



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.06.2007 Bulletin 2007/24

(51) Int Cl.:
F24H 9/02 (2006.01)

(21) Application number: **05026925.7**

(22) Date of filing: **09.12.2005**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU
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(54) **Enclosure structure of water heater**

(57) An enclosure structure of water heater is disclosed, which is readily assembled/disassembled and has an enhanced structural strength, including two opposite side panels having front and rear edges along which aluminum-extruded channels are integrally fixed to respectively receive opposite edges of a front panel and an opposite base plate and top and bottom cover boards respectively attached to upper and lower edges

of the side panels to secure the front panel and the base plate in the channels of the side panels. Such a structure enhances simplification of assembling/disassembling the water heater enclosure and provides flexibility in modification of overall outside appearance of the water heater by replacing the side panels and the front panel to thereby eliminate troubles and inconveniences that are encountered in the conventional water heater enclosures.

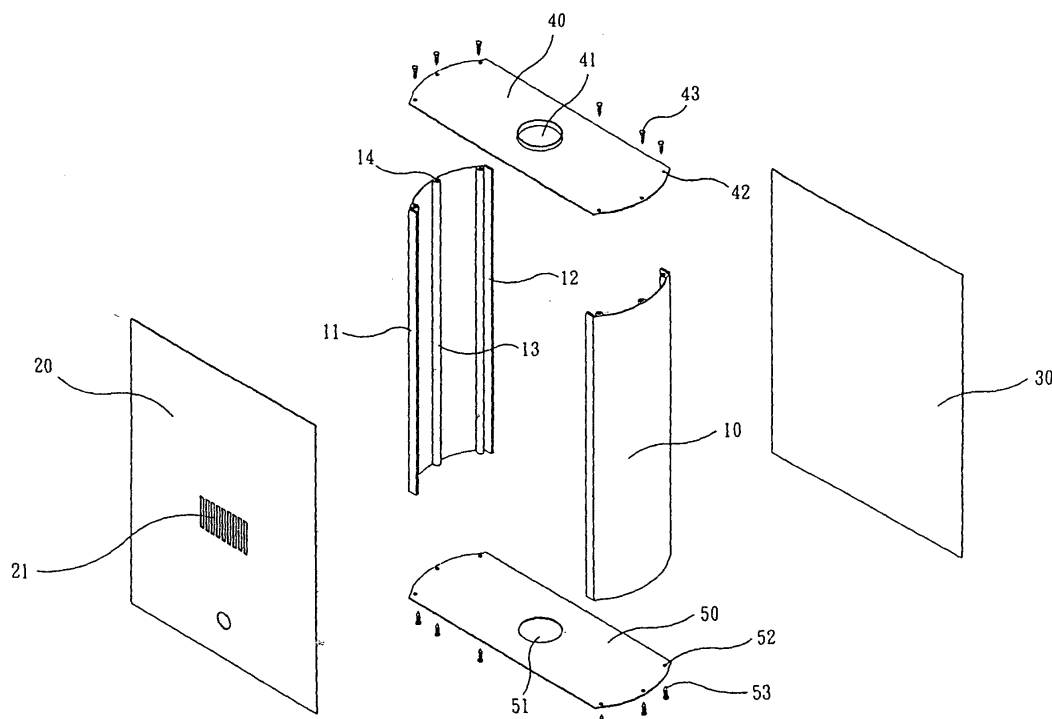


FIG. 7

Description

BACKGROUND OF THE INVENTION

(a) Technical Field of the Invention

[0001] The present invention generally relates to an enclosure structure of a gas water heater, and in particular to a water heater enclosure having a readily-detachable front panel for frequent change of outside appearance in an economic manner.

(b) Description of the Prior Art

[0002] A gas water heater comprises a base plate mounted to a vertical fixed surface, such as a wall, and a front cover mounted to the base plate. The front cover comprises a front panel having a circumference from which side panels extend rearward to form a casing having an open rear side, which is attached and secured to the base plate to form an enclosure inside which a burning/heating assembly of the heater that is generally fixed to the base plate is accommodated for protection purposes.

[0003] Taiwan Patent Publication No. 326262 discloses an improvement over the previously discussed water heater structure by forming holes on opposite marginal portions in a top portion of the front cover at positioned close to a rear edges of the top portion. A projection is formed on the base plate at a location corresponding to each hole of the front cover and each projection forms an inclined extension receivable in the hole to thereby attach the front cover to the base plate. As such, efficient assembling of the water heater can be realized.

[0004] The conventional designs of the water heater both comprises a front cover that is made as a single piece by die stamping and the front cover so made is then mounted to and shields the base plate. Thus, the front cover plays a major role for the outside appearance of the water heater. However, the conventional front cover, as discussed previously, once made, has a fixed construction and configuration. New die or mold is required for differently-constructed or shaped front cover. This is not economically practical due to the great expense for making of new dies or molds, and consequently, to save cost, the water heater industry often employs the old design of front cover in new models of water heaters. This imposes an undesired constraint on selection and modification of the outside appearance of water heaters. Also, distinction between different models of water heater is hard to tell. Apparently, further improvement is still of a great need of the water heater industry.

[0005] Furthermore, due to the fact that the front cover is made as a single piece by stamping, the front cover that is comprised of a front panel and side panels extending from and substantially normal to the front panel occupies a great amount of space. This causes problems in manufacturing, storage, and transportation of the man-

ufacturers of the front cover. Costs are thus increased.

[0006] Thus, it is desired to have an enclosure structure for water heater that overcomes the above problems of the conventional designs.

SUMMARY OF THE INVENTION

[0007] The primary purpose of the present invention is to provide an enclosure structure that comprises a base plate mounted to a fixed vertical surface and a front panel opposite to the base plate and two side panels each forming channels extending along opposite edges thereof to receive corresponding edges of the base plate and the front panel. A top cover board and a bottom board, each defining an air passage, are fixed to upper and lower ends of the assembly of the base plate, the front panel, and the side panels and fixed thereto by fasteners, such as bolts, to secure the front panel, the side panels, and the base plate together. Such an arrangement allows for easy assembling/disassembling, and thus allowing for change of the outside appearance by replacing the front panel, and efficient storage by reducing the space occupied by an individual front cover.

[0008] The foregoing object and summary provide only a brief introduction to the present invention. To fully appreciate these and other objects of the present invention as well as the invention itself, all of which will become apparent to those skilled in the art, the following detailed description of the invention and the claims should be read in conjunction with the accompanying drawings. Throughout the specification and drawings identical reference numerals refer to identical or similar parts.

[0009] Many other advantages and features of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Figure 1 is a perspective view of an enclosure structure for water heater in accordance with a first embodiment of the present invention;

Figure 2 is an exploded view of the enclosure of the present invention;

Figure 3 is an exploded view of an enclosure constructed in accordance with a second embodiment of the present invention;

Figure 4 is an exploded view of an enclosure constructed in accordance with a third embodiment of the present invention;

Figure 5 is an exploded view of an enclosure constructed in accordance with a fourth embodiment of the present invention;

Figure 6 is an exploded view of an enclosure constructed in accordance with a fifth embodiment of the present invention;

Figure 7 is an exploded view of an enclosure constructed in accordance with a sixth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] The following descriptions are of exemplary embodiments only, and are not intended to limit the scope, applicability or configuration of the invention in any way. Rather, the following description provides a convenient illustration for implementing exemplary embodiments of the invention. Various changes to the described embodiments may be made in the function and arrangement of the elements described without departing from the scope of the invention as set forth in the appended claims.

[0012] With reference to the drawings and in particular to Figures 1 and 2, an enclosure of water heater constructed in accordance with a first embodiment of the present invention comprises two opposite side panels (10), which are substantially rectangular, having front and rear edges. Each side panel (10) comprise a first, front channel (11), preferably aluminum-extruded, longitudinally extending along and integrally formed at the front edge thereof, and a second, rear channel (12), also preferably aluminum-extruded, longitudinally extending along and integrally formed at the rear edge thereof. The first and second channels (11), (12) are opposite to each other. A rib (13), preferably aluminum-extruded, longitudinally extends between and opposite to the first and second channels (11), (12) and is integrally formed with each side panel (10). Opposite ends of the rib (13) form threaded holes (14) respectively.

[0013] A front panel (20) having a thickness substantially corresponding to the first channels (11) of the side panels (10) has opposite edges received in the first channels (11), respectively, with upper and lower edges of the front panel (20) substantially flush with upper and lower edges of the side panels (10), respectively. The front panel (20) forms, at a central portion thereof, an observing window (21).

[0014] A base plate (30) having a thickness substantially corresponding to the second channels (12) of the side panels (11) has opposite edges received in the second channels (12) of the side panels (10) with upper and lower edges of the base plate (30) substantially preferably flush with the upper and lower edges of the side panels (10), respectively.

[0015] A top cover board (40) mates the upper edges of the two side panels (10), the front panel (20), and the base plate (30) and forms air an outlet hole (41) at a center thereof. The top cover board (40) also defines through holes (42) corresponding in position to the threaded holes (14) of the side panels (10) for the extension of bolts (43) therethrough to engage the threaded

holes (14) thereby securing the top cover board (40) to the side panels (10), the front panel (20), and the base plate (30).

[0016] A bottom cover board (50) mates the lower edges of the side panels (10), the front panel (20), and the base plate (30) and forms air an inlet hole (51) at a center thereof. The bottom cover board (50) also defines through holes (52) corresponding in position to the threaded holes (14) of the side panels (10) for the extension of bolts (53) therethrough to engage the threaded holes (14) thereby securing the bottom cover board (50) to the side panels (10), the front panel (20), and the base plate (30).

[0017] To this point, it is apparent that the front panel (20), the base plate (30), and the side panels (10) can be readily assembled/disassembled by simply fitting the edges of the front panel (20) and the base plate (30) into the first and second channels (11), (12) of the side panels (10) and attaching the top cover board (40) and the bottom cover boards (50) to the upper and lower edges thereof with bolts to secure the side panels (10), the front panel (20), and the base plate (30) together. In addition, the side panels (10), the front panel (20), the base plate (30), the top cover board (40), and the bottom cover board (50) can be made separately. This significantly improves the conventional manufacturing process that makes a front cover of water heater enclosure as a single piece with a single die.

[0018] Referring now to Figure 3, which shows a second embodiment of the water heater enclosure in accordance with the present invention, the enclosure of second embodiment is a modification of the first embodiment by removing the central rib (13) from each side panel (10). In the second embodiment, each channel (11), (12) has an expanded inboard edge having opposite ends in which the threaded holes (14) that are originally formed in the central rib (13) are formed to engage bolts (43), (53) extending through holes (42), (52) defined in the top and bottom cover boards (40), (50) and corresponding in positions to the threaded holes (14) thereby securing the top and bottom cover boards (40), (50) to the upper and lower edges of the side panels (10) and the front panel (20) and the base plate (30).

[0019] Referring now to Figure 4, which shows a third embodiment of the water heater enclosure in accordance with the present invention, the enclosure of the third embodiment is a modification of the previously discussed first and second embodiments by combining the first and second embodiments together. Threaded holes (14) are defined in ends of both the expanded inboard edges of the channels (11), (12) and the rib (13) and corresponding through holes (42), (52) are defined in the top and bottom cover boards (40), (50) to receive bolts (43), (53) that engage the threaded holes (14) to thereby secure the side panels (10), the front panel (20), and the base plate (30) together.

[0020] Referring now to Figure 5, which shows a fourth

embodiment of the water heater enclosure in accordance with the present invention, the enclosure of the fourth embodiment is a modification of the first embodiment by replacing the side panels (10) of the first embodiment, which are flat in general, with curved plates and the top and bottom cover boards (40), (50) are contoured in accordance with the curves of the curved side panels of the present embodiment. Similar to the previous embodiments, the top and bottom cover boards (40), (50) are attached to the side panels (10) by bolts extending through the holes (42), (52) of the top and bottom cover boards (40), (50) and engaging the threaded holes (14) of the side panels (10). The instant embodiment is intended to demonstrate that the enclosure in accordance with the present invention can be easily modified in the outside appearance by simply replacing the side panels (10), the top cover board (40), and the bottom cover board (50) with counterparts of different shapes. Consequently, the overall configuration or shape of the water heater can be made different to quite an extent. In addition, the costs for changing the side panels and the top and bottom cover boards, as well as the front panel and the base plate, are certainly much lower than replacing different stamping dies.

[0021] Referring to Figure 6, which shows a fifth embodiment of the water heater enclosure in accordance with the present invention, the enclosure of the fifth embodiment is a modification of the fourth embodiment by removing the central rib (13) from each side panel (10). In the fifth embodiment, each channel (11), (12) has an expanded inboard edge having opposite ends in which the threaded holes (14) that are originally formed in the central rib (13) are formed to engage bolts (43), (53) extending through holes (42), (52) defined in the top and bottom cover boards (40), (50) and corresponding in positions to the threaded holes (14) thereby securing the top and bottom cover boards (40), (50) to the upper and lower edges of the side panels (10) and the front panel (20) and the base plate (30).

[0022] Referring now to Figure 7, which shows a sixth embodiment of the water heater enclosure in accordance with the present invention, the enclosure of the sixth embodiment is a modification of the previously discussed fourth and fifth embodiments by combining the fourth and sixth embodiments together. Threaded holes (14) are defined in ends of both the expanded inboard edges of the channels (11), (12) and the rib (13) and corresponding through holes (42), (52) are defined in the top and bottom cover boards (40), (50) to receive bolts (43), (53) that engage the threaded holes (14) to thereby secure the side panels (10), the front panel (20), and the base plate (30) together.

[0023] Although the present invention has been described with reference to the preferred embodiments thereof, it is apparent to those skilled in the art that a variety of modifications and changes may be made without departing from the scope of the present invention which is intended to be defined by the appended claims.

[0024] It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of methods differing from the type described above.

[0025] While certain novel features of this invention have been shown and described and are pointed out in the annexed claim, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

Claims

1. An enclosure of water heater, comprising:

two opposite side panels, each having front and rear edges along which front and rear channels are formed;
a front panel having opposite edges received in the front channels of the side panels;
a base plate having opposite edges received in the rear channels of the side panels;
a top cover board mounted to upper edges of the side panels; and
a bottom cover board mounted to lower edges of the side panels to thereby secure the front panel and the base plate in the channels of the side panels.

2. The enclosure as claimed in Claim 1, wherein each side panel comprises a rib between the first and second channels, the rib having opposite ends in which threaded holes are defined, the top cover board defining through holes corresponding in positions to the threaded holes defined in the upper edges of the side panels to receive bolts that engage the threaded holes respectively, and the bottom cover board defining through holes corresponding in positions to the threaded holes defined in the lower edges of the side panels to receive bolts that engage the threaded holes respectively.

3. The enclosure as claimed in Claim 1, wherein each channel has an expanded inboard edge having opposite ends defining threaded holes to engage bolts extending through holes defined in the top and bottom cover boards and corresponding in positions to the threaded holes thereby securing the top cover board and the bottom cover board to the side panels.

4. The enclosure as claimed in Claim 1, wherein the front panel has upper and lower edges, which are substantially flush with the upper and lower edges of the side panels.

5. The enclosure as claimed in Claim 1, wherein the front panel forms an observing window in a central portion thereof.
6. The enclosure as claimed in Claim 1, wherein the base plate has upper and lower edges, which are substantially, flush with the upper and lower edges of the side panels.
7. The enclosure as claimed in Claim 1, wherein the top cover board defines an air outlet opening.
8. The enclosure as claimed in Claim 1, wherein the bottom cover board defines an air inlet opening.

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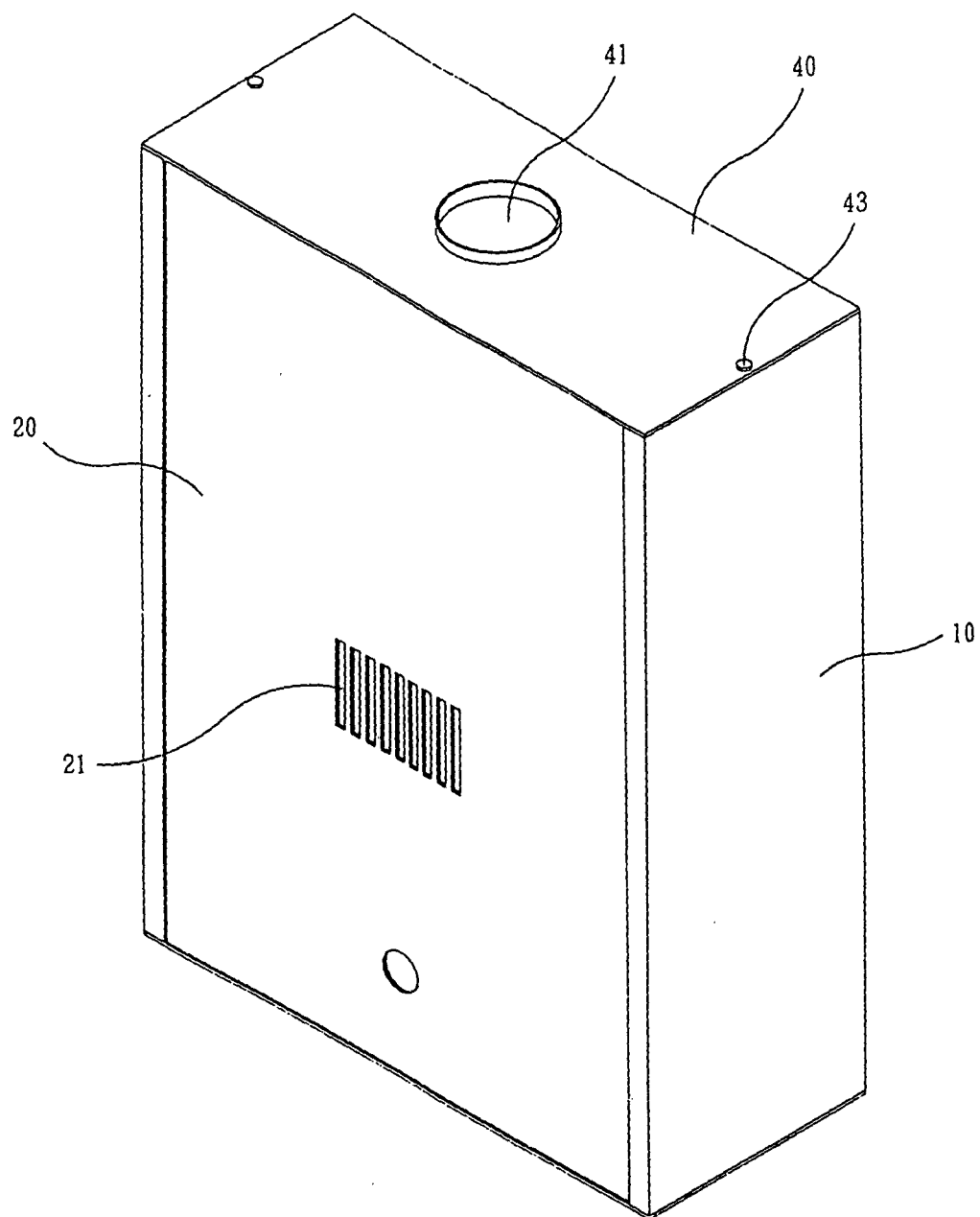


FIG. 1

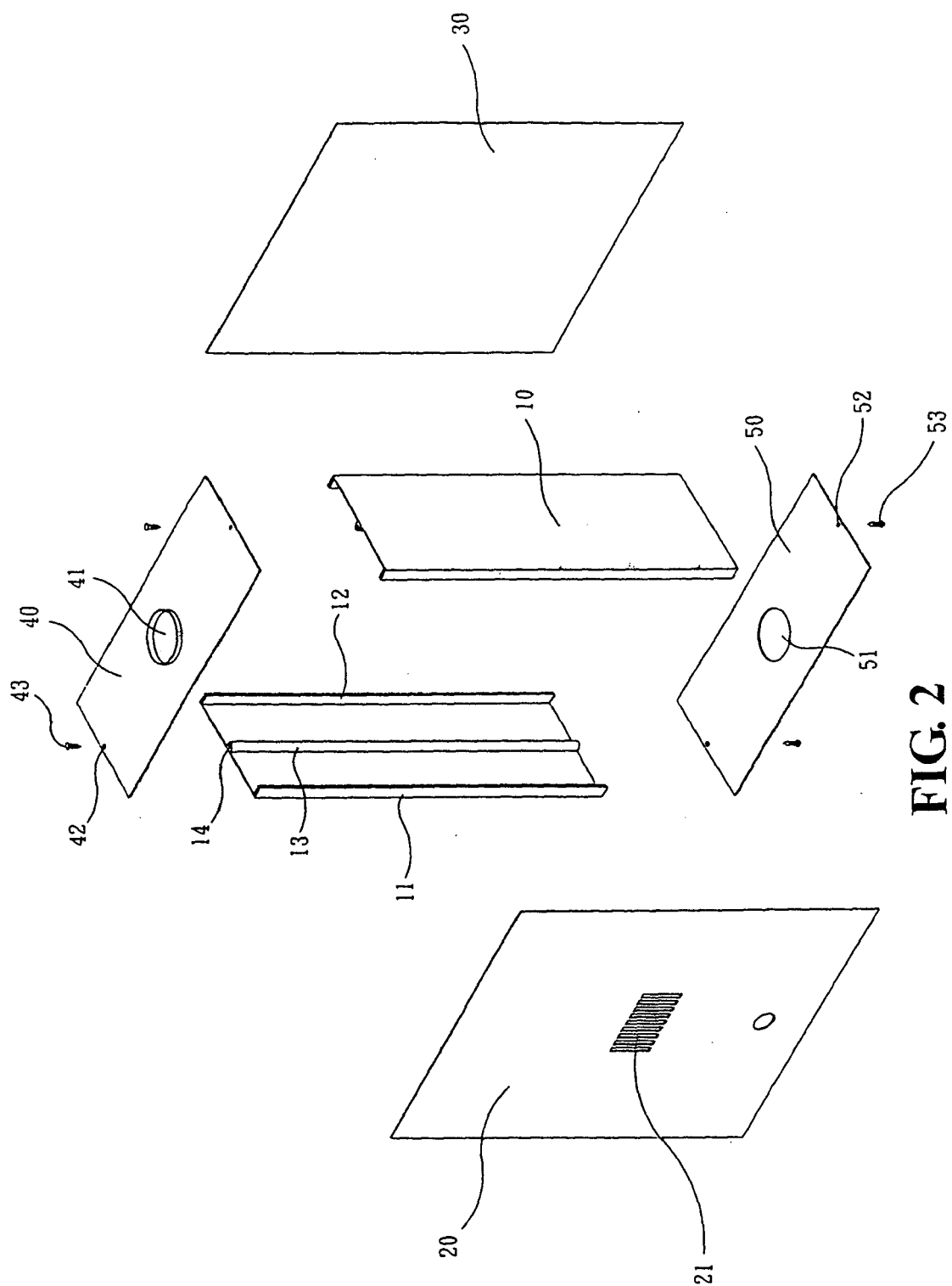


FIG. 2

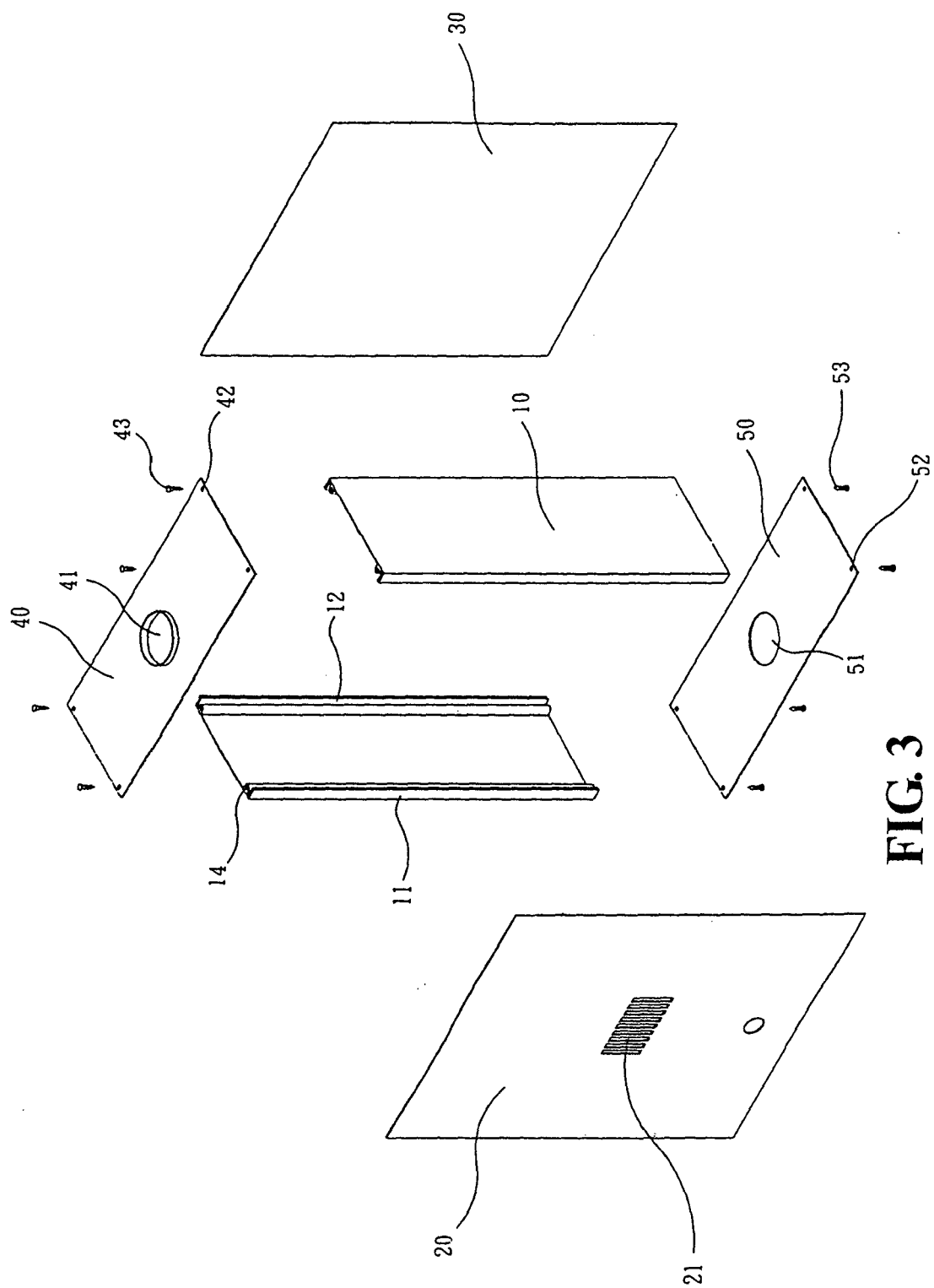


FIG. 3

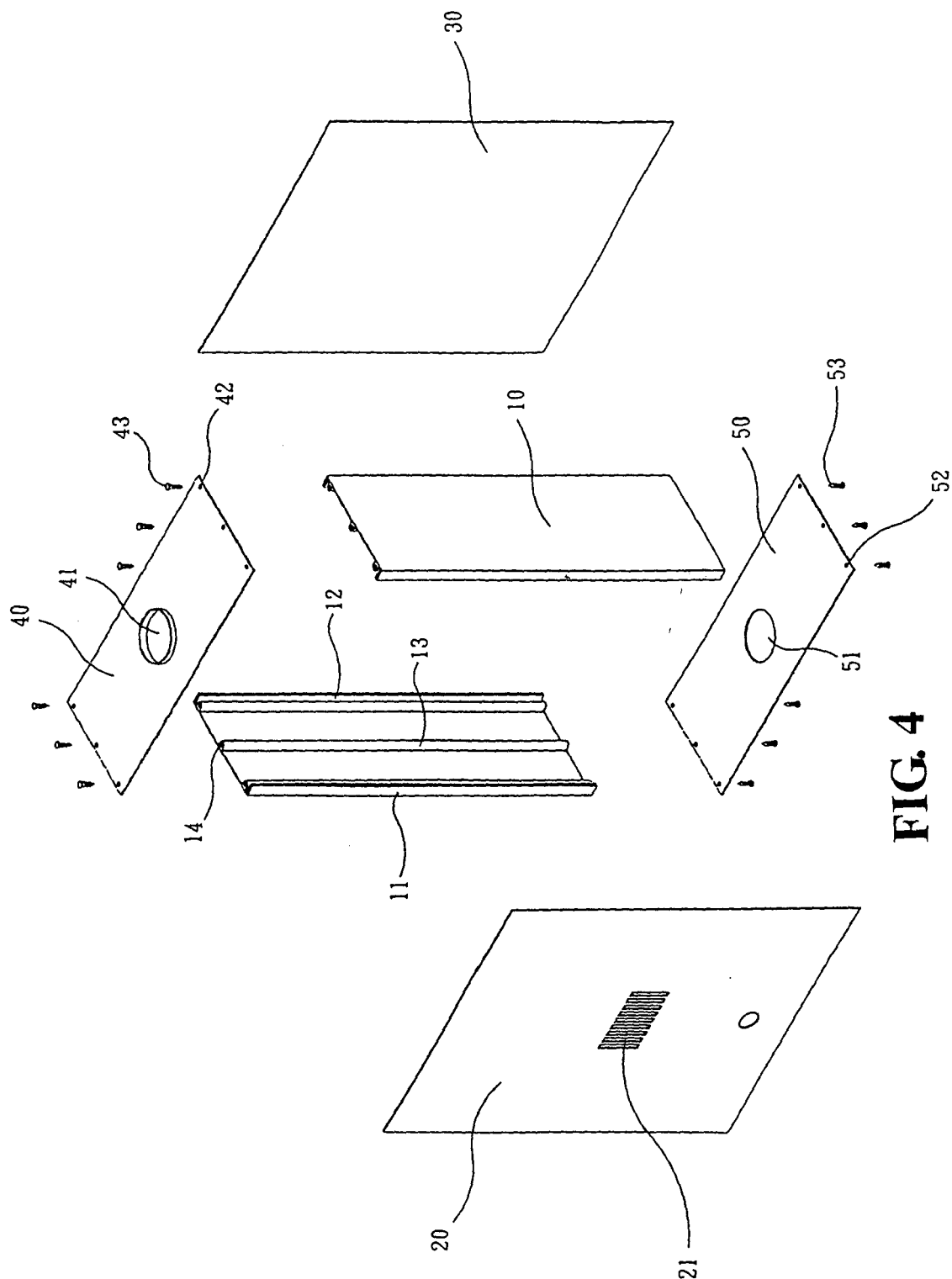


FIG. 4

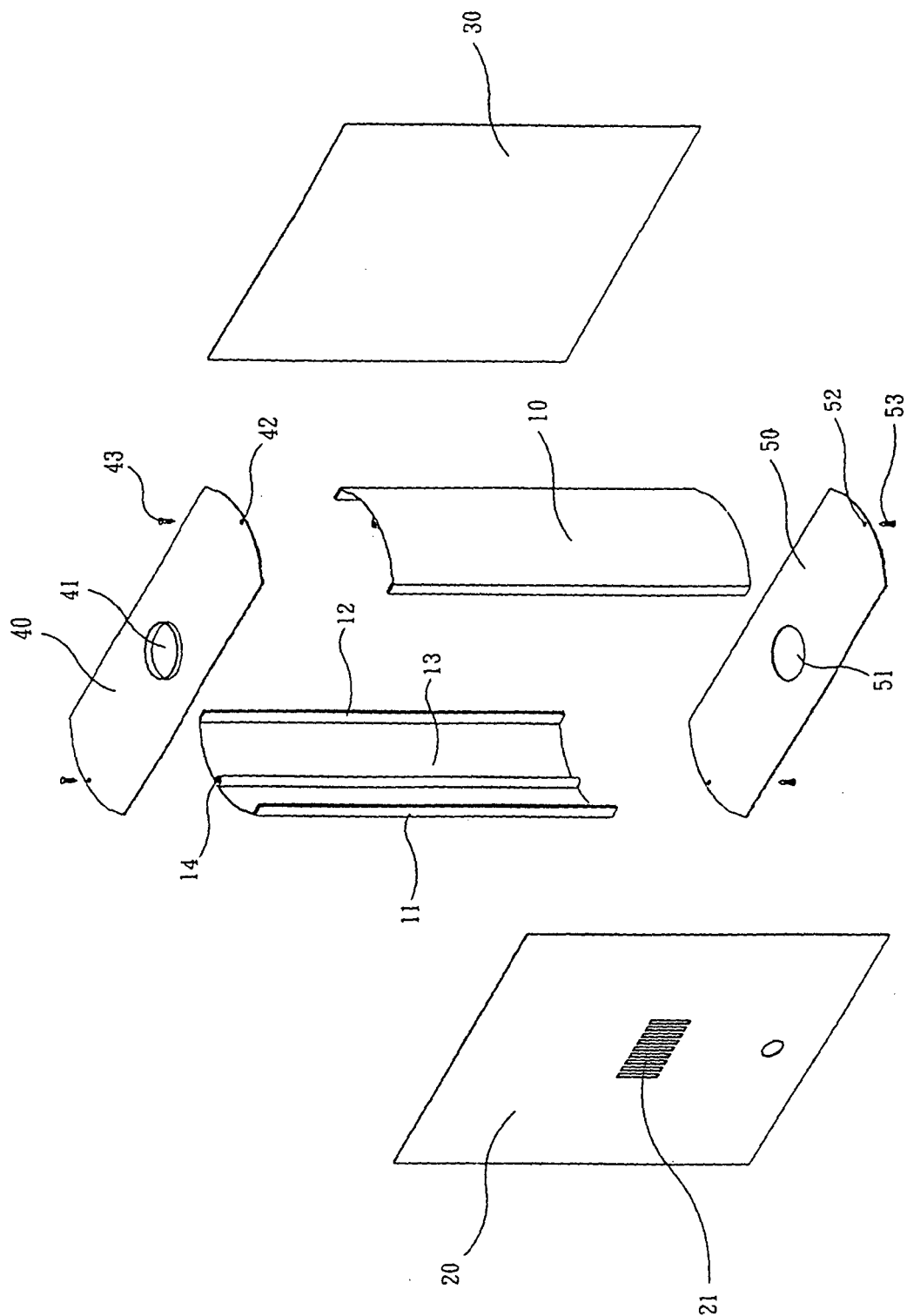


FIG. 5

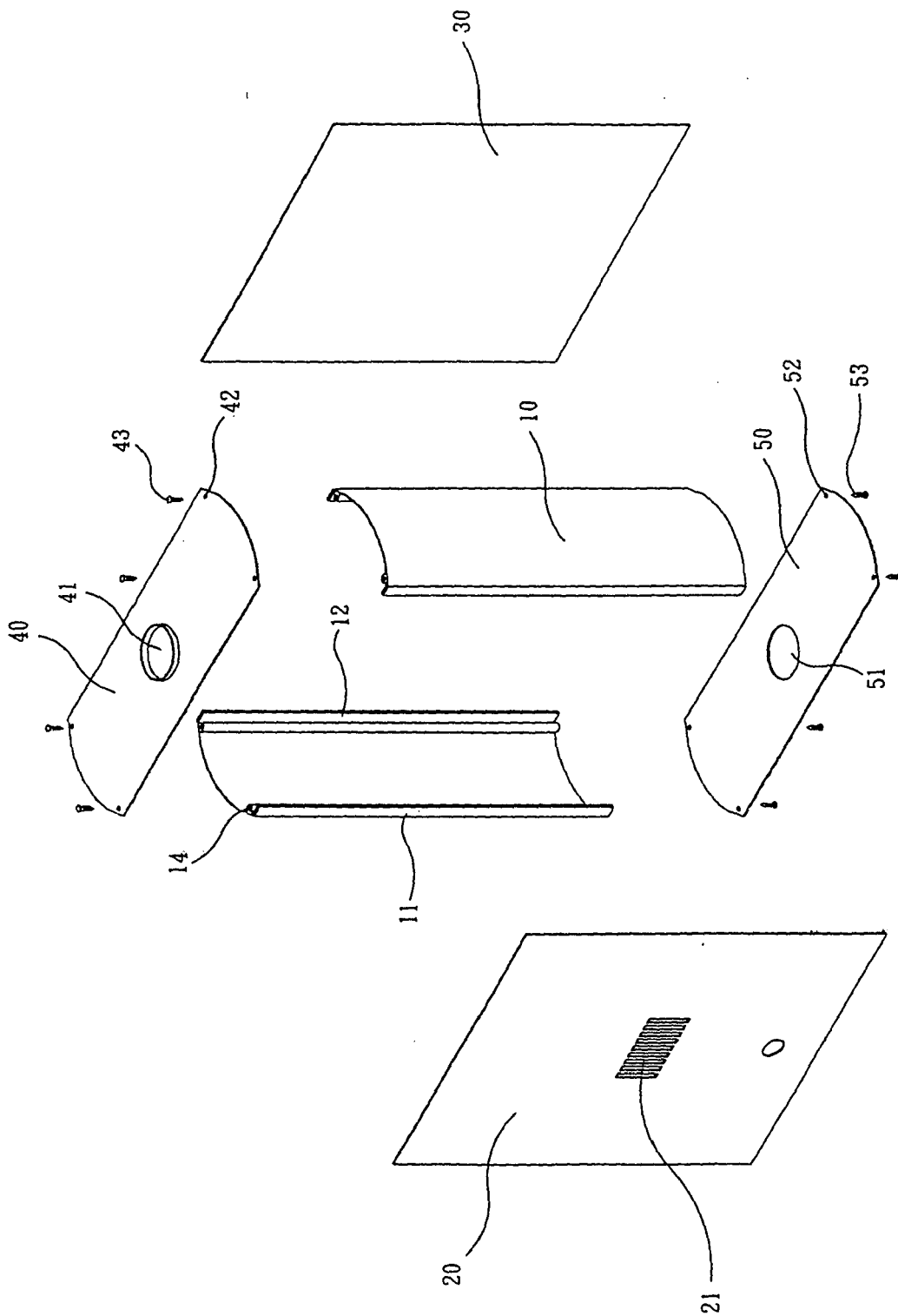


FIG. 6

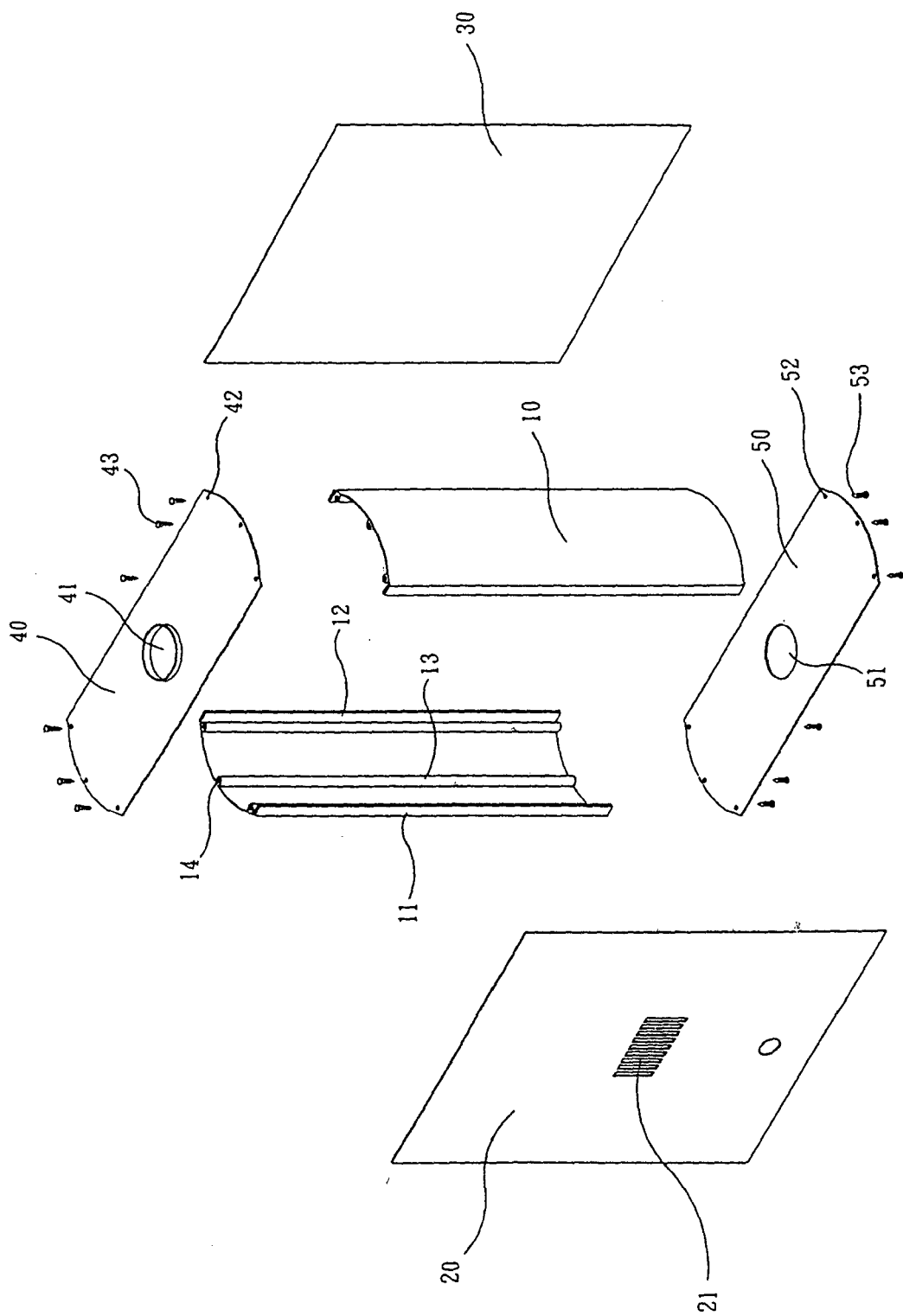


FIG. 7



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 89 03 315 U1 (JOH. VAILLANT GMBH U. CO, 5630 REMSCHEID, DE) 3 May 1989 (1989-05-03) * the whole document *	1-8	INV. F24H9/02
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A	GB 2 145 204 A (* TI GLOW-WORM LIMITED) 20 March 1985 (1985-03-20) * page 2, line 25 - line 30 *	2,3	
A	US 6 182 613 B1 (MCCRANEY W. JEFFREY) 6 February 2001 (2001-02-06) * the whole document *	1-8	TECHNICAL FIELDS SEARCHED (IPC)
			F24H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 May 2006	Examiner García Moncayo, O
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 02 6925

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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03-05-2006

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REFERENCES CITED IN THE DESCRIPTION

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