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(54) **FAN CONVECTOR ASSEMBLY**

GEBLÄSEZUSAMMENBAU

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Description

[0001] The present invention relates to a structure for a fan/convector, particularly to a structure for supporting a plurality of electromechanical devices, according to the preamble to Claim 1.

[0002] It is known that fan/convectors are particularly suitable for the construction of air-conditioning systems both in new and in existing buildings and are ideal for installation in hotels, restaurants, bars, residential buildings, houses, etc.

[0003] It is also known that fan/convectors are able to heat, cool, dehumidify, and filter air and to maintain the desired temperature throughout the year.

[0004] One of the main problems which affect fan/convectors is the generation of noise which is produced by the fans and by the consequent air-flow emerging from the ventilation opening.

[0005] In fact, if the air is pushed out or drawn in too forcefully, turbulence is created, which gives rise to noise; in practice, this noise manifests itself as an annoying background "whistle".

[0006] Other sources of noise may be located in the electromechanical devices housed inside the fan/convector. The electromechanical devices inside the fan/convector usually comprise at least one electric motor and several fans/blowers, connected to one another by means of a drive-transmission shaft, as well as various other devices.

[0007] It is during the operation of the fan/convector that these electromechanical devices generate noises which are quite annoying to users/consumers who are close to the fan/convector.

[0008] The cause of these noises usually lies in incorrect assembly of the electromechanical devices.

[0009] Even if an assembly error such as, for example, play or tolerance, is of small magnitude in comparison with that provided for at the design stage, annoying mechanical noise peaks are created and these considerably detract from the comfort provided by the fan/convector.

[0010] A typical known structure of a fan/convector is shown in WO99/67565. The document discloses a machine comprising an air intake opening, a heat exchanger suitable for conditioning the air taken in, an opening for the discharge of the air taken in, which opening is provided with orientable deflector elements, one motor and fans driven by the motor. The disclosed structure further comprises one support plate to which is fixed a cradle for the motor, the support plate and said cradle being provided with respective complementary locating means suitable for producing a form fit for a predetermined positioning of the cradle relative to the support plate. The connection means by which the cradle is fixed to the support plate are in form of bent fingers provided on the cradle which enter corresponding openings provided on the support plate. When the fingers are in position through the openings, the cradle is horizontally displaced so that the bent fingers engage the thickness of the support

plate.

Although screws are used to keep in place the cradle, such a type of connection is a source of vibrations because it becomes slack after a short time of functioning of the fan/convector.

[0011] Control of the noise sources of fan/convectors for use in domestic and/or communal environments has therefore become particularly critical.

[0012] It is therefore desirable for the air-conditioning unit to be as quiet as possible in order not to disturb users/consumers who are close to the fan/convector.

[0013] In view of the prior art described, the object of the present invention is to provide a fan/convector which is free of the problems of the prior art.

[0014] An object of the present invention is therefore to provide a fan/convector having low operative noise.

[0015] According to the present invention, this object is achieved by means of a structure for a fan/convector according to the characterizing part of Claim 1.

[0016] Quieter operation of the fan/convector is thus achieved in comparison with those of the prior art, so that these novel fan/convectors provide a very high level of acoustic comfort by virtue of the absence of noise peaks.

[0017] By virtue of the innovative fixing structure, the electromechanical devices of which the fan/convector is composed can be assembled with the most rigorous compliance with design tolerances.

[0018] A further advantage is that the fan/convector is easier to inspect, facilitating cleaning.

[0019] The characteristics and the advantages of the present invention will become clear from the following detailed description of a practical embodiment which is illustrated by way of non-limiting example in the appended drawings, in which:

Figure 1 is a perspective view of a fan/convector according to the present invention,

Figure 2 is a perspective view of a detail of Figure 1, and

Figure 3 is a section taken on the line III-III of Figure 2.

[0020] With reference to Figure 1, the fan/convector, generally indicated 1, comprises an intake opening 2 provided with an air filter 3; the air-flow 4 is conveyed, by means of a pumping unit 5, from the environment surrounding the fan/convector 1, through the opening 2, towards a heat exchanger 6.

[0021] The heat-exchanger 6 comprises a coil (not shown in the drawing) through which a hot and/or cold fluid flows, according to the climate to be created in the surrounding environment. The fluid is preferably but not necessarily water.

[0022] The air-flow 4 drawn from the environment surrounding the fan/convector 1 is thus heated and/or cooled and is conveyed towards an outlet opening 7 by means of at least one orientable deflector element 8.

[0023] The orientable deflector element 8 is oriented and guided to a plurality of angular positions between a closed position and a fully open position by means of an electric motor (not shown in the drawings).

[0024] In a particular embodiment, the air filter 6 is electrostatically precharged, thus enabling the air 4 to be filtered so as to render it almost free of dust, spores and bacteria.

[0025] The pumping unit 5 comprises an electric motor 9 to be housed and positioned in a cradle 10; the electric motor 9 is used for driving a pair of fans 11a and 11b.

[0026] According to a preferred embodiment, the fans 11a and 11b are provided, for example, with centrifugal rotors 11c with straight blades and are made, for example, of plastics material such as ABS which is characterized by good resistance to high temperatures and to mechanical stresses.

[0027] The rotors 11c of the fans 11a and 11b are housed in respective shells 11d, which are made, for example, of plastics material.

[0028] As in a conventional electric motor, the electric motor 9 comprises a loadbearing structure 12 for supporting a stator element (not shown in the drawing) and a drive shaft 13 to which a rotor (not shown in the drawing) is connected.

[0029] In order to drive the pair of fans 11a and 11b, the drive shaft 13 projects from both ends of the electric motor 9 along a longitudinal axis of rotation (X-X).

[0030] The electric motor 9 can be housed and positioned in the cradle 10, the function of which is to support the electric motor 9 in operation.

[0031] In particular, in the fan/convector 1, the motor cradle 10 is connected, as described in detail below, to a trough 14 for the collection of condensation.

[0032] According to a preferred embodiment, the condensation-collection trough 14 is made of galvanized sheet-metal having, for example, a thickness of 1 mm. This prevents the growth of bacteria, germs and mould in the condensation trough in the long term.

[0033] The condensation which collects in the trough 14 must be conveyed to the drainage system of the building through a draining system (not shown in the drawings) which is accessible after removal of a plug 27.

[0034] The plug 27 and the draining system associated therewith may equally well be arranged on the right-hand side or left-hand side of the trough 14.

[0035] With particular reference to Figure 2, it will be noted that the trough 14 has a rectangular shape provided with a base 14a with splayed edges 14b.

[0036] It should be noted that the trough 14 may also adopt other shapes such as, for example, a square shape, and other spatial positions instead of the horizontal position, for example, a vertical position, consistent with the external shape and positioning of the fan/convector 1.

[0037] According to a preferred embodiment, with particular reference to Figures 2 and 3, the cradle 10 is in the form of a U-shaped bent sheet-metal structure hav-

ing, for example, a thickness of 2.5 mm and provided with a base 15 and a pair of side walls 16 and 17. The side walls 16 and 17 have respective recesses 18 and 19 which are suitable for housing respective portions 20 and 21 of the motor 9, that is, which can act as a seat for the electric motor 9.

[0038] According to a preferred embodiment, the portions 20 and 21 of the electric motor 9 correspond to the shock-absorbers of the electric motor 9 which are disposed at both head ends of the shaft 13 of the motor 9.

[0039] The cradle 10 and the fans 11a and 11b are connected to the outer surface of the base 14a of the trough 14, that is, to the surface which does not act as the condensation-collection region.

[0040] The trough 14 thus acts both as a well for collecting water and as a structure for supporting or holding a plurality of electromechanical devices which, in the embodiment described, are the electric motor 9 and the fans 11a and 11b.

[0041] In particular, the cradle 10 is connected to the base 14a of the trough 14 by connection means 22 such as, for example, screws.

[0042] It should be noted that, in a particular embodiment of the present invention, these screws are self-tapping screws with three-lobed cross-sections.

[0043] These self-tapping screws 22 are advantageously screwed into smooth holes, that is, holes that have not been threaded beforehand, so that the screws form their own counter-thread during the screwing operation by plastic deformation. The continuity of the fibres of the material in the vicinity of the thread that is formed render a joint thus produced suitable for ensuring a firm grip and optimal resistance to stripping.

[0044] This method therefore ensures that there is no percolation of water from the trough 14 towards the interior of the fan/convector 1.

[0045] In fact, a portion 14c of the base 14a of the trough 14 is dished in the manner of a cup the end portion of which acts as a collar 26.

[0046] Once the screws 22 are tightened, that is, because of the pull which the screw 22 exerts on the dished portion of the trough 14, a force within the elastic range is exerted such that the dished portion is retracted, causing the collar 26 to be coupled with the stem 29 of the screw 22.

[0047] The top 28 of the collar 26 is thus at a higher level than the base 14a of the trough 14, thus preventing condensation from overflowing through the seat of the screw 22.

[0048] A further advantage of the use of this type of screw is a reduction in the steps for the processing of the metal matrix in which the self-tapping screw is engaged. In particular, boring and tapping of the hole can be avoided with a consequent saving in production times and costs.

[0049] Moreover, this solution has the advantage that it does not use a split washer for the clamping operation between the screw 22 and the collar 26.

[0050] Advantageously, the cradle 10 and the trough 14 have complementary locating means 23 which can produce a form fit for a predetermined positioning of the cradle 10 relative to the trough 14.

[0051] In this embodiment, the complementary locating means 23 take the form of a plurality of protuberances or bosses 24 on the base 14a of the trough 14, to be housed in recesses or depressions 25 formed in the base 15 of the cradle 10.

[0052] In other words, as shown in Figure 2, the trough 14 has a plurality of protuberances 24 suitable for being fitted in respective holes 24 in the cradle 10.

[0053] The presence of these protuberances 24 and respective holes 25 enables a precise positioning of the cradle 10 relative to the trough 14 to be achieved; that is, a form fit is produced between the trough 14 and the cradle 10.

[0054] Since the motor seat 10 is the place that is intended for receiving the electric motor 9, which motor is intended to provide the drive to the fans 11a and 11b by means of the drive shaft 13, this embodiment advantageously eliminates errors which might arise at the assembly stage.

[0055] With reference to the particular embodiment of Figure 2, the positioning of the cradle 10 relative to the trough 14 permits an assembly in which the geometrical centre C of the cradle 10 and the geometrical centre C' of the trough 14 coincide.

[0056] This advantageously ensures that there is no lack of symmetry during the assembly of the cradle 10 relative to the fans 11a and 11b.

[0057] This solution is highly significant because mechanical noise is eliminated or at least reduced. This is possible only if the cradle 10 is positioned so as to conform as rigorously as possible to the design specifications.

[0058] Naturally, in order to satisfy contingent and specific requirements, a person skilled in the art will be able to apply to the above-described fixings many modifications and variations all of which, however, are included within the scope of protection of the invention as defined by the appended claims.

Claims

1. A structure for a fan/convector (1), the fan/convector (1) comprising an air-intake opening (2) provided with a filter (3), a heat exchanger (6) suitable for conditioning the air taken in, and an opening (7) for the discharge of the air taken in, which opening (7) is provided with at least one orientable deflector element (8), as well as at least one motor (9) and at least one fan (11a, 11b) driven by the motor (9), said structure further comprising at least one support plate (14) to which is fixed a cradle (10) provided with a motor seat (18, 19) for receiving the motor (9), the support plate (14) and the cradle (10) being pro-

vided with respective complementary locating means (23) suitable for producing a form fit for a predetermined positioning of the cradle (10) relative to the support plate (14)

characterized in that the support plate (14) is a condensation-collection trough (14) having a base (14a) and edges (14b), the cradle (10) is fixed to the base (14a) of the trough (14) by

a plurality of screws, each screw (22) engages a dished portion (14c) of the base (14a) of the trough (14) in a manner such that the dished portion (14c) is retracted causing the upper portion (28) of the dished portion (14c) to be coupled with the stem (29) of the screw (22).

2. A fan/convector structure according to Claim 1, **characterized in that** the complementary locating means (23) comprise a plurality of protuberances (24) suitable for engaging in respective recesses (25).
3. A fan/convector structure according to Claim 2, **characterized in that** the protuberances (24) are positioned in the base (14a) of the trough (14) and the holes (25) are formed in the base (15) of the cradle (10).

Patentansprüche

1. Aufbau für einen Gebläsekonvektor (1), wobei der Gebläsekonvektor (1) eine Luftansaugöffnung (2), die mit einem Filter (3) versehen ist, einen Wärmetauscher (6), der die angesaugte Luft klimatisieren kann, eine Öffnung (7), um die angesaugte Luft ausströmen zu lassen, wobei die Öffnung (7) mit zumindest einem einstellbaren Ablenkelement (8) versehen ist, sowie zumindest einen Motor (9) und zumindest ein Gebläse (11a, 11b) enthält, das vom Motor (9) angetrieben wird, wobei der Aufbau weiters zumindest eine Tragplatte (14) enthält, an der eine wiegenartige Halterung (10) befestigt ist, die mit einem Motorsitz (18, 19) versehen ist, um den Motor (9) aufzunehmen, wobei die Tragplatte (14) und die wiegenartige Halterung (10) mit entsprechenden komplementären Einstelleinrichtungen (23) ausgestattet sind, die dazu geeignet sind, um einen formschlüssigen Sitz für eine vorgegebene Einstellung der wiegenartigen Halterung (10) relativ zur Tragplatte (14) zu bilden, **dadurch gekennzeichnet, dass** die Tragplatte (14) eine das Kondenswasser sammelnde Wanne (14) ist, die eine Basis (14a) sowie Kanten (14b) besitzt, wobei die wiegenartige Halterung (10) an der Basis (14a) der Wanne (14) mit einer Vielzahl von Schrauben befestigt ist, wobei jede Schraube (22) in einen konkav gewölbten Teil (14c) der Basis (14a) der

Wanne (14) so eingreift, dass der konkav gewölbte Teil (14c) zurückgezogen wird, wodurch der obere Teil (28) des konkav gewölbten Teils (14c) mit dem Schaft (29) der Schraube (22) gekuppelt wird.

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2. Gebläsekonvektor-Aufbau gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die komplementäre Einstelleinrichtung (23) eine Vielzahl von Erhebungen (24) besitzt, die dazu geeignet sind, um in entsprechende Ausnehmungen (25) einzugreifen. 10
3. Gebläsekonvektor-Aufbau gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die Erhebungen (24) in der Basis (14a) der Wanne (14) und die Löcher (25) in der Basis (15) der wiegenartige Halterung (10) angeordnet sind. 15

Revendications

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1. Ensemble ventilateur convecteur (1), le ventilateur convecteur (1) comportant une prise d'air (2) munie d'un filtre (3), un échangeur de chaleur (6) prévu pour conditionner l'air introduit, une l'ouverture (7) pour l'évacuation de l'air introduit, ladite ouverture (7) étant pourvue d'au moins un déflecteur (8) orientable, ainsi que d'au moins un moteur (9) et au moins un ventilateur (11a, 11b) commandé par le moteur (9), ledit ensemble comportant par ailleurs au moins une plaque de support (14) à laquelle est fixée un berceau (10) comportant un logement (18, 19) pour le moteur (9), la plaque de support (14) et le berceau (10) étant munis de moyens de positionnement (23) complémentaires correspondants conçus pour définir un repère pour un positionnement prédéterminé du berceau (10) par rapport à la plaque de support (14), **caractérisé en ce que** la plaque de support (14) est une cuve de condensation-récupération (14) comportant une base (14a) et des bords (14b), le berceau (10) étant fixé à la base (14a) de la cuve (14) par une série de vis, chacune desdites vis (22) engageant une partie emboutie (14c) de la base (14a) de la cuve (14) de telle sorte que la partie emboutie (14c) se rétracte pour provoquer l'accouplement de la partie supérieure (28) de la partie emboutie (14c) avec la tige (29) de la vis (22). 25
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2. Ensemble ventilateur convecteur selon la revendication 1, **caractérisé en ce que** les moyens de positionnement complémentaires (23) comportent une série de protubérances (24) prévues pour être engagées dans des creux correspondants (25). 50
3. Ensemble ventilateur convecteur selon la revendication (2), **caractérisé en ce que** les protubérances (24) sont disposées sur la base (14a) de la cuve (14) et les orifices (25) sont formées dans le base (15) du berceau (10) 55

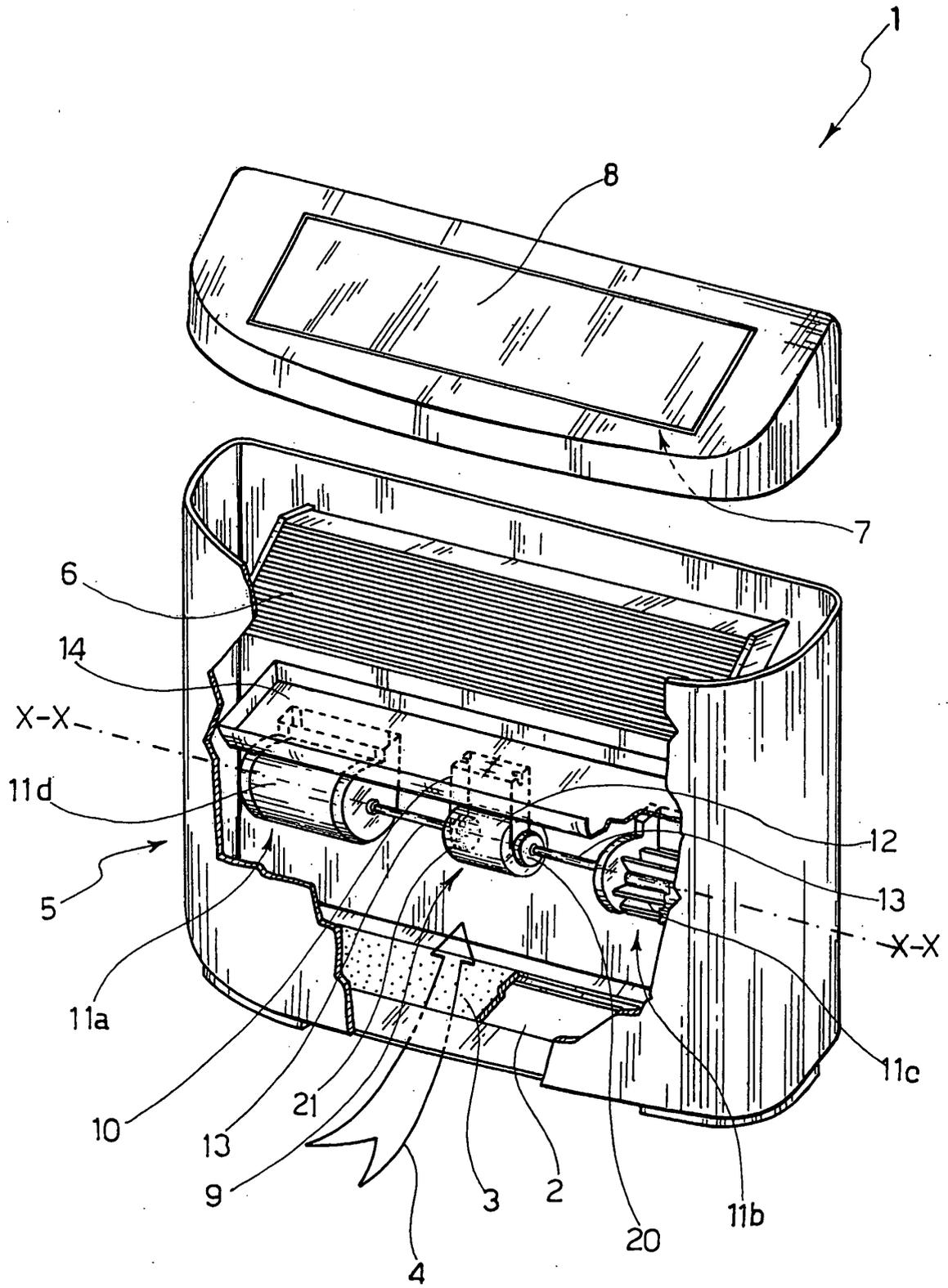


FIG. 1

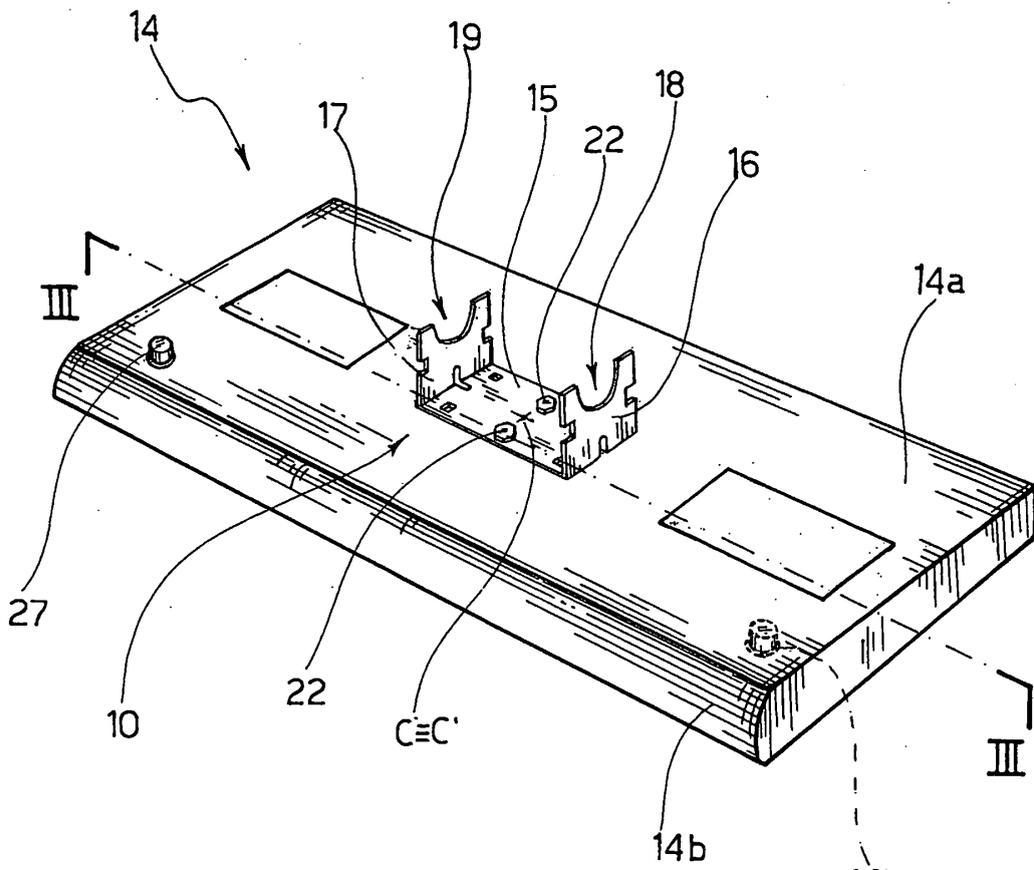


FIG. 2

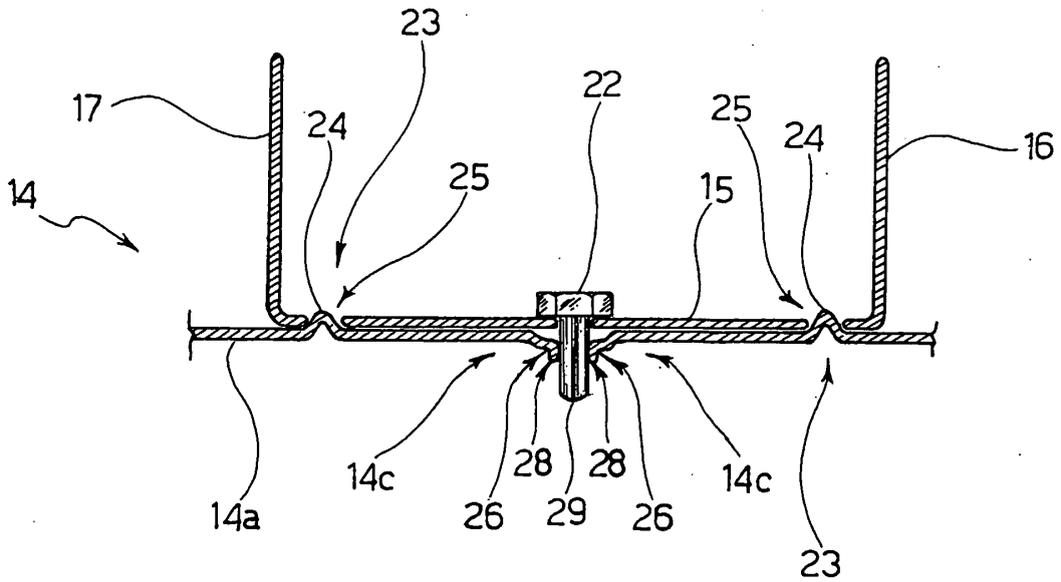


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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