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(54) **Thermally insulated door for controlling access to a refrigerated storage space**

Wärmegedämmte Tür zum Steuern des Zugangs zu einem Kühllagerraum

Porte isolée thermiquement pour contrôler l'entrée à une enceinte d'entreposage réfrigérée

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Description

[0001] This invention relates to a thermally insulated door for controlling access to a refrigerated storage space, such as the internal cooling space of a freezer, or a cold room or cold store.

[0002] The invention has been developed primarily, though not exclusively, in connection with a large volume freezer store in the form of a cold room or cold store, in which access to and from the storage space is via a large access opening which is closed by a door while the frozen contents are in store, but which is opened from time to time to load fresh items into the store, or to remove frozen items for consumption.

[0003] In a large scale installation e.g. a large meat store, the access door is of substantial size so that, when opened, it can allow loading and unloading by passage of a vehicle, such as a fork lift truck, through the access opening.

[0004] There are two important factors to bear in mind when designing and installing an access door to a large cooled or refrigerated space. First of all, since vehicles enter and exit the space via the access opening which is defined when the door is opened, the design of the door and the frame in which it is mounted must take into account occasional careless work on the part of vehicle operators, and therefore with present designs must be fabricated sufficiently robustly to be able to withstand unintentional vehicle impact.

[0005] Secondly, since there will be an inevitable air change each time the door is opened to allow access to and from the storage space, this brings fresh moisture-laden air into the space and which on cooling causes condensation which can cause a build-up of frost and ice on chilled surfaces over a period of time.

[0006] It is therefore present practice to provide a robust installation of a strong rectangular metal frame which defines the access opening, and on which a massive door is mounted which can move between open and closed positions with respect to the access opening. The robust design of the installation (door and frame) means that it can withstand occasional glancing impact by a vehicle without being subjected to any significant damage.

[0007] However, the rectangular metal frame, and also the inner face of the door are continuously exposed to the cooling action of the refrigerated air in the storage space (when the door is closed), and therefore there will inevitably be a build-up of frost and ice on the inner surfaces of the frame and the door, and also along the mating surfaces of the door edge and the frame when the door is closed. This is clearly undesirable, as the frost requires regular removal, which is time-consuming, and which interferes with the normal requirements for access to and from the cooled storage space. Also, build-up of frost on the mating surface, tends to form films of ice which can prevent easy opening of the door. The document "HCR Frost free "Airlok- Door" model ECAV instruction manual" discloses an opening system which comprises two sets of doors spaced apart to form a temperature controlled room between the same. Each of the sets of doors comprises two doors which are hinged to be swung between open and closed positions.

[0008] FR2799539 discloses one form of door which has two walls, with in this case, the doors being separably controllable so as to provide a staggered opening and closing effect. Heaters are mounted adjacent the base of the door frame to provide a heating effect in the door cavity between the front and rear walls of the door. EP0816624 discloses a similar system in which heated air is supplied.

[0009] The invention therefore seeks to provide an improved installation of a thermally insulated access door to a cooled or refrigerated storage space, which is lightweight and which, when installed in a frame defining an access opening, and in operation, is better able to prevent, or at least reduce the build-up of frost on the exposed inward faces of the door and the frame in which it is mounted.

[0010] The invention is a insulated access door installation as defined by claim 1. The thermally insulated access door installation for controlling an access opening to a refrigerator or cooled storage space comprises at least one door mounted in a frame which defines the opening, said frame including a pair of horizontally spaced upright frame members which define opposed sides of the opening said door can be raised and lowered and is formed by a double-walled flexible curtain with front and rear walls and with a space defined between the front and rear walls;
guide means in the upright frame members and engaging the side edges of the front and rear walls;
and a blower and characterised in that the blower communicates with the space defined between the front and rear walls of the door and ducts or passages provided in the upright frame members to deliver a supply of dry or at least low humidity air into the space when the door is in the closed lowered position.

[0011] Therefore, in use of the installation according to the invention, dry and relatively warm air (which is at a higher temperature and lower humidity than the air prevailing in the storage space), can be supplied from the space between the front and rear walls of the curtain, and then be routed internally of the upright frame members, and which therefore minimises the risk of condensation forming internally of the curtain and the frame members, and also externally on the faces of the curtain and the frame members which are exposed to the chilled air in the storage space (and therefore minimise the risk of frost / ice forming on the exposed faces also).

[0012] A closed loop blower / dryer system is provided, which is able to generate a continuous supply of warm air (relative to the temperature of the air in the storage space), and also air which is dry, to the inter-wall space defined between the front and rear walls of the curtain. The warm dry air is also routed to internally of the upright members, and then (after further treatment if necessary

e.g. filtration, drying / warming), the air may be then re-circulated.

[0013] The double walled curtain type door is formed from a single strip of flexible material of which its opposite ends are each wound onto a respective horizontal support roller overlying the upper horizontal edge of the access opening, and from which the front and rear walls hang downwardly and terminate in a common bottom edge, preferably strengthened by a horizontal bracing member.

[0014] The curtain type door is lightweight, and of low thermal capacity, and therefore is easily warmed to a higher temperature than the air in the storage space so that condensation should not normally be deposited on the exposed faces of the curtain (or also of the upright frame members).

[0015] Bearing in mind that vehicular access to the storage space is required, it is preferred that the guidance between the upright frame members and the side edges of the front and rear walls of the curtain is sufficiently robust to maintain the curtain in the closed position during normal use, but in the event of accidental impact by a vehicle e.g. a forklift truck, the guidance may incorporate a "brake-open" feature which allows the curtain edge concerned to disengage from the respective frame member and therefore avoid damage being done to the curtain. Preferably, the break-open feature takes the form of break-out tabs provided on the outer ends of the bottom edge (a so-called "blade") of the curtain.

[0016] A preferred embodiment of thermally insulated door installation according to the invention will now be described in detail, by way of example only, with reference to the accompanying illustrations, in which:

Figure 1 is an oblique perspective view from the front of a thermally insulated door installation, having a double walled flexible curtain type door and which is shown in the closed position;

Figure 2 is a view, similar to Figure 1, but showing the curtain in a partly raised position in order to allow access to and from a refrigerated storage space;

Figure 3 is a detail front view of the double walled curtain in a partly raised position (but with "break-out" tabs on the bottom edge or "blade" of the curtain door still engaged with the guides);

Figure 4 illustrates an internal face of one of a pair of opposed vertical side frame members which define the side edges of the access opening, and with the door in the raised position (and showing a bottom edge or blade of the curtain door);

Figure 5 is a perspective illustration corresponding to Figure 4, but before assembly of the blade;

Figure 6 is a diagrammatic illustration of some of the essential components of the installation according to the invention; and

Figure 7 illustrates a blower/dryer installation for providing a continuous supply of warm and dry air internally of the door and frame installation.

[0017] Referring first to Figure 6 of the drawings, a thermally insulated access door installation according to the invention is designated generally by reference 10 and comprises a curtain door 11 mounted in a frame defining an access opening to a refrigerated or cooled storage space (not shown). The frame includes a pair of upright frame members of which one is shown by reference 12 in Figure 6, and which are horizontally spaced apart to define opposed sides of the required access opening. A double-walled flexible curtain forms the door 11, and having front and rear walls 13 and 14 which can be raised to an open position and lowered to a closed position with respect to the access opening. The front and rear walls 13 and 14 define a space 15 which receives a continuous supply of warm and dry air, when the curtain is closed, as will be described in more detail below.

[0018] Each upright frame member 12 is provided with guide means (not shown in detail in Figure 6) and taking the form of guide slots 16 and 17, which engage respective side edges of the front and rear walls 13 and 14 of the curtain 11. Thereby, the raising and lowering movement of the curtain 11 can be guided.

[0019] A blower / dryer system shown diagrammatically in Figure 7 communicates with the space 15 defined between the front and rear walls 13 and 14 of the curtain 11, to deliver a supply of dry or at least low humidity air at a temperature greater than the temperature prevailing in the storage space.

[0020] Also, although not shown in detail, ducts or passages are provided in the upright frame members 12, and which communicate with the space 15 between the front and rear walls 13 and 14 of the flexible curtain 11, when the curtain is in the closed position, in order also to receive the supply of dry warm air.

[0021] Therefore, in use of the installation 10, dry and relatively warm air (which is at a higher temperature and lower humidity than the air prevailing in the storage space) can be supplied to the space 15, and then routed internally of the upright frame members 12, and which minimises the risk of condensation forming internally of the curtain 11 and the frame members 12, and also externally on the faces exposed to the chilled air in the storage space (and therefore minimize the risk of frost / ice forming on the exposed faces also).

[0022] The blower / dryer system shown in Figure 7, designated generally by reference 18, is a closed loop system, comprising blower 19 and hood 20 which supplies air to the space 15 between the walls 13 and 14, from above the access opening, and such warm dry air then being routed through the space 15 and internally of the upright frame members 12, before being re-circulated

after passing through any further treatment device which may be required (such as filtering / drying and warming unit shown by reference 30).

[0023] The double walled curtain 11 (front and rear walls 13 and 14) is formed from a single strip of flexible material, which has each opposite end wound onto a horizontal support roller overlying the upper horizontal edge of the access opening, and from which the front and rear walls 13 and 14 hang downwardly and terminate in a common bottom edge, strengthened by a horizontal bracing member. This is shown schematically only in Figure 6, in which lower horizontal support roller 21 has the upper edge of front wall 13 connected thereto, so that the front wall 13 can be wound and unwound relative to roller 21. Upper roller 22 serves the same function to wind and unwind the rear wall 14. The front and rear walls 13 and 14 terminate in common bottom edge 23, and which is strengthened by a horizontal bracing member, so as to form the bottom end of the curtain 11 resting on the floor when the curtain is in the closed position.

[0024] The curtain 11 is lightweight, and of low thermal capacity, and therefore is easily warmed to a higher temperature than the air in the storage space, so that condensation should not normally be deposited on the exposed faces of the curtain 11 or the upright frame members 12.

[0025] In order to prevent damage to the door installation, in the event of accidental impact by a vehicle passing thorough the access opening when the curtain is in the closed position, it is preferred that the guidance between the upright frame members 12 and the side edges of the front and rear walls 13 and 14 is sufficiently robust to maintain the curtain in the closed position, but can "break-open" and allow the curtain edge to disengage from the frame member on impact, and therefore avoid damage being done to the curtain.

Conveniently, this is obtained by providing "break-out" tabs at the opposite end of the bottom edge (blade) of the curtain, and which normally run in the guide slots, but which can be displaced out of the slots by a vehicle impact with the blade so as to avoid damage being done to the curtain.

[0026] Figures 6 and 7 have been described above as schematic illustrations of the essential components of the preferred embodiment of the invention, and Figures 2 to 5 are illustrations of the constructional features of one preferred and more detailed embodiment of the invention. Parts corresponding with those already described with reference to Figure 6 are given the same reference numerals, but with the addition of 100. In particular, the side frame numbers 112 are shown in more detail, and having guide slots 116 and 117 which receive and guide the upward and downward movement of the vertical edges of the front and rear walls 113, and 114 of the door curtain 111. Also, ducts or passages 131 are provided internally of the frame member 112, (to communicate via access openings in the front wall of each frame member 112 with the internal spacing between the walls 113, 114), and thereby allow routing of relatively warm and dry air internally of the frame members.

Claims

1. A thermally insulated access door installation (10) for controlling an access opening to a refrigerated or cooled storage space, said installation large enough for allowing passage of a vehicle, said thermally insulated access door installation (10) comprising:

   a frame (12) comprising a hood (20) and a pair of horizontally spaced upright frame members (12) which define opposed sides of the opening, wherein the upright frame members (12) comprise ducts or passages and guide means (16, 17);

   at least one door (11) mounted in the frame (12) which defines the opening, said at least one door (11) comprises two horizontal support rollers (21,22) overlying an upper horizontal edge of the opening,

   said door configured to be raised and lowered by the two support rollers (21,22) and is formed by a double-walled flexible curtain (11) of low thermal capacity formed from a single strip of flexible material with front and rear walls (13, 14) that hang downwardly and terminate in a common bottom edge thereby defining a space (15) between the front and rear walls (13,14), wherein the guide means (16, 17) engage the side edge of the front and rear walls (13, 14); and

   a closed loop blower system (18) comprising a blower (19) wherein the ducts or passages of the frame (12) communicate with the space (15) defined between the front and rear walls (13, 14) of the flexible curtain;

   characterised in that the closed loop blower system (18) further comprises a drying and warming unit (30), wherein said blower (19) is operative with the drying and warming unit (30) to generate a continuous supply of dry or at least low humidity air at a temperature greater than the temperature prevailing in the storage space; and

   the blower (19) and the hood (20) is configured to deliver the continuous supply of dry or at least low humidity air to the space (15) from above the access opening, such that the dry or at least low humidity air is then routed through the space (15) when the flexible curtain is in the closed position, in order also to receive said supply of air when the door (11) is in the closed, lowered position and then routed internally of the ducts or passages of the upright frame members (12) before being re-circulated to the closed loop blower system (18).

2. An installation according to claim 1, in which the bottom edge (23) has a horizontal bracing member.

3. An installation according to claim 1, in which the guide means of each member which engages corresponding side edges of the front and rear walls (13, 14) of the curtain (11) also engages break-open tabs provided on the ends of the bottom edge (23) of the curtain (11) and which allows the curtain edge to disengage from the frame member in the event of an impact greater than a predetermined minimum, thereby to avoid damage being done to the curtain.

Patentansprüche

1. Wärmegedämmte Zugangstüranlage (10) zur Kontrolle einer Zugangsöffnung zu einem Kühl- oder gekühlten Lagerraum, wobei die genannte Anlage groß genug ist, um die Durchfahrt eines Fahrzeugs zu ermöglichen, wobei die genannte wärmegedämmte Zugangstüranlage (10) Folgendes beinhaltet:

einen Rahmen (12), der eine Haube (20) und ein paar horizontal beabstandeter aufrechter Rahmenteile (12), die einander genüberliegende Seiten der Öffnung definieren, beinhaltet, wobei die aufrechten Rahmenteile (12) Kanäle oder Durchgänge und Führungsmittel (16, 17) beinhalten;
wenigstens eine Tür (11), die in dem Rahmen (12) montiert ist, der die Öffnung definiert, wobei die genannte wenigstens eine Tür (11) zwei horizontale Trägerrollen (21, 22) beinhaltet, die über einem oberen horizontalen Rand der Öffnung liegen,
wobei die genannte Tür so gestaltet ist, dass sie durch die beiden Trägerrollen (21, 22) hochgezogen und heruntergelassen werden kann, und von einem doppelwandigen flexiblen Vorhang (11) mit geringer Wärmekapazität gebildet wird, der aus einer einzelnen Bahn eines flexiblen Materials mit einer vorderen und einer hinteren Wand (13, 14) gebildet wird, die nach unten hängen und in einem gemeinsamen unteren Rand enden, wodurch zwischen der vorderen und der hinteren Wand (13, 14) ein Zwischenraum (15) definiert wird, wobei die Seitenränder der vorderen und der hinteren Wand (13, 14) in den Führungsmitteln (16, 17) in Eingriff sind; und
ein Gebläsesystem mit geschlossenem Kreislauf (18), das ein Gebläse (19) beinhaltet, wobei die Kanäle oder Durchgänge des Rahmens (12) mit dem Zwischenraum (15) in Verbindung stehen, der zwischen der vorderen und der hinteren Wand (13, 14) des flexiblen Vorhangs definiert wird;
dadurch gekennzeichnet, dass das Gebläsesystem mit geschlossenem Kreislauf (18) ferner eine Trocknungs- und Erwärmungseinheit (30) beinhaltet, wobei das genannte Gebläse (19) mit der Trocknungs- und Erwärmungseinheit (30) betrieben wird, um eine kontinuierliche Zufuhr von trockener oder zumindest feuchtigkeitsarmer Luft mit einer Temperatur, die höher als die in dem Lagerraum herrschende Temperatur ist, zu erzeugen; und
das Gebläse (19) und die Haube (20) so gestaltet sind, dass sie die kontinuierliche Zufuhr von trockener oder zumindest feuchtigkeitsarmer Luft zu dem Zwischenraum (15) von über der Zugangsöffnung fördern, so dass die trockene oder zumindest feuchtigkeitsarme Luft dann durch den Zwischenraum (15) geleitet wird, wenn der flexible Vorhang in der geschlossenen Stellung ist, um diese Luftzufuhr auch zu empfangen, wenn die Tür (11) in der geschlossenen, heruntergelassenen Stellung ist, und dann im Inneren der Kanäle oder Durchgänge der aufrechten Rahmenteile (12) geleitet wird, bevor sie wieder zu dem Gebläsesystem mit geschlossenem Kreislauf (18) zurückgeführt wird.

2. Anlage nach Anspruch 1, bei der der untere Rand (23) ein horizontales Versteifungselement hat.

3. Anlage nach Anspruch 1, bei der das Führungsmittel jedes Teils, in dem entsprechende Seitenränder der vorderen und der hinteren Wand (13, 14) des Vorhangs (11) in Eingriff sind, auch mit Ausreißlaschen in Eingriff ist, die an den Enden des unteren Rands (23) des Vorhangs (11) bereitgestellt sind, und das zulässt, dass der Vorhangrand sich im Fall eines Aufpralls, der größer als ein vorbestimmter Mindestwert ist, aus dem Rahmenteil löst, um dadurch eine Beschädigung des Vorhangs zu vermeiden.

Revendications

1. Installation de porte d'accès thermiquement isolée (10) pour contrôler une ouverture d'accès à un espace d'entreposage réfrigéré ou refroidi, ladite installation étant suffisamment large pour permettre le passage d'un véhicule, ladite installation de porte d'accès thermiquement isolée (10) comprenant :

un cadre (12) comprenant une coiffe (20) et une paire d'éléments de cadre verticaux espacés dans le plan horizontal (12) qui définissent des côtés opposés de l'ouverture, les éléments de cadre verticaux (12) comprenant des conduits ou passages et des moyens de guidage (16, 17) ;
au moins une porte (11) montée dans le cadre (12) qui définit l'ouverture, ladite au moins une

porte (11) comprenant deux rouleaux de support horizontaux (21, 22) posés par-dessus un bord horizontal supérieur de l'ouverture,
ladite porte étant configurée pour être relevée et abaissée par les deux rouleaux de support (21, 22) et étant formée par un rideau souple à double paroi (11) d'une faible capacité thermique formé à partir d'une bande unique de matériau souple avec des parois avant et arrière (13, 14) qui pendent vers le bas et se terminent en un bord inférieur commun, définissant ainsi un espace (15) entre les parois avant et arrière (13, 14), les moyens de guidage (16, 17) se mettant en prise avec le bord latéral des parois avant et arrière (13, 14) ; et
un système à soufflante en boucle fermée (18) comprenant une soufflante (19) dans lequel les conduits ou passages du cadre (12) communiquent avec l'espace (15) défini entre les parois avant et arrière (13, 14) du rideau souple ;
caractérisée en ce que le système à soufflante en boucle fermée (18) comprend en outre une unité de séchage et de réchauffement (30), dans lequel ladite soufflante (19) est apte à fonctionner avec l'unité de séchage et de réchauffement (30) afin de générer une alimentation continue d'air sec ou d'au moins faible humidité à une température plus élevée que la température régnant dans l'espace d'entreposage ; et
la soufflante (19) et la coiffe (20) sont configurées pour délivrer l'alimentation continue d'air sec ou d'au moins faible humidité vers l'espace (15) à partir du dessus de l'ouverture d'accès, de telle sorte que l'air sec ou d'au moins faible humidité soit ensuite acheminé à travers l'espace (15) lorsque le rideau souple est dans la position fermée, dans le but également de recevoir ladite alimentation d'air lorsque la porte (11) est dans la position fermée, abaissée et ensuite acheminée à l'intérieur des conduits ou passage des éléments de cadre verticaux (12) avant d'être recirculée vers le système à soufflante en boucle fermée (18).

2. Installation selon la revendication 1, dans laquelle le bord inférieur (23) a un élément de renfort horizontal.

3. Installation selon la revendication 1, dans laquelle les moyens de guidage de chaque élément qui se mettent en prise avec des bords latéraux correspondants des parois avant et arrière (13, 14) du rideau (11) se mettent également en prise avec des languettes à ouverture par rupture prévues sur les extrémités du bord inférieur (23) du rideau (11) et qui permettent au bord de rideau de se dégager de l'élément de cadre dans le cas d'un impact plus grand qu'un impact minimum prédéterminé, ce qui évite ainsi que le rideau ne soit endommagé.

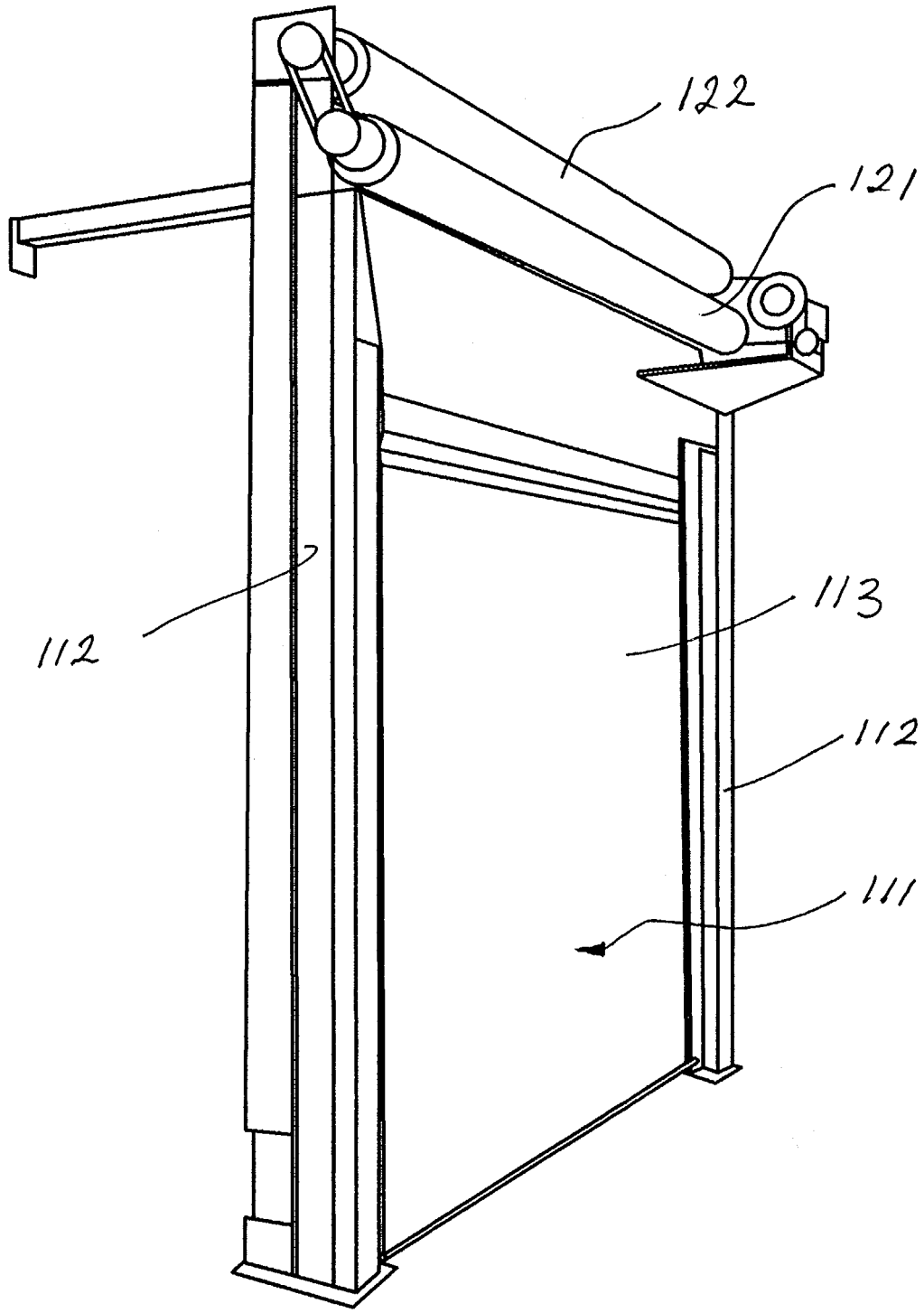


FIG. 1

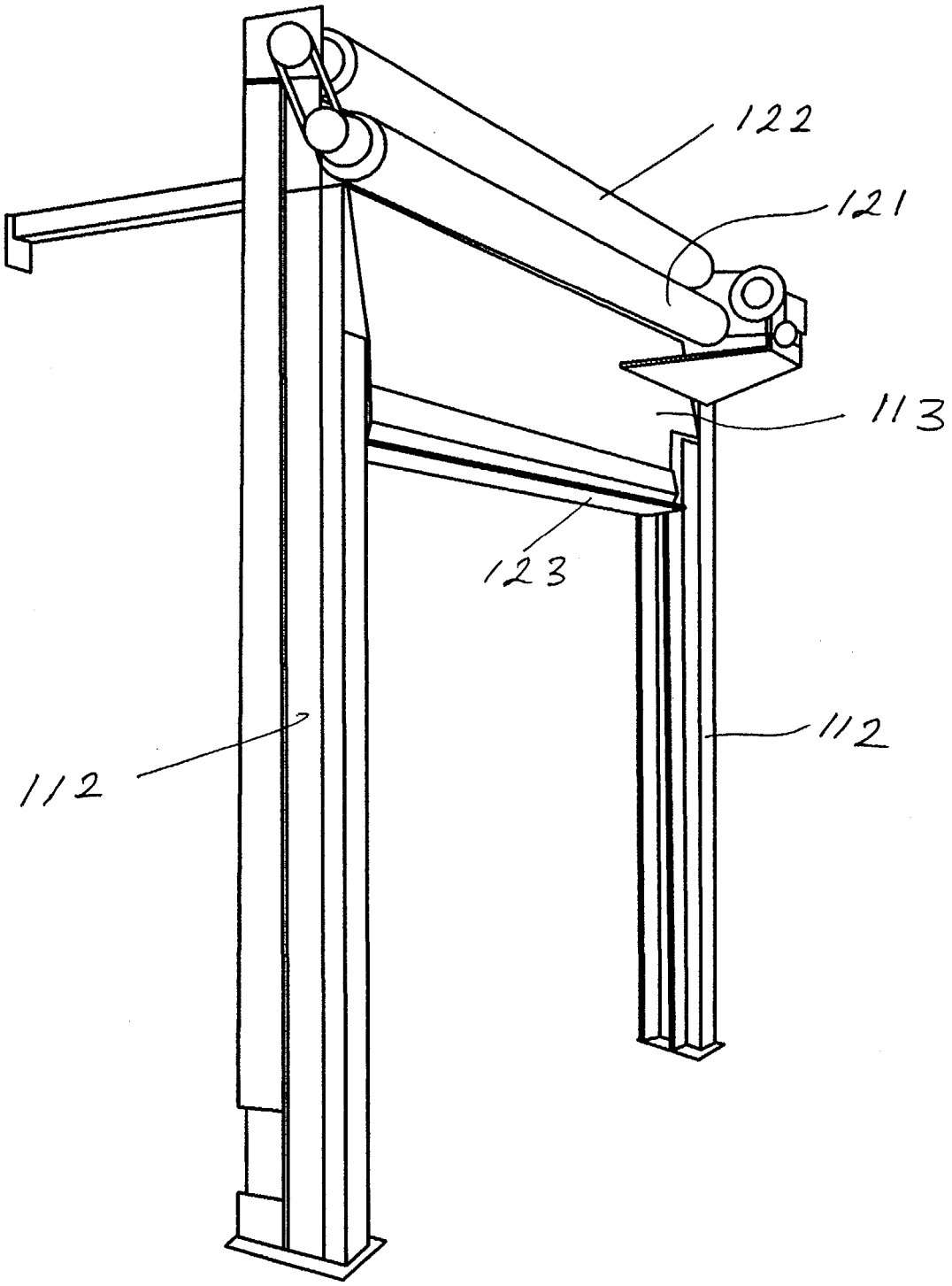


FIG. 2

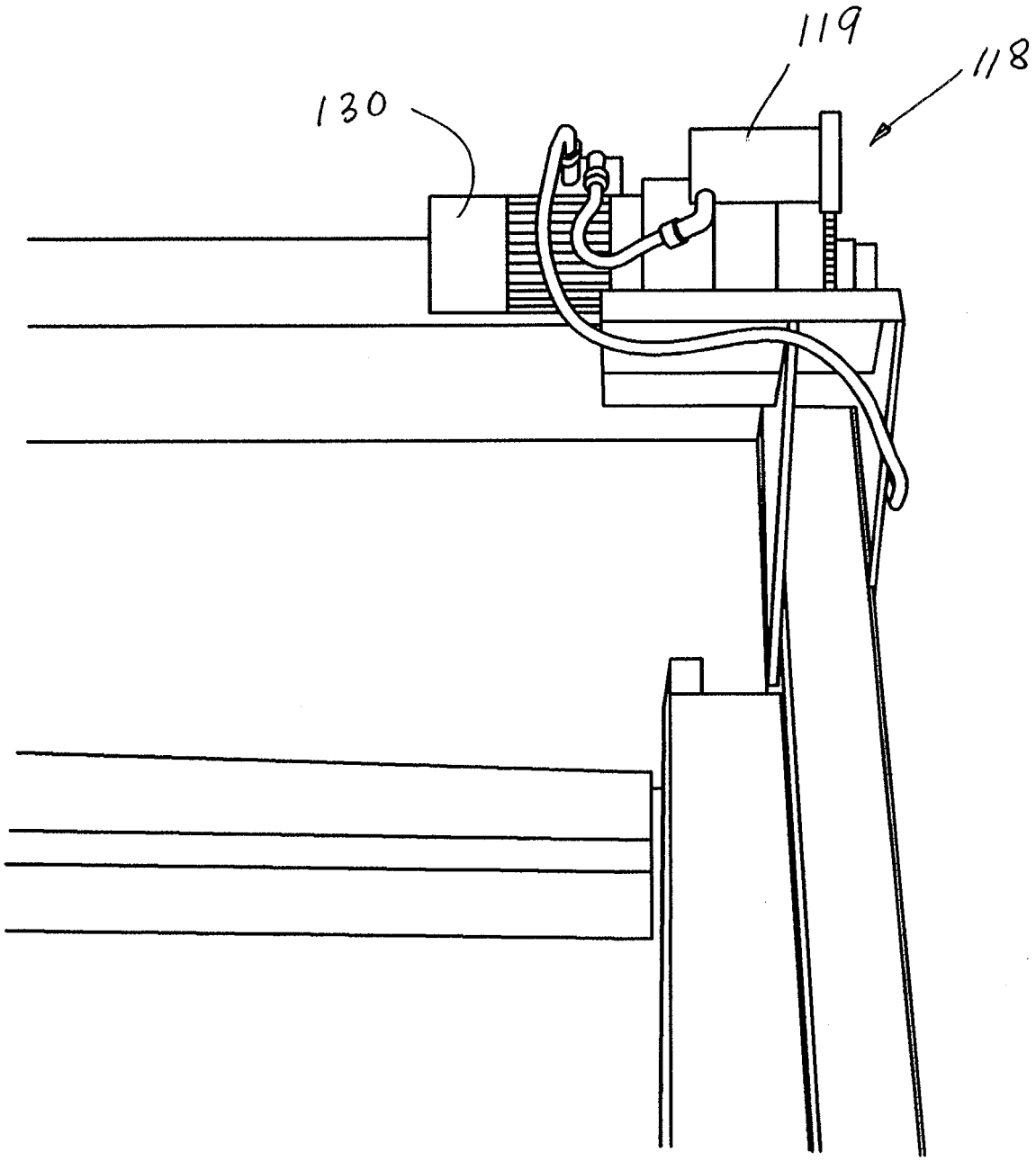


FIG. 3

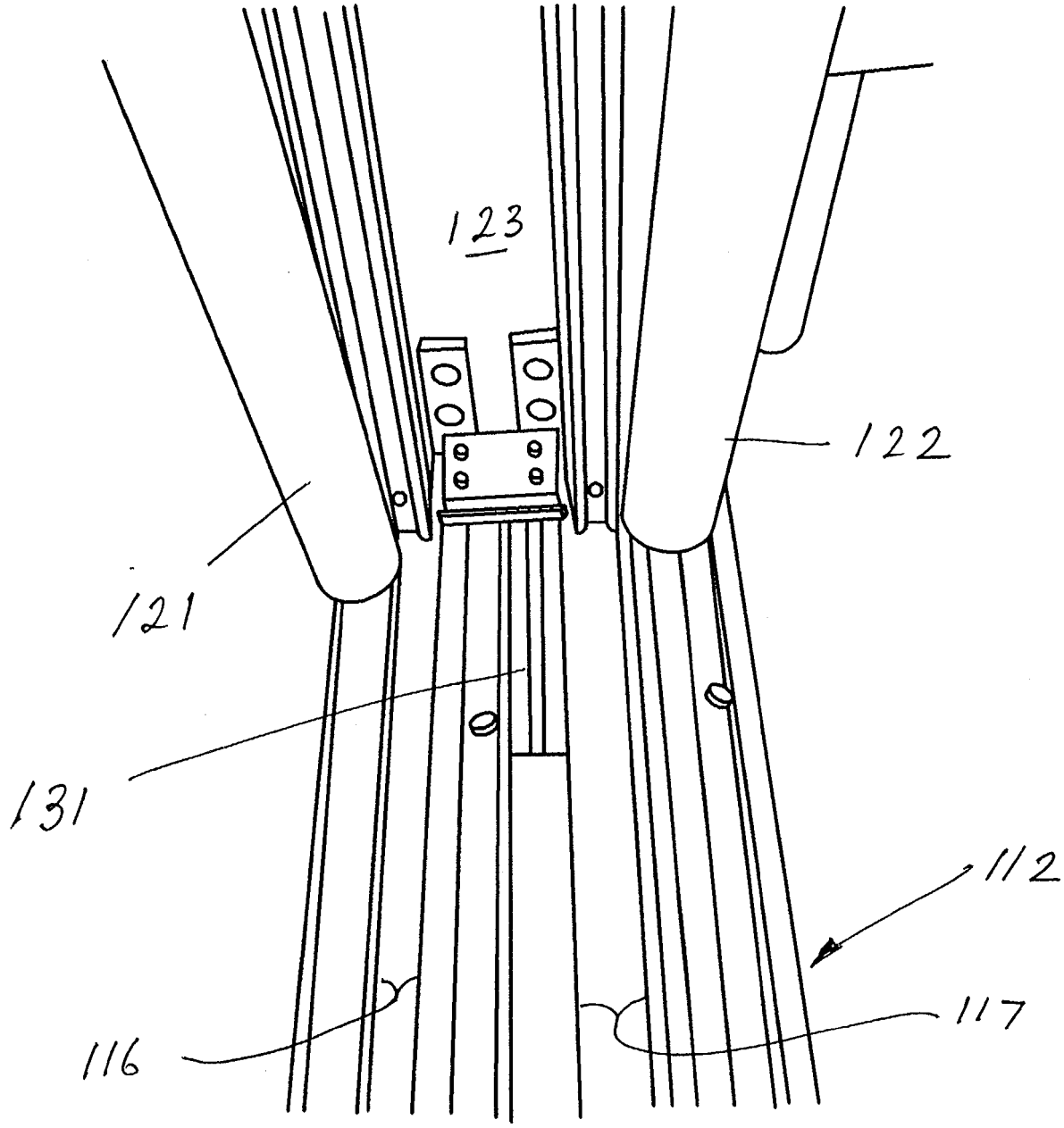


FIG. 4

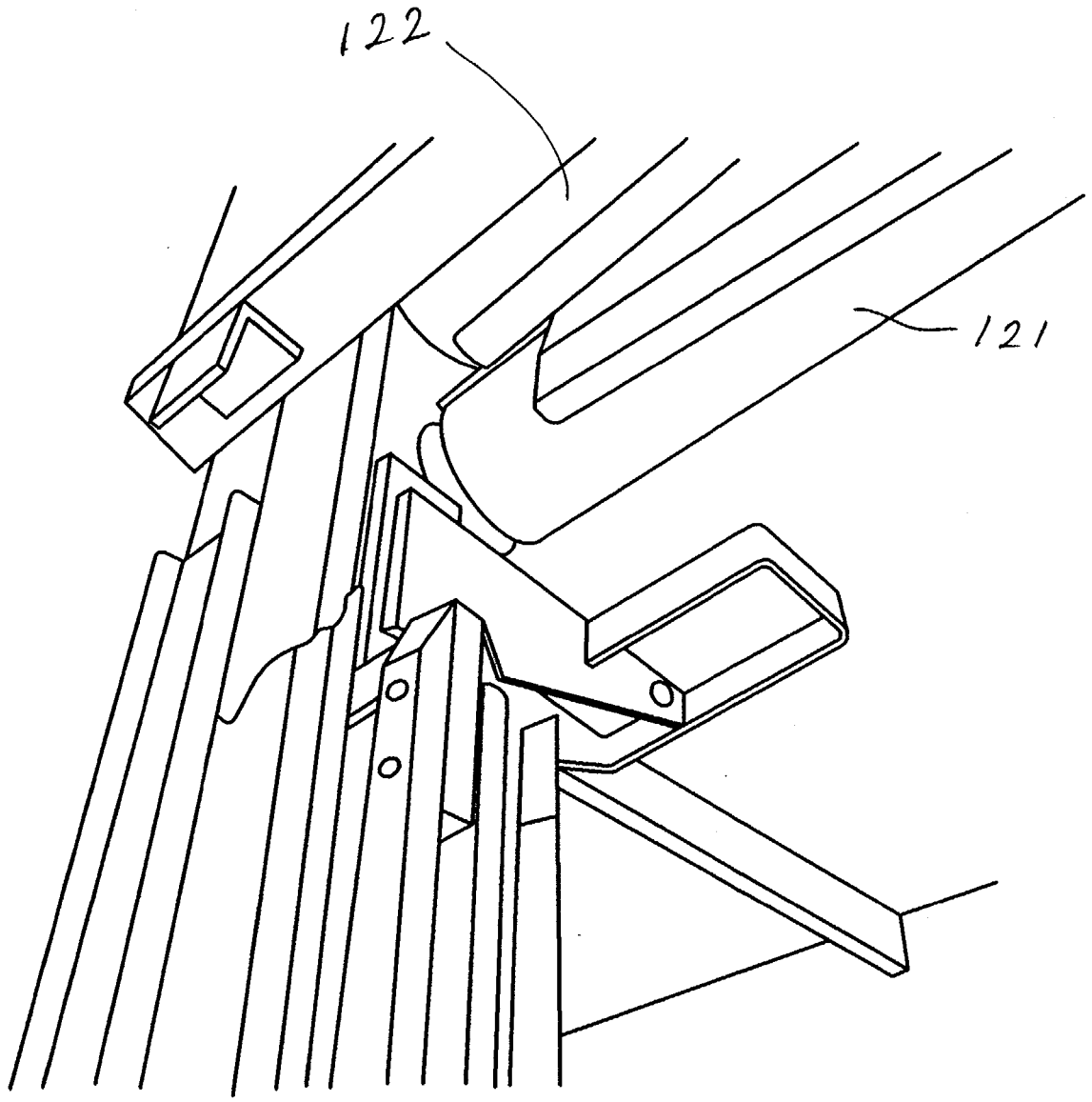


FIG. 5

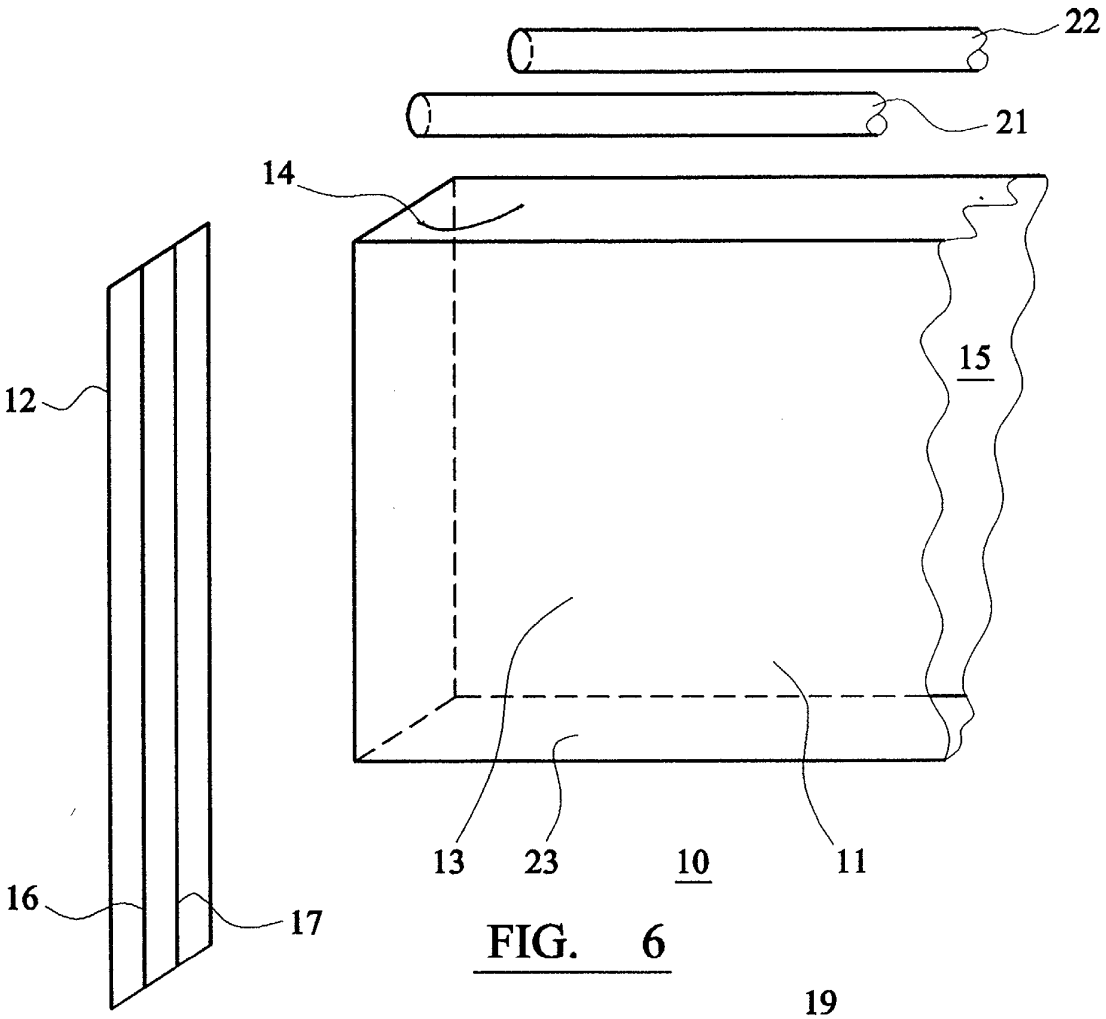


FIG. 6

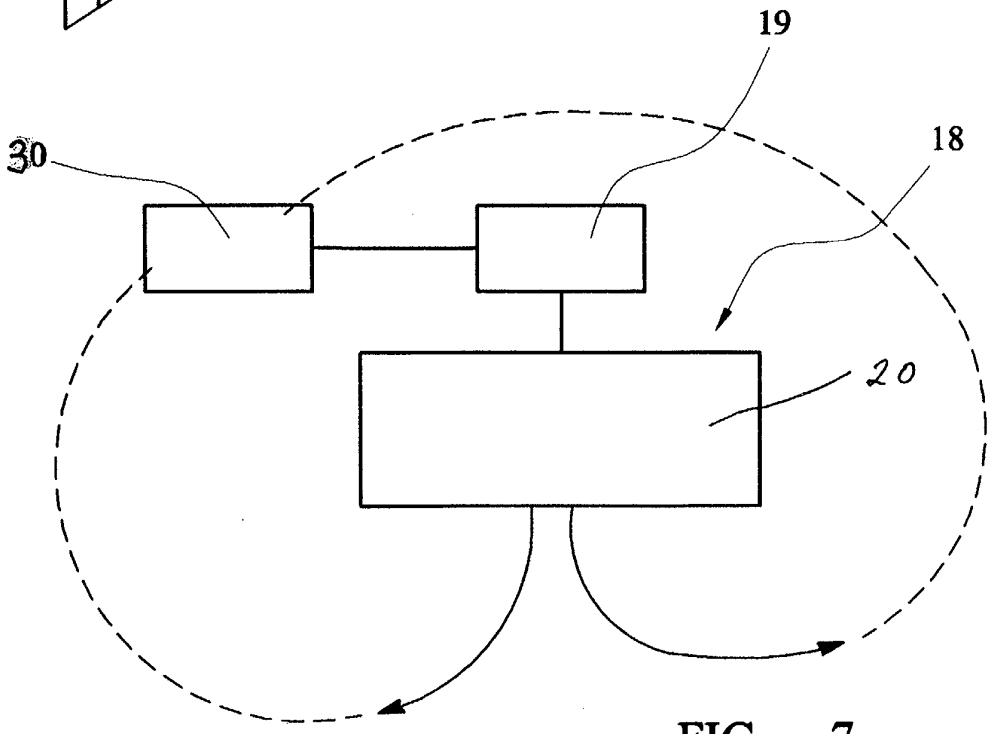


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- EP 0816624 A **[0008]**