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(54) **REFRIGERATOR WITH NOISE REDUCTION SYSTEM**

KÜHLSCHRANK MIT LÄRMMINDERUNGSSYSTEM

REFRIGERATEUR AVEC SYSTEME DE REDUCTION DU BRUIT

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Description

TECHNICAL FIELD

[0001] The present invention relates to a refrigerator and/or freezer cabinet comprising an outer shell, an inner shell and at least one cooling system having at least one evaporator, at least one compressor and at least one condenser between which a cooling agent is circulated through a cooling tube. Each of said evaporators is being positioned inside a cabinet space, said compressor being positioned in a compressor space and at least one of said condensers being mounted at the outer shell on the rear side of said cabinet so that a condenser space is formed extending in a vertical direction between the outer shell and the condenser. At least one opening of said compressor space is substantially facing the rear side of said cabinet. At least one covering plate is being positioned at the rear side of said cabinet and at least partly covering said condenser, said plate being mounted substantially in parallel with said rear side of said outer shell. Such a refrigerator and/or freezer is known from GB-A-2200980.

BACKGROUND

[0002] Conventional refrigerator of freezer cabinets are provided with at least one compartment for storing groceries, each compartment being enclosed by an inner liner of said cabinet and a door. The cabinet has at least one cooling system for cooling the cabinet compartment/-s. If the cabinet combines refrigeration and freezing it may comprise two different cooling systems. Each cooling system comprises at least one evaporator, one condenser and one compressor. The compressor for example can be used both for a refrigerator compartment and a freezer compartment. The cooling system also comprises a cooling pipe or tube which connects said parts in order for cooling agent to flow. During operation the cooling agent circulates through the closed cooling system from the evaporator to the condenser. In each compartment the heat is received by the agent inside the evaporator. The received hear causes the agent to vaporize. In the condenser the vaporized agent transmits the heat energy to the outside air, whereby the agent is liquefied again. The compressor keeps up the pressure of the agent and makes it circulate in the cooling system.

[0003] The condenser is normally placed along the vertical backside of the cabinet on its outside and is normally covering a major parts of said backside. It comprises a tube section with a lot a parallel turns together with fins in order to increase the contact surface with the surrounding air. There is also normally a space between the backside and the condenser which improves the air flow along the condenser. The space forms a vertical duct along the backside. When the air receives the heat energy from the agent in the condenser it starts rising upwards, which causes air to normally flow upwards along the duct.

[0004] The compressor in the cooling system is normally placed in a compressor space in the bottom part of the cabinet. If the cabinet has two compressors both are normally placed in the same space. The space is normally rectangular and stretches from the furthest back part of the cabinet and a bit forward. This space steals volume from the cabinet compartment which can be seen looking into the compartment. A channel or duct connects the compressor space with an opening facing the front side of the cabinet at the bottom of the cabinet. The channel helps the air to circulate and ventilate heat transferred from the condenser. The compressor and a heat exchanger placed in the same space also produces a lot of heat which is ventilated by said airflow. The flow circulates through the bottom duct, via the compressor space upwards along the condenser duct.

[0005] One major problem with cooling systems of this type is that they produce noise emissions. These could for example be caused by boiling or flowing agent or resonance vibrations caused by the compressor motor. Flowing noises is also emitted by the heat exchanger as part of the cooling system. Particularly, as the compressor space communicates through the mentioned openings, noise from the compressor or heat exchanger such as noise generated when the motor of the compressor is rotated, noise generated when lubricating oil is stirred, noise generated by the flowing cooling agent and noise generated by resonance is transferred to the open room around the cabinet.

[0006] The object of the present invention is therefore to provide a solution to the noise emission problems of existing refrigerator or freezer cabinets and to provide refrigerator or freezer cabinet with at least one cooling system wherein noise generated by the cooling system, such as compressor sound emissions is effectively attenuated. The cabinet should also provide a heat transfer that works efficient enough, not causing any problems for the cooling system of the cabinet. The cabinet of the present invention provides a solution to the above-mentioned objects.

SUMMARY OF THE PRESENT INVENTION

[0007] The present invention relates to a refrigerator and/or freezer cabinet as defined in claim 1.

[0008] Moreover, the opening of said compressor space is being partly covered by one plate in which the partly covered opening comprises one open section facing upwards in a substantially vertical direction, said open section connecting said compressor space at least with said duct. The furthest back of at least one of said plates is preferably substantially positioned at a vertical surface which is substantially parallel with the backside and in level with the furthest back part of said cabinet. Further, at least one of said plates at least comprises one part made in metal, plastic or a sound absorbing soft material.

[0009] Furthermore, said sound absorbing means consist in at least one sound absorbing plate made in a sound

absorbing material, preferably made of a polyester foam sound absorbing material. Further, it is preferable that the plate of any embodiment is being designed with two parallel shoulders extending vertically along at least parts of the right and left side of said plate, said plate at least partly being in contact with said backside through said shoulders. In any embodiment the plate should preferably be in substantially airtight surface contact with said cabinet at its two vertical sides and at its lower horizontal side.

[0010] The plate of any embodiment preferably extends substantially from the level of the cabinet bottom at least up to the highest level of said opening of the compressor space. Where said sound absorbing plate of one embodiment is preferably being mounted on the side of the plastic plate which faces the cabinet, the absorbing plate preferably extending substantially from the level of the cabinet bottom at least up to the highest level of said opening of the compressor space. The absorbing plate when relevant substantially fills the space between the metal plate and the condenser.

[0011] Further, a horizontal compressor duct connects said compressor space with an compressor opening substantially facing the front side of said cabinet, the bottom of said compressor duct being substantially covered by a sound absorbing material, preferably made of a polyester foam sound absorbing material. The sound absorbing material is preferably substantially or at least half the volume of said compressor duct.

DESCRIPTION OF DRAWINGS

[0012] The invention will be described in form of an illustrative embodiment by making reference to the accompanying drawings, in which:

Fig. 1 shows a perspective view of a refrigerator or freezer cabinet on which the present invention is being applied.

Fig. 2 shows a perspective view of a cabinet according to fig. 1 together with the present invention.

Fig. 3 shows a blown out perspective view of the cabinet and present invention according to fig. 2.

Fig. 4 shows a blown out perspective view of parts of the present invention according to fig. 2.

DESCRIPTION OF AN ILLUSTRATIVE EMBODIMENT

[0013] An illustrative embodiment of the present invention will now be described in relation to the accompanied figures 1 - 4. In fig. 1 the rear parts of a refrigerator or freezer cabinet of a conventional type is shown. The cabinet comprised an outer shell 10 normally made in metal or plastic. The shell enclosed an inner liner (not shown) which is normally made of molded plastic. Between the shell and the liner, insulation material is placed which keeps the cool energy inside the cabinet. A door (not shown) on the front side encloses a compartment together with the inner liner. The cabinet may have more than one compartment, each having the function of working as a refrigerator or freezer cabinet.

[0014] The cabinet furthermore comprises a back plate 11 held in place by hooking means 12 formed as part of the outer shell 10. This type of solution is not necessary but illustrates how a back plate could be mounted. From now on the back plate together with the hooking means will be called the "backside" of the cabinet, which is the cabinets rear side facing backwards. A condenser 13 is mounted at the backside of the cabinet. The condenser consists a tube 14 meandering back and forth along the backside in parallel turns. Moreover, the condenser comprises fins 15 that improve the heat transfer from the condenser. The condenser is supported by holders 18. These holds the condenser in a position distanced from and not in direct contact with the backside and in parallel with said side. The distance forms a space along the backside stretching as a duct or channel from the lower to the upper point of the condenser 13.

[0015] The condenser 13 is the only part shown in the figures of the cooling system which provides cooling energy to a compartment. The system also comprises one evaporator in each compartment and one compressor. The system may be used also for cabinets having both a refrigeration compartment and a freezer compartment. The parts mentioned are all connected with a tube and together forms a closed system in which cooling agent flows. The agent flows through the evaporator where it receives heat and therefore vaporizes. When the agent flows though the condenser the heat energy of the agent is then transferred out into the air, whereby the agent is again liquefied. The compressor keeps up the circulation and pressure inside the closed cooling system.

[0016] The compressor (not shown) is normally placed in a compressor space 16 in the bottom part of the cabinet. If the cabinet has two compressors, both are normally placed in the same space. The cooling system also comprises a heat exchanger (not shown) placed in the same space. As shown in fig. 1 the space is normally rectangular and stretches from the furthest back part of the cabinet and a bit forward. This space steals volume from the cabinet compartment, which can be seen if one is looking into the compartment. Moreover, a channel or duct 17 connects the compressor space with an opening (not shown) facing the front side of the cabinet at the bottom of the cabinet.

[0017] In order to transfer and remove heat emitted from the compressor and the condenser 13 air circulates. The heating of the air drives the circulation. The heated air flows from the front opening of the duct 17 into the compressor space 16 and upward along the condenser through the duct. Since nothing hinders the air it may also flow upward in other places. The heat is effectively removed by the airflow.

[0018] The problem of cooling systems is that they often produce noise emissions. These could for example be caused by boiling or flowing agent or resonance vibrations caused by the compressor motor. These emissions could be very disturbing for the user. Most noise emissions caused by vibrations etc. come directly from the compressor and most of the sound emissions caused by the flowing agent come from the heat exchanger. The features of the present invention intends to solve this problem and also enable an effective air circulation in order to allow heat to be removed as effective as necessary.

[0019] In fig. 2 - 4 the features of an illustrative embodiment of the present invention are shown. In fig. 2 a cover plate 20 stretches from the lower point of the cabinet upward along the backside at least to the middle of said cabinet. The plate is placed outside the condenser and covers the opening of the compressor space 16 facing backwards. The plate is preferably made in plastic, vacuum molded and around 2 millimeters thick. A preferable material is polystyrenebutadiene. In fig. 3 all parts of the present invention are shown. A sound absorption plate 21 is mounted between the cover plate and the backside of the cabinet. The sound absorption plate may for example be made in a polyester foam sound absorbing material. The absorption plate may preferably also be deformable in order to work effective with the cabinet. Moreover, said absorption material should of course work effective when it comes to sound absorption and handle the heat created by the cooling system. Preferably, the absorption material should also be able to ventilate heat through its fiber structure without allowing sound emissions to pass.

[0020] In fig. 4 the side of the cover plate 20 which faces the backside of the cabinet is shown. The absorption plate 21 has a certain thickness which is not specified further. The demand of the plate 21 is to fit, deform and work in a good way together with the cabinet. The cover plate has two horizontal walls 22 between which the absorption plate should fit. Moreover, the cover plate has two shoulders 23 formed in one piece with said plate. The plate is substantially flat as shown in the figures. The shoulders stretch from the upper part of the plate downward along the left and right sides of the cover plate. Further, reinforcements 24 helps up the stiffness of the 2 millimeters thin cover plate 20. The cover plate 20 in the illustrative embodiment is preferably around 1100 millimeters long and the sound absorption plate 21 is around 600 millimeters long.

[0021] When the cover plate 20 and sound absorption plate 21 are mounted together their connection is shown in fig. 4. In fig. 3 it is then shown how these plates cooperates with the cabinet. When mounted in place as shown in fig. 2, the inner parts of the shoulders 23 will substantially rest on the back plate 11. The shoulders also enable to form a distance between the back plate and the main flat part of the cover plate. The distance is large enough for the condenser to fit between the two plates. Moreover, enough distance it available for the sound absorption plate 21 to deform and fit between the cover plate and the outside of the condenser 13. The lower parts of the cover plate sides and the bottom of the cover plate cooperates with the rear sides of the outer shell 10 which results in a substantially air tight attachment between the plate sides and the shell sides.

[0022] The result, as shown in fig. 2, it that the cover plate 20 together with the sound absorption plate will cover at least a part of the backside. Since the cover plate is provided with shoulders, the mounted plates will cause a very little increase in dimensions of the cabinet. The furthest back part of the cover plate will be substantially positioned at a level backward which is substantially the same as the level of the furthest back part of said cabinet. In theory this means that the furthest back part of the cover plate is substantially positioned at a vertical surface which is substantially parallel with the backside and in vertical level with the furthest back part of said cabinet.

[0023] Moreover, the duct formed between the condenser 13 and the back plate 11 will be unaffected by the plates 20-21. The air will circulate via the duct 17, through the compressor space 16 and upward along the duct formed between the condenser 13 and the back plate 11. The shoulders will hinder circulating air from leaking out at the hooking means 12. Since the air circulation works as necessary, the heat generated at the compressor, heat exchanger and the condenser will be removed effectively.

[0024] The plates will furthermore isolate from noise mainly emitted from the compressor and the heat exchanger to reach out to the open room surrounding the cabinet. The sound transferred backwards will the blocked by the plates 20-21 and sound transported upwards though the duct formed at the condenser 13 will be absorbed by the sound absorption plate 21 extending upwards a bit along said duct. It is shown that the sound absorption effect is maximized with a cover plate of 1100 millimeters and an absorption plate of around 600 millimeters. Increasing the height of the cover plate will only give eye-looking benefits and increasing the height of the absorption plate will give negative results for the heat removal effect.

[0025] In order to further increase the sound absorption a sound absorption plate 25 is also placed inside the duct 17 extending between the compressor space 16 and an opening facing the front side of the cabinet. As shown in fig. 3 the plate substantially covers the whole bottom of said duct 17. This means that the plate has a width substantially corresponding to the breadth of the compressor space. The plate is preferably made in the same material as the absorption plate 21. Moreover, the volume of the plate fills a substantial part of the duct, for example half of the volume of said duct. For information, the duct of the illustrative embodiment extends horizontally from the compressor space 16 along the bottom of the cabinet. The duct 17 is enclosed by a cabinet outer shell 10 bottom plate, 2 vertical outer shell side plates

and one upper plate defining the bottom of the lower compartment.

[0026] The noise emitted frontward through the duct 17 from the compressor and heat exchanger will be absorbed by the plate 25. The plate 25 volume is maximized in order to achieve the best sound absorption effect without causing negative results for the air circulation and the heat removal effect. Preferably, the volume of the plate 25 may be half the volume of the duct 17.

[0027] It will be appreciated by those ordinary people skilled in the art that the present invention can be embodied in other specific forms without departing from the spirit or essential character thereof. The present disclosed embodiment is therefore considered in all respect to be illustrative and not restrictive. The scope of the invention is indicated by the appended claims rather than the foregoing description, and all changes which come within the meaning and range of equivalents thereof are intended to be embraced therein.

[0028] This means that the scope of the invention is to use material the remove noise emitted from a cooling system to the open room surrounding the refrigerator or freezer cabinet. And also to use a plate positioned on the rear side of the cabinet in order to achieve this without loosing heat convection effect. It should be understood by a person skilled in the art to replace the plates described with only one plate or another combination of plates to improve the sound absorption effect. Moreover, the dimensions of each plate in the illustrative embodiment should not be seen as limiting. Any dimensions choose depends on which cabinet the invention is applied to and which materials that are used. It is therefore obvious for a person skilled in the art to choose the proper dimensions in order to maximize the sound absorption effect without loosing too much of the heat removal properties. The dimension selection also encounters the sound absorptions plate placed in the horizontal duct at the compressor space.

[0029] It should also be understood by the person skilled in the art to use the same solution for a dynamic refrigerators or freezers having a cooling system using a fan. A fan of a dynamic cooling system placed on the upper part of the rear side of the cabinet could be covered by a plate in the same manner. This could be the same plate as in the illustrative embodiment, extending all the way up to the fan, or an extra plate positioned vertically above the first plate. The demands of air circulation and sound absorption for this plate is solved in the same manner and falls within the scope of the present invention. This particularly relates to the design and selection of material.

Claims

1. A refrigerator and/or freezer cabinet comprising an outer shell (10), an inner shell and at least one cooling system having at least one evaporator, at least one compressor and at least one condenser (13) between which a cooling agent is circulated through a cooling tube, each of said evaporators being positioned inside a cabinet compartment, at least one compressor being positioned in a compressor space (16) and at least one condenser (13) being mounted at the outer shell (10) on the rear side of said cabinet so that a condenser space is formed extending in a vertical direction between the outer shell (10) and the condenser (13), at least one opening of said compressor space (16) substantially facing the rear side of said cabinet, at least one covering plate (20) being positioned at the rear side of said cabinet and at least partly covering said condenser, said plate (20) being mounted substantially in parallel with said rear side of the outer shell (10), **characterized in that** sound absorbing means (21) are mounted between said plate (20) and said condenser (13), wherein said opening is being partly covered by said at least one covering plate (20), and wherein said sound absorbing means (21) extends substantially from the level of the cabinet bottom at least up to the highest vertical level of said opening of the compressor space (16).

2. A refrigerator or freezer cabinet according to claim 1 **characterized in that** said partly covered opening comprises at least one open section facing the rear side of said cabinet, said open section connecting said compressor space (16) with said condenser space.

3. A refrigerator or freezer cabinet according to any of the preceding claims **characterized in that** the furthest back part of at least one of said covering plates (20) is substantially positioned at a vertical plane which is substantially parallel with the rear side of said outer shell (10), the furthest back part of said cabinet is being positioned substantially at said plane.

4. A refrigerator or freezer cabinet according to any of the preceding claims **characterized in that** at least one of said covering plates (20) at least comprises one part made in metal, plastic or an sound absorbing material.

5. A refrigerator or freezer cabinet according to any of the preceding claims **characterized in that** said sound absorbing means consist in at least one sound absorbing plate (21) made in a sound absorbing material.

6. A refrigerator or freezer cabinet according to any of the preceding plates **characterized in that** said covering plate (20) is being designed with two parallel shoulders (12) extending vertically along at least parts of the right and left side of said plate (20), said

plate (20) at least partly being in contact with the rear side of said outer shell (10) through said shoulders (12).

7. A refrigerator or freezer cabinet according to any of the preceding claims **characterized in that** said covering plate (20) is being in substantially air tight surface contact with said cabinet at least at parts of the two vertical sides and at its lower horizontal side.

8. A refrigerator or freezer cabinet according to any of the preceding claims **characterized in that** said covering plate (20) extends substantially from the level of the cabinet bottom at least up to the highest vertical level of said opening of the compressor space (16).

9. A refrigerator or freezer cabinet according to any of the preceding claims **characterized in that** said sound absorbing means (21) is being mounted on the side of the covering plate (20) which faces the cabinet.

10. A refrigerator or freezer cabinet according to any of the preceding claims **characterized in that** said sound absorbing means (21) substantially fills the space between the covering plate (20) and the condenser (13).

11. A refrigerator or freezer cabinet according to any of the preceding claims **characterized in that** a horizontal compressor duct (17) connects said compressor space (16) with an compressor opening substantially facing the front side of said cabinet, the bottom of said compressor duct (17) being substantially covered by a plate (25) of sound absorbing material.

12. A refrigerator or freezer cabinet according to claim 11 **characterized in that** the volume of said plate (25) of sound absorbing material is substantially or at least half the volume of said compressor duct (17).

13. A refrigerator or freezer cabinet according to any of the preceding claims **characterized in that** said sound absorbing material consists in a polyester foam material.

Patentansprüche

1. Kühl- und/oder Gefrierschrank, umfassend einen Außenmantel (10), einen Innenmantel und mindestens ein Kühlsystem mit mindestens einem Verdampfer, mindestens einem Kompressor und mindestens einem Verflüssiger (13), zwischen denen über ein Kühlrohr ein Kühlmittel zirkuliert, wobei jeder der Verdampfer in einem Schrankfach positioniert ist, mindestens ein Kompressor in einem Kompressorraum (16) positioniert ist und mindestens ein Verflüssiger (13) am Außenmantel (10) an der Rückseite des Schranks montiert ist, so dass ein Verflüssigerraum gebildet wird, der sich in einer vertikalen Richtung zwischen dem Außenmantel (10) und dem Verflüssiger (13) erstreckt, wobei mindestens eine Öffnung des Kompressorraums (16) im wesentlichen der Rückseite des Schranks zugewandt ist und mindestens eine Abdeckplatte (20) an der Rückseite des Schranks positioniert ist und den Verflüssiger wenigstens teilweise abdeckt, wobei die Platte (20) im wesentlichen parallel zu der Rückseite des Außenmantels (10) montiert ist, **dadurch gekennzeichnet, dass** ein schallabsorbierendes Mittel (21) zwischen der Platte (20) und dem Verflüssiger (13) montiert ist, wobei die Öffnung teilweise von der mindestens einen Abdeckplatte (20) abgedeckt wird und wobei sich das schallabsorbierende Mittel (21) im wesentlichen von der Ebene des Schrankbodens mindestens bis zur höchsten vertikalen Ebene der Öffnung des Kompressorraums (16) erstreckt.

2. Kühl- oder Gefrierschrank gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die teilweise abgedeckte Öffnung mindestens einen offenen Abschnitt aufweist, welcher der Rückseite des Schranks zugewandt ist, wobei der offene Abschnitt den Kompressorraum (16) mit dem Verflüssigerraum verbindet.

3. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der am weitesten hinten liegende Teil mindestens einer der Abdeckplatten (20) im wesentlichen an einer vertikalen Fläche angeordnet ist, die im wesentlichen parallel zu der Rückseite des Außenmantels (10) ist, wobei der am weitesten hinten liegende Teil des Schranks im wesentlichen an dieser Fläche positioniert ist.

4. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** mindestens eine der Abdeckplatten (20) mindestens einen Teil umfasst, der aus Metall, Kunststoff oder einem schallabsorbierenden Material gefertigt ist.

5. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das schallabsorbierende Mittel aus mindestens einer schallabsorbierenden Platte (21) besteht, die aus einem schallabsorbierenden Material gefertigt ist.

6. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abdeckplatte (20) mit zwei parallelen Schultern (12) ausgeführt ist, die sich vertikal wenig-

stens entlang Teilen der rechten und linken Seite der Platte (20) erstrecken, wobei die Platte (20) über die Schultern (12) zumindest teilweise in Kontakt mit der Rückseite des Außenmantels (10) ist.

7. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Abdeckplatte (20) zumindest an Teilen der zwei vertikalen Seiten und der unteren horizontalen Seite in im wesentlichen luftdichtem Oberflächenkontakt mit dem Schrank steht.

8. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** sich die Abdeckplatte (20) im wesentlichen von der Ebene des Schrankbodens mindestens bis zu der höchsten vertikalen Ebene der Öffnung des Kompressorraums (16) erstreckt.

9. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet**, das das schallabsorbierende Mittel (21) an der Seite der Abdeckplatte (20) montiert ist, die dem Schrank zugewandt ist.

10. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das schallabsorbierende Mittel (21) im wesentlichen den Raum zwischen der Abdeckplatte (20) und dem Verflüssiger (13) ausfüllt.

11. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** eine horizontale Kompressorleitung (17) den Kompressorraum (16) mit einer Kompressoröffnung verbindet, die im wesentlichen der Vorderseite des Schranks zugewandt ist, wobei der Boden des Kompressorkanals (17) im wesentlichen von einer Platte (25) aus schallabsorbierendem Material abgedeckt wird.

12. Kühl- oder Gefrierschrank gemäß Anspruch 11, **dadurch gekennzeichnet, dass** das Volumen der Platte (25) aus schallabsorbierendem Material im wesentlichen oder mindestens zur Hälfte dem Volumen der Kompressorleitung (17) entspricht.

13. Kühl- oder Gefrierschrank gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das schallabsorbierende Material aus einem Polyesterschaummaterial besteht.

Revendications

1. Caisse de réfrigérateur et/ou congélateur comprenant une coque externe (10), une coque interne et au moins un système réfrigérant ayant au moins un évaporateur, au moins un compresseur et au moins un condenseur (13) entre lesquels un agent réfrigérant est mis en circulation à travers un tube réfrigérant, chacun desdits évaporateurs étant positionné à l'intérieur d'un compartiment de caisse, au moins un compresseur étant positionné dans un espace de compresseur (16) et au moins un condenseur (13) étant monté sur la coque externe (10) sur le côté arrière de ladite caisse de sorte qu'un espace de condenseur est formé s'étendant dans une direction verticale entre la coque externe (10) et le condenseur (13), au moins une ouverture dudit espace de compresseur (16) étant sensiblement face au côté arrière de ladite caisse, au moins une plaque de couverture (20) étant positionnée au niveau du côté arrière de ladite caisse et couvrant au moins en partie ledit condenseur, ladite plaque (20) étant montée sensiblement parallèlement audit côté arrière de la coque externe (10), **caractérisée en ce que** des moyens d'absorption des sons (21) sont montés entre ladite plaque (20) et ledit condenseur (13), où ladite ouverture est en partie couverte par ladite au moins une plaque de couverture (20), et où lesdits moyens d'absorption des sons (21) s'étendent sensiblement depuis le niveau du fond de la caisse au moins jusqu'au niveau vertical le plus haut de ladite ouverture de l'espace de compresseur (16).

2. Caisse de réfrigérateur ou congélateur selon la revendication 1, **caractérisée en ce que** ladite ouverture en partie couverte comprend au moins une section ouverte faisant face au côté arrière de ladite caisse, ladite section ouverte raccordant ledit espace de compresseur (16) audit espace de condenseur.

3. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la partie arrière la plus éloignée d'au moins une desdites plaques de couverture (20) est positionnée sensiblement dans un plan vertical qui est sensiblement parallèle au côté arrière de ladite coque externe (10), la partie arrière la plus éloignée de ladite caisse étant positionnée sensiblement dans ledit plan.

4. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce que** au moins l'une desdites plaques de couverture (20) comprend au moins une pièce réalisée en métal, plastique ou un matériau absorbant les sons.

5. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce que** lesdits moyens d'absorption des sons consistent en au moins une plaque absorbant les sons (21) réalisée en un matériau absorbant les sons.

6. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ladite plaque de couverture (20) est conçue avec deux épaulements parallèles (12) s'étendant verticalement le long d'au moins des parties des côtés droit et gauche de ladite plaque (20), ladite plaque (20) étant au moins en partie en contact avec le côté arrière de ladite coque externe (10) à travers lesdits épaulements (12).

7. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ladite plaque de couverture (20) est en contact par surface de manière sensiblement étanche à l'air avec ladite caisse au moins au niveau de parties des deux côtés verticaux et au niveau de son côté horizontal inférieur.

8. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ladite plaque de couverture (20) s'étend sensiblement depuis le niveau du fond de la caisse au moins jusqu'au niveau vertical le plus haut de ladite ouverture de l'espace de compresseur (16).

9. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce que** lesdits moyens d'absorption des sons (21) sont montés sur le côté de la plaque de couverture (20) qui fait face à la caisse.

10. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce que** lesdits moyens d'absorption des sons (21) remplissent sensiblement l'espace entre la plaque de couverture (20) et le condenseur (13).

11. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**une conduite de compresseur horizontale (17) raccorde ledit espace de compresseur (16) à une ouverture de compresseur faisant sensiblement face au côté avant de ladite caisse, le fond de ladite conduite de compresseur (17) étant sensiblement couvert par une plaque (25) en matériau absorbant les sons.

12. Caisse de réfrigérateur ou congélateur selon la revendication 11, **caractérisée en ce que** le volume de ladite plaque (25) de matériau absorbant les sons fait sensiblement ou au moins la moitié du volume de ladite conduite de compresseur (17).

13. Caisse de réfrigérateur ou congélateur selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ledit matériau d'absorption des sons consiste en un matériau en mousse de polyester.

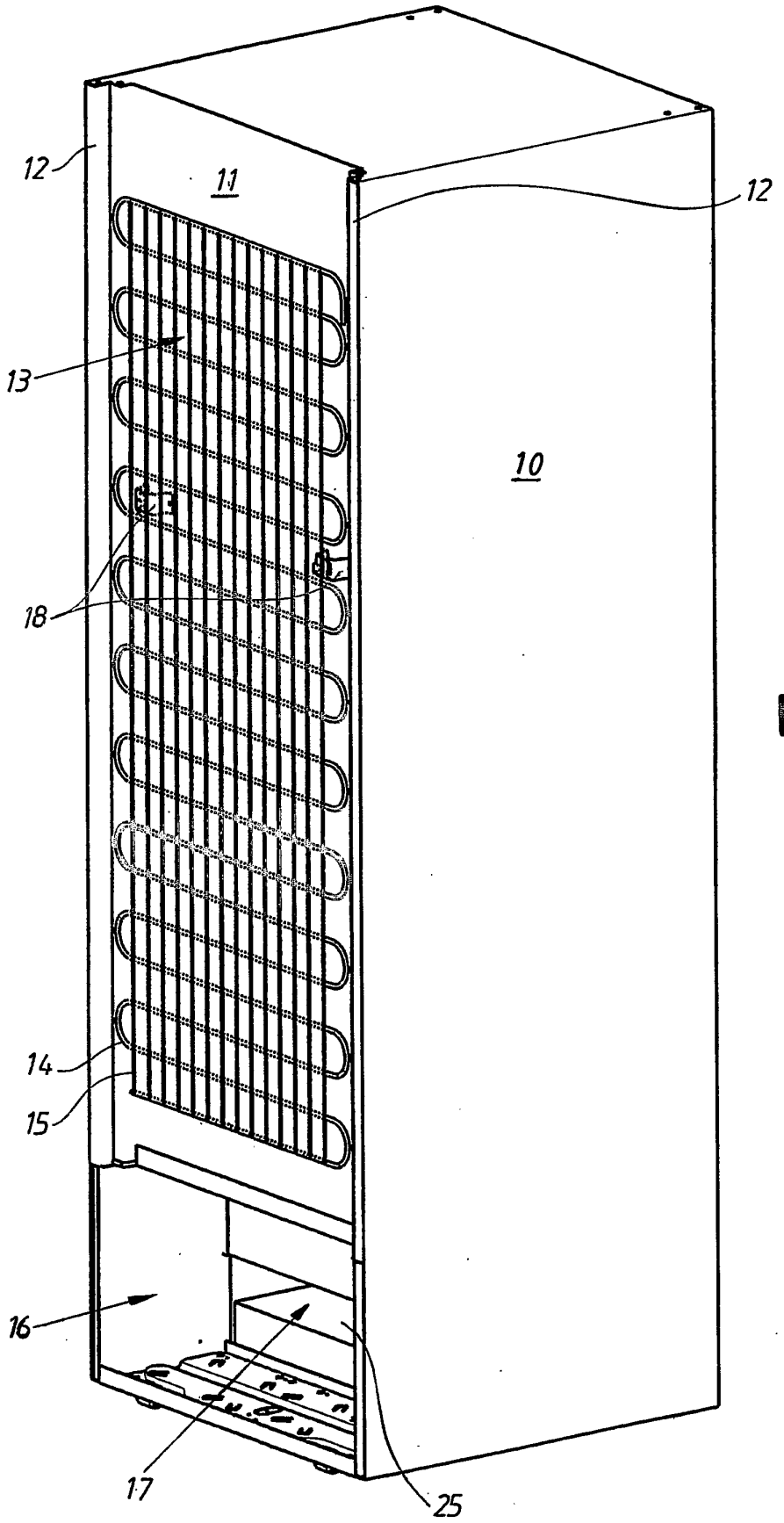


FIG.1

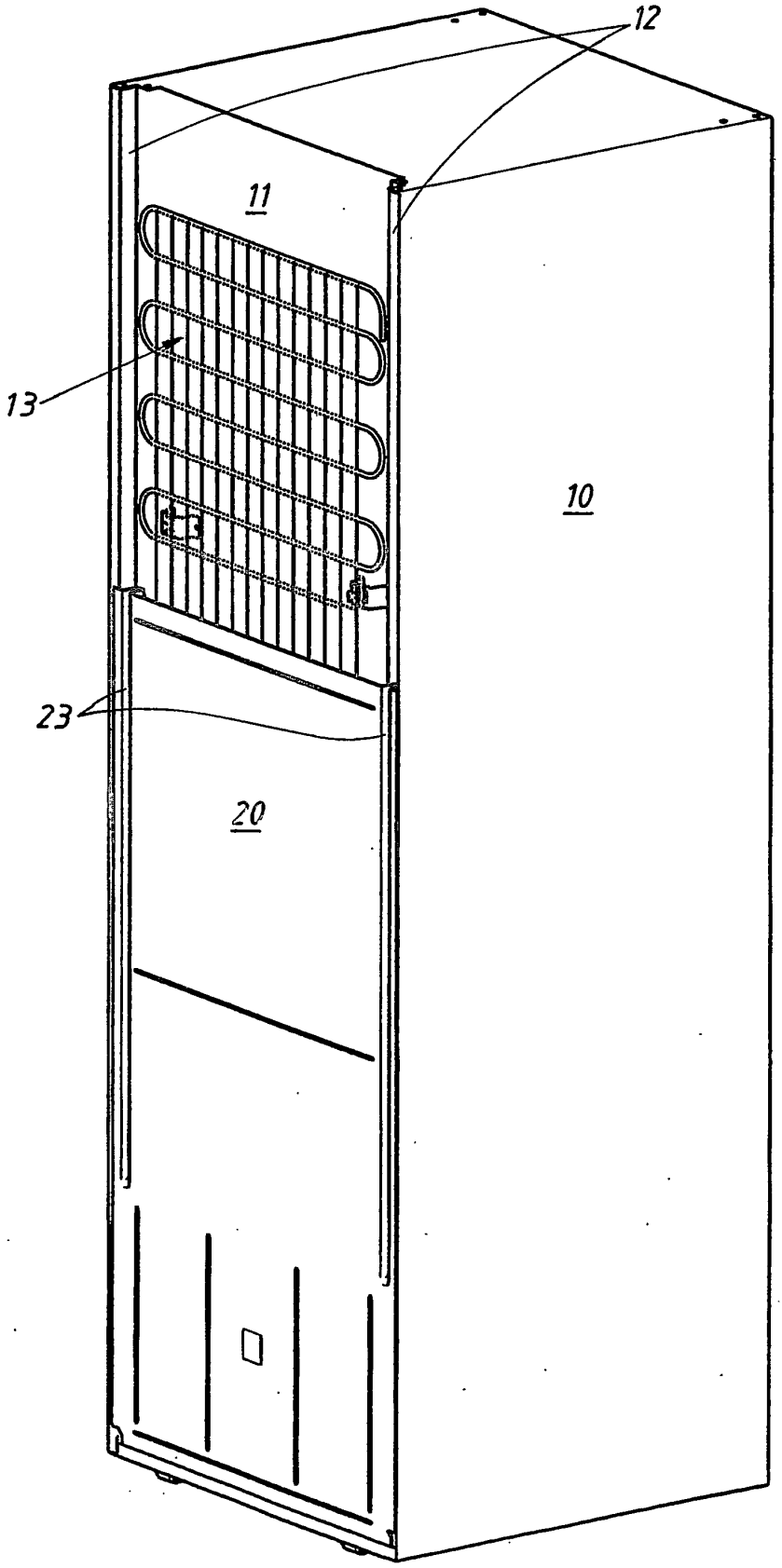


FIG. 2

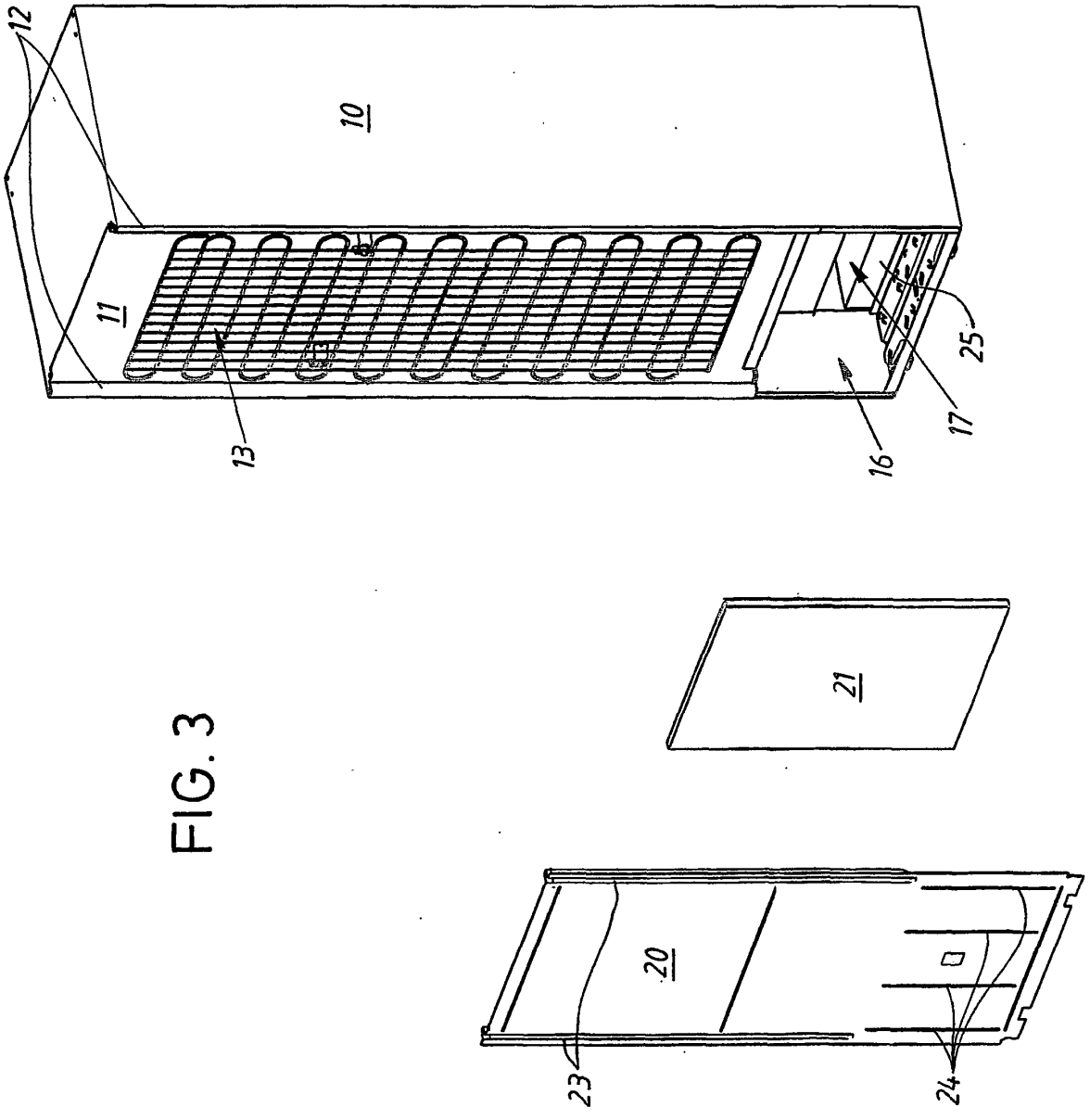
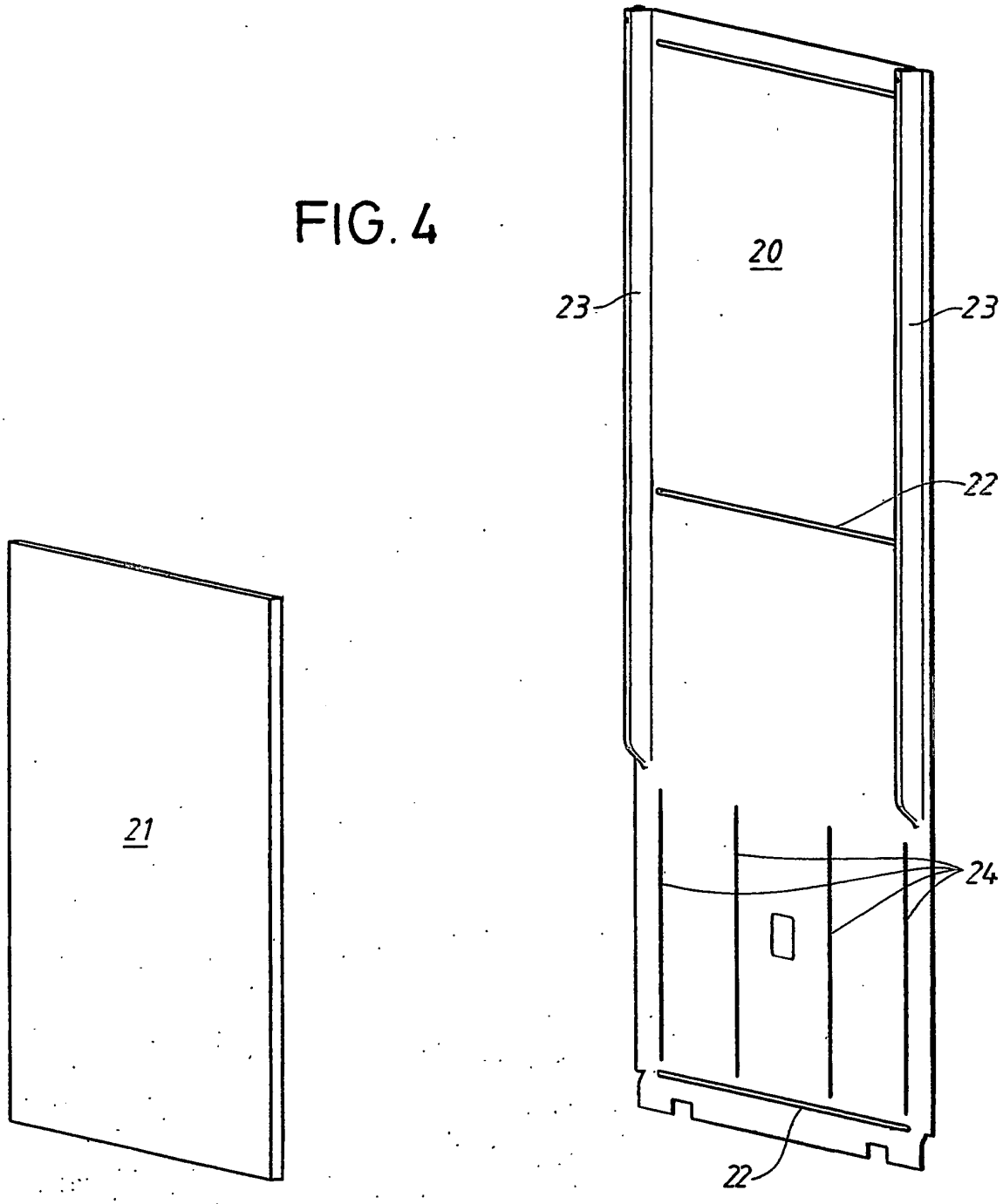


FIG. 3

FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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