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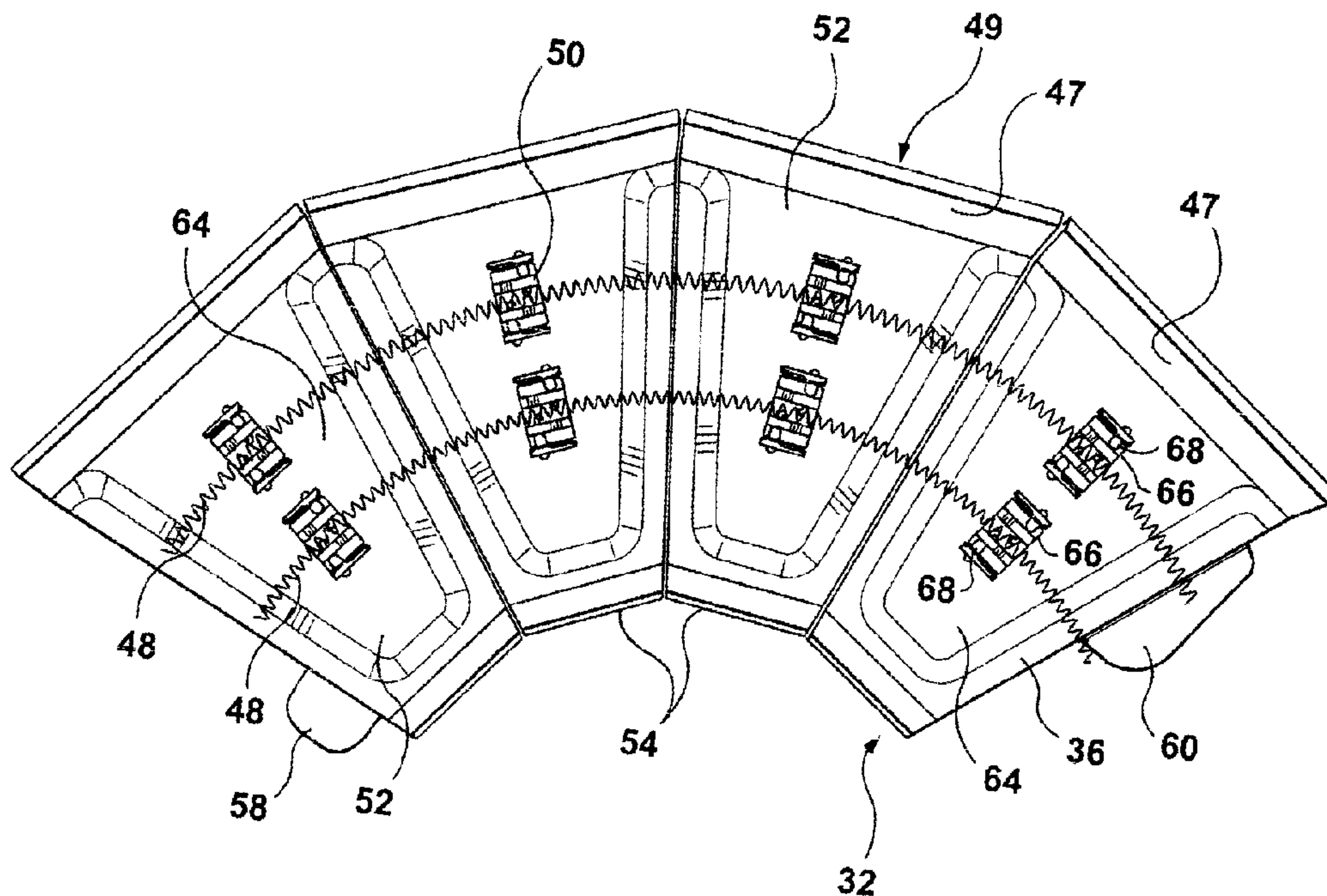
(71) Demandeur/Applicant:
CAMCO INC., CA

(72) Inventeur/Inventor:
ST. LOUIS, ROBERT MAURICE, CA

(74) Agent: CRAIG WILSON AND COMPANY

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(54) Title: ELECTRICAL HEATER HOUSING SUPPORT WALL



(57) **Abrégé/Abstract:**

An electrical heater housing support wall for use in a heater assembly of a clothes dryer is adapted to support electrical resistant insulators carrying heating elements. The heater housing support wall has a series of leaves folded together to provide a continuous substantially annular wall portion for supporting an electrical heating element relative thereto. Each of the leaves has an outer peripheral end portion, an inner periphery end portion narrower in width than said outer peripheral end portion, and opposing tapering side walls tapering from the outer peripheral end portion to the inner peripheral end portion. The leaves are connected together at their outer peripheral end portions and at least partially engage each other along respective juxtapositioned tapering side walls. The assembled heater housing support wall has the advantage that during assembly of the heating elements onto the support wall, the support wall is not yet folded permitting the heating elements to be evenly stretched linearly for mounting onto the insulators.



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ELECTRICAL HEATER HOUSING SUPPORT WALL**ABSTRACT OF THE DISCLOSURE**

An electrical heater housing support wall for use in a heater assembly of a clothes dryer is adapted to support electrical resistant insulators carrying heating elements. The heater housing support wall has a series of leaves folded together to provide a continuous substantially annular wall portion for supporting an electrical heating element relative thereto. Each of the leaves has an outer peripheral end portion, an inner periphery end portion narrower in width than said outer peripheral end portion, and opposing tapering side walls tapering from the outer peripheral end portion to the inner peripheral end portion. The leaves are connected together at their outer peripheral end portions and at least partially engage each other along respective juxtapositioned tapering side walls. The assembled heater housing support wall has the advantage that during assembly of the heating elements onto the support wall, the support wall is not yet folded permitting the heating elements to be evenly stretched linearly for mounting onto the insulators.

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ELECTRICAL HEATER HOUSING SUPPORT WALL

FIELD OF THE INVENTION

The present invention relates to an electrical heater housing support wall for supporting electrical resistant insulators carrying heating elements. In particular the present invention relates to an electrical heater housing support wall for use in a heater assembly of a clothes dryer.

BACKGROUND OF THE INVENTION

Electric clothes dryers typically have a rotating drum which tumbles clothing as warm air passes through the drum. The drum has a wall having a plurality of perforations through which air may enter the drum. The air entering the drum through the rear wall is heated in a heater assembly located behind the rear wall. In my U.S. patent 4,994,654 issued February 19, 1991 there is illustrated a heater housing onto which are mounted electrical coils through insulated brackets. Air is drawn in through the air gap between the heater housing and the rear wall of the dryer drum. The air is drawn over the electrical heating coils and in through the apertures in the rear wall of the dryer drum. As a result, air entering the dryer drum is heated for drying the clothes. The heater housing is shown to be circular in shape and the insulating supports are mounted directly to the rear wall of the diffuser dryer heater housing.

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The problem with this heater housing resides in the assembly of the heating coils onto the insulating supports. This assembly process involves mounting the electrical insulators onto the housing in a circular pattern and then stretching the heater coil in a circular pattern around the heater housing for mounting onto the insulators. This latter step of mounting the heater coil is time consuming and difficult to insure even distribution of the heater coil between the insulators because the coil must be stretched in a circular pattern around the insulators or in a piecemeal manner between each of insulators.

SUMMARY OF THE INVENTION

The present invention relates to an electrical heater housing support wall for supporting electrical resistant insulators carrying heating elements. In particular, the present invention relates to the assembled heater housing support wall which permits for easy assembly of insulators and heater coils onto the support wall.

The electrical heater housing support wall of the present invention is adapted for supporting electrical resistant insulators carrying one or more electrical heating elements. The heater housing support wall has a series of leaves folded together to provide a continuous substantially annular wall portion for supporting the electrical heating element relative thereto. Each of the leaves has an outer peripheral end portion, an inner periphery end portion narrower in width than said outer peripheral end portion, and opposing tapering side walls tapering from the outer peripheral end portion to the inner peripheral end portion. The leaves are connected together at their outer peripheral end portions and at least partially engaging each other along respective juxtapositioned tapering side walls.

The assembled heater housing support wall of the present invention has the advantage that during assembly of the electrical heating element onto the support wall, the support wall is not yet folded permitting the heating element to be evenly stretched linearly for mounting onto the insulators.

Preferably, each leaf has at least one flap extending from at least one of the tapering side walls for engaging in overlapping and supporting relation at least one adjacent leaf when the leaves are folded together. Each of the leaves may be adapted to support one or more electrical resistant insulators.

It is envisaged that the electrical insulator has a base portion and a stem portion and that each of the leaves is provided with notches and/or tabs to mount the base portion of the electrical insulator to the leaf. The base portion of the insulator has two opposing feet adapted to rest or abut against the surface of the corresponding leaf and each foot has a depending flange projecting into the notch of the leaf so as to prevent lateral movement of the insulator relative to the leaf. Further, the tabs of the leaf are bent over the feet of the insulator to secure the insulator to the leaf. It is further envisaged that the insulator has a single or double stem portion onto which one or more coils of the electrical heating element is mounted.

Preferably, the electrical heater housing support wall has notches between the outer peripheral end portions of adjacent leaves to facilitate folding of the leaves into engaging relation. Preferably, the outer peripheral end portions of each of the leaves each has an outer rim wall portion angled therefrom which rim wall portions collectively define an outer boundary wall for the heater housing support wall. Also, the inner peripheral end portions of each of the leaves has an inner rim wall portion which inner rim wall portions collectively define an inner peripheral boundary wall. In a preferred embodiment, the inner peripheral boundary wall is discontinuous between adjacent leaves.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the nature and objects of the present invention, reference may be had to the accompanying diagrammatic drawings in which:

Figure 1 is a view showing an electric clothes dryer having a rotating drum, rear end head and heater housing of the present invention;

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Figure 2 is an elevation view showing heater housing;

Figure 3 is a plan view of the heater housing showing it as an elongated member prior to folding;

Figure 4 is a side view taken along lines 4-4 of Figure 3; and,

Figure 5 a partial view showing an assembled heater housing with insulators and heating coils; and,

Figure 6 is a perspective view showing the mounting of an insulator to the heater housing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figures 1, 2 and 5 there is shown a clothes dryer 10 having a rotating drum 12 mounted therein. The rotating drum has an open front through which access can be gained through door 14 of the dryer 10 for the insertion and removal of clothing and other articles from the drum. The clothes dryer 10 has a rear panel 16 provided with a series or plurality of louvers 18 through which air may be drawn into the interior of the dryer 10. The airflow is shown by arrows 20 passing through the louvers, through a series of openings 23 in the rear end head 22 of the dryer drum 12 through front ducting 24 and out through exhaust ducting 26. Motor 28 draws or rotates fan 30 to draw the air 20 through the drum 12. The motor 28 through pulley 35 and belt 33 also causes the rotation of the dryer drum 12.

A heater housing 32 is mounted by suitable bolts 34 to the rear panel 16 of the dryer 10. The heater housing 32 is adjacent the end head 22. The heater housing 32 has a rear wall 36 that is spaced from the rear end head 22. The rear end head 22 has a boss 45 and the rear wall 36 has a diameter which is greater than the boss 45. The rear wall 36 has a generally irregular annular polygonal shape (see Figure 2).

The heater housing 32 has an upstanding outer peripheral wall portion 44 that extends around the periphery of the polygonal shaped rear wall 36.

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The wall portion 44 is angled approximately at 90° to the rear wall 36. The upstanding sidewalls 44 further extend towards the rear end head 22. An air gap 46 of variable size extends between the wall portion 44 and the end head 22 of the dryer drum.

Helically wound heater coils 48 are mounted via electrical insulators 50 to the rear wall 36 of the heater housing 32. The coils 48 are spaced from the rear walls 36 and from the end head 22 of the dryer drum. The heater coils 48 are connected to a source of electrical supply through terminals 51 (see Figure 2). When electrical energy is fed through terminals 51 to coils 48, the coils warm heating air passing over the coils and towards the openings (not shown) in the end head 22 of the dryer drum 12.

The electrical heating support wall of heater housing 32 is shown in an assembled position in Figure 2 wherein a plurality of leaves 52 are positioned in a juxtaposition relationship and folded relative to each other to provide a continuous substantially annular wall portion 36 for supporting the electrical heater coils 48 relative thereto. Each of the leaves 52 has an outer peripheral wall end portion 47, an inner peripheral end portion 54 narrower in width than the outer peripheral end portion 47. Between the inner and outer peripheral end portions 54, 47 each of the leaves 52 has opposing tapering sidewalls 56 that taper from the outer peripheral end portion 47 to the inner peripheral end portion 54. Each leaf 52 is provided with at least one flap 58 (see Figure 3) on one of its sidewalls 56 and another flap 60 on its other sidewall 56.

As shown in Figure 3, the outer peripheral wall 47 is initially flat relative to the leaves 52 and has an overturned flange 49. The wall 47 is bent upwardly about fold line 51 to its raised portion shown in Figure 2. The leaves 52 are folded towards each other and the outer peripheral wall then folds about fold lines 62. When the leaves 52 as shown in Figure 3 are folded into the configuration shown in Figure 2, the flaps or tabs 58, 60 overlap with each other to engage the adjacent leaf 52 in overlapping and supporting relationship. It should be understood that more than one tab or flap may be

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provided on each leaf tapering sidewall 56. The outer rim or outer peripheral end portion 47 of each leaf 52 effectively forms rim wall portion 47 that defines an outer boundary for the heater housing 32 when the leaves 52 are folded together.

As best seen in Figure 5, each of the leaves 52 has a raised land portion 64 which has provided thereon two sets of notches 66 and tabs 68. As shown in Figure 6, these notches 66 and tabs 68 are adapted to seat the base 72 of the insulator 50 in place relative to each leaf. Preferably, the shape of stem 70 corresponds to the shape of the stem of the insulator shown in my U.S. patent 5,935,471 issued August 10, 1999. In the preferred insulator of the present invention, the base portion 72 of the insulator 50 has two opposing feet 71 adapted to rest or abut against the surface 79 of the corresponding leaf and each foot 71 has a depending flange 73 projecting into the notch 66 of the leaf to engage the edges of the notch 66 so as to prevent lateral movement of the insulator 50 relative to the leaf. Further, at least one tab 68 of the leaf is bent over each of the feet 71 of the insulator 50 to secure the insulator 50 to the leaf 52. The cut out stem 70 has mounted thereto the heating coils 48.

During the assembly of the present heater housing 32 an elongate member 80 as shown in Figure 3, is formed by stamping a metal blank having a series of spaced apart and interconnected leaves 52 where the leaves 52 have aligned outer peripheral end portions 47 and aligned inner peripheral end portions 54 narrower in width than the outer end portions 47. Each of the leaves 52 is formed with opposing tapering sidewalls 56 tapering from a respective outer peripheral end portion 47 to a respective inner peripheral end portion 54. Each of the leaves 52 is also formed in a stamping manner with the tabs 58 and 60 as shown. The raised land surface portions 64 of the leaf may also be formed with a press during stamping and the notches 66 and tabs 68 cut therefrom.

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In accordance with one method of assembling heater 32, the electrical insulators 50 are mounted to each of the leaves 52 in alignment along the elongated member 80. The insulators 50 are inserted into the notches 66 with the tabs 68 folded about the base 72 of the insulators 50 as shown in Figure 6. Then the heating coil 48 are stretched along the elongate member 80 and inserted into the electrical insulators 50. Thereafter, the leaves 52 are folded to bring the flaps 58, 60 of adjacent leaves 52 into engagement with each other and to provide a continuous inner rim wall portion 54 as shown in Figure 2 with the tapering sidewalls 56 of the leaves juxtapositioned. In this method, the continuous outer peripheral wall portions 47 are bent upwards at a predetermined angle anytime during the process prior to the step of folding the leaves 52.

In accordance with the preferred method of assembling heater 32, two electrical heating coils 48 are stretched beside each other over a support jig (not shown) and insulators 50 have their stem portions mounted onto the coils 48 at predetermined positions along the coils 48 corresponding to the location of the notches 66 in the leaves 52 of the elongated member 80. The support coils are also supported by the support jig. The elongated member 80 is preferably bent along fold lines 51 (Figure 3) to form a depending side wall portions 47. Next, the elongated member is moved downwardly so that the notches 66 pass over the depending flange 73 and the feet 71 of base portion 72 abut against surface 79 of the leaves 52. Next, the tabs 68 are bent about the feet 71 of the insulators to mount the insulators 56 and heating coil elements 48 to the member 80. The member 80 is then raised from the support jig (not shown) and the leaves 52 are folded to bring the flaps 58, 60 of adjacent leaves 52 into engagement with each other and to provide a continuous inner rim wall portion 54 as shown in Figure 2 with the tapering sidewalls 56 of the leaves juxtapositioned.

In accordance with the present invention the folded heater housing support wall 32 and the method of forming it makes for ease of assembly. In

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particular, it is relatively easy to insert the heater housing coil 48 on an even distribution across the insulators 50 by simply stretching coils 48 in a elongated manner and inserting coil turns down onto the stem 70 heater insulators 50. As a result, there is no uneven distribution of the heater coil 48 between the insulators 50. Consequently when elongated member 80 is folded into annular heater housing 32, there is no need to subsequently mount a heater coil 48 in a circular fashion thereabout because the heater coil has already been mounted relative to the leaves 52 prior to folding the leaves 52 into the annular heater housing 32.

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What I claim is:

1. An electrical heater housing support wall for supporting electrical resistant insulators carrying heating elements, said heater housing support wall comprising:

a series of leaves folded together to provide a continuous substantially annular wall portion for supporting an electrical heating element coil relative thereto,

each of the leaves having an outer peripheral end portion, an inner periphery end portion narrower in width than said outer peripheral end portion, and opposing tapering side walls tapering from the outer peripheral end portion to the inner peripheral end portion, and,

the leaves being connected together at their outer peripheral end portions and at least partially engaging each other along respective juxtapositioned tapering side walls.

2. The electrical heater housing support wall of claim 1 wherein each leaf has at least one flap extending from at least one of the tapering side walls for engaging in overlapping and supporting relation at least one adjacent leaf when the leaves are folded together.

3. The electrical heater housing support wall of claim 2 wherein the at least one flap is fastened to the adjacent leaf.

4. The electrical heater housing support wall of claim 1 wherein each leaf has at least one flap extending from each of its tapering side walls for engaging in overlapping and supporting relation with adjacent leaves when the leaves are folded together.

5. The electrical heater housing support wall of claim 4 wherein the at least one flap is fastened to one of the adjacent leaves.

6. The electrical heater housing support wall of claim 1 wherein the leaves are adapted to support an electrical resistant insulator onto which the electrical heating element coil is mounted.

7. The electrical heater housing support wall of claim 6 wherein the electrical insulator has a base portion and a stem portion, and a plurality of the leaves have notches and tabs for mounting the base portion of at least one electrical insulator thereto, the base portion of the insulator has two opposing feet adapted to rest against a surface of one of the leaves and each of the feet has a depending flange projecting into the notch to engage edges of the notch so as to prevent lateral movement of the insulator relative to the corresponding one of the leaves, and at least one tab of corresponding one the leaves is bent over each of the feet of the insulator to secure the insulator to the leaf.

8. The electrical heater housing support wall of claim 1 wherein the outer peripheral end portions of each of the leaves each have an outer rim wall portion angled therefrom which rim wall portions collectively define an outer boundary wall for the heater housing support wall.

9. The electrical heater housing support wall of claim 7 wherein the inner peripheral end portions of each of the leaves have an inner rim wall portion which inner rim wall portions collectively define an inner peripheral boundary wall.

10. The electrical heater housing of claim 8 wherein the inner peripheral boundary wall is discontinuous between adjacent leaves.

11. An electric clothes dryer comprising:

a rotating drum

a rear end head associated with the drum head having a plurality of apertures through which air flows into the drum;

a heater housing mounted in the dryer adjacent the rear end head, the heater housing having a rear wall spaced from the rear end head,

the rear wall comprising a series of leaves folded together to provide a continuous substantially annular wall portion, each of the leaves having an outer peripheral end portion, an inner periphery end portion narrower in width than said outer peripheral end portion, and opposing tapering side walls tapering from the outer peripheral end portion to the inner peripheral end

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portion, and the leaves being connected together at their outer peripheral end portions and at least partially engaging each other along respective juxtapositioned tapering side walls;

a plurality of electrical insulators mounted to the leaves; and,

an electrical heating element coil mounted to the electrical insulators spaced from the rear wall of the heater housing and the rear end head wall of the dryer drum.

12. The electric clothes dryer of claim 11 wherein each leaf has at least one flap extending from at least one of the tapering side walls for engaging in overlapping and supporting relation at least one adjacent leaf when the leaves are folded together.

13. The electric clothes dryer of claim 12 wherein the at least one flap is fastened to the adjacent leaf.

14. The electric clothes dryer of claim 11 wherein each leaf has at least one flap extending from each of its tapering side walls for engaging in overlapping and supporting relation adjacent leaves when the leaves are folded together.

15. The electric clothes dryer of claim 14 wherein the at least one flap is fastened to one of the adjacent leaves.

16. The electric clothes dryer of claim 11. wherein the electrical insulator has a base portion and a stem portion, and a plurality of the leaves have notches and tabs for mounting the base portion of at least one electrical insulator thereto, the base portion of the insulator has two opposing feet adapted to rest against a surface of one of the leaves and each of the feet has a depending flange projecting into the notch to engage edges of the notch so as to prevent lateral movement of the insulator relative to the corresponding one of the leaves, and at least one tab of corresponding one the leaves is bent over each of the feet of the insulator to secure the insulator to the leaf.

17. The electric clothes dryer of claim 11 wherein the outer peripheral end portions of each of the leaves each have an outer rim wall

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portion angled therefrom which rim wall portions collectively define an outer boundary wall for the rear wall.

18. The electric clothes dryer of claim 11 wherein the inner peripheral end portions of each of the leaves have an inner rim wall portion which inner rim wall portions collectively define an inner peripheral boundary wall for the rear wall.

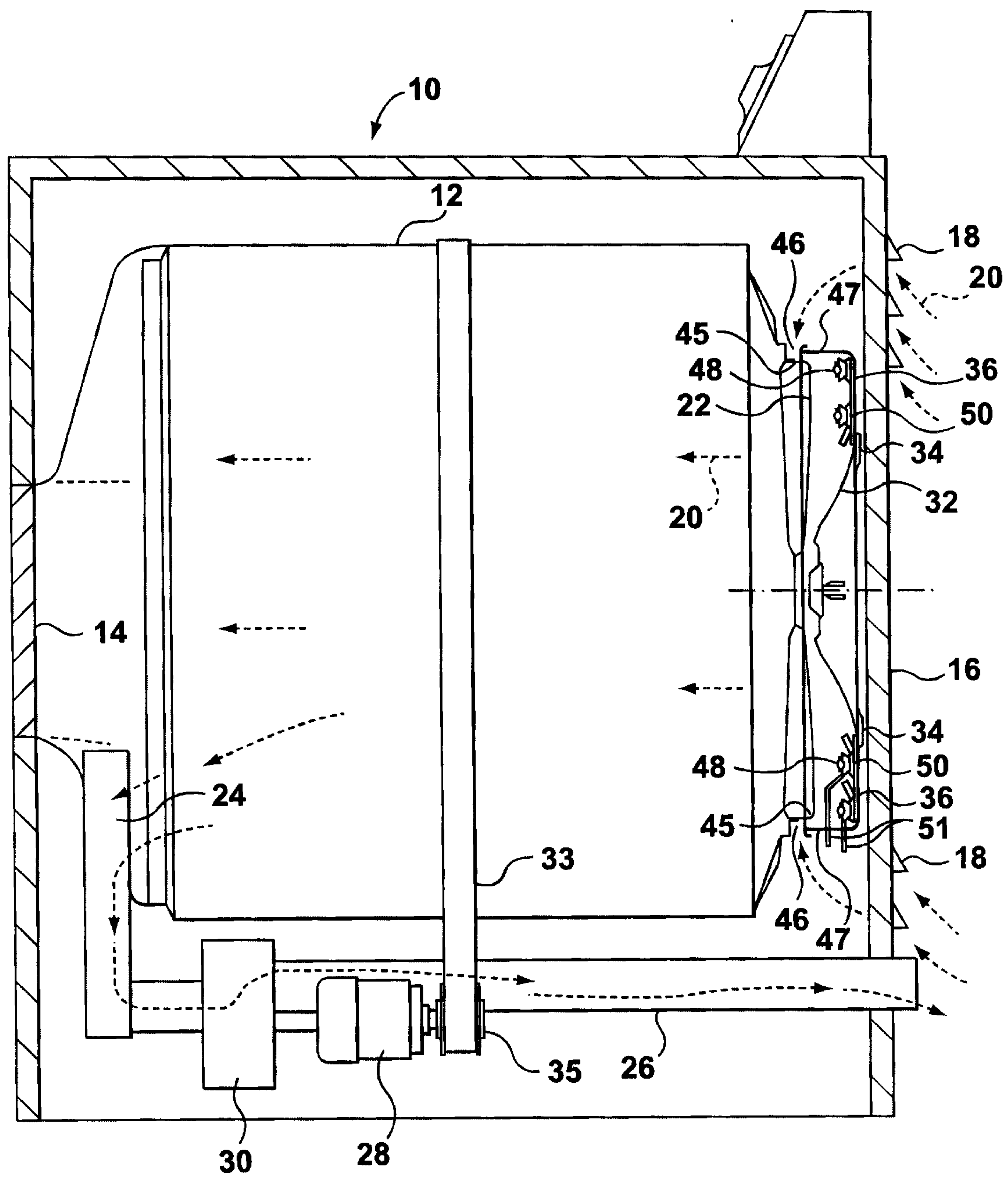
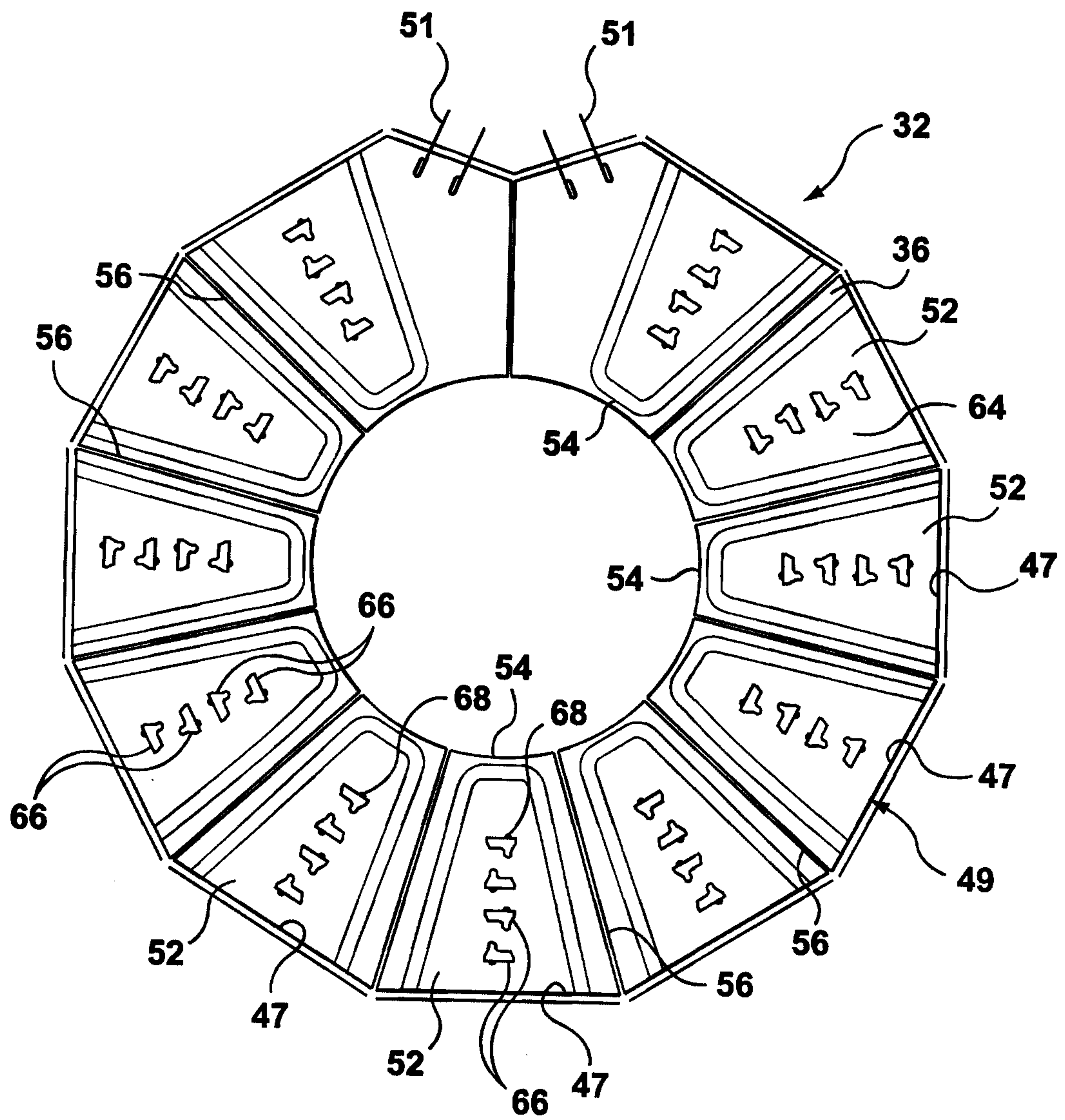


FIG. 1

**FIG. 2**

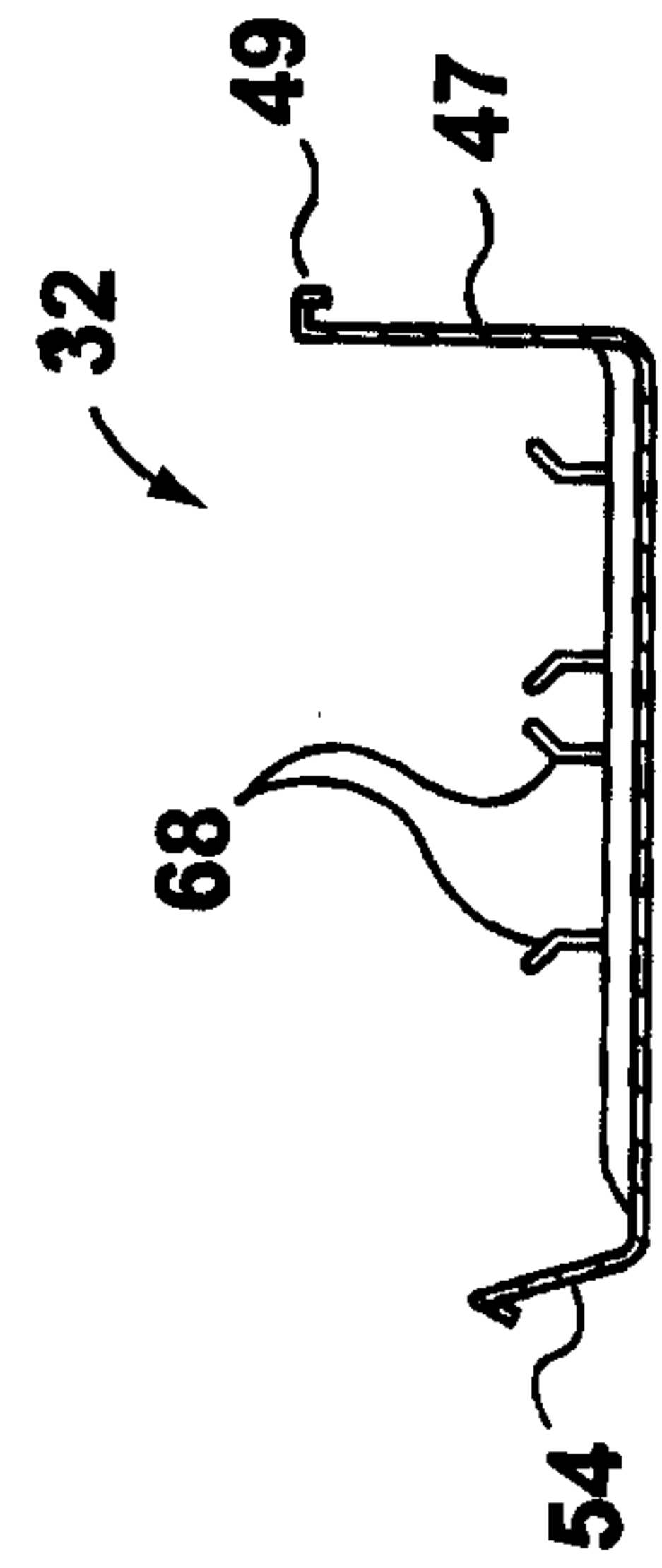
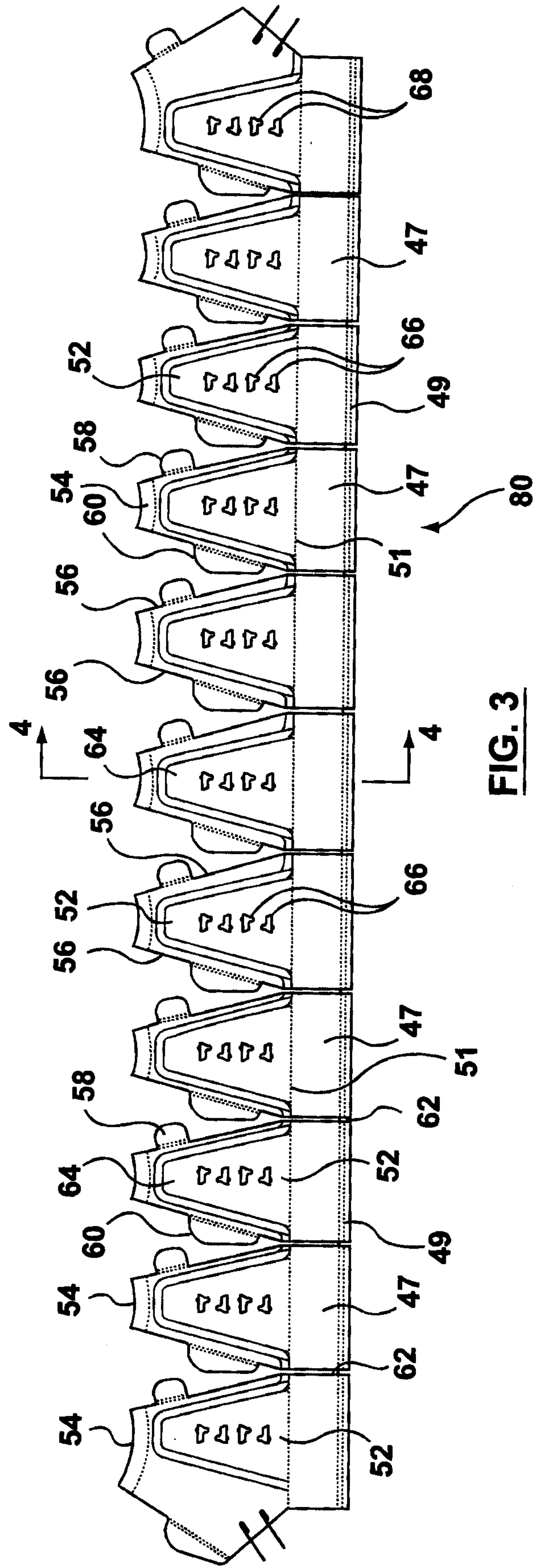


FIG. 4

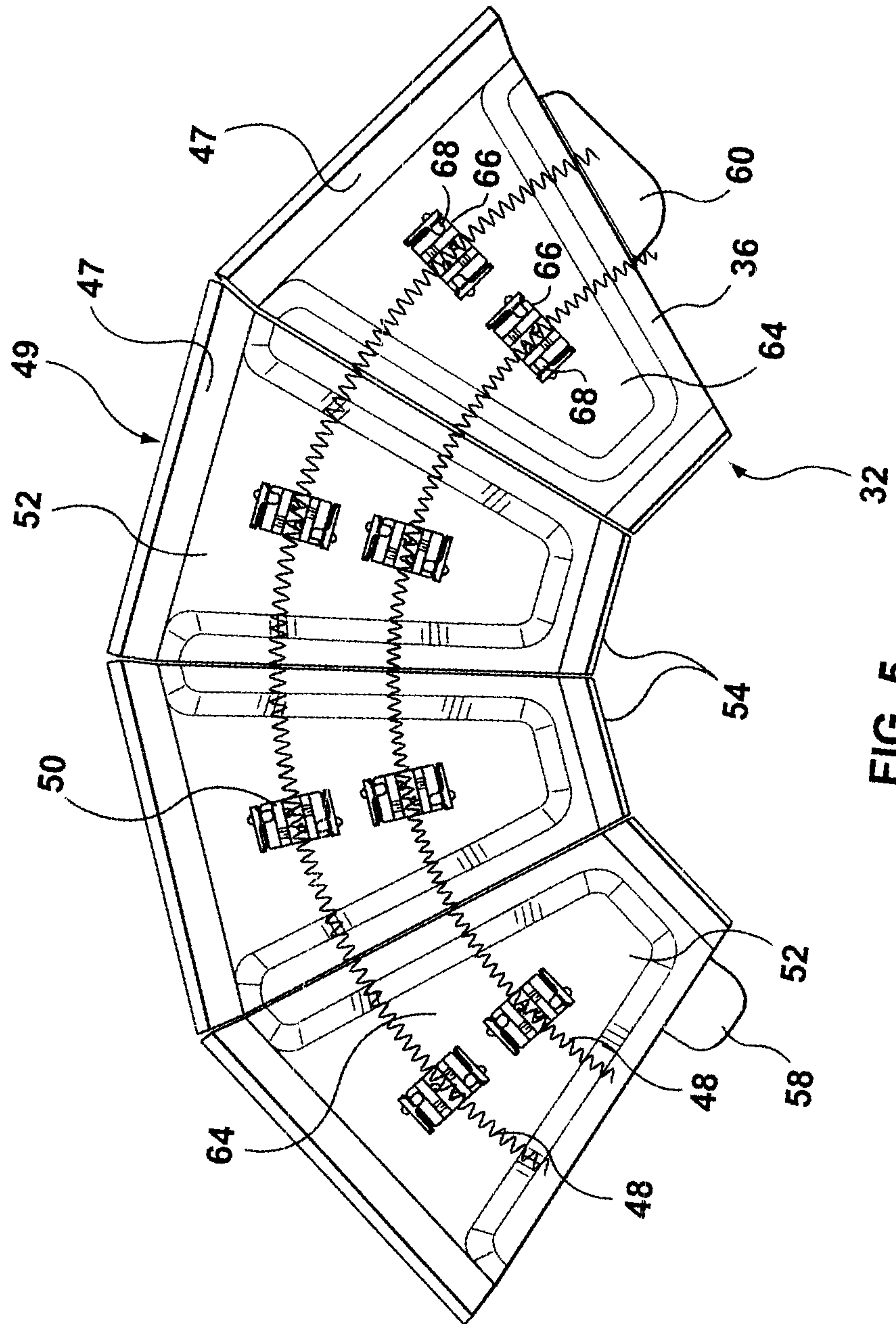


FIG. 5

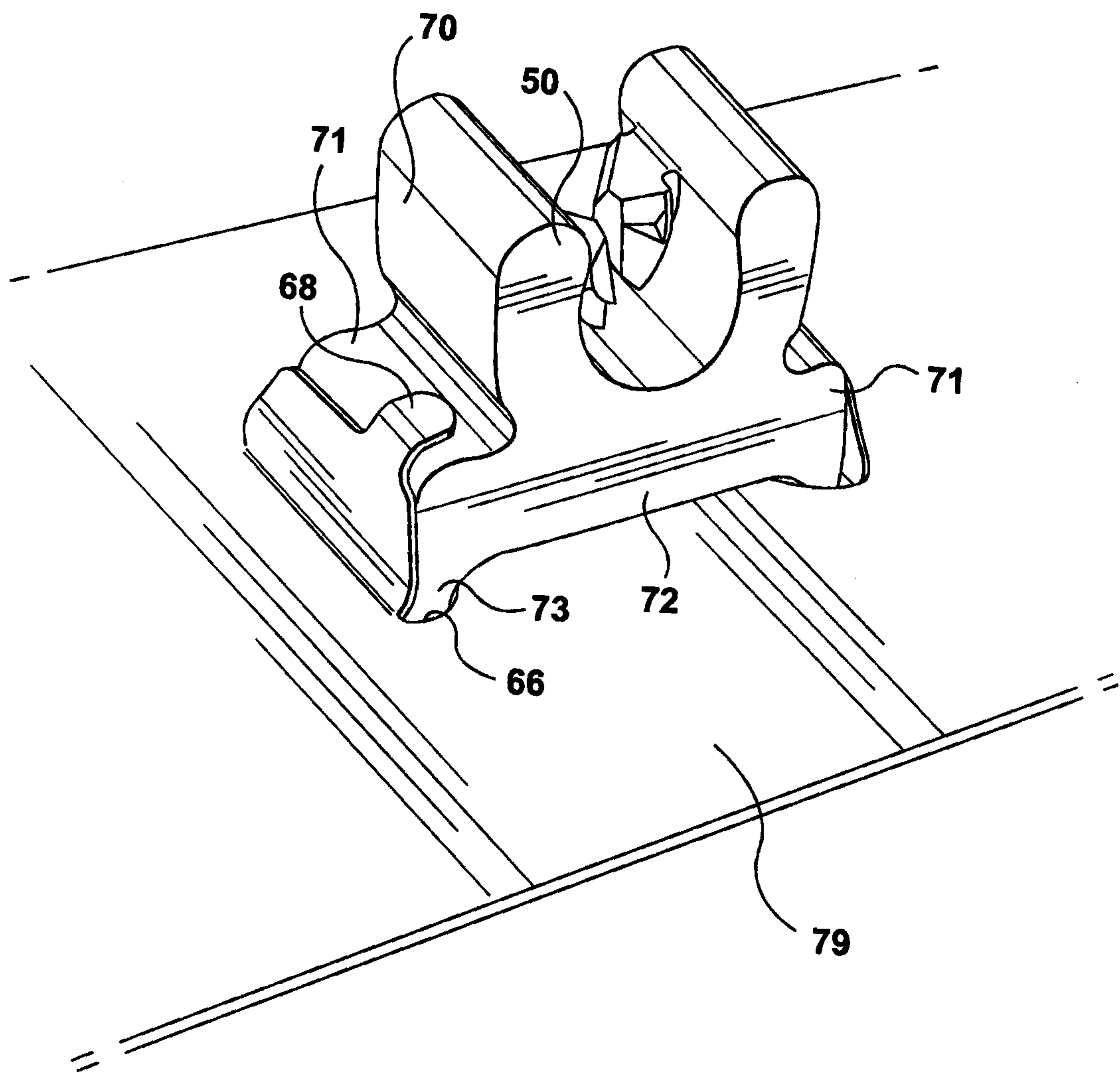


FIG. 6

