance 5 shaped as a plane blade is equipped with suitable electric connectors 5a, 5b adapted to allow its connection with electric supply means (not shown) and can be dimensioned depending on the electric power that has to be developed depending on the dissipating surface of the radiating resistance 1 according to the present invention.

[0018] In addition, the radiating resistance 1 according to the present invention could also be equipped with at least one control sensor 13 of the temperature of flows of heated gaseous substance and/or the external temperature of the dissipating tabs, such control sensor 13 operatively cooperating with the electric resistance 5 to adjust the electric power delivered by this latter one depending on a range of pre-set temperature values. In particular, the control sensor 13 could increase or decrease the electric power delivered by the electric resistance 5 if the flows of gaseous substance are respectively too cold or too hot or stop the delivery of electric power if the temperature of the dissipating tabs is too high or anyway greater that a pre-set safety temperature level, in such a way as to safeguard the integrity of the radiating resistance 1.

[0019] The radiating resistance 1 according to the present invention, in particular the body 3 and the related dissipating tabs, can obviously be made of the most suitable materials. In particular, the radiating resistance 1 can be produced by melting or die-casting a metallic material, such as cast iron or aluminium, or ceramics, with variable sizes and different installed electric powers.

[0020] With reference now to FIG. 5a and 5b, it is possible to note a first preferred embodiment of a packaging machine 20 for vacuum products through a heat-shrinking plastic film according to the present invention. In particular, such machine 20 comprises at least one welding and packaging chamber 21 through heat-shrinking of a plastic film. Heat-shrinking and welding of the open film edges occur in a single operation by closing at least one oscillating bell 23 that comprises elements adapted to weld the open edges of the plastic film and to contain hot air that heats the film around which the product is wound. Circulation of hot air inside the bell 23 is then guaranteed by at least one fan 25 placed on the base of the welding and packaging chamber 21. Advantageously, along at least one internal wall of such welding and packaging chamber 21 the packaging machine 20 comprises at least one radiating resistance 1 according to the present invention, obviously supplied by electric means of the machine itself, and arranged so that its discontinuity grooves 11 are substantially orthogonal to the convective motion direction of the flows of air heated by the radiating resistance 1 and re-circulated by the fan 25.

[0021] In addition, the radiating resistance 1 according to the present invention could be equipped with at least one conveying blade 27 (in FIG. 5a and 5b such blade is shown as partially removed merely to facilitate understanding) arranged in parallel with the radiating surface of the resistance 1 itself, in order to favour the convective motion of the flows of air pushed by the fan 25.

[0022] Further additionally, the machine 20 could comprise at least one movable protecting blade 29 arranged on top of the radiating resistance 1, whose opening can for example be driven by activating the fan 25.

[0023] With reference now to FIG. 6, it is possible to note a second preferred embodiment of a packaging machine for vacuum products according to the present invention, and in particular of a specific component of its, such as a shrinking oven 30 of the plastic film. The oven 30 therefore comprises at least one heat-shrinking chamber 31 inside which circulation of hot air is guaranteed by at least one fan 33, for example placed on top the chamber 31 itself. Laterally to the chamber 31, at least one radiating resistance 1 according to the present invention is arranged, obviously supplied by electric means of the oven 30. The oven 30 is then equipped with conveying walls 35 adapted to convey air re-circulated by the fan 33 towards the radiating resistance 1 (that is arranged preferably so that its discontinuity grooves 11 are substantially orthogonal to the motion direction of the flows of air re-circulated by the fan 33 and pointed out as an example by arrows in FIG. 6) that, once heated, is entered inside the heat-shrinking chamber 31 through at least one slit 37.

[0024] Obviously, in above-described packaging machines, the arrangement and number of radiating resistances 1 according to the present invention can be various and depending on specific needs. For example, it can be provided to arrange a plurality of radiating resistances 1 mutually in series to linearly obtain a radiating surface with greater sizes.

Claims

1. Heating radiating resistance (1) for flows of gaseous substances, in particular of air, **characterised in that** it comprises at least one body (3) internally containing at least one electric resistance (5) and along an external surface thereof at least two series of dissipating tabs (7a, 7b), between each one of said series of dissipating tabs (7a, 7b) at least one discontinuity groove (11) being externally arranged.

2. Radiating resistance (1) according to claim 1, **characterised in that** each one of said series of dissipating tabs (7a, 7b) is composed of a plurality of dissipating tabs arranged mutually in parallel to obtain between every one of said wings and one of said adjacent wings at least one passing groove of said flows of said gaseous substances.

3. Radiating resistance (1) according to claim 2, **characterised in that** said discontinuity groove (11) is orthogonal to said passing grooves between said dissipating tabs.

4. Radiating resistance (1) according to claim 2, **characterised in that** said passing grooves are parallel to a convective movement direction (A_F - A_C) of said flows of said gaseous substances heated by said radiating resistance (1).

5. Radiating resistance (1) according to claim 1, **characterised in that** said discontinuity groove (11) is orthogonal to a convective movement direction (A_F - A_C) of said flows of said gaseous substances heated by said radiating resistance (1).

6. Radiating resistance (1) according to claim 1, **characterised in that** it comprises five of said series of dissipating tabs (7a, 7b, 7c, 7d , 7e), the first three of said series of dissipating tabs (7a, 7b, 7c) being arranged mutually parallel and separated from two respective of said discontinuity grooves (11), and the last two of said series of dissipating tabs (7d, 7e) being arranged mutually in parallel, separated from said respective discontinuity groove (11) and flanked and offset with respect to said first three series (7a, 7b, 7c).

7. Radiating resistance (1) according to claim 1, **characterised in that** said body (3) is composed of two substantially mutually similar halves, adapted to be then mutually joined longitudinally through fastening means, at least one seat adapted to receive said electric resistance (5) being arranged inside said body (3).

8. Radiating resistance (1) according to claim 1, **characterised in that** said electric resistance (5) is at least one heating spark plug composed of at least one tubular body inside which at least one electric resistor is contained.

9. Radiating resistance (1) according to claim 1, **characterised in that** said electric resistance (5) is a body of resistance shaped as a plane blade.

10. Radiating resistance (1) according to claim 9, **characterised in that** said electric resistance (5) shaped as a plane blade comprises at least one support made of insulating material (51) resisting to heat around which at least one resistance spiral (53) shaped as a plate is wound, or around which at least one wire-shaped resistance spiral (55) is wound.

11. Radiating resistance (1) according to claim 9, **characterised in that** said electric resistance (5) shaped as a plane blade is inserted inside at least

one protection housing (57) by interposing at least one layer made of an insulating material (59), said protection housing (57) being at least one metallic bent sheet.

12. Radiating resistance (1) according to claim 1, **characterised in that** it comprises at least one control sensor (13) of a temperature of said flows of said gaseous substance and/or an external temperature of said dissipating tabs, said control sensor (13) operatively cooperating with said electric resistance (5) to adjust the delivered electric power.

13. Radiating resistance (1) according to claim 1, **characterised in that** it is made of melted or die-cast metallic material, such as cast iron or aluminium, or it is made of ceramics.

14. Packaging machine for vacuum products through a heat-shrinking plastic film, **characterised in that** it comprises at least one radiating resistance (1) according to any one of the previous claims.

15. Packaging machine (20) according to claim 14, **characterised in that** it comprises at least one welding and packaging chamber (21) through heat-shrinking, at least one oscillating bell (23) equipped with welding elements of said plastic film and at least one fan (25) on the base of said welding and packaging chamber (21) for circulating hot air inside said bell (23), said radiating resistance (1) being arranged along at least one internal wall of said welding and packaging chamber (21).

16. Packaging machine (20) according to claim 15, **characterised in that** it comprises at least one conveying blade (27) arranged in parallel with a radiating surface of said radiating resistance (1).

17. Packaging machine (20) according to claim 16, **characterised in that** it comprises at least one movable protecting blade (29) arranged on top of said radiating resistance (1).

18. Packaging machine (20) according to claim 14, **characterised in that** it comprises at least one shrinking oven (30) of said heat-shrinking plastic film, said shrinking oven (30) comprising at least one heat-shrinking chamber (31), at least one fan (33), conveying walls (35) adapted to convey air re-circulated by said fan (33) towards said radiating resistance (1) to be heated and entered inside said heat-shrinking chamber (31) through at least one slit (37).

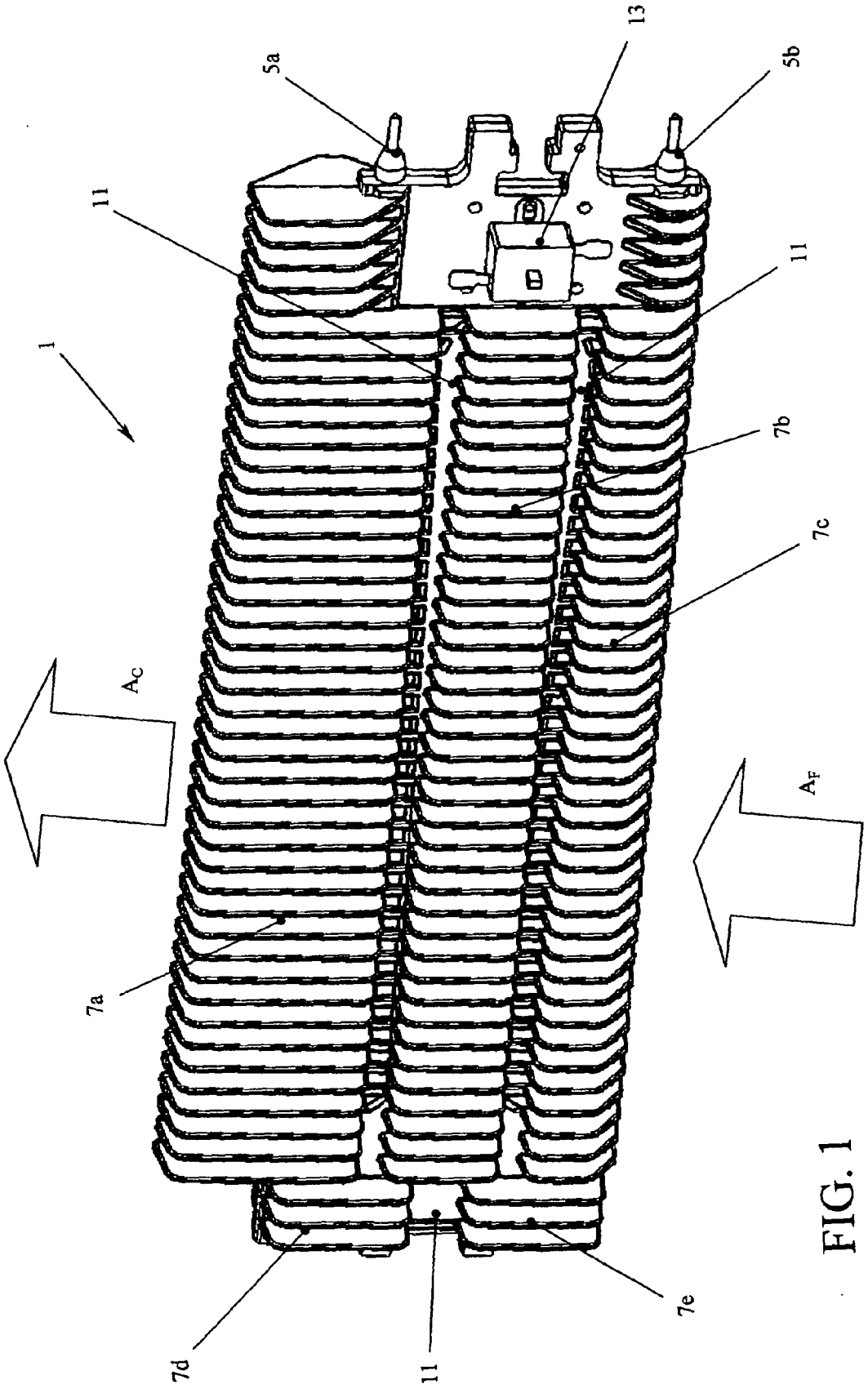

FIG. 1

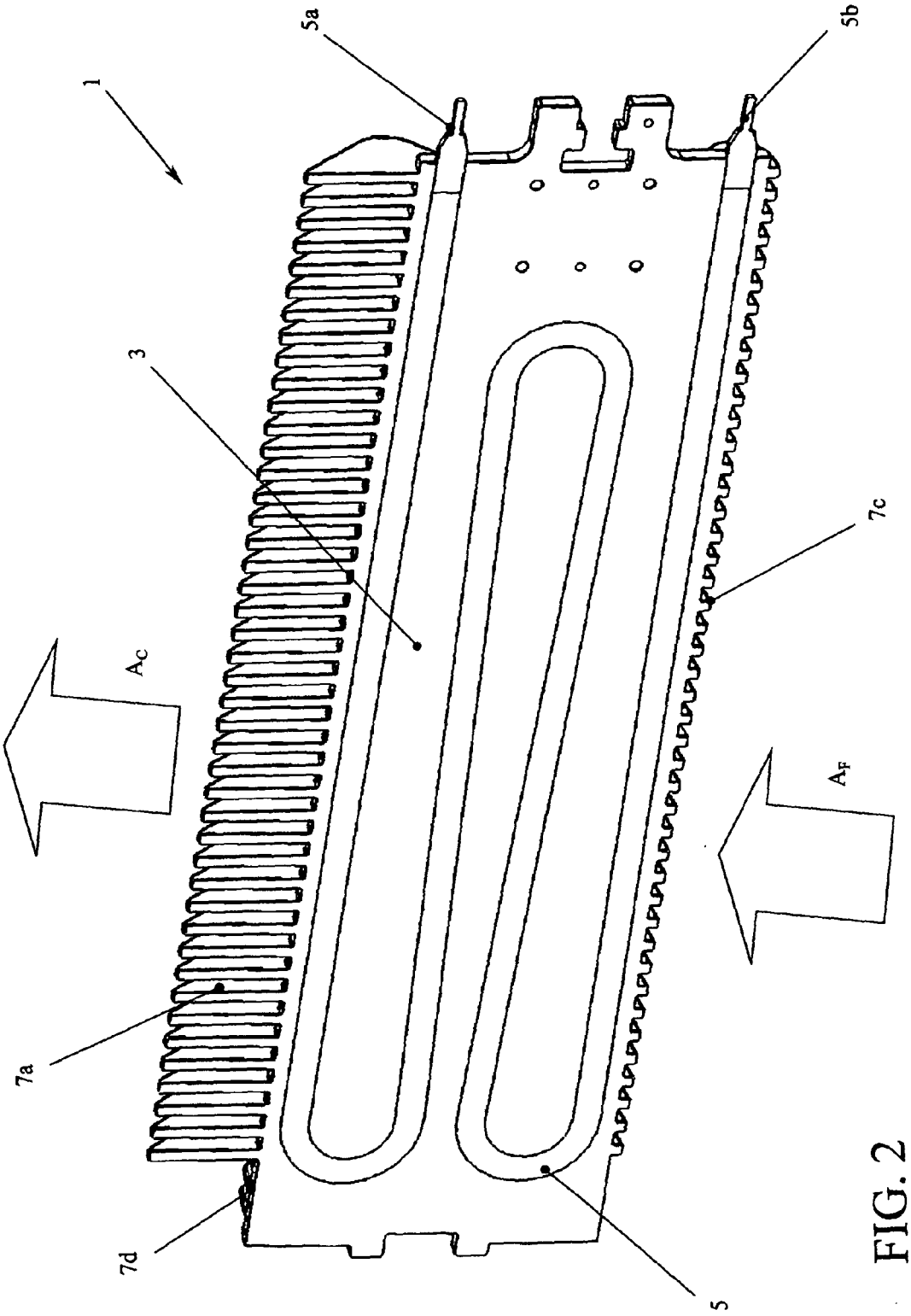

FIG. 2

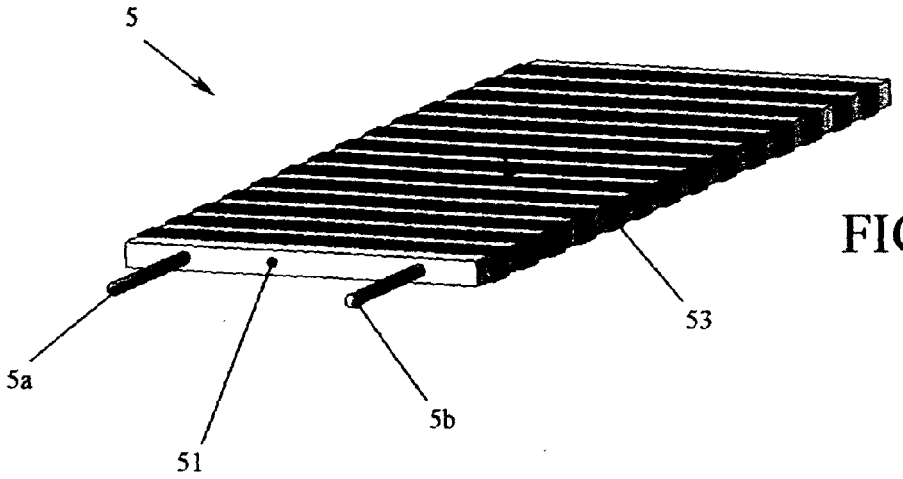

FIG. 3a

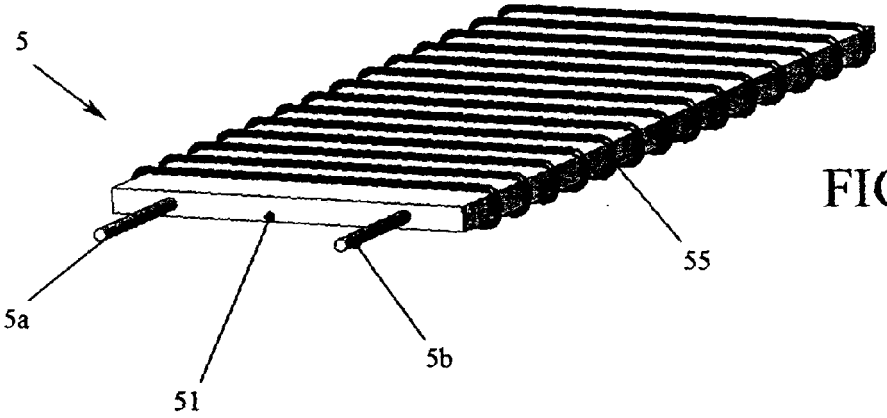

FIG. 3b

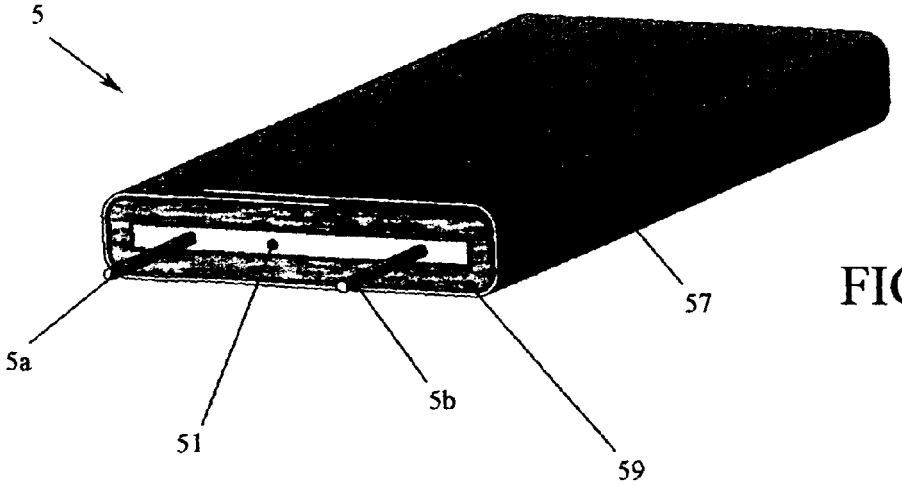

FIG. 4

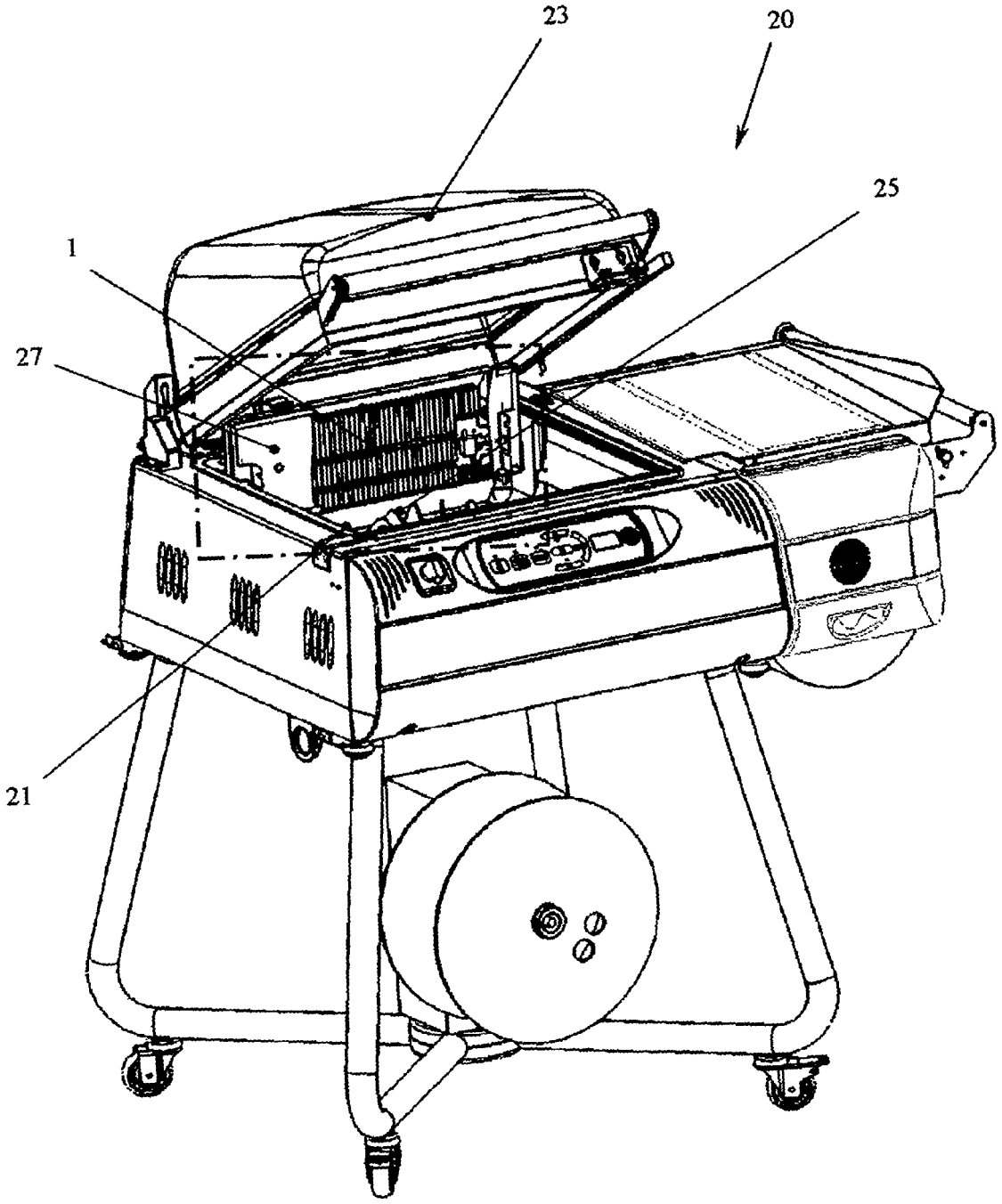

FIG. 5a

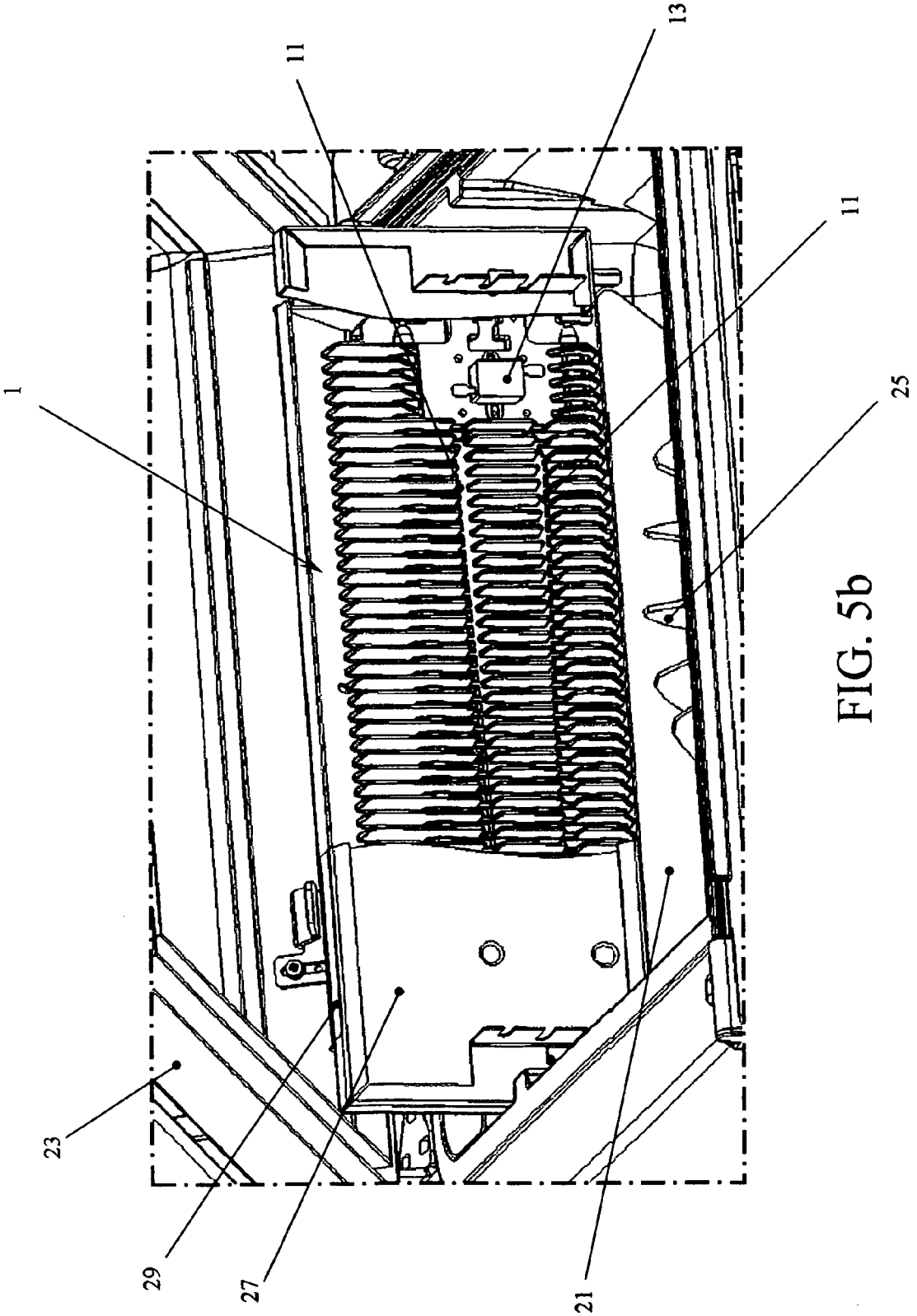

FIG. 5b

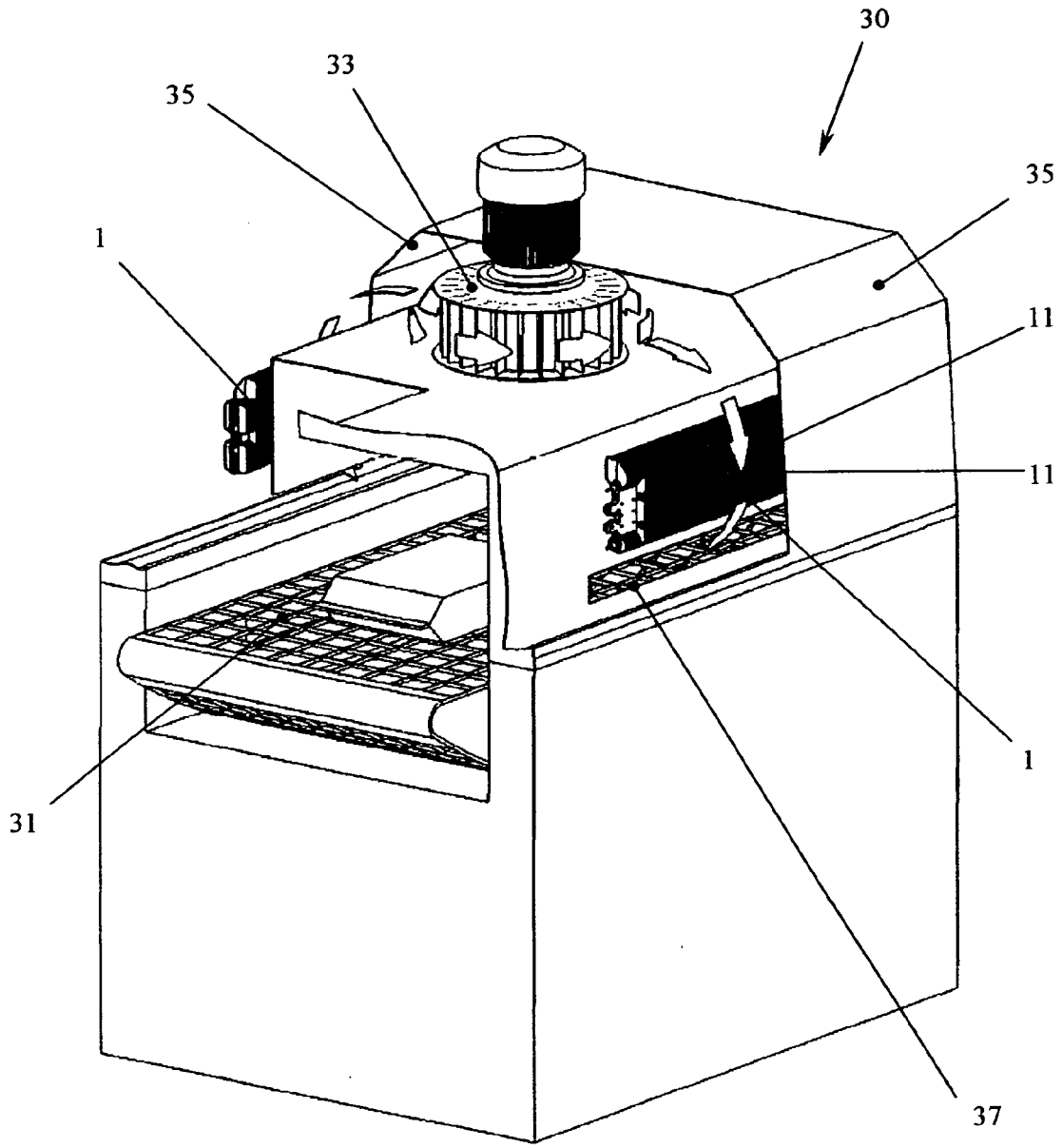

FIG. 6