(19) DANMARK

(10) DK/EP 2574794 T3

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: *F 04 D 17/16 (2006.01)* *F 04 D 29/66 (2006.01)* *F 24 F 7/06 (2006.01)* *F 24 F 13/24 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2018-05-07**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2018-01-24**

(86) Europæisk ansøgning nr.: **12186254.4**

(86) Europæisk indleveringsdag: **2012-09-27**

(87) Den europæiske ansøgnings publiceringsdag: **2013-04-03**

(30) Prioritet: **2011-09-30 EP 11183516**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

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(54) Benævnelse: **VENTILATIONSKOMPONENT**

(56) Fremdragne publikationer:
WO-A1-93/09389
DE-A1- 2 513 946
DE-U1- 9 110 195
FR-A5- 2 226 003
GB-A- 1 198 549

Description

[0001] The invention relates to a ventilation component, comprising a channel-shaped housing preferably of rectangular or square cross-section, wherein at least one radial fan and at least one sound absorber for flowing gases are provided in the housing, wherein, in particular, the sound absorber, seen in the flow direction, is arranged behind the radial fan, and comprises at least one silencer, filled with an absorption material. Such a ventilation component is known from DE 91 10 195 U. A radial fan comprises an impeller, which is driven by a drive motor. The impeller usually comprises a cover disk and a carrier disk, arranged between which is an impeller blade. In a radial fan, the air is usually drawn in parallel to the drive axis of the radial fan, deflected by 90º by the rotation of the radial impeller, and blown out radially. The radial fans used in the present field of technology do not comprise a housing arranged around the impeller.

[0002] Known sound absorbers comprise a plurality of silencers arranged next to one another. Two adjacent silencers form between them in each case a flow channel. The silencers operate on the absorption principle or the absorption resonance principle or the resonance principle respectively. The upper sides and the lower sides of the silencers are in contact with the inner side of a silencer frame or the housing. Accordingly, the sound energy can only penetrate into the silencer concerned by way of the two side surfaces aligned parallel to the flow direction. In known ventilation components the distance interval between the edges of the impeller blades, which face towards the silencer of the silencer sound absorber on the one hand, and the silencer on the other hand, corresponds in this situation to the diameter of the carrier disk of the radial fan provided. It is not possible for this distance interval to be shortened, since this results in the pressure losses of the sound absorber that substantially reduce the performance capability of the ventilation component. In this situation the flow speed in the flow channels located in the middle of the housing is in part very low. From WO 93/09389 A1 a ventilation and filter module for clean rooms is known.

[0003] The object of the invention is to avoid the disadvantages referred to hereinbefore, and to provide a ventilation component with a sound absorber which exhibits a lesser pressure loss while providing the same or optimized sound absorption.

[0004] This object is solved in that, with each silencer allocated to a radial fan, the area

between the outer dimensions of the silencer, seen in the flow direction, is filled at least in some regions, that each silencer is arranged at a distance from the nearest and next adjacent component, and therefore each silencer is surrounded on all sides by a circumferential free space for the flowing of gases, such that each silencer can be flowed around on all sides by the flowing gas, wherein the housing cross-section comprises a number of theoretical housing cross-section part regions corresponding to the number of silencers provided in a region of the housing cross-section, wherein each silencer, related to the housing cross-section region which belongs to it, blocks between 55% and 90%, preferably between 64% and 81% of the theoretical free flow cross-section of the housing cross-section part region.

[0005] In the case where as the ventilation component comprises only one silencer, the housing cross-section part region corresponds to the housing cross-section. In the case of one embodiment with, for example, four silencers, a total of four theoretical the housing cross-section part regions are provided. The size of the housing cross-section part regions can be identical or different. It is of course possible for the housing cross-section part region to be subdivided in turn into housing cross-section subdivision regions.

[0006] With the ventilation component according to the invention, at least one, and preferably each, silencer cannot be flowed through, even seen in the flow direction.

[0007] In the case where one silencer is provided and the region between the outer dimensions of the silencers is only filled in some regions, it is advantageous for the region of the silencer to be filled which is at the rear when seen in the flow direction. It is of course possible for the silencer also to be filled over its complete length extending parallel to the flow direction.

[0008] Preferably, the free space along the longitudinal extension of the silencer which is flowed around, i.e. seen in the flow direction, is uniform and consistent. In this case, the outer dimensions of the silencer run, for example, parallel to the adjacent walls of the housing.

[0009] It will be appreciated that all the distance intervals, i.e. with a rectangular housing, four distance intervals, can have concordant percentage values. It is also possible, however, for the distance intervals to be different from one another, but that each interval lies within

the claimed range.

[0010] Each silencer can, for example, consist of a plurality of layers, which are immediately adjacent to one another. Due to the spaced arrangement of each silencer in relation to the inner wall of the housing and/or to the adjacent silencer, the sound energy can penetrate into the silencer concerned not only by way of the two side surfaces aligned parallel to the flow direction, but, among other possibilities, also by way of the upper side and the lower side of each silencer. At the same time, as a result of the flowing around on all sides, the pressure loss is reduced, while the sound absorption remains at least at the same level.

[0011] Due to the embodiment according to the invention, a circumferential free space exists around each silencer, which under certain circumstances, however, is interrupted only by a holding structure which holds each respective silencer. For the purpose of holding, each silencer can comprise, for example in the region of the upper side and lower side, holding bars. Other holding structures, such as wires or cables which fix the silencer in the interior of the housing for example, are of course conceivable.

[0012] In order to increase efficiency still further, each silencer is preferably arranged at a very short distance interval from the impeller of the radial fan. The term distance interval is understood to be the geometric distance between the inflow side of a silencer on the one hand and, on the other, the edges of the impeller blades which are arranged facing towards the silencers of the silencer sound absorber. Advantageously if the distance interval referred to, that is between the edges of the impeller blades which are arranged facing towards the silencers of the silencer sound absorber and the inflow front side of each silencer is between 1 to 20 cm, is preferably between 5 to 10 cm. In this case, the ventilation component also acquires a particularly short structural length.

[0013] Each silencer consists of an absorption material which has the effect of sound absorption, or is filled with such a material. At least one silencer can, for example, be made of mineral wool. The surface of the mineral wool is preferably laminated with a glass silk fabric, in order to avoid any undesirable detachment of mineral wool particles. On the outside, for example, the silencer 3 concerned can comprise a perforated plate.

[0014] Each silencer can be configured as open, for example, in the region of its outer sides. It is, however, entirely possible, that one or more of the outer side(s) facing towards the

inflowing gases is or are configured as open, and another open side is configured as closed. With a closed configuration, use is usually made of chamber plates with a thickness of up to 0.35-0.5 mm. A silencer enclosed on all sides is of course also possible. In this case, the silencer is surrounded full-surface by a sheet. This is then a resonator silencer. Resonator sheets can exhibit a thickness of between 05 mm and 2 mm. It is of course possible for a plurality of silencers to be arranged behind one another, as seen in the flow direction.

[0015] With at least one silencer, the face surface on the inflow side and/or on the outflow side can be configured as rounded or oblique angled in the region of the edges. As a result, the pressure loss is reduced due to the better flow around the silencer, which also leads to reduced production of self-induced noises.

[0016] At least one silencer is arranged centred in the housing cross-section region belonging to it in a first direction and/or in a second direction orthogonal to the first direction.

[0017] With a preferred exemplary embodiment of the invention, in each case one single silencer configured in a manner similar to a block, in particular in the form of a cuboid or regular parallelepiped, is in each case exclusively assigned to at least one radial fan, and in particular to each. It is of course also possible for hollow spaces also to be provided in the silencer configured in a manner similar to a block, which contribute to the sound absorption. The silencer is flowed around on all sides, wherein the silencer is not in contact with any of its outer sides with the housing and/or the adjacent silencer(s). The pressure loss with the use of a silencer configured in this way can be further reduced, since, due to the circumferential free space, the air which is conveyed by the radial fan radially outwards can flow further directly via the circumferential free space, in the flow direction.

[0018] Due to the very small distance interval between the edges of the impeller blades, which are arranged facing towards the silencers of the silencer sound absorber, and the inflow side of the sound absorber, the structural length is also reduced, with the result that such a ventilation component is suitable for use in particular in a decentralized ventilation device, for example in an underfloor ventilation device. The use of the ventilation component according to the invention in a central climate control system is of course also possible.

[0019] Since the distance interval between the edges of the impeller blades, which are arranged facing towards the silencers of the silencer sound absorber on the one hand, and

the sound absorber on the other, are substantially shorter in comparison with the prior art, and sound power is emitted by way of a housing, the ventilation component according to the invention acquires perceptibly better acoustic properties due to the shorter “interval range” between the impeller and the silencer.

[0020] The dimensions with at least one silencer can remain constant, seen in the flow direction, such that the width of the free space, with walls of the housing aligned in parallel, is therefore constant in the flow direction.

[0021] With at least one silencer, the dimensions, as seen in the flow direction, can be increased, in particular in stepped fashion, and therefore the width of the free space, as seen in the flow direction, with the walls of the housing aligned in parallel, can decrease. The enlargement of the dimensions of the silencer in the flow direction can be configured as continuous or discontinuous.

[0022] It is of course also possible for the housing to have a course which corresponds to the silencer, for example in stepped fashion, such that the width, i.e. the height, of the free space remains constant when seen in the flow direction.

[0023] It is advantageous if, with at least one silencer, the dimensions reduce, as seen in the flow direction, and therefore the width of the free space, as seen in the flow direction and with the walls of the housing aligned in parallel, increases. The reduction of the dimensions of the silencer, as seen in the flow direction, can be configured as continuous or discontinuous.

[0024] In the case where the dimensions of the housing reduce or increase in the same proportion to the dimensions of the silencers, the width, i.e. the height, of the free space remains constant when seen in the flow direction.

[0025] The dimensions with at least one silencer, as seen in the flow direction, can reduce discontinuously, in particular in stepped fashion, and therefore, with parallel walls of the housing, the width of the free space, as seen in the flow direction, can increase.

[0026] As an alternative, the dimensions with at least one silencer, as seen in the flow direction, can in particular reduce continuously, and therefore, with parallel walls of the

housing, the width of the free space, as seen in the flow direction, can increase.

[0027] With a continuous reduction of the dimensions, at least in some regions, the angle α between an outer side and the middle axis of the silencer pointing in the flow direction can be between 4º and 10º, preferably 7.5º. Accordingly, the silencer is configured in the form of a diffusor. Due to the configuration of the silencer as a diffusor, a part of the dynamic pressure can be transformed into static pressure.

[0028] At least one silencer can comprise, on the approach flow side facing the radial fan, a cut-out opening to receive a part of the radial fan, in particular the drive motor. As a result of such a configuration, the distance interval between the radial fan and the silencer is further reduced, and therefore also the structural length.

[0029] At least one silencer can exhibit a quadrilateral cross-section, in particular rectangular, with four outer sides, in particular aligned parallel to the housing.

[0030] With at least one silencer, the transition region of two adjacent outer sides can be chamfered or rounded.

[0031] When viewed in the flow direction, a baffle can be arranged upstream of the radial fan or fans, common to them, which exhibits at least one opening, in particular one opening allocated in each case to each radial fan, for the passage of the flow medium to the suction region of the radial fan or fans. A connection piece can also be provided between the baffle and the radial fan.

[0032] It is advantageous if, for additional soundproofing and/or for sound damping, in the region of at least one silencer and, preferably, also in the region upstream of the silencer, seen in the flow direction, i.e. in the region of the drive motor and also of the radial fan, on the inner side of the walls of the housing, at least one circumferential soundproofing and/or sound damping material is provided, preferably directly on the walls of the housing. The free space then lies between the circumferential soundproofing and/or sound damping material, preferably provided directly on the walls of the housing, and the silencer. With such an embodiment, the distance spacing is determined of 5 to 10% of the corresponding inner dimension from the circumferential soundproofing and/or sound damping material, provided preferably directly on the walls of the housing, to the adjacent outer side of the silencer. In

the case where a baffle is provided, the circumferential soundproofing and/or sound damping material, provided preferably directly on the walls of the housing, can extend as far as the baffle, and can also be in contact with the baffle on the face side.

[0033] It is advantageous if at least two arrangements are provided in the housing, arranged next to one another and/or above one another, in each case comprising a radial fan and a sound absorber, with a silencer filled with an absorption material. Such an embodiment can be arranged inside a climate control system in such a way that a common inlet and a common outlet are provided. The arrangements are arranged in the housing between the inlet and the outlet in such a way that the air flowing into the housing is “divided onto” the different arrangements.

[0034] At least one silencer can be arranged in the housing in such a way that the silencer has a distance interval from the adjacent inner wall of the housing which amounts in particular in each case to 5 to 10% of the corresponding inside dimension of the housing.

[0035] At least one silencer can be arranged in the housing in such a way that the silencer has a distance interval to the boundaries G of its housing cross-section part region which amounts in particular in each case to 5 to 10% of the corresponding dimension of the housing cross-section part region. In cases where the ventilation component comprises only one silencer, the housing cross-section part region corresponds to the housing cross-section. The walls of the housing then represent the limits G. With an embodiment with, for example, four silencers, a total of four theoretical housing cross-section part regions are provided. The four limits of each housing cross-section part region are formed by two walls of the housing as well as by two virtual theoretical limits G.

[0036] Hereinafter exemplary embodiments of the invention are explained in detail, represented in the drawings. The drawings show:

Fig. 1 a side view of a unit according to the invention,

Fig. 2 a view into the unit, seen in the flow direction,

Fig. 3 a view into the unit, against the flow direction,

Fig. 4 a-d a side view, a view from above, and an oblique view from above onto a silencer in accordance with Figs. 1 to 3 in an enlarged scale, wherein Fig. 4c shows the silencer without a cut-out opening, and Fig. 4d shows the silencer with a cut-out opening.

Fig. 5 a-c a side view, a view from above, and an oblique view from above onto a first alternative embodiment of a silencer,

Fig. 6 a-c a side view, a view from above, and an oblique view from above onto a second alternative embodiment of a silencer,

Fig. 7 a-c a side view, a view from above, and an oblique view from above onto a third alternative embodiment of a silencer,

Fig. 8 a-c a side view, a view from above, and an oblique view from above onto a fourth alternative embodiment of a silencer,

Fig. 9 the object according to Fig. 1 without a sound absorber,

Fig. 10 a side view onto an alternative exemplary embodiment of a ventilation component according to the invention, without a sound absorber,

Fig. 11 the object according to Fig. 10 without a sound absorber,

Fig. 12 a ventilation component according to the invention, with four arrangements arranged next to one another, in each case comprising a radial fan and a sound absorber, seen against the flow direction,

Fig. 13 the object according to Fig. 12, seen in the flow direction,

Fig. 14 a side view onto an alternative embodiment of a unit according to the invention,

Fig. 15 a view against the direction of flow into the unit according to Fig. 14,

Fig. 16 a section in the direction XVI-XVI through the objection according to Fig. 14,

Fig. 17 a section in the direction XVII-XVII through the objection according to Fig. 14,

Fig. 18 a side view onto a further alternative embodiment of a unit according to the invention,

Fig. 19 a-c different housing cross-sections, wherein in Fig. 19c the details U, V, W from Fig. 19c are represented on an enlarged scale, and

Fig. 20 a section through a ventilation component according to the invention, with four silencers arranged next to one another.

[0037] In all the figures, concordant reference numbers are used for the same components, or components of the same type.

[0038] In Figs. 1 to 3, 9 to 11, and 14 to 19, a ventilation component is represented which comprises a channel-shaped housing 1 with a rectangular cross-section, in which a radial fan 2 and a sound absorber for flowing gases are provided, wherein the sound absorber comprises a silencer 3 filled with an absorption material. Since each ventilation component represented in Figs. 1 to 3, 9 to 11, and 14 to 19, comprises only one silencer 3, the housing cross-section part region I corresponds to the housing cross-section.

[0039] The silencer 3, seen in the flow direction 4, is arranged downstream of the radial fan 2. In the exemplary embodiment according to Figs. 1 to 3 and 9, the radial fan 2 is driven by a drive motor 5, which is arranged on the outflow side of the radial fan 2. The radial fan 2 and the drive motor 5 are connected to one another by a shaft.

[0040] The radial fan 2 comprises an impeller 2a, which is driven by a drive motor 5. The impeller 2a comprises a cover disk 2b as well as a carrier disk 2c, between which are arranged a plurality of impeller blades 2c. The carrier disk 2c is arranged on the side of the impeller 2a which faces towards the drive motor 5.

[0041] Seen in the flow direction 4, arranged upstream of the radial fan 2 is a baffle 6, which comprises a rectangular opening 7 for the passage of the gas to the suction region of the

radial fan 2. Provided between the rectangular opening 7 in the baffle 6 and the suction region of the radial fan 2 is a connection piece 8.

[0042] As can be derived, for example, from Figs. 1 and 3, the radial fan 2 with the drive motor 5, and the baffle 6, are secured on an underside holding structure 9, which is located in the housing 1.

[0043] With the embodiments according to Figs. 1 to 13, each silencer 3 is configured as a single silencer 3 in a manner similar to a block, wherein the silencer 3 is arranged in the housing 1 in such a way that there is a distance interval to the housing 1 on all sides. Accordingly, a circumferential free space 10 is formed for the flowing of the gas, which is interrupted only in the lower region of the holding structure 9. In this way, the silencer 3 is flowed around on all sides by the flowing gas.

[0044] The fixing of the silencer 3 in relation to the housing 1 is not represented in detail. In the exemplary embodiment represented in Figs. 1 to 3, a securing arrangement is represented of the silencer 3 in the region of its edge on the lower side, on the inflow side, at the holding structure 9.

[0045] With the exemplary embodiment represented in Figs. 1 to 4 and 11, the dimensions of the silencer 3, seen in the flow direction 4, such that the silencer 3, seen in a side view, has the form of a truncated pyramid. The angle α between the outer side and the middle axis of the silencer 3 pointing in the flow direction 4, in the exemplary embodiment represented, is about 7º. The silencer 3 is therefore configured in the form of a diffusor.

[0046] In the exemplary embodiment according to Figs, 5a to c, each transition region is in contact with two adjacent outer sides of the silencer 3.

[0047] Represented in Figs. 6a to c is a silencer 3, which is configured as a cuboid or regular parallelepiped.

[0048] Figs. 7a to c show an embodiment in which the dimensions of the silencer 3, seen in the flow direction 4, at a point 11, enlarge in step form, and in consequence the width of the free space 10, seen in the flow direction 4, and wherein the walls of the housing 1 run in

parallel, decreases in the region of the point 11. In the exemplary embodiment represented, both part regions of the silencer 3, arranged behind one another in the flow direction 4, exhibit parallel side surfaces.

[0049] Represented in Figs. 8a to c is an embodiment in which the region of the silencer 3 on the approach flow side is configured as cuboid or regular parallelepiped, and the dimensions of the silencer 3 reduce towards the outflow side end. Accordingly, the free space 10, which in the first instance exhibits a constant width, enlarges towards the outflow side end, wherein the walls of the housing 1 are arranged in parallel.

[0050] As represented in Fig. 1, in the exemplary embodiment shown the silencer 4 comprises on the approach flow side, facing towards the radial fan 2, a cut-out opening 12, into which a part of the drive motor 5 of a radial fan 2 projects. Accordingly, the structural length of the ventilation component is reduced. The cut-out opening 12 is represented in detail in Fig. 4c.

[0051] With the exemplary embodiment according to Figs. 10 and 11, the drive motor 5 is arranged in the hub of the radial fan 2. Such radial fans 2 are also designated as fans with drive motors integrated directly in the impeller or flanged onto it. The radial fan 2 therefore, seen in the flow direction 4, has a very short structural length. Accordingly, the distance interval between the edges of the impeller blades 2d, facing towards the silencer 3, on the one hand, and the silencer 3 on the other, is very small, such that the structural length of the ventilation component is very small.

[0052] In Figs. 9 and 10, for better illustration of the design structure of the respective radial fan 2, the respective silencer 3 is not represented.

[0053] Represented in Fig. 12 is a ventilation component, which in turn comprises a channel-shaped housing 1 with a rectangular cross-section. However, arranged in the housing 1 are four radial fans 2, wherein in each case a sound absorber is allocated in each case to a radial fan 2. Each sound absorber comprises a silencer 3 filled with an absorption material. Since four silencers 3 are arranged in the housing 1, the housing cross-section comprises a corresponding number, namely four, theoretical housing cross-section part regions I-IV.

[0054] Each silencer 3, when viewed in the flow direction 4, is arranged behind the radial fan

2 assigned to it, such that, in the view represented in Fig. 12, each silencer 3, when viewed in the flow direction 4, covers the upstream radial fan 2 assigned to it.

[0055] When viewed in the flow direction 4, the baffle 6 is arranged upstream of the four radial fans 2, which exhibits four rectangular openings 7 for the passage of the gas to the suction region of the respective radial fan 2.

[0056] Each silencer 3 is configured as a single silencer 3 in a manner similar to a block, wherein the silencer 3 is arranged in the housing 1 in such a way that there is a distance interval between the housing 1 on all sides to the adjacent silencer 3. Accordingly, a circumferential free space 10 is formed around each silencer 3, for the flowing of the gas, which is interrupted only in the respective lower region of a silencer 3 by the holding structure 9. In this way, each silencer 3 is flowed around on all sides by the flowing gas. In the exemplary embodiment represented in Fig. 12, the distance interval between two silencers 3 corresponds approximately to double the distance interval between a silencer 3 and the adjacent inner wall of the housing 1.

[0057] The fixing of each silencer 3 in relation to the housing 1 is not represented in detail. Each silencer 3 is secured in the region of its edge on the lower side, on the approach flow side, by means of a holding structure 9, to the housing 1. The holding structure 9 of each silencer 3 consists of two feet. The radial fans 2 can be secured, for example, to the baffle 6. The direction of rotation of the four radial fans 2 is the same.

[0058] With the exemplary embodiment according to Fig. 12, the dimensions of the silencer 3 also reduce continuously, seen in the flow direction 4, such that each silencer 3, seen in a side view, has the form of a truncated pyramid. The angle α between the outer side and the middle axis of the silencer 3 pointing in the flow direction 4, in the exemplary embodiment represented, amounts to some 7º. Accordingly, each silencer 3 is configured in the manner of diffusor.

[0059] Represented in Figs. 14 to 17 is an alternative embodiment of a ventilation component according to the invention. In this case, the silencer 3 consists of a total of five components 3a-3e. These are four damper plates 3b-3e, arranged at a right angle to one another and forming a square, wherein the damper plates 3b-3d surround the drive motor 5 laterally and on the upper side, while the lower damper plate 3e, seen in the flow direction 4, only delimits it approximately as far as the drive motor 5. The cavity formed by the four

damping plates 3b-3e, seen in the flow direction 4, is filled behind the drive motor 5 entirely by a damping block 3a, which is in contact with its four sides in each case with one of the four damping plates 3b-3e.

[0060] Moreover, when seen in the flow direction 4, in the region arranged behind the baffle 6, on the inner side of the wall of the housing 1, at each wall, a soundproofing plate and/or sound damping plate is arranged, as soundproofing and/or sound damping material 13. The free space 10 is formed in this exemplary embodiment between the inner side of the soundproofing plate and/or sound damping plate and the outer side concerned of one of the four damping plates 3b-3e.

[0061] Represented in Fig. 18 is an alternative embodiment. Here, the lower damping plate 3a also extends as far as into the region of the front edge of the drive motor 5, such that the drive motor 5 is completely surrounded on the circumferential side by the four damping plates 3b-3e. The damping plates 3b-3e form, in the region of the end facing against the flow direction 4, the cut-out opening 12.

[0062] Represented in Fig. 19, in sectional drawings, are possible cross-sectional forms of a housing 1, wherein, for reasons of easier overview, only one silencer 3 and the resulting free space 10 in the housing 1 are drawn in. As can be seen from the drawings, the height or width of the free space 10 is determined in the direction of the arrows shown. The one end of each arrow stands perpendicular on the surface of the silencer 3, or on the corresponding tangent in the case of a cambered tangent 3. The other end of the arrow stands perpendicular on the adjacent inner side of the wall of the housing 1, or on the corresponding tangent with a cambered housing 1.

[0063] In the regions E of the corners, or I of the inner corners, which are indicated by broken lines in the corresponding figures, in the exemplary embodiments according to Figures 19a, c and d, the free space 10, depending on the direction of measurement, is a little greater, inasmuch as the corner of the housing 1or of the silencer 3 is not configured as rounded.

[0064] Represented in Fig. 19c, in the details V and W, on an enlarged scale, are the regions I of an inner corner, and in detail U, on an enlarged scale, the region E of a corner from Fig. 19c.

[0065] In the exemplary embodiment according to Fig. 19b, the housing 1 is round. The free space 10 has the same width at every point.

[0066] This is also the case, with the exception of the four regions E in which the four edges are located, with the rectangular housing 1 according to Fig. 19a this is also the case. The free space 10, in the region of the four sides on the silencer 3, has a concordant percentage value.

[0067] Represented in Fig. 19c is an exemplary embodiment in which the distance intervals between the housing 1 and the silencer 3 deviate from one another. However, with the exception of the eight regions E, which are located in the eight corners, and with the exception of the eight regions I, which are also located in the eight inner corners, the distance interval lies within the range being claimed.

[0068] On the basis of Fig. 20, the housing cross-section part regions I-IV are explained. In Fig. 20, for reasons of better overview, only four silencers 3, arranged next to one another, are represented in the housing 1.

[0069] With the exemplary embodiment represented, both the outer dimensions of each silencer 3 as well as the walls of the housing 1 are parallel. Accordingly, the free spaces 10 which are flowed around, along the longitudinal extension of each silencer 3, i.e. when viewed in the flow direction 4, are uniform and consistent.

[0070] Since four silencers 3 are arranged in the housing 1, the housing cross-section comprises a corresponding number, namely four, of theoretical housing cross-section part regions I-IV. In the present case, each of these four housing cross-section part regions I-IV is formed by two adjacent walls of the housing 1, as well as by two virtual limits G. The latter are therefore only represented by broken lines.

[0071] In the case represented, each silencer 3, related to its housing cross-section part regions I or II or III or IV respectively, blocks approximately between 84% and 88% of the housing cross-section part region I or II or III or IV respectively.

PATENTKRAV

1. Ventilationskomponent omfattende et kanalformet kabinet (1) fortrinsvis med rektangulært eller kvadratisk tværsnit, hvori mindst en radialventilator (2) og mindst en lyddæmper for flydende gasser er tilvejebragt i kabinettet (1), hvor navnlig mindst en og fortrinsvis hver lyddæmper - set i strømningsretningen (4) - er placeret bagved den radiale ventilator (2) og omfatter mindst en lyddæmper (3) fyldt med absorberende materiale, **kendetegnet ved,** at med hver lyddæmper (3) tildelt til en radial ventilator (2) er arealet - set i strømningsretningen (4) - mellem de ydre dimensioner af lyddæmperen (3) fyldt i det mindste i nogle områder, således at hver lyddæmper (3) er arrangeret i afstand fra det nærmeste og næste nabokomponent, og at hver lyddæmper (3) derfor til alle sider er omgivet af et periferisk frirum (10) for flydende gasser, således at hver lyddæmper (3) til alle sider kan bestryges af flydende gas, hvorhos kabinettværsnittet omfatter et antal af teoretisk kabinettværsnit respektive delområder I eller II eller III eller IV, som svarer til antallet af lyddæmpere (3) tilvejebragt i et område af kabinettværsnittet, hvorhos hver lyddæmper (3) relateret til kabinettværsnittet i de respektive delområder I eller II eller II eller IV- hvortil den hører - blokkerer mellem 55% og 90%, fortrinsvis mellem 64% og 81% af det teoretiske frie flowtværsnit af kabinettværsnittet i de respektive delområder I eller II eller III eller IV.

2. Ventilationskomponent ifølge det foregående krav, **kendetegnet ved**, at mindst en lyddæmper (3) er arrangeret centreret i de respektive delområder af kabinettværsnittet I eller II eller III eller IV - hvortil den hører - i en første retning og/eller i en anden retning vinkelret til første retning.

3. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at i hvert tilfælde er mindst en lyddæmper (3) konfigureret tilsvarende en blok, navnlig i form af en kubisk eller et regelmæssig parallelepipedum, et tilforordnet til mindst en eller navnlig hver radiale ventilator (2).

4. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at dimensionerne af den mindst ene lyddæmper (3) - set i strømningsretningen (4) - forbliver konstant, og derfor er vidden af frirummet (10) konstant i strømningsretningen (4).

5. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at dimensionerne af den mindst ene lyddæmper (3) - set i strømningsretningen (4) - er forstørret, navnlig på trinvis måde, og derfor formindskes vidden af frirummet (10) - set i strømningsretningen (4).

6. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at dimensioner af den mindst ene lyddæmper (3) - set i strømningsretningen (4) - er reduceret, og derfor forøges vidden af frirummet (10) - set i strømningsretningen (4).

7. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at dimensionerne af den mindst ene lyddæmper (3) - set i strømningsretningen (4) - er reduceret, navnlig på trinvis måde, og derfor forøges vidden af frirummet (10) - set i strømningsretningen (4).

8. Ventilationskomponent ifølge hvert af kravene 6 eller 7, **kendetegnet ved**, at dimensionerne af den mindst ene lyddæmper (3) - set i strømningsretningen (4) - er reduceret, navnlig kontinuerligt, og derfor forøges vidden af frirummet (10) - set i strømningsretningen (4).

9. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at mindst to lyddæmpere (3) navnlig arrangeret indbyrdes parallelle og danner en strømningskanal i mellem dem, er tilforordnet til mindst en radial ventilator (2) og navnlig til hver sin radial ventilator (2).

10. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at mindst en lyddæmper (3) på tilgangsstrømsiden mod den radiale ventilator (2) fremviser en udskæringsåbning (12) til at modtage en del af den radiale ventilator (2), navnlig drivmotoren (5).

11. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at mindst en lyddæmper (3) fremviser et firkantet navnlig rektangulært tværsnit med fire ydersider, navnlig afstemt parallelt med kabinettet (1).

12. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at et overgangsområde af to nærliggende ydersider af mindst en lyddæmper (3) er rejfet eller afrundede.

13. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at - set i strømningsretningen (4) - en afbøjningsplade (6) er arrangeret opstrøms i forhold til den radiale ventilator (2) eller radiale ventilatorer (2), som udviser mindst en åbning (7), navnlig i hvert tilfælde til hver radiale ventilator (2) til passage af gasstrømmen til sugeområdet af den radiale ventilator (2) eller de radiale ventilatorer (2).

14. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at der i området af mindst en lyddæmper (3), og fortrinsvis også - set i strømningsretningen (4) - i området opstrøms ventilatoren (2) indersiderne af væggene af kabinettet (1) er forsynet med mindst et lydtæt og/eller lyddæmpende materiale (13) arrangeret periferisk og fortrinsvis direkte på væggene af kabinettet (1).

15. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at mindst to arrangementer forefindes i kabinettet (1) arrangeret ved siden af hinanden og/eller ovenpå hinanden omfattende en radial ventilator (2) og en lydpotte med en lyddæmper (3) fyldt med absorberende materiale.

16. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at mindst en lyddæmper (3) er arrangeret i kabinettet (1) på en sådan måde, at lyddæmperen (3) er placeret i et afstandsinterval fra nærmeste indervæg af kabinettet (1), som angår navnlig i hvert tilfælde 5-10% af den tilsvarende indersidedimension af kabinettet (1).

17. Ventilationskomponent ifølge ethvert af de foregående krav, **kendetegnet ved**, at mindst en lyddæmper (3) er arrangeret i kabinettet (1) på en sådan måde, at lyddæmperen (3) er placeret i et afstandsinterval fra grænselinjen G af dets respektive kabinettværsnit delområde I eller II eller III eller IV, som navnlig i hvert tilfælde omfatter 5-10% af den tilsvarende dimension af kabinettværsnittets respektive delområder I eller II eller III eller IV.

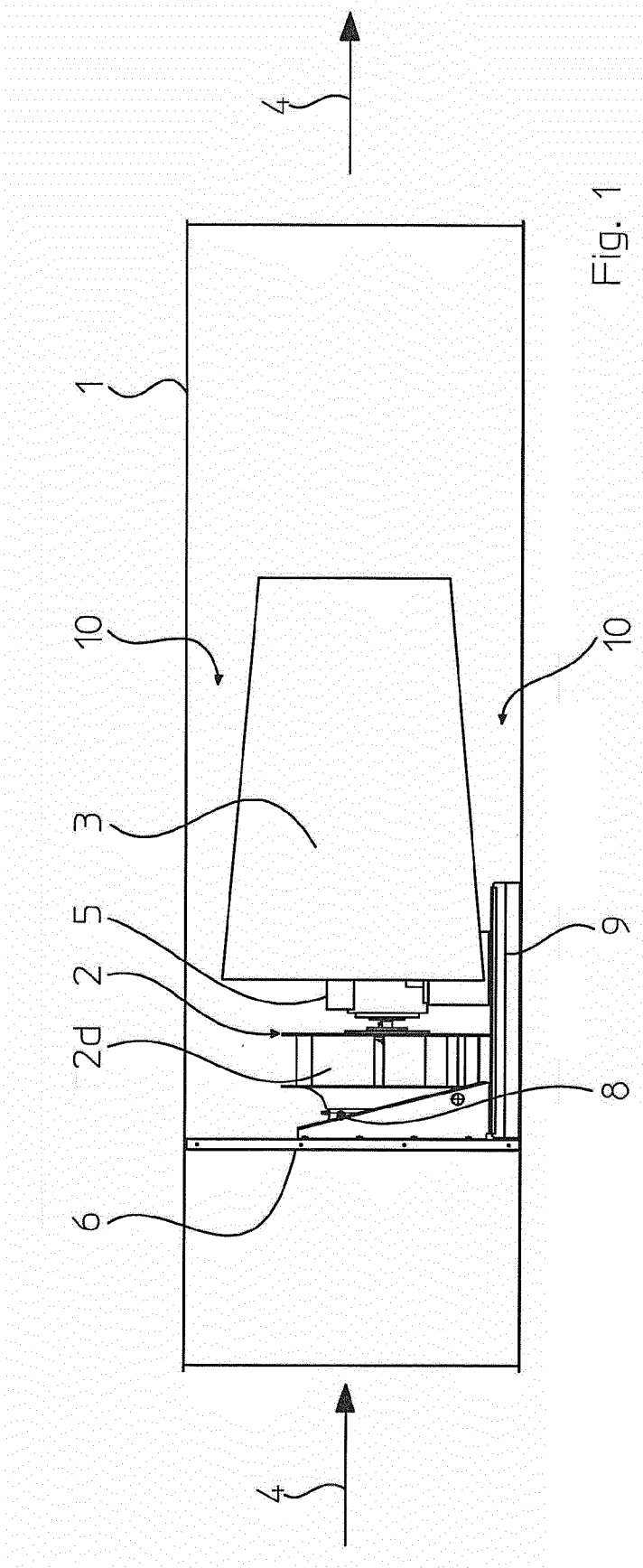


Fig. 1

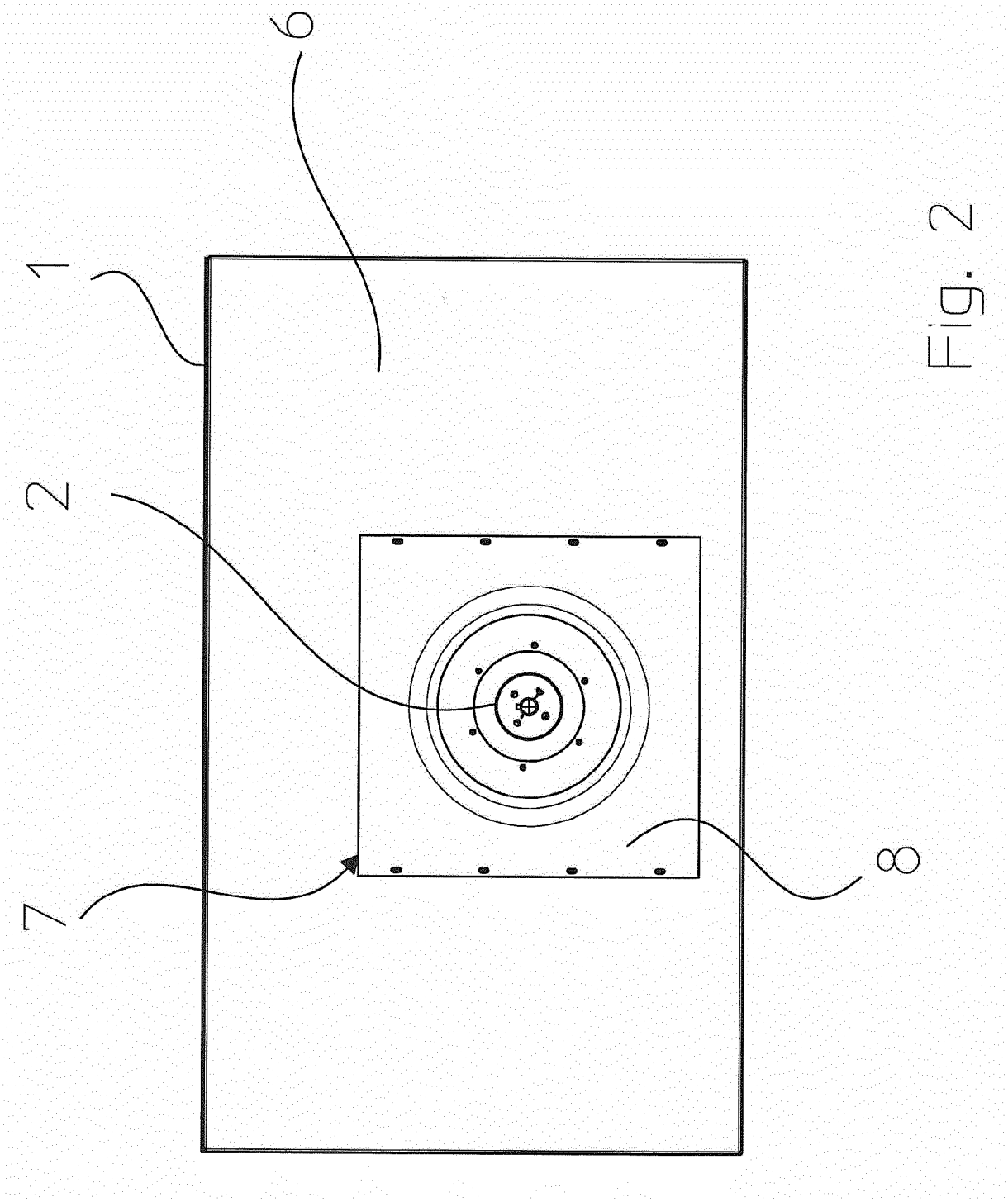


Fig. 2

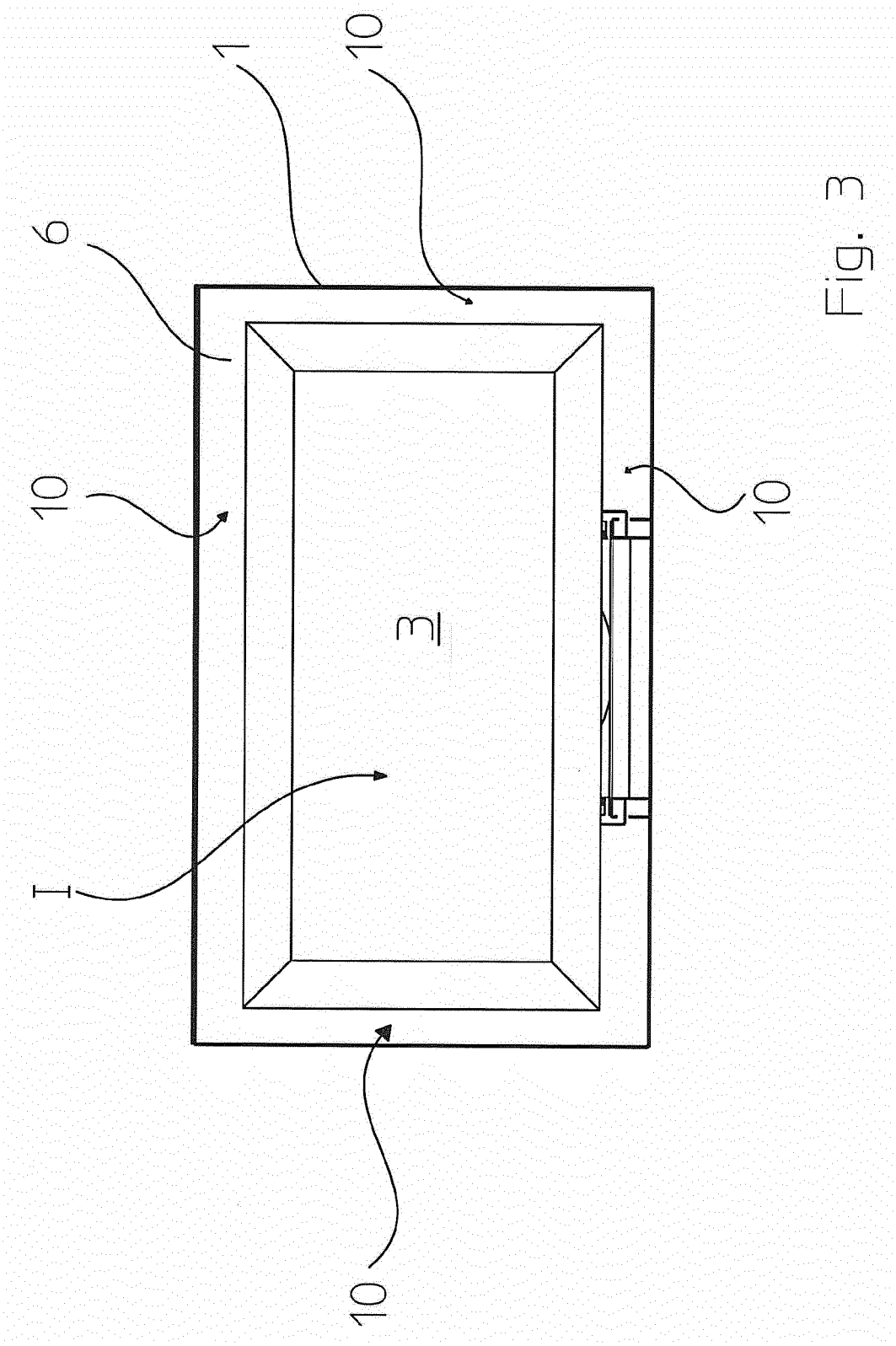


Fig. 3

Fig. 4

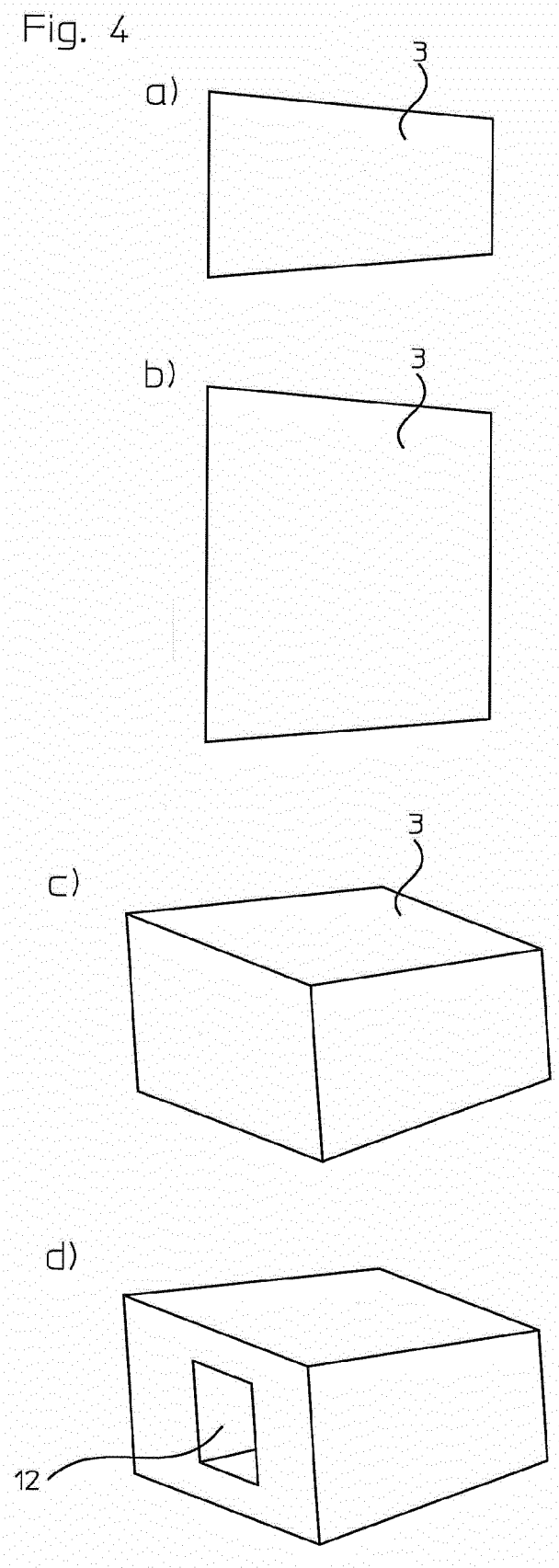


Fig. 5

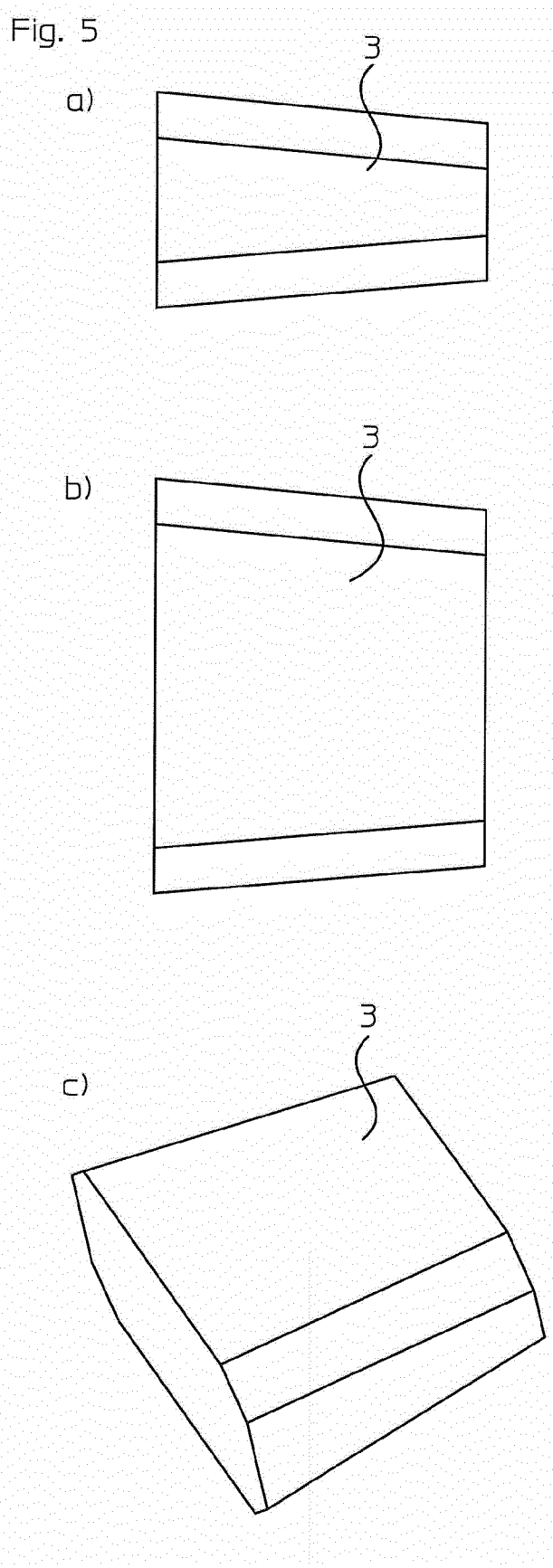
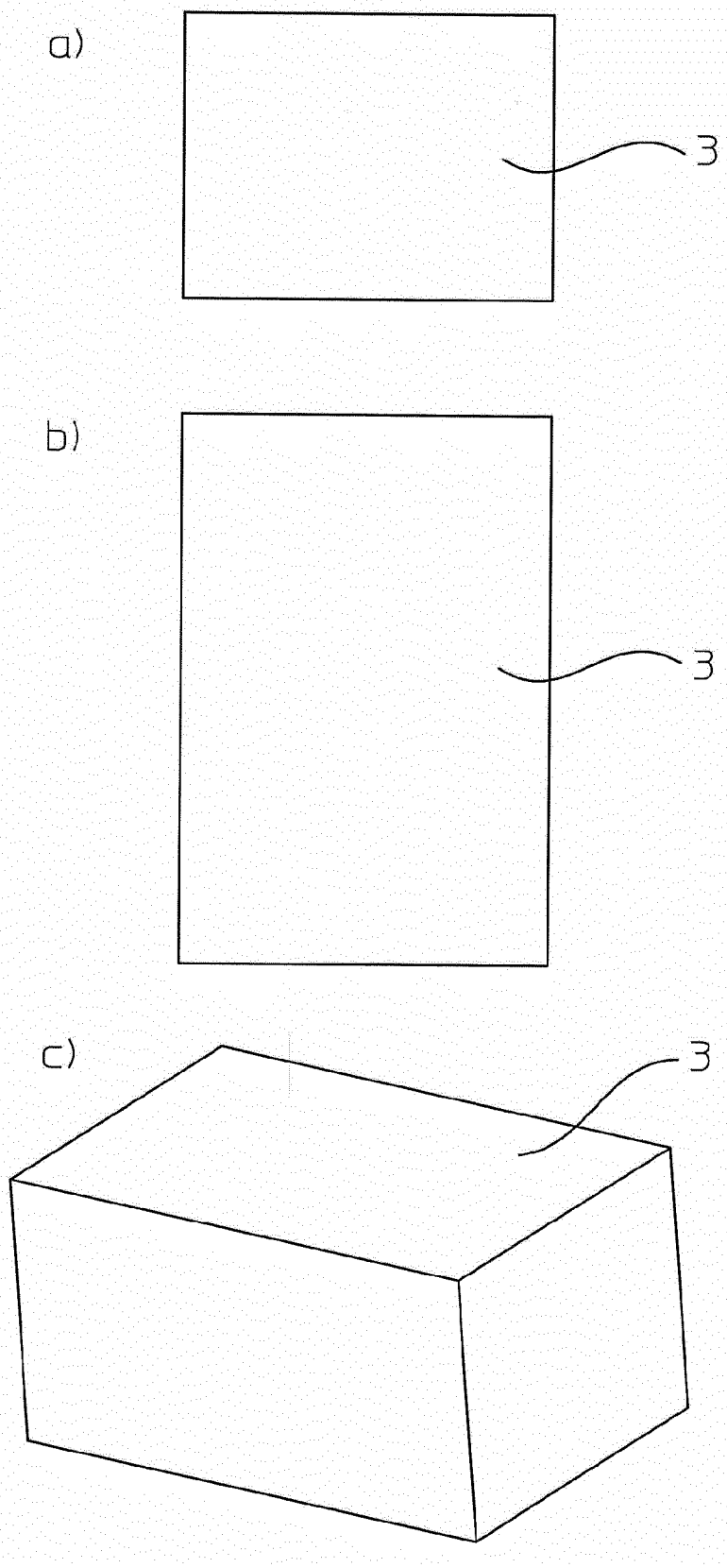


Fig. 6



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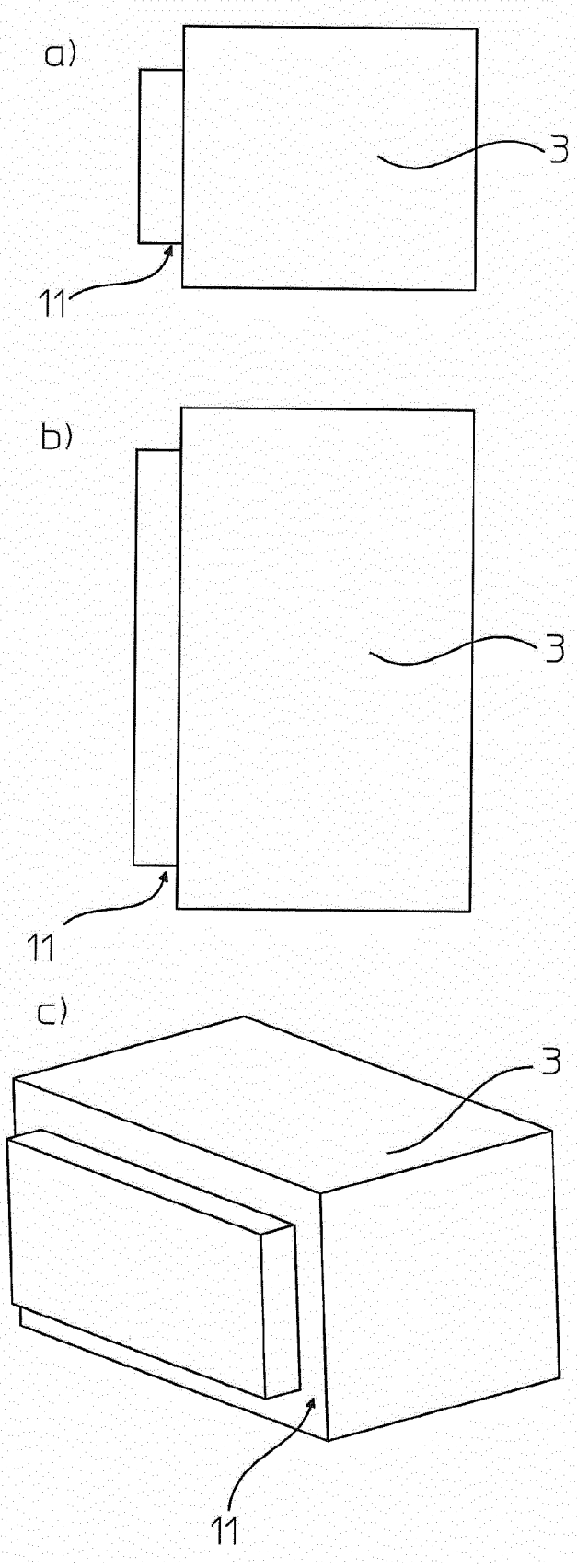


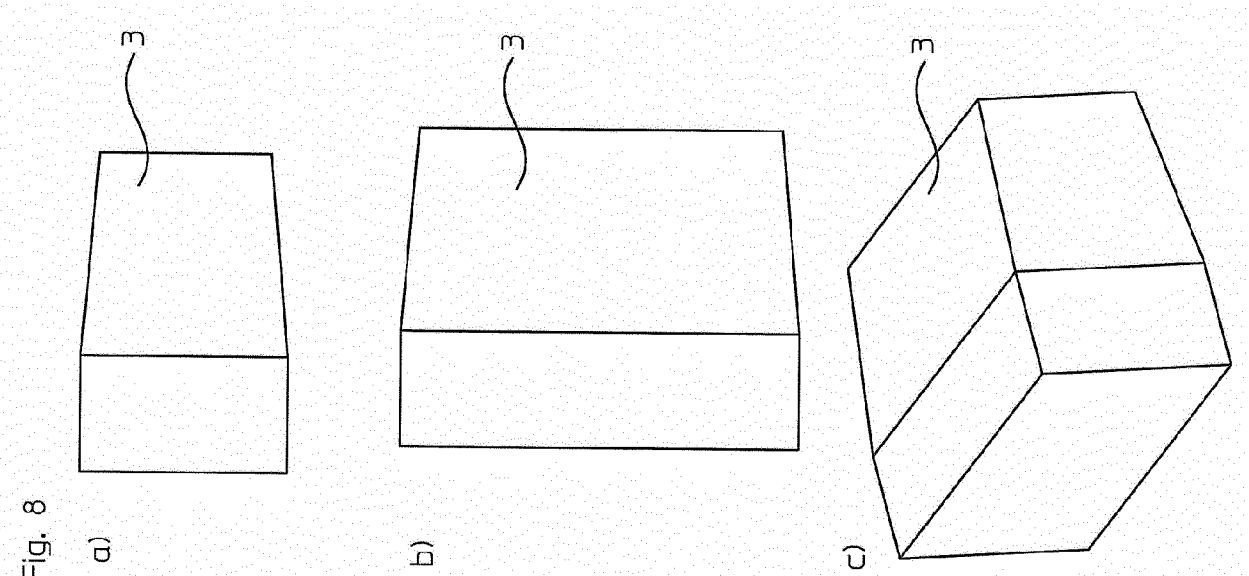


Fig. 8

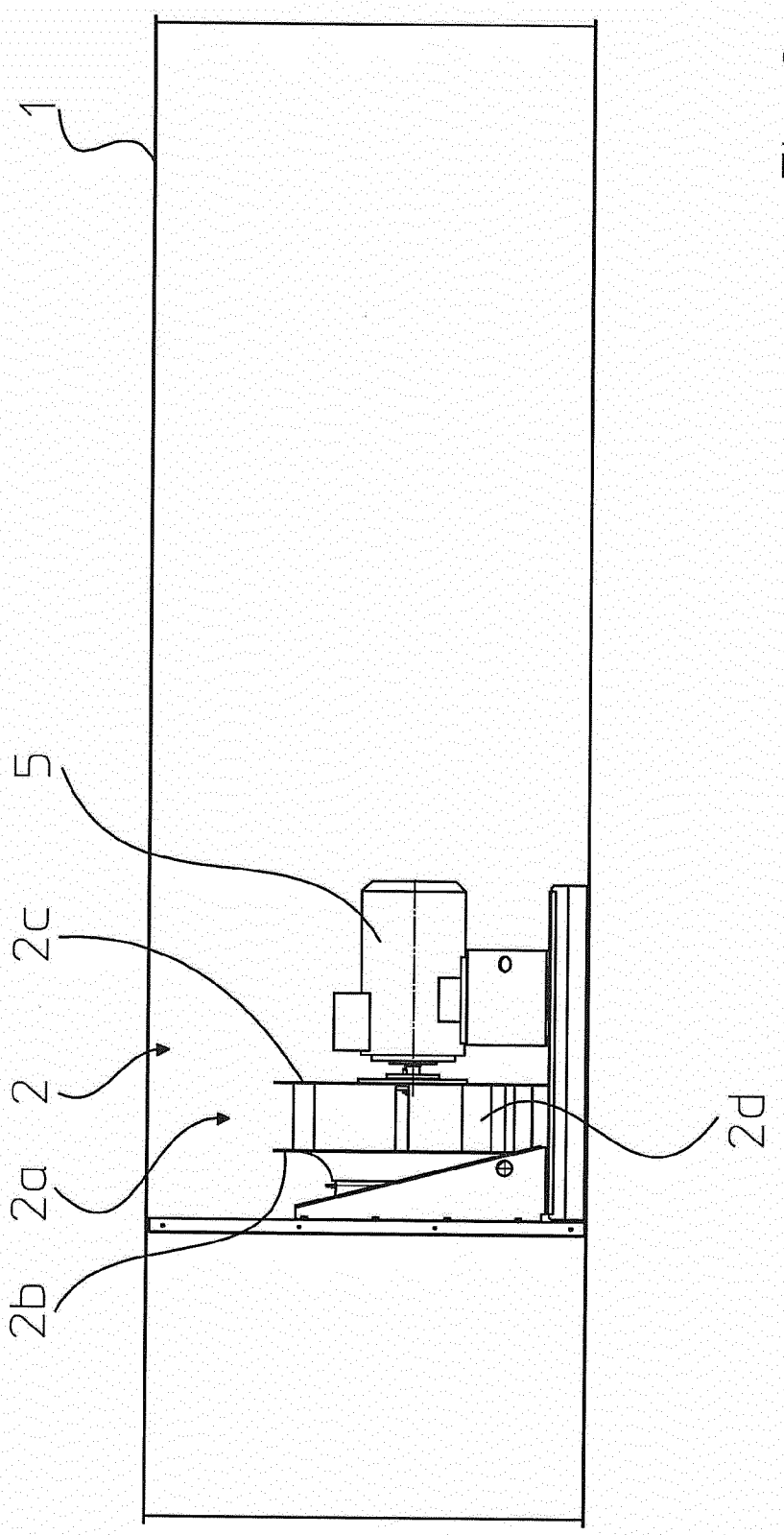


Fig. 9

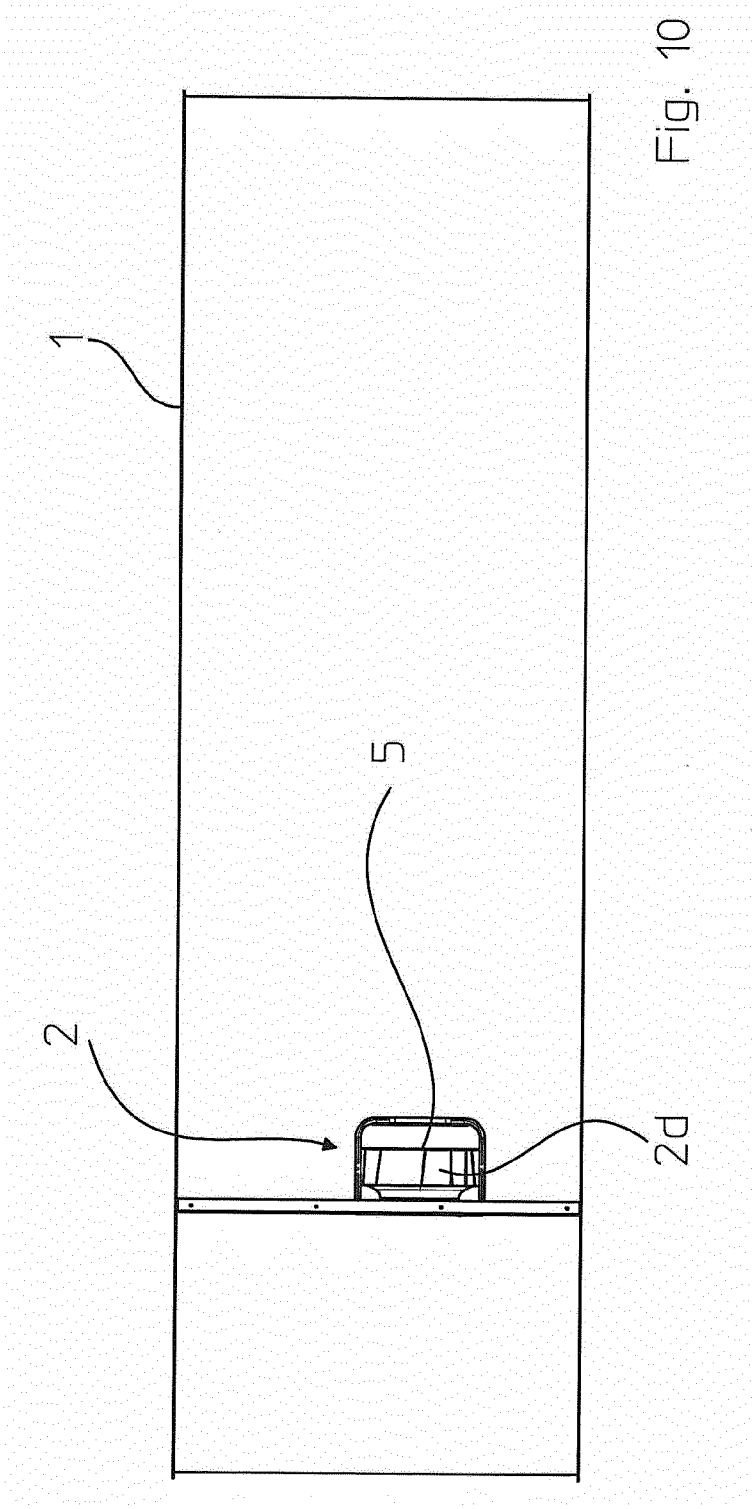


Fig. 10

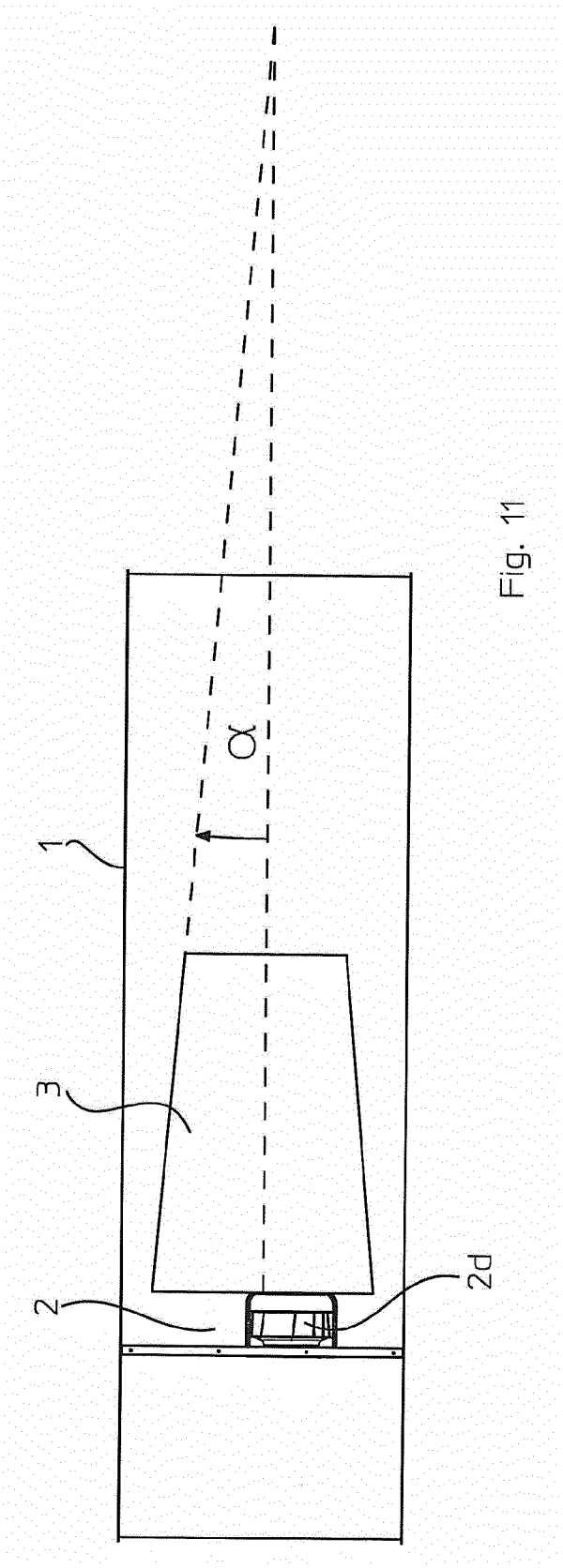


Fig. 11

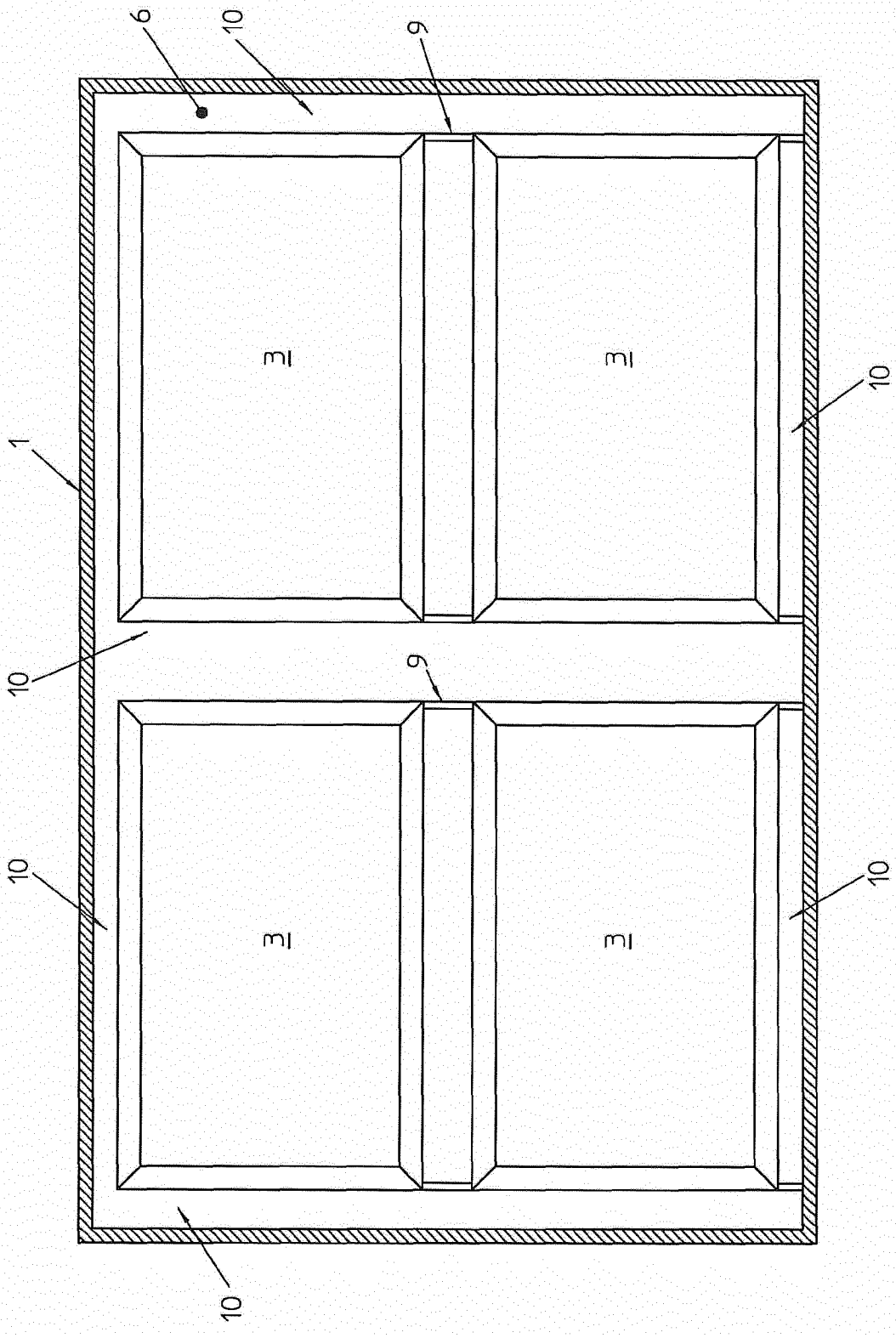


Fig. 12

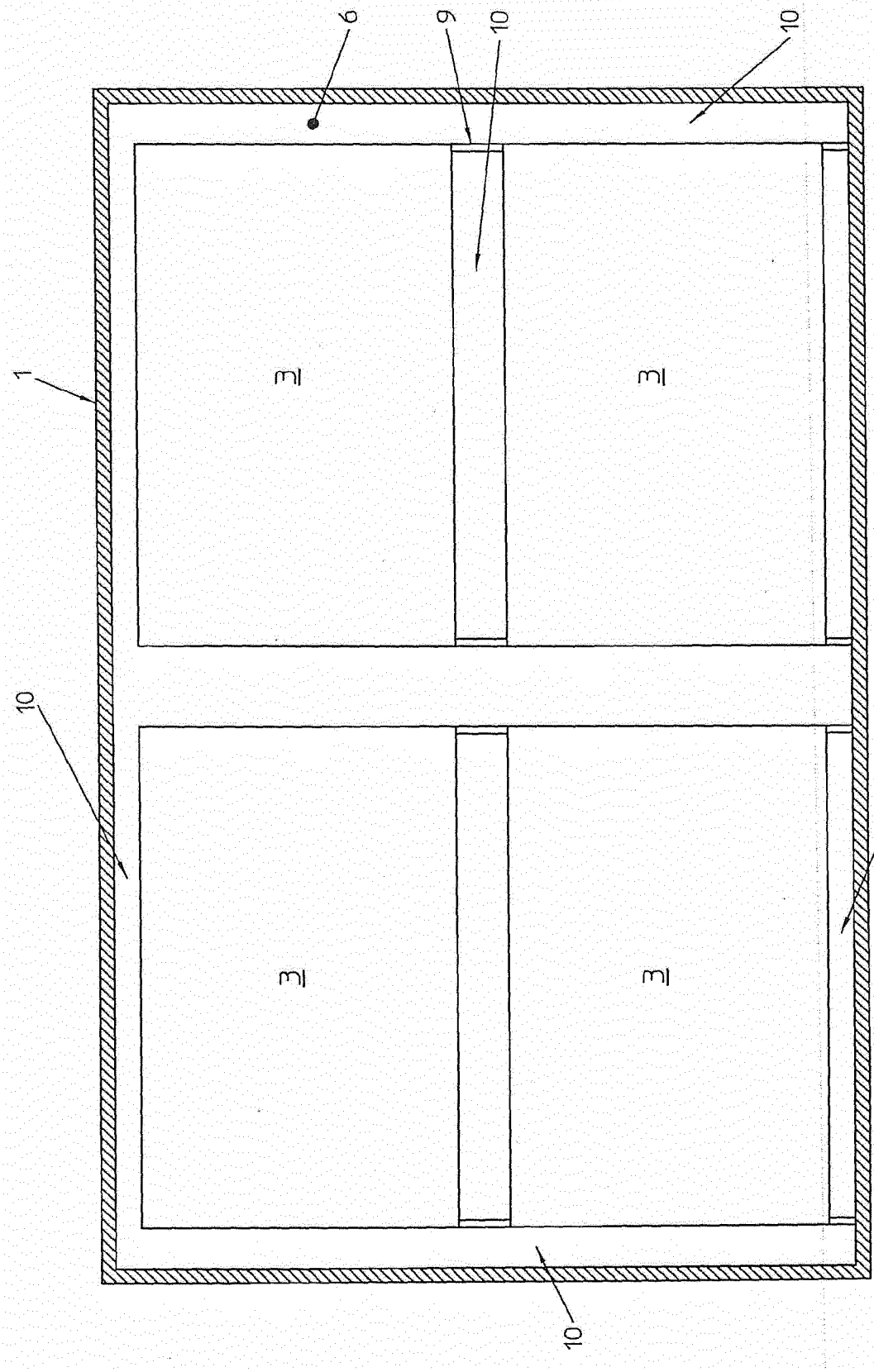


Fig. 13

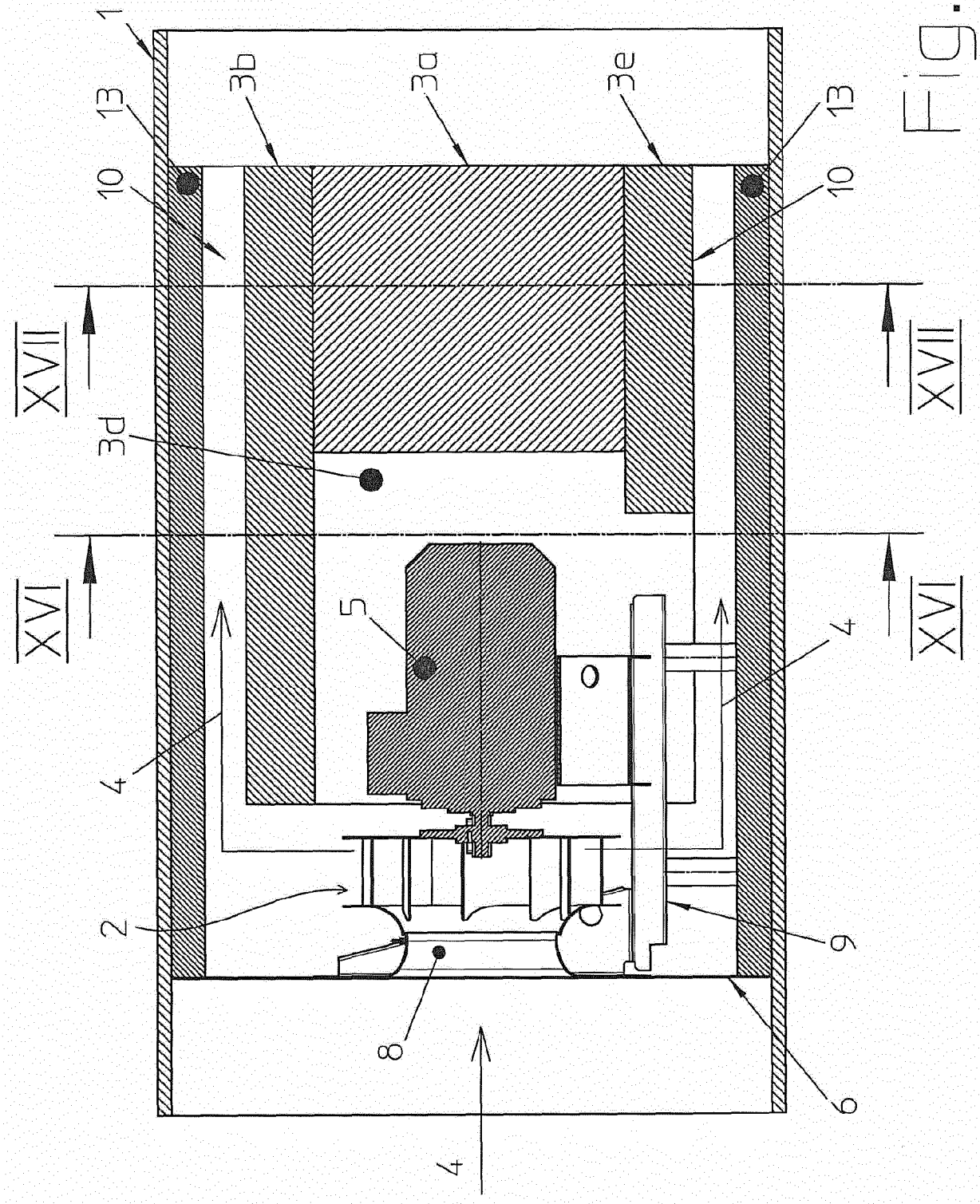
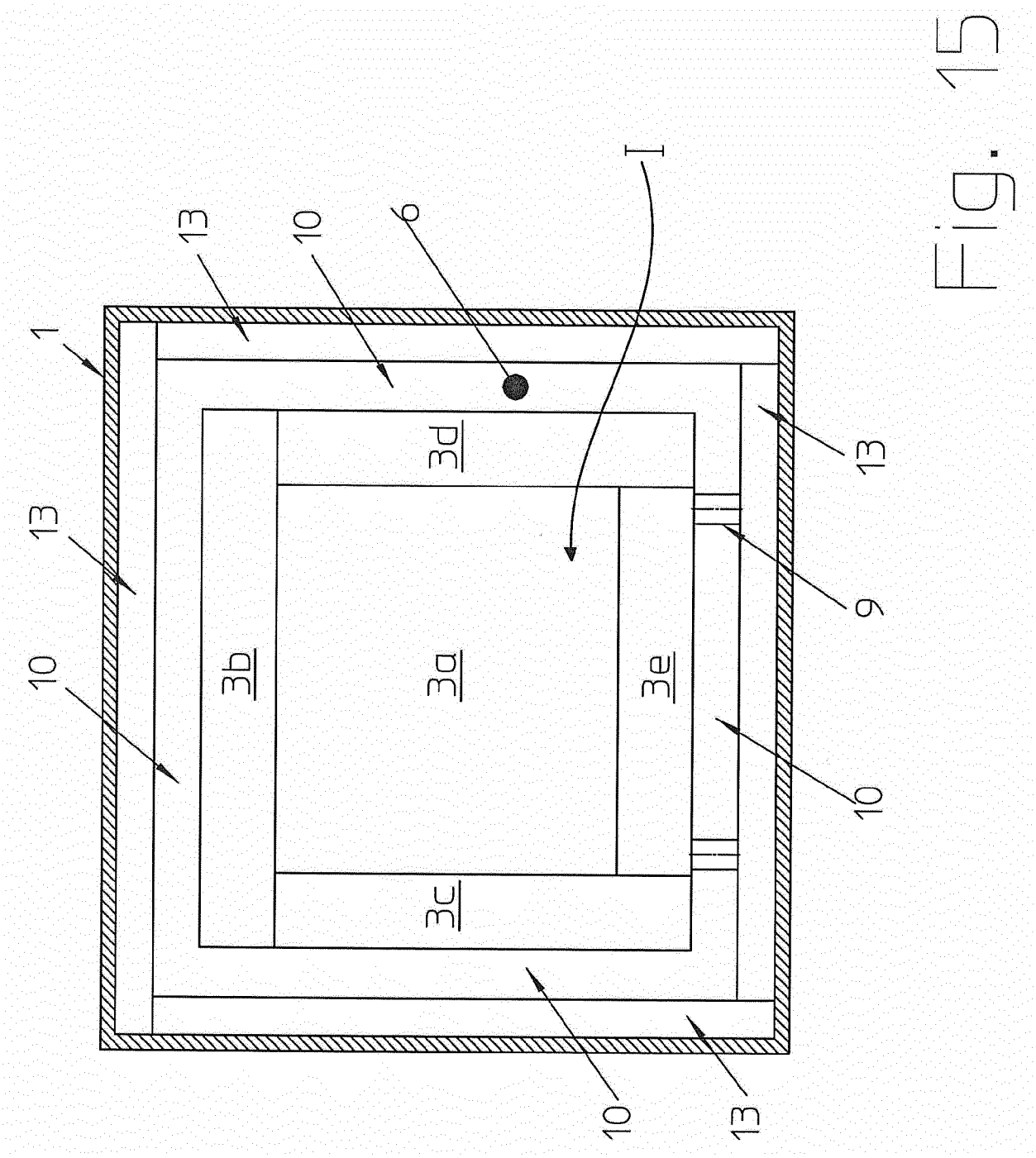


Fig. 14



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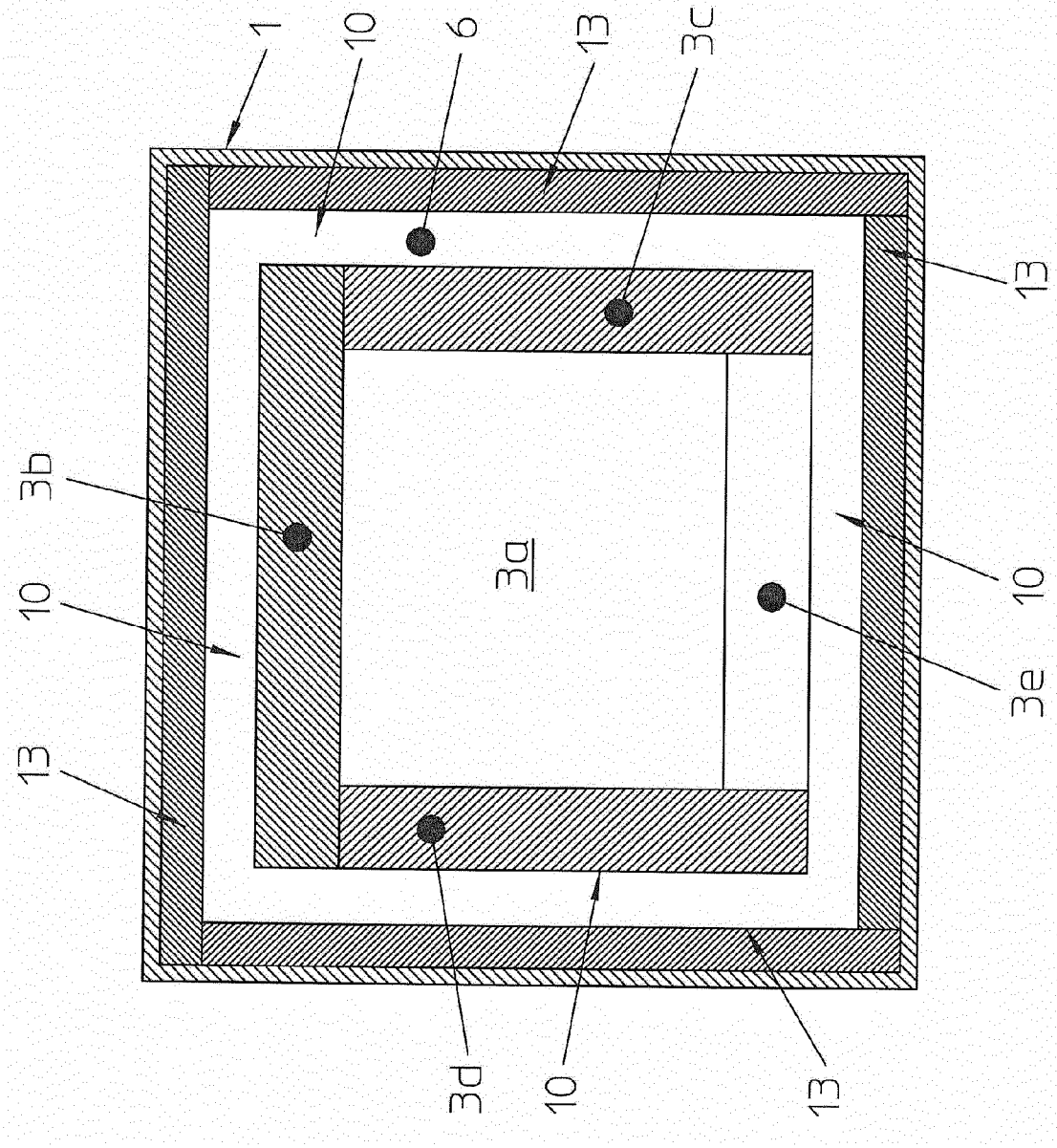


Fig. 16

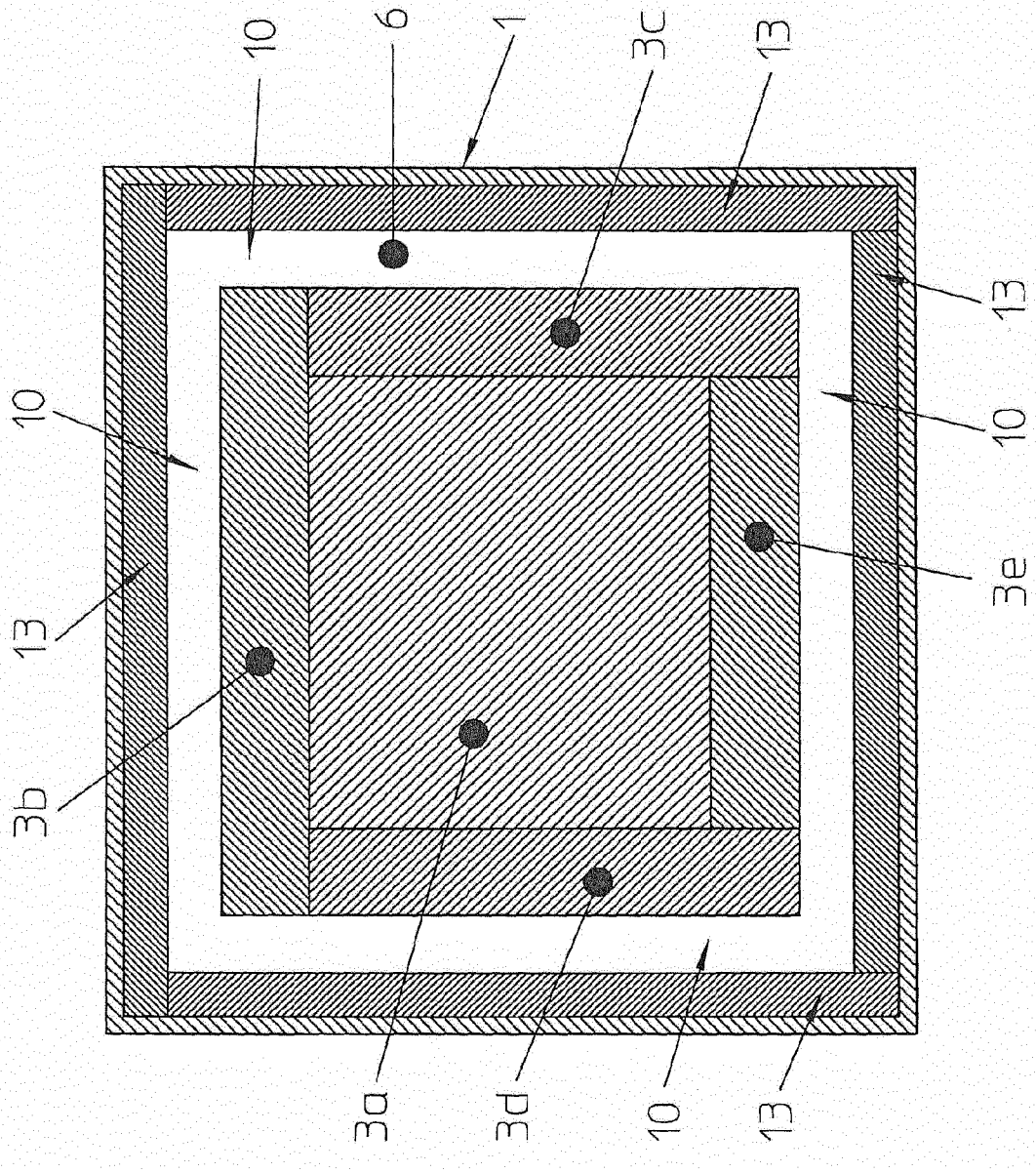


Fig. 17

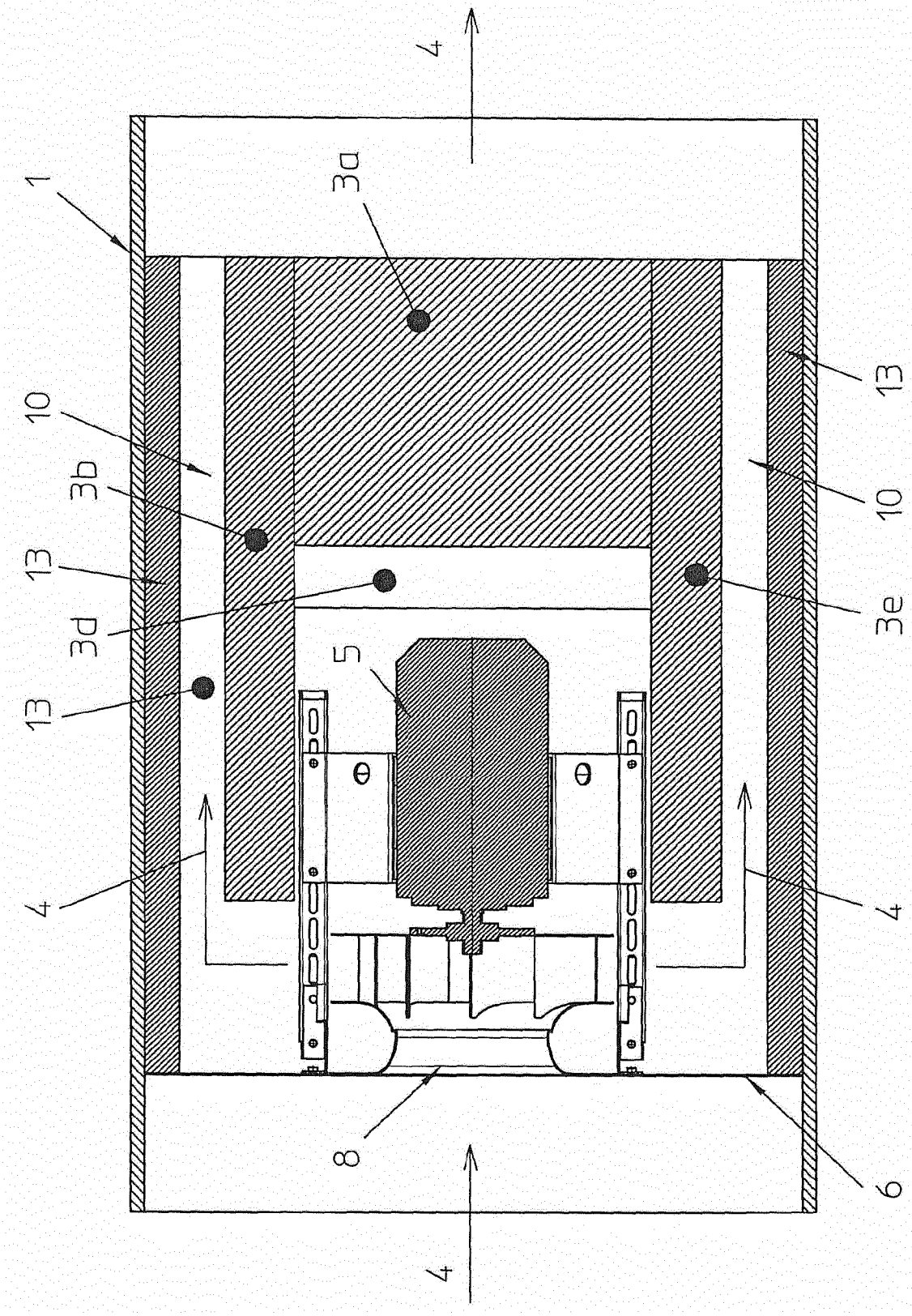


Fig. 18

Fig. 19

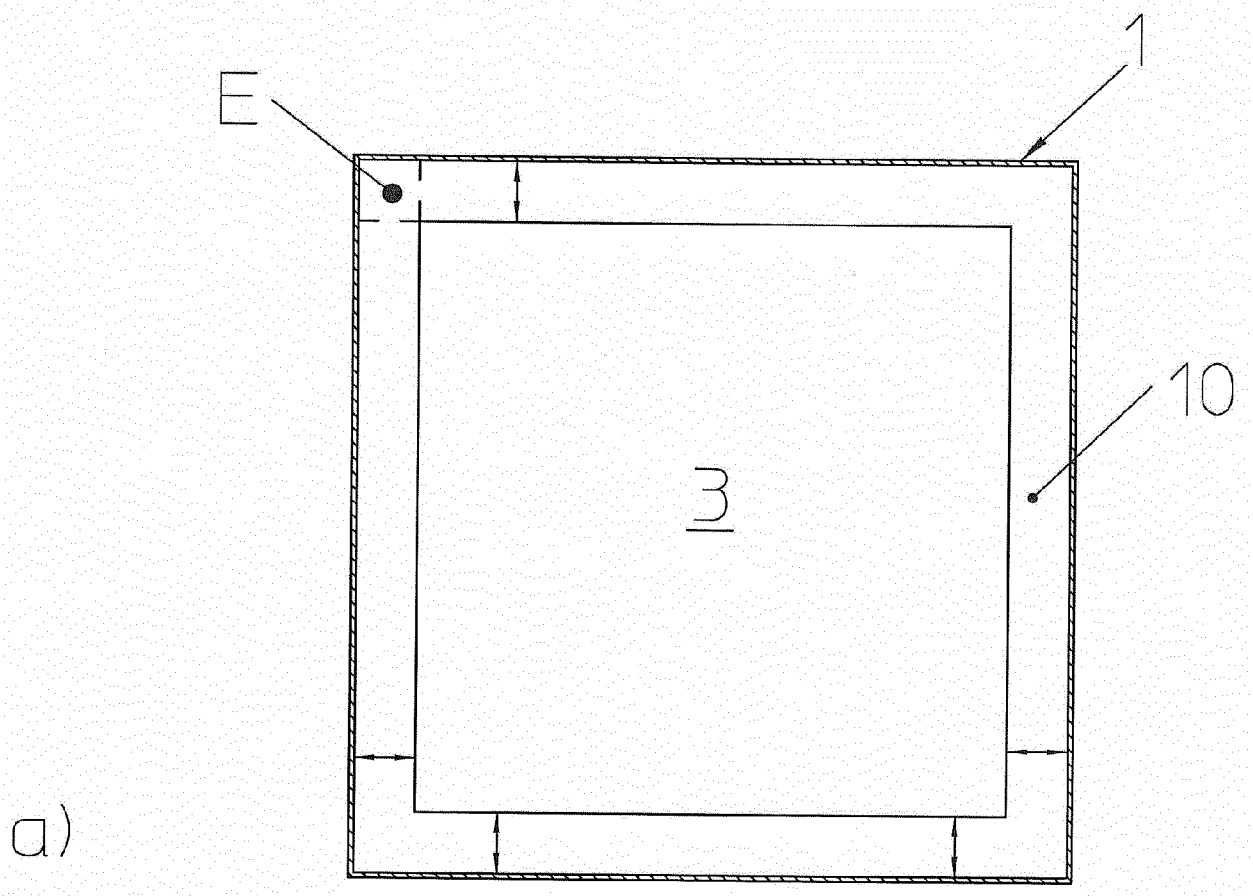


Fig. 19

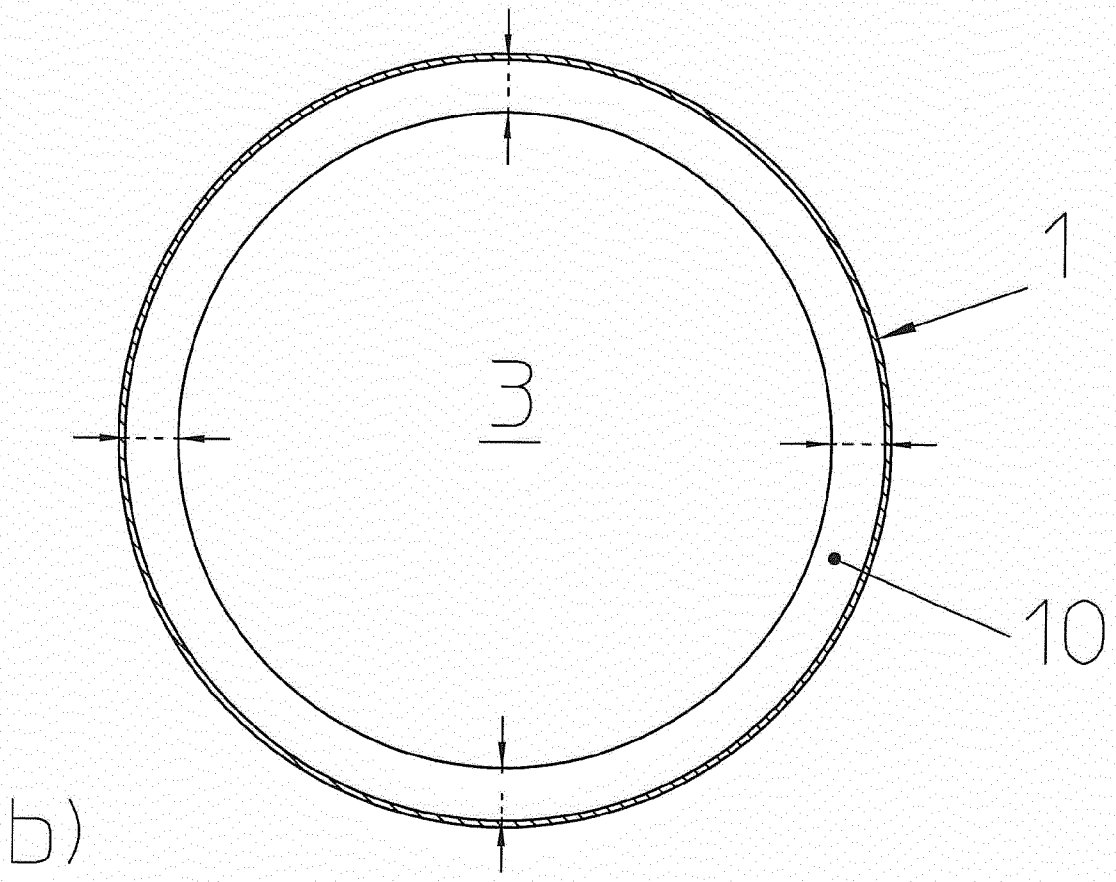
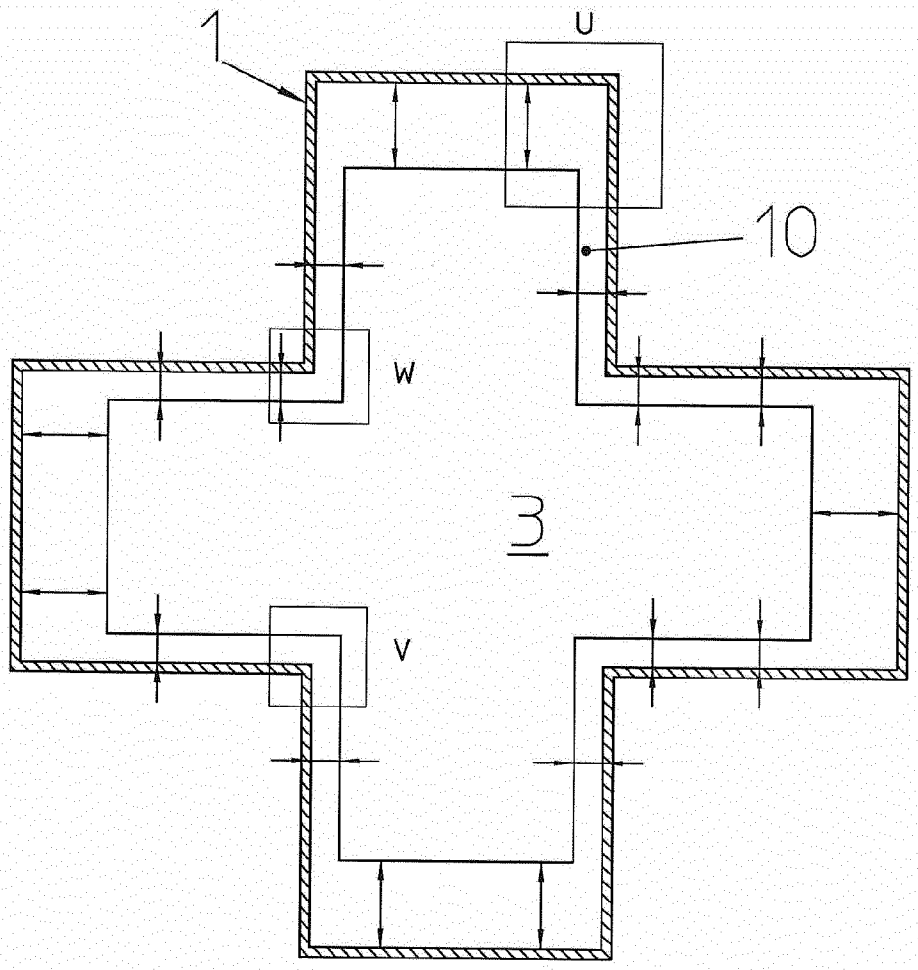
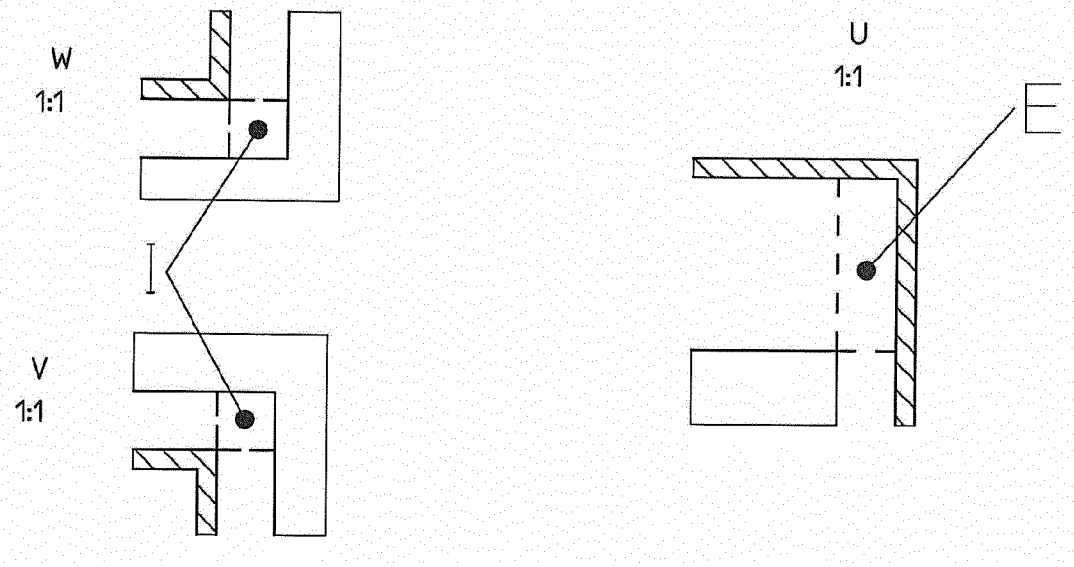


Fig. 19



c)



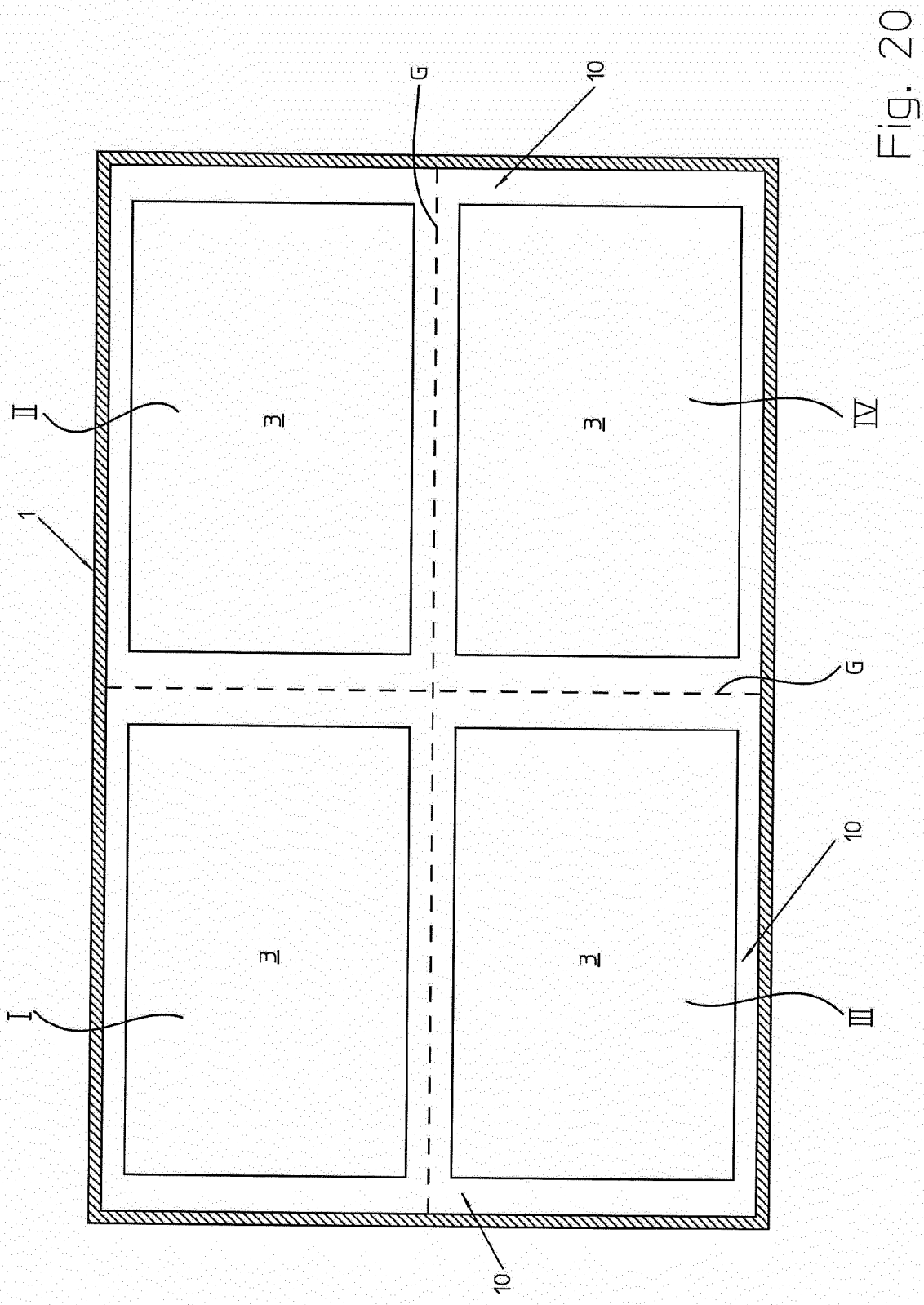


Fig. 20