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(54) **TEMPERATURE CONTROLLED CABINET**

(57) The invention relates to a temperature controlled cabinet comprising cooling equipment (33, 34, 36) and a frame structure, which comprises side walls and a back wall (15), which temperature controlled cabinet (10) is open or openable on the front side of the temperature controlled cabinet (10), in which temperature controlled cabinet (10) inside the frame structure is a product space (11) and in which temperature controlled cabinet (10) above the product space (11) an equipment space (12) for the cooling equipment is located. The cooling equipment (33, 34, 36) and its support structures (22, 23, 21) are constructed as a releasably to the temperature controlled cabinet (10) connected cooling equipment module (20) that is mountable and demountable from front of the temperature controlled cabinet (10) through the open or openable front side of the temperature controlled cabinet (10) and that the cooling equipment module (20) is connected to the temperature controlled cabinet (10) by a connecting

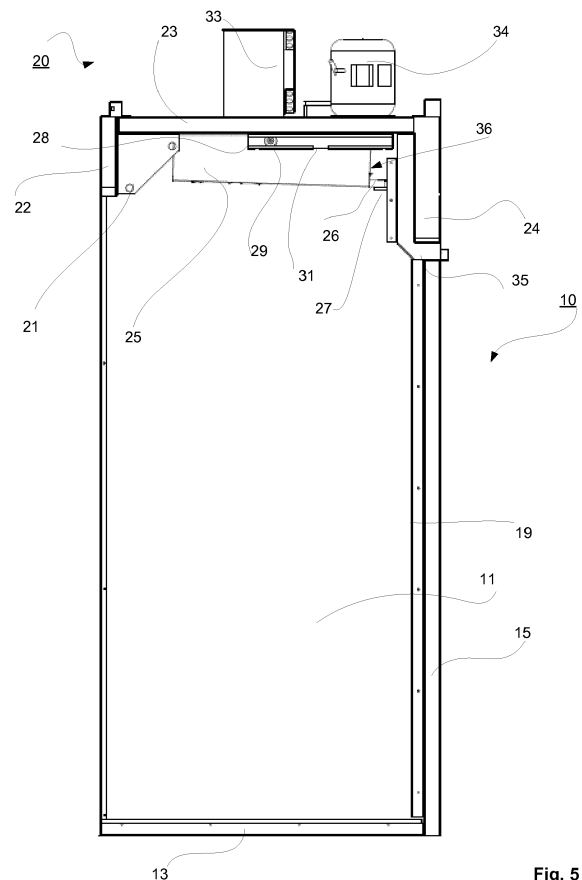


Fig. 5

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Description

[0001] The present invention relates to a temperature controlled cabinet and especially the invention relates to a temperature controlled cabinet according to the preamble of claim 1.

[0002] Different types of temperature controlled cabinets are known from prior art for grocery stores, super markets etc. and for institutional catering services, for example for schools, canteens, cafeterias. Temperature controlled cabinets are employed for products, such as food stuffs, beverages and like that must be kept in cooled temperatures i.e., in temperatures below +8 °C, and to allow users or customers to access groceries and other refrigerated or frozen items from the cabinet. The temperature controlled cabinet comprises typically shelves for the products and often at least partially transparent wall structure in order to provide direct view to the products inside. Often, they also include a light source that illuminates the product display area for better marketing of the food product and for higher visibility.

[0003] These types of temperature controlled cabinets typically comprise frame structures and wall structures with at least one door or without the doors with at least one open wall for customers to access the products and shelves and/or other structures for the products. The temperature controlled cabinets may comprise temperature control units such as cooling equipment with blowing devices to create temperature controlled gas, usually air flows to the interior of the cabinet in order to keep inside of the cabinet and the products inside in the required temperature to ensure the required shelf life of the products. The temperature control equipment typically comprises an evaporator and a blower located at equipment space next to the temperature controlled product space with shelves for products. The temperature controlled cabinet may also be without its own temperature control unit such as cooling equipment and in these cases it is connected to a common temperature control system located remote from the temperature controlled cabinet, which common temperature control system provides the temperature controlled gas, typically air flow into the cabinet.

[0004] The present invention relates to a temperature controlled cabinet type that has frame structure comprising side walls and a back wall, and without doors i.e. with an open wall or at least one door on the front side for customers to access the products. Thus the front of the temperature controlled cabinet is open or openable. Inside the frame structure the product space is formed. The equipment space for the cooling equipment of the temperature controlled cabinet is located on top of the product space i.e. to upper part of the temperature controlled cabinet.

[0005] It is known from prior art to construct the cooling equipment as a releasable cooling equipment module that has been mounted and demounted from above the temperature controlled cabinet. In these types of temper-

ature controlled cabinet according to the prior art the location of the cooling equipment module has caused disadvantages as maintenance or change of the cooling equipment has been difficult due to the height and also due to the fact that demounting of the cooling equipment must be done from above and typically from behind the cabinet. Also when mounting the cooling equipment module the lifting height up onto the top of the temperature controlled cabinet has been troublesome and causing awkward work positions. Due to this the temperature controlled cabinets have typically been transported in vertical position i.e. in standing position as the mounting and demounting of the cooling equipment module has been laborious. Or if the transport has been done in horizontal position the cooling module has been transported separately and thus the difficult mounting has been needed after transportation.

[0006] An object of the present invention is to create a temperature controlled cabinet in which the disadvantages of prior art arrangements are eliminated or at least minimized.

[0007] A particular object of the invention is to create a temperature controlled cabinet, in which the maintenance or changing problems caused by the location of the cooling equipment module on top of the temperature controlled cabinet are solved.

[0008] A particular object of the invention is to create a temperature controlled cabinet, in which the difficulties relating to the mounting and demounting of the cooling equipment module of the temperature controlled cabinet are solved.

[0009] In order to achieve the above objects and those that will come apparent later the temperature controlled cabinet is mainly characterized by the features of the characterizing part of claim 1. Advantageous embodiments and features are defined in dependent claims.

[0010] According to the invention the temperature controlled cabinet comprises cooling equipment and a frame structure, which comprises side walls and a back wall, which temperature controlled cabinet is open or openable on the front side of the temperature controlled cabinet, in which temperature controlled cabinet inside the frame structure is a product space and in which temperature controlled cabinet above the product space an equipment space for the cooling equipment is located, wherein the cooling equipment and its support structures are constructed as a releasably to the temperature controlled cabinet connected cooling equipment module that is mountable and demountable from front of the temperature controlled cabinet through the open or openable front side of the temperature controlled cabinet and the cooling equipment module is connected to the temperature controlled cabinet by a connecting structure formed of guides attached to the support structures of the cooling equipment module and of rollers attached to the side walls of the temperature controlled cabinet.

[0011] According to an advantageous feature of the invention the rolls are attached at top part of each side

wall in the product space and connected to the corresponding guides via openings in the guide.

[0012] According to an advantageous feature of the invention each guide on each side next to the corresponding side wall is attached below a horizontal/roof foam plate of the support structures of the cooling equipment module.

[0013] According to an advantageous feature of the invention the rolls are located in front of the center of gravity of the cooling equipment module.

[0014] This inventive connecting structure formed by the guides and rollers provides the possibility of mounting and demounting the cooling equipment module from front side of the temperature controlled cabinet and through the opened door such that the various advantages are achieved and the problems of temperature controlled cabinets of this type known from prior art are solve. Also by this inventive connecting structure formed by the guides and rollers provides the possibility of moving the cooling equipment module to the transport position such that the temperature controlled cabinet can be transported in horizontal position without the need of removing the cooling equipment module and also maintenance or change of the cooling equipment module without moving the temperature controlled cabinet from its use position.

[0015] According to an advantageous feature of the invention the temperature controlled cabinet comprises an outlet projection, which is connected to an outlet attached to a cover plate connected to a horizontal/roof foam plate of the support structures of the cooling equipment module.

[0016] According to an advantageous feature of the invention the temperature controlled cabinet is transportable in horizontal position with the cooling equipment module inside the product space and the rolls in the guides.

[0017] According to an advantageous feature of the invention the support structures of the cooling equipment module are releasably secured to the frame structures of the temperature controlled cabinet by screws, advantageously by knurled-head screws, attached to corresponding holes in the frame structure of the temperature controlled cabinet.

[0018] In this description and the claims by terms vertical and horizontal as well as by terms front, back and side are referred to directions in use position of the temperature controlled cabinet unless otherwise mentioned.

[0019] The temperature controlled cabinet according to the present invention provides many advantages for example the lifting height compared to that of the known cabinets is significantly reduced by several tens of centimeters as the cooling equipment module is mounted and demounted trough the product space of the temperature controlled cabined i.e. via inside and front. Thus a person of normal height does not need to lift the heavy cooling equipment module, which weighs typically 20 - 40 kg, above the shoulder height. This is provides also an important improvement in work safety. Also the main-

tenance and change of the cooling equipment is easier and more efficient as for the maintenance or change of the cooling equipment module of the temperature controlled cabinet can easily be demounted and thus the burning gases of the cooling equipment can be not handled in the place of use but the cooling equipment module can easily be transported to a maintenance place where the maintenance and handling of the gases can be done controllably and safely. The temperature controlled cabinets according to the present invention can be transported in horizontal position, when the cooling equipment module is set to its transport position. In case of need of transport in vertical position the cooling equipment module is in its use position or demounted and transported separately.

[0020] In the following the invention is described in detail with reference to the accompanying drawings, in which in figures 1 - 5 is shown schematically one advantageous example of a temperature controlled cabinet in different stages.

[0021] During the course of the following description of figures 1 - 5 like numbers and signs will be used to identify like elements according to the different views which illustrate the invention. Some repetitive reference signs may have been omitted from the figures for the sake of clarity.

[0022] In figures 1 - 5 is shown a schematical example of a temperature controlled cabinet 10 being substantially rectangular of its form and comprising a product space 11 for products to be kept in the controlled temperature and an above the product space located cooling equipment space 12. Frame structure of the temperature controlled cabinet 10 comprises a bottom frame 13 and back wall 15 and side walls (not shown) located correspondingly on each side of the temperature controlled cabinet 10. A front cover plate 14 is located to cover from front the cooling equipment space 12. Opposite to the back wall 15 and between the side walls of the frame structure in this example is a door 16 with to the frame structure attached hinges 17 is located. The front side of the temperature cabinet 10 is thus openable but it can also be open i.e. without doors for access to products. Inside the product space 11 attached to the back wall 15 is located support structure 19 for shelves 18 (one shown in the figure) attached by fastener parts 32 to the support structure 19.

[0023] The temperature controlled cabinet 10 comprises a cooling equipment module 20 releasably as a block attached to the frame structure of the temperature controlled cabinet 10 on top of the product space 11 in the cooling equipment space 12. The cooling module 20 comprises cooling equipment 33, cooling component 36 and a drive means 34. The temperature controlled cabinet 10 comprises a support structure for the cooling equipment module 10 comprising a vertical foam element 22 and a horizontal/roof foam plate 23. To the vertical foam element 22 and the horizontal/roof foam plate 23

is attached a support plates 21 of the cooling equipment module 20.

[0024] A vertical support part 35 is supported to the back wall 15 on the back side of the temperature cabinet 10. To the vertical support part 35 an outlet projection 27 is attached, which outlet projection 27 is connected an outlet 26 attached to a cover plate 25 connected to the horizontal/roof foam plate 23 of the cooling equipment module 20. The cover plate 25 also functions as an water collector for a condenser of the cooling equipment 33. An evaporation pan 24 can be located above the back wall 15 of the temperature controlled cabinet 10, if need-ed.

[0025] To side walls of the temperature controlled cabinet 10 at the top part of each side wall in the product space 11 is attached a roll 29, which is connectable to a corresponding guide 28 via opening 31 in the guide 28. Each guide 28 on each side next to the corresponding side wall is attached below to the horizontal/roof foam plate 23 of the cooling equipment module 20 such that the cooling equipment module is movable on the guides 28 from use position (figures 1 and 5) to transport position (figure 2), in which the horizontal/roof foam plate 23 is in substantially vertical position and substantially parallel to the back wall 15, and to demounting position (figures 3 and 4), in which the rolls 29 are disconnected from the corresponding guides 28. The rolls 29 are located in front of the center of gravity of the cooling equipment module 20 such that the cooling equipment module 20 stays in place even when securing screws or corresponding are releases and does not fall by itself. This inventive connecting structure formed by the guides 29 and rollers 28 provides the possibility of mounting and demounting the cooling equipment module 20 from front side of the temperature controlled cabinet 10 and through the opened door 16 or an opening, if the temperature controlled cabinet 10 comprises no doors, such that the various advantages of the invention are achieved. Also by this inventive connecting structure formed by the guides 28 and rollers 29 provides the possibility of moving the cooling equipment module 20 to the transport position such that the temperature controlled cabinet 10 can be transported in horizontal position without the need of removing the cooling equipment module 20 and also maintenance or change of the cooling equipment module 20 without moving the temperature controlled cabinet from its use position.

[0026] In figure 1 the temperature controlled cabinet 10 is shown in use position, in which the shelves 18 (one of which is show) are in place for products and the cooling equipment module 20 is at its place in the equipment space 12 above the product space 11 with the front cover plate 14 at its place for visual effect. The cooling module 20 is supported by its support structures on the frame structure of the temperature controlled cabinet 10. The support structures of the cooling equipment module are advantageously releasably secured to the frame structures of the temperature controlled cabinet 10 by screws,

advantageously by knurled-head screws, attached to corresponding holes in the frame structure of the temperature controlled cabinet 10. In this position the rolls 29 are at front area in the guides 28 in front of the center of gravity of the cooling equipment module 20. In the figure 1 only one roll 29 and corresponding guide 28 is shown.

[0027] In figure 2 the temperature controlled cabinet 10 is shown with the cooling equipment module 20 in transport position. It should be noted that in the figure 2 the position is shown vertical for clarity reasons but actually in the transport position the back wall 15 is next to the transport base or transport pallet or corresponding surface and thus the temperature controlled cabinet 10 located horizontally. In this position the rolls 29 are at end positions in the guides 28 i.e. at the back ends of the guides 28. In the figure 2 only one roll 29 and corresponding guide 28 is shown. The front edge i.e. edge on side of the front of the temperature controlled cabinet 10 is inclined down.

[0028] In figure 3 is shown how the cooling equipment module 20 is turned such that the rolls 29 are located at the openings 31 of the guides 28 and the cooling equipment module 20 can be demounted from the temperature controlled cabinet 10. The front edge i.e. edge on side of the front of the temperature controlled cabinet 10 is inclined downwards until the rolls 29 are at the openings 31 of the guides 28. In the figure 3 only one roll 29 and corresponding guide 28 is shown.

[0029] In figure 4 is shown how the cooling equipment module 20 is removed through the opened door 16 from the front side of the temperature controlled cabinet 10.

[0030] In figure 5 the temperature controlled cabinet 10 is shown in use position the cooling equipment module 20 is at its place in the equipment space 12 above the product space 11 with the front cover plate 14 and the shelve 18 not shown. The cooling module 20 is supported by its support structures on the frame structure of the temperature controlled cabinet 10. The support structures of the cooling equipment module are advantageously secured to the frame structures of the temperature controlled cabinet 10 by screws located to corresponding holes in the frame structure of the temperature controlled cabinet 10.

[0031] In figures 1-5 one advantageous example of the invention is show it is apparent that frame and support structures of the temperature controlled cabinet 10 and of the cooling equipment module 20 are constructible in various manners in which detailed structures can vary.

Reference signs used in the drawing:

[0032]

- 10 temperature controlled cabinet
- 11 product space
- 12 equipment space
- 13 bottom frame

14 front cover plate
 15 wall
 16 door
 17 hinge
 18 shelve
 19 support structure for shelves
 20 cooling equipment module
 21 support plate
 22 vertical foam element
 23 horizontal/roof foam plate
 24 evaporation pan
 25 cover plate
 26 outlet
 27 outlet projection
 28 guide
 29 roll
 31 opening
 32 fastener part
 33 cooling equipment
 34 drive means
 35 vertical support part
 36 cooling component

Claims

1. Temperature controlled cabinet (10) comprising cooling equipment (33, 34, 36) and a frame structure, which comprises side walls and a back wall (15), which temperature controlled cabinet (10) is open or openable on the front side of the temperature controlled cabinet (10), in which temperature controlled cabinet (10) inside the frame structure is a product space (11) and in which temperature controlled cabinet (10) above the product space (11) an equipment space (12) for the cooling equipment is located, **characterized in, that** the cooling equipment (33, 34, 36) and its support structures (22, 23, 21) are constructed as a releasably to the temperature controlled cabinet (10) connected cooling equipment module (20) that is mountable and demountable from front of the temperature controlled cabinet (10) through the open or openable front side of the temperature controlled cabinet (10) and that the cooling equipment module (20) is connected to the temperature controlled cabinet (10) by a connecting structure formed of guides (28) attached to the support structures of the cooling equipment module and of rollers (29) attached to the side walls of the temperature controlled cabinet (10).
2. Temperature controlled cabinet (10) according to claim 1, **characterized in, that** the rolls (29) are attached at top part of each side wall in the product space (11) and connected to the corresponding guides (28) via openings (31) in the guide (28).
3. Temperature controlled cabinet according to claim

1 or 2, **characterized in, that** each guide (28) on each side next to the corresponding side wall is attached below a horizontal/roof foam plate (23) of the support structures of the cooling equipment module (20).

4. Temperature controlled cabinet according to any of claims 1 - 3, **characterized in, that** in the rolls (29) are located in front of the center of gravity of the cooling equipment module (20).

5. Temperature controlled cabinet according to any of claims 1 - 4, **characterized in, that** the temperature controlled cabinet (10) comprises an outlet projection (27), which is connected to an outlet (26) attached to a cover plate (25) connected to a horizontal/roof foam plate (23) of the support structures of the cooling equipment module (20).

6. Temperature controlled cabinet according to any of claims 1 - 5, **characterized in, that** the temperature controlled cabinet (10) is transportable in horizontal position with the cooling equipment module (10) inside the product space (11) and the rolls (29) in the guides (28).

7. Temperature controlled cabinet according to any of claims 1 - 6, **characterized in, that** the support structures of the cooling equipment module (20) are releasably secured to the frame structures of the temperature controlled cabinet (10) by screws, advantageously by knurled-head screws, attached to corresponding holes in the frame structure of the temperature controlled cabinet (10).

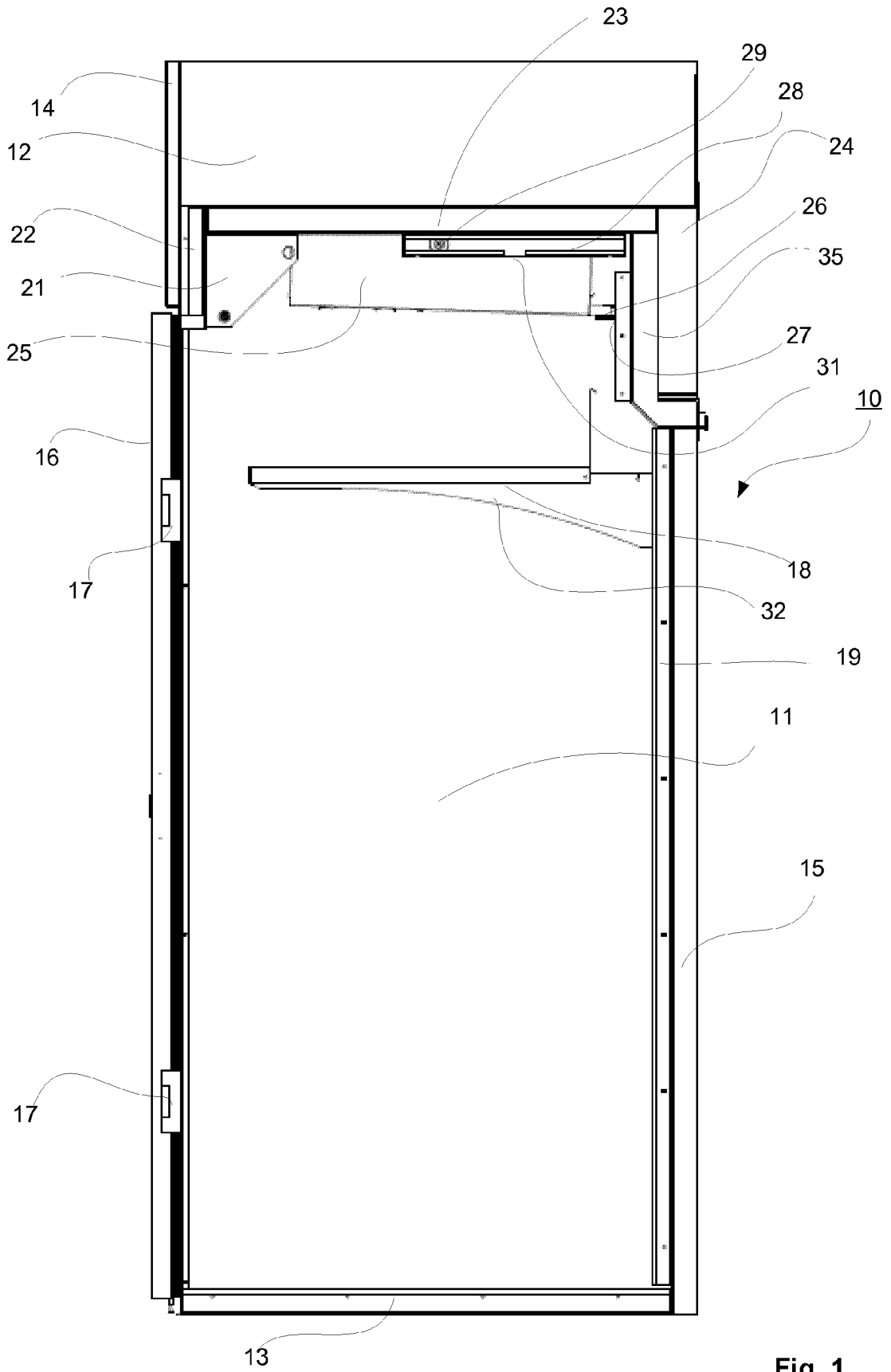


Fig. 1

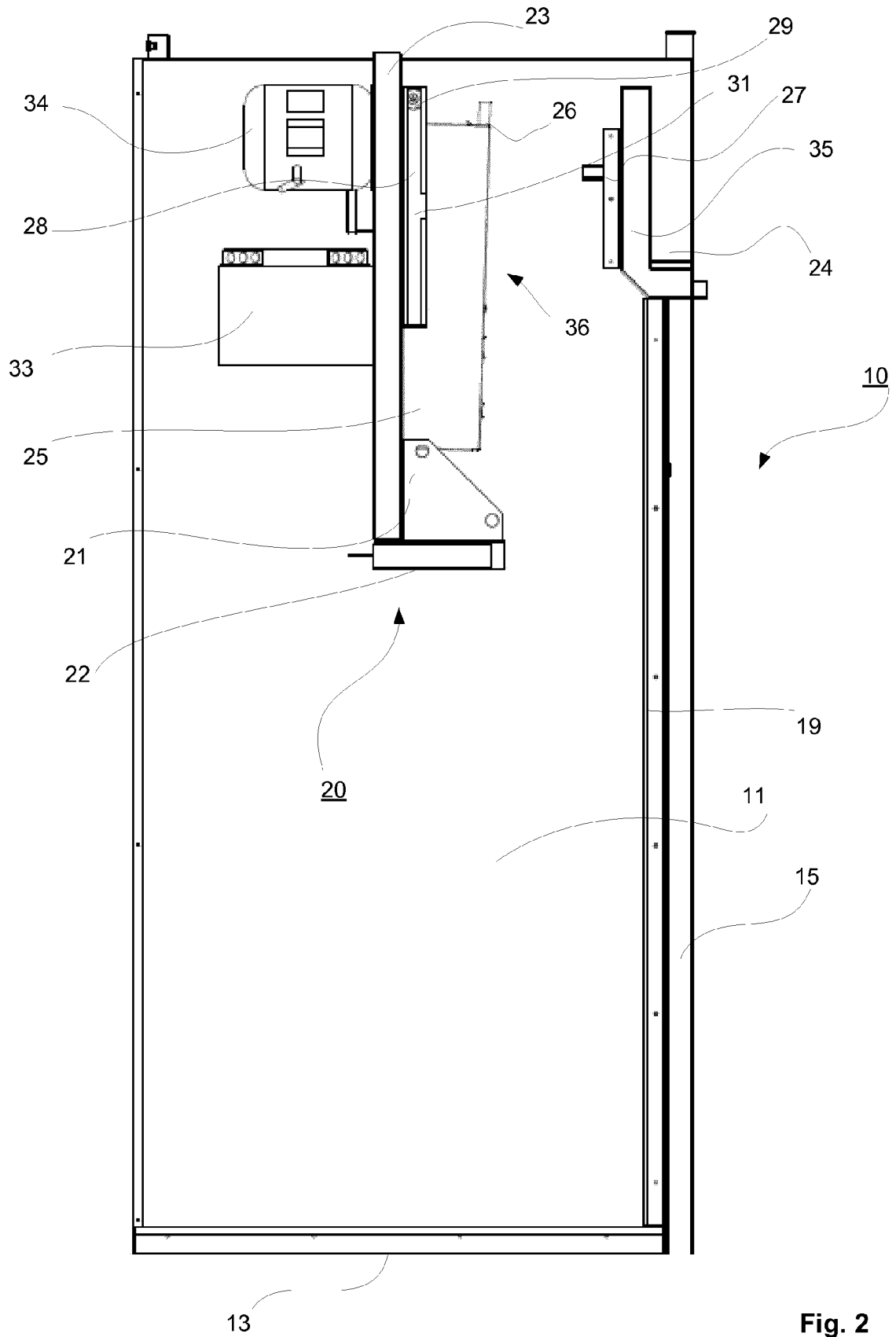


Fig. 2

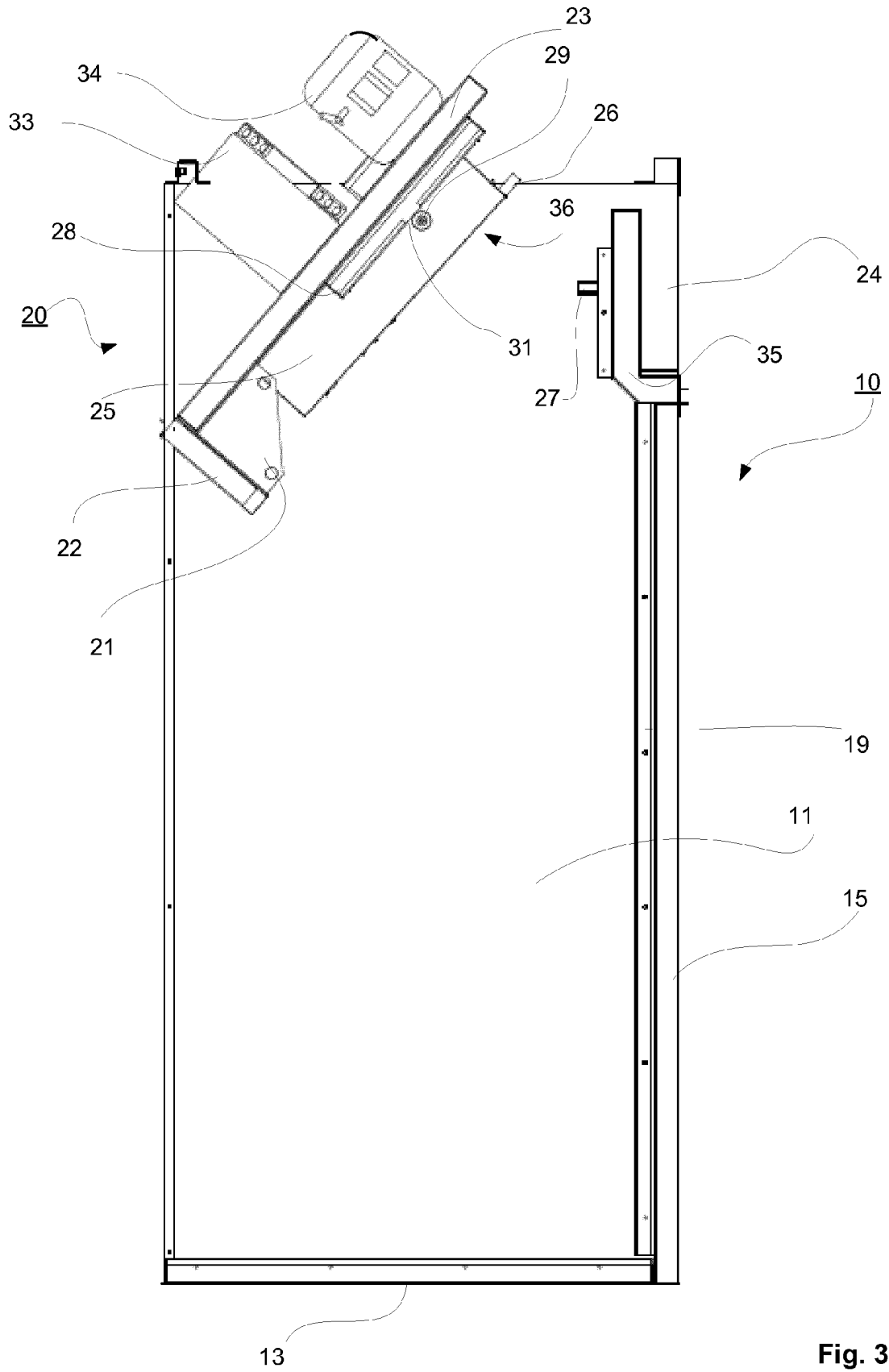


Fig. 3

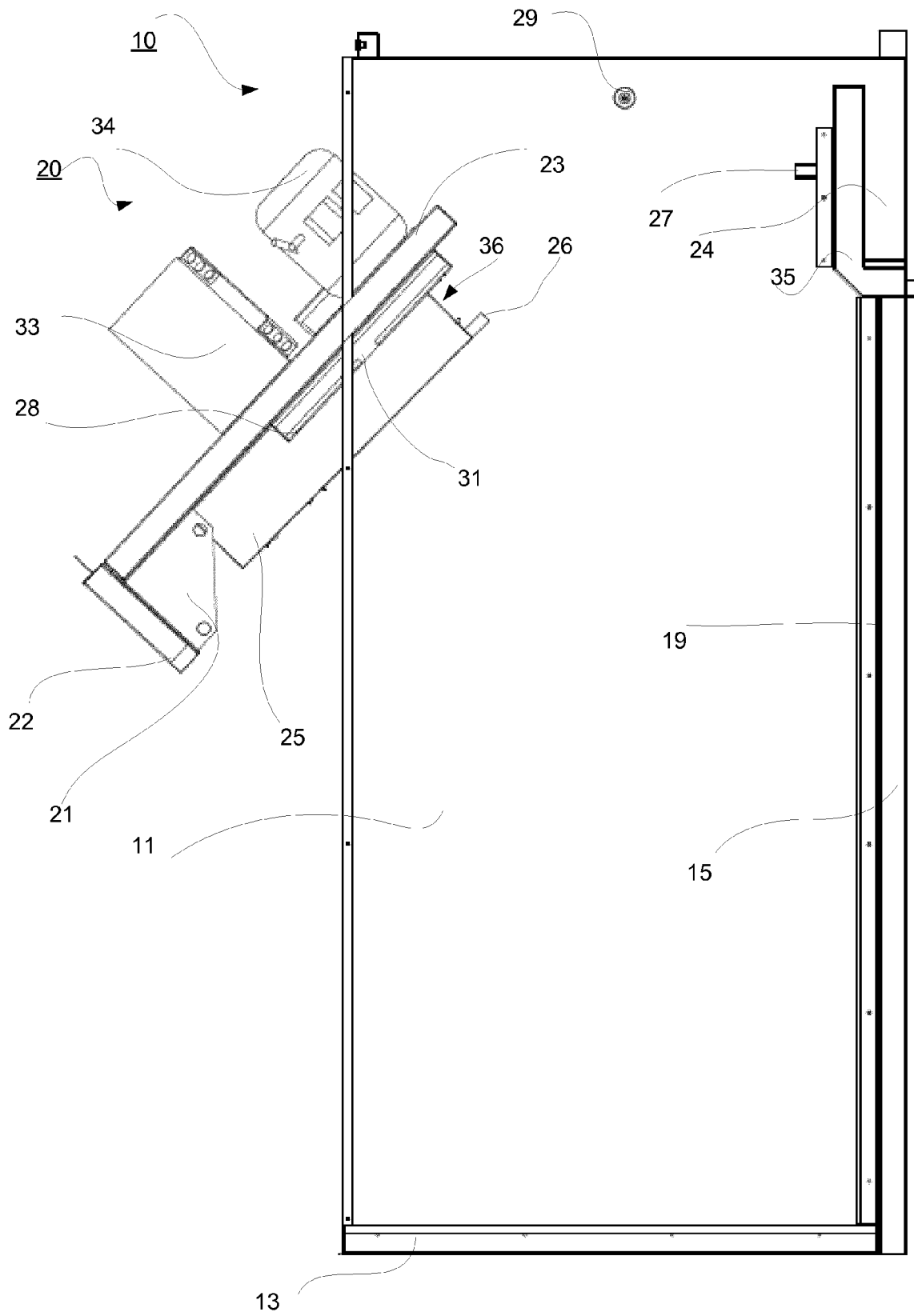


Fig. 4

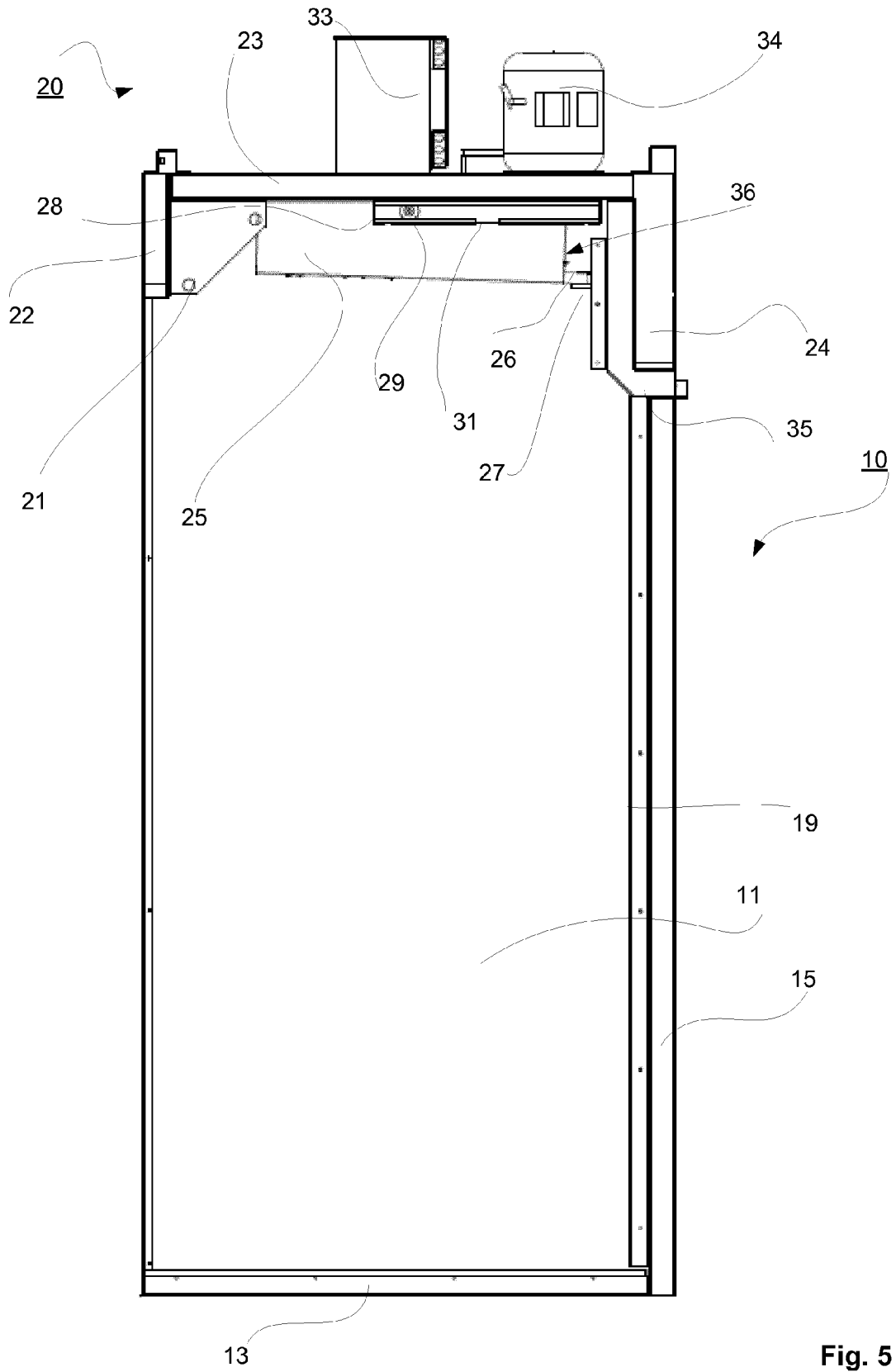


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 15 17 7599

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 338 813 A (WESTINGHOUSE ELECTRIC & MFG CO) 27 November 1930 (1930-11-27) * the whole document * -----	1	INV. F25D19/02 A47F3/04
			TECHNICAL FIELDS SEARCHED (IPC)
			A47F F25D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 January 2016	Examiner Kohler, Pierre
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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14-01-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 338813	A	27-11-1930	NONE

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82