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(72) Inventor: **ALSJÖ, Torsten**
743 30 Storråta (SE)

(74) Representative:
Lindgren, Anders et al
Dr. Ludwig Brann Patentbyrå AB,
P.O. Box 1344,
Drottninggatan 7
751 43 Uppsala (SE)

(71) Applicant:
Ki-Panel Produktion AB
750 15 Uppsala (SE)

(54) Safety release assembly

(57) A safety release assembly for a door of e.g. a climate chamber, freight container, or the like, comprising means (4, 4a) for receiving a locking arm (9), which means are provided on the outside of the door. Said means (4) are connected with an actuating lever (5) provided on the inside of the door (D) by means of connecting means (1, 3, 6, 6a, 6b) in order to be manoeuvrable from the inside. On the inside, the actuating lever (5) is

receivable in a releasable manner within retaining means (7, 8) in a retaining position, in which position the means (4, 4a) for receiving the locking arm (9) is prevented from rotating out of locking position, said means (4, 4a) being rotatable out of locking position when the actuating lever (5) is released from the retaining means (7, 8).

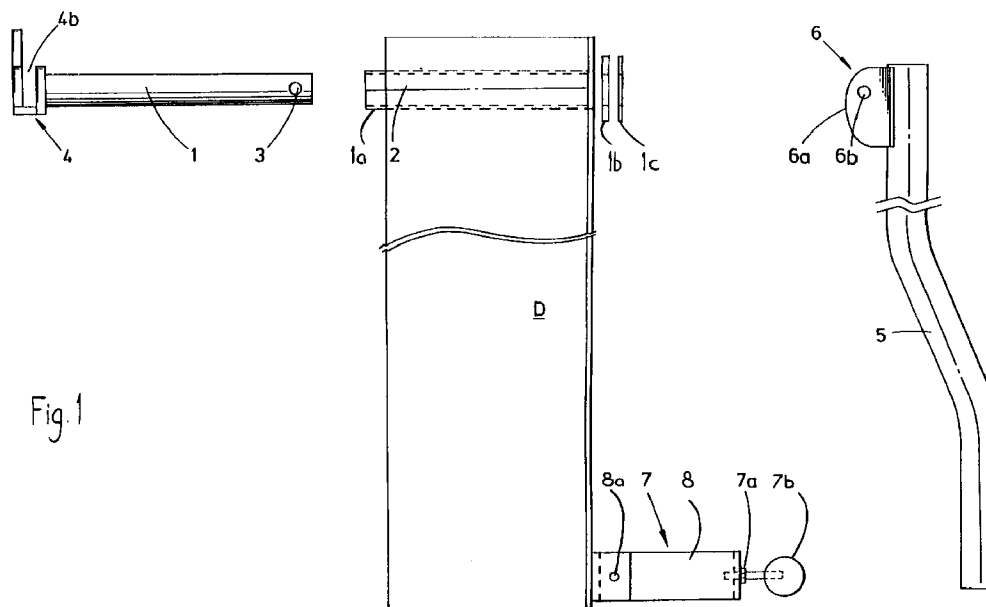


Fig. 1

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Description

Field of the invention

[0001] The present invention relates generally to a safety release assembly, and more specifically to an safety release mechanism which is designed for use with climate chambers, or the like.

Prior art

[0002] A safety release mechanism for the doors of freight containers is shown in GB A 2 154 646. Said mechanism comprises a lever for rotating an operating bar which is equipped with locking cams. Said lever is in locked condition secured to a retainer, which in turn, is held fast with the door by permanent fixings. The emergency release mechanism provides releasable fixings for the retainer, which can be released from the inside by turning pins. By pushing a plunger assembly, the door is opened. This action urges the unfastened retainer outward from the door, carrying with it the operating lever. The plunger assembly rotates the operating lever and hence the operating rod during actuation.

[0003] GB 1 490 651 discloses a door lock and safety release mechanism of a type where the locking mechanism is a rotatable locking bar, which when rotated engage separate keeper members. The rotation is effected by turning a hand lever, which, when the locking bar has been rotated into engagement with the keeper members is held by retainer means. Said retainer means comprises a hub, which is held in the door by a threaded rod screwed into said door. Said rod extends through the door, on the inside of which is found the safety release mechanism. On the inside of the door is arranged a rotatable mechanism, by means of which the threaded rod can be unscrewed from its engagement with the door, which in turn has the effect that the hub, holding the retainer means assembly, is pushed in an outward direction in relation to the door, thereby also pushing the hand lever in the same direction. Since the hand lever is connected to the locking bar, the outward movement of the hand lever causes the locking bar to rotate, which rotation disengages the radially extending portions of the locking bar from the keeper members.

[0004] Another safety opening device is disclosed in EP A 0 580 911, in which the portion of the door onto which the locking member, padlock or the like is attached, is removable by releasing a mechanism which locks said door portion, and subsequently pushing said door portion outwardly, thereby achieving the effect of also pushing aside and turning into open position the locking mechanism of the door to be locked.

[0005] Finally, US 2 636 767 discloses a mechanism, which functions in a manner which is parallel to the mode of function of GB A 2 154 646, i.e. that a retaining element which is screwed to the door may be unscrewed from the inside.

[0006] The solutions for a safety release mechanism in the above cited document have, however, some serious drawbacks in relation to climate chambers, and other highly corrosive environments. The number of parts, and accordingly, the number and the size of the surfaces which are exposed to the corrosive climate, is very high. It is in many cases possible to manufacture the exposed parts in a material which is able to withstand corrosion, although at a very high cost. In a climate chamber for drying wood such as planks, boards and the like, the only acceptable materials are pure aluminium and stainless steel.

[0007] Another salient problem is the sealing of all openings, the most important being the opening through the door, which houses parts of the safety release mechanism. If the corrosive climate is allowed to leak through an opening in the door, parts arranged on the outer side of the door may be affected by this, causing corrosion to vital parts, and maybe even the door itself, which is, of course, is very costly. Further, such leakage is of course influencing the power consumption of climate control devices inside such chambers. This constitutes a serious problem for the above cited devices.

[0008] Another desired characteristic feature is easy actuation of the safety release mechanism. Most prior art devices require that a threaded rod or the like need to be unscrewed from the inside, before the door may be opened. After use of the safety release mechanism, it has to be refitted, i.e. screwed back in place, or remounted.

[0009] Yet another desired characteristic is the possibility of using such a device with a door which previously lacked a safety release mechanism.

[0010] There is, then, a need for a safety release mechanism, which may be manufactured in materials resistant to corrosion at a low cost, which safety release mechanism is arranged in such a way as to completely seal off the climate within the room to which the door leads, and which is easy to actuate, may be returned to locking position with the same ease, and which is, finally, easy to fit in a door which previously lacked a safety release mechanism.

Summary of the invention

[0011] The drawbacks of prior art devices are overcome by the safety mechanism according to the invention, by providing, on the inside of the door, a lever and a simple releasable lever retaining device, which allows locking of a door from the outside only when the retainer device is in its locking mode. When the retaining device is released, and the lever is removed from its retained position, it is impossible to lock the door from the outside. If, inadvertently, the door was locked from the outside, i.e. with the safety mechanism activated, the lock is rendered inoperative simply by raising said lever, and the door may be opened from the inside. The inventive

safety mechanism is defined in claim 1.

[0012] Preferred embodiments of the invention are defined in the dependent claims.

Short description of the drawings

[0013] The invention will be described in closer detail in the description which follows, reference being made to the accompanying drawings, in which

fig. 1 is an exploded view of a safety release assembly according to an embodiment of the present invention,

fig. 2 is a plan view of the details of a safety release assembly according to an embodiment of the present invention, located on the outside of a door,

fig. 3 is a plan view, from above, of a conventional locking mechanism,

fig. 4 is a plan view of the details of a safety release assembly, according to an embodiment of the invention, which are located on the inside of the door, and

fig. 4a is a perspective view of details in fig. 3.

Detailed description of the invention

[0014] Fig. 1 shows an exploded view of a safety release assembly according to the present invention. The assembly comprises a connecting rod 1 of tubular shape, which is rotatably mounted in a hole 2 in a door D which is to be locked. The connecting rod 1 has a locking bracket 4 attached to a first end thereof, which locking bracket 4 has a forward portion with the general shape of a "T" in plan view (the shape can be seen in fig. 2), and has a slot 4b for receiving a locking arm. The second end of the connecting rod is adapted for pivotable attachment to an actuating arm 5, e.g. by means of a locking screw (not shown) in a hole 3. The actuating arm 5 is comprised of a tubular rod, to a first end of which is attached, e.g. by means of welding in the case of a metallic material, two parallel flanges 6 having cam surfaces 6a and mutually concentric holes 6b, for receiving the above mentioned locking screw which pivotably joins the connecting rod 1 and the actuating arm 5, thus enabling the actuating arm 5 to be moved between a first, or retaining position, and a second position in which it is freely movable. The second end of the tubular rod 5, as well as the end of the connecting rod which is located on the inside of the door, may advantageously be sealed by appropriate means, such as an end hat. Said second end of the actuating arm 5 is, in the retaining position received by retaining means 7, pivotably mounted to door D, as shown in the figure 1, and designed so as to prevent movement of the arm 5

in retaining position. Retaining means 7 comprise a bracket 8, having the general shape of a "U" (see fig. 4a), which is pivotable around pivots 8a, and has a handle knob 7b affixed thereto for ease of actuation of retainer means 7 by a user. Retaining means 7 is provided with means for adjustably applying a desired bias force to the actuating arm 5, as will be explained below.

[0015] In a preferred embodiment there is also provided a mount 1a for the connecting rod, in order to ensure that the locking bracket 4 is positioned at a suitable distance from the door, a distance which depends on the individual door, and for receiving the load which is applied to the assembly of the connecting rod 1 and the mount, especially in the case of a door with a soft insulation material, such as mineral wool or the like, which would otherwise be deformed. This bias forced is applied in order to compress into a sealing condition, at least one sealing member 1b, which is arranged on the inner surface of the door. In operating mode, as will be explained below, the sealing member is compressed by the cam surfaces 6a of the actuating lever 5 acting on a washer 1c which is placed between the sealing member 1b and the cam surfaces, in order to achieve a good sealing. The sealing member 1b is preferably made of a material with high sealing and wear capability, such as silicone.

[0016] Figure 2 shows a locking arm 9, preferably pivotable in the horizontal and the vertical directions, which is connected to a locking rod 11, which connects the locking arm 9 to a conventional locking mechanism, which is described further below, together with fig. 3. The locking bracket 4 has a slot 4b (see fig. 1) for receiving the locking arm 9. As can be seen from fig. 2, the locking arm 9 also has a hole 9a for receiving a locking device (not shown), which may be a padlock or the like. In order to provide the mechanism with a locking function, the locking bracket 4 has, as was mentioned above, the general shape of a "T", where the upper, horizontal bar of the "T" constitutes a locking flange arm 4b, which can co-operate with the locking device.

[0017] The above mentioned conventional locking mechanism comprises hook-shaped locking members 10, extending radially from the locking rod 11. On the doorframe or other part of the structure in which the door is arranged, there are provided arch-shaped members 12, which are engagable by the hook-shaped locking members 10, when the locking rod 11 is rotated by moving the locking arm 9 (fig. 2) in an inward direction,

[0018] Figure 4 shows the details of the inventive assembly from the inside. The lever retaining means 7 is shown in a retaining position, in which it retains the actuating lever 5, which is received within a bracket of the retaining means 7. The bracket, together with other details of the construction of the retaining means, is shown in perspective in fig. 4a. Said bracket 8, has mounted onto it a spherical handle knob 7b, which knob is gripped by a user when he or she wishes to operate the retaining means 7 in order to release the actuating

arm 5. Adjustment means 7a (see fig. 1) is provided for adjusting the bias of the sealing member, as will be explained below.

[0019] In use, the inventive safety release assembly is set in operating mode by turning the locking bracket 4 into a position in which it can receive the locking arm 9. This is done by rotating the connecting rod 1, onto which the locking bracket 4 is fixed, preferably by welding, by gripping and turning the actuating lever 5. The locking bracket 4 is in receiving position on the outside of the door D when the actuating lever may be pivoted towards the door D and be received within the bracket 8 of the retaining means 7. The retaining means 7 is pivoted away from the actuating lever 5, the actuating lever 5 is pivoted towards the door D, whereby it is received within the bracket 8 of the retaining means 7 when said means 7 are pivoted back to the position which is shown in figure 3.

[0020] When the actuating lever 5 is pivoted towards the door D, the cam surfaces 6a will eventually come to abut against the washer 1c, which is placed on top of the sealing member 1b. When the actuating lever 5 is pushed further, the cam surfaces 6a will act upon the washer 1c, and consequently the sealing member 1b, which preferably is of a shape which corresponds to the shape of the washer 1c. The sealing member 1b is thus compressed into a condition where it seals the connecting rod 1 penetration passage 2 through the door. In case that the sealing member 1b should be worn, it might be necessary to retain the actuating arm 5 in a position closer to the inside of the door, in order to achieve the desired compression of the sealing member 1b. For this case, the retaining means is provided with adjusting means 7a, e.g. an adjusting screw (see fig. 1), by means of which this may be achieved.

[0021] In a preferred embodiment of the invention, the connecting rod 1 penetrates the door D through a mount 1a with the form of a tube, which is flush with the inner surface of the door, and protrudes a predetermined distance on the outside of the door, said distance being determined for each individual door. This door mount 1a performs two functions. Firstly, by protruding a distance outwards from the surface of the door D, it keeps the locking bracket 4, at a predetermined distance from the door D, since the locking bracket 4 will abut against the end of said mount 1a. Secondly, since the locking bracket 4 abuts against the end of the mount 1a, it will serve to receive the force which is applied to the connecting rod 1, and thus the locking bracket 4, on the outside of the door, and to the surface of the door on the inside. This is important in the case of a door which comprises a thin sheet material, such as aluminium or stainless steel, and a soft insulation layer, such as mineral wool, or the like. In this case, the door will not be able to take up the load without deforming; therefore, the mount 1a is indispensable for doors thus constructed.

[0022] When the inventive safety release assembly is

in operating mode, the doors D is shut, and locked by pushing the locking arm 9 towards the door D, which brings the hook-shaped locking members 10 into engagement with the respective arch-shaped members 12. The locking arm 9 is then inserted into the slot 4a in the locking bracket 4 and is thus secured in a locked position. An appropriate locking device, e.g. a padlock may then be inserted into the hole 9a in the locking arm 9, in order to prevent unauthorised access to the space inside of the door D, by simply lifting and pushing outwards the locking arm 9.

[0023] If, however, a person is inside said space when the door is locked from the outside, the door D may be opened from the inside by means of the inventive safety release assembly. This is done by pushing the actuating rod 5 towards the door D, thereby releasing the outwardly directed force which acts upon the retaining means 7, which force results from the bias force applied on the connecting rod 1. After this force on the retaining means 7 is released, said retaining means 7 is pivoted in a direction away from the actuating rod 5, thereby releasing said actuating rod 5 from the retained position, to a second position, in which it is freely movable. The actuating rod 5 is then used to rotate the connecting rod 1, and thus the locking bracket 4 such, that the flange arm 4a, which prevents the locking arm 9 from being lifted up from the slot 4b, by obstructing the upward movement of the locking device, will be brought out of the position in which it is able to obstruct the upward movement of the locking arm 9. When the connecting rod 1 and the locking bracket 4 have been rotated 180°, no part of the locking bracket 4 is able to obstruct the movement, in any direction, of the locking arm 9. This means that the door D is openable from the inside, simply by pushing the door D outwards, whereby the hook-shaped locking members 10 are urged to rotate around the arch-shaped members 12. This rotation is possible since the locking arm 9, which is fixedly connected thereto, no longer is prevented from moving, and the locking members 10 will eventually disengage from the members 12. Said disengagement means that the door D is free to be pushed open from the inside.

[0024] The described embodiment of the present invention described above is intended for use with rooms with a relatively high temperature and humidity. All the parts of the safety release mechanism are, in order to withstand that highly corrosive environment, manufactured from a corrosion resistant material, such as pure aluminium, or stainless steel. The penetration passage 2 between the insulated climate inside the room, which may contain oxidative pollutants or the like, and the ambient atmosphere may be sealed by means of further sealing members.

[0025] In an alternative embodiment of the invention, the safety release mechanism is adapted for use in cold storage facilities. In order to prevent the leakage of cold out of the room, the connecting rod 1 may be formed from two separate end portions, interconnected by

means of a similarly shaped central connecting portion, in a plastic material, such as PTFE (polytetrafluoroethylene), or the like, with low thermal conductivity. Yet another possibility consists in manufacturing the connecting rod in one piece from a material such as PTFE, although this reduces the resistance to wear.

[0026] The invention has been described in relation to specific embodiments. For instance, the padlock may be substituted by a conventional lock, or any other means which are capable of performing the same function. As a further example, the retaining means could have any structure which permits releasable retaining of the actuating arm, and adjustment of the load in retaining, or locking position. The invention is, however, not limited by such detail. A great number of alternatives and modifications are conceivable, without departing from the scope of the present invention, which is defined, solely, by the appended claims.

Claims

1. A safety release assembly for a door, comprising locking means (4, 4a) for receiving a locking arm (9), **characterised by** connecting means (1, 3, 6, 6a, 6b) connecting the locking means (4) with an actuating lever (5) which is provided on the inside of the door (D) in order for the locking means to be operable from the inside, said actuating lever (5) being receivable in a releasable manner within retaining means (7, 8) in a retaining position, in which position the locking means (4, 4a) which receive the locking arm (9) are prevented from being rotated out of locking position, said means (4, 4a) being rotatable out of locking position to a position, when the actuating lever (5) is released from the retaining means (7, 8), in which position the outside locking means no longer are capable of obstructing the outward and upward movement of the locking arm (9).
2. Safety release assembly according to claim 1, **characterised in** that the locking means (4, 4a) are comprised of a bracket (4) with the general shape of a "T", the upper bar of the "T" being capable of co-operating with a locking device which is mountable in the locking arm (9), the bracket (4) having a slot (4a) in which the locking arm (9) is receivable.
3. Safety release assembly according to claim 1 or 2, **characterised in** that said connecting means (1, 3, 6, 6a, 6b) comprises a tubular connecting rod (1), which is pivotably connected to the actuating lever (5), said actuating lever (5) having two parallel flange members (6), each having a cam surface (6a) capable of functioning as lever supports, and means (6b) for connecting to the connecting rod (1).
4. Safety release assembly according to claim 3, **characterised in** that the connecting rod (1) penetrates the door (D) through a mount (1a), for placing the locking bracket (4) at a predetermined distance from the door, and for receiving the biasing force which is applied to the connecting rod (1) by the actuating lever (5).
5. Safety release assembly according to any of the above claims, **characterised by** a sealing member (1b) being provided on the inner surface of the door, on the periphery of the connecting rod (1), with a washer (1c) placed between the sealing member (1b) and the cam surfaces of the actuating arm, said cam surfaces (6a) performing the function of compressing the sealing member (1b) via said washer (1c), in order to ensure sealing of the penetration passage (1a, 2) of the connecting rod (1) through the door (D).
6. Safety release assembly according to any of the above claims, **characterised in** that the retaining means (7, 8) comprises a retaining bracket (8), pivotably attached to the door, for releasably receiving and retaining the actuating lever (5), movable by an operator between a first or retaining position, in which the actuating lever is held fast by the retaining means (7, 8), and a second position, in which the actuating lever is released for enabling a pivoting movement directed away from the plane of the door, thereby releasing the load on the connecting rod and the sealing member (1b), and for enabling a rotational movement to rotate the locking bracket (4) to a position where said locking bracket (4) no longer holds the locking arm (9) in locked position.
7. Safety release assembly according to any of the above claims, **characterised in** that the locking device is a padlock.
8. Safety release assembly according to any of the above claims, **characterised in** that all the parts of the assembly which are located on the inside of the door, the sealing member excepted, are made of a metallic material which is highly resistive to corrosion.
9. Safety release assembly according to any of the claims 3 to 8, **characterised in** that the connecting rod (1) is comprised of two end portions made from a metallic material, and a central portion which is made from a material with low thermal conductivity.

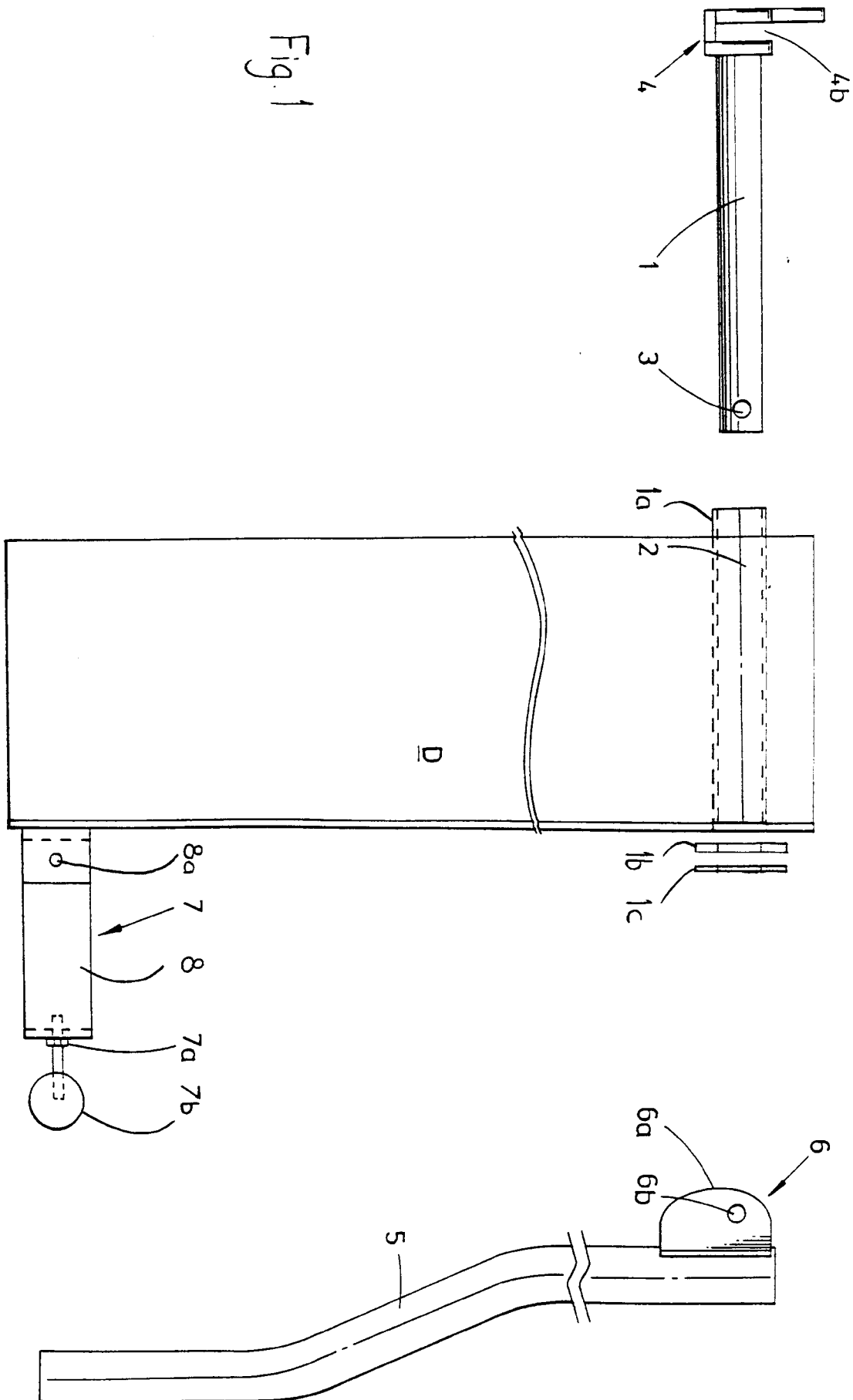


Fig. 1

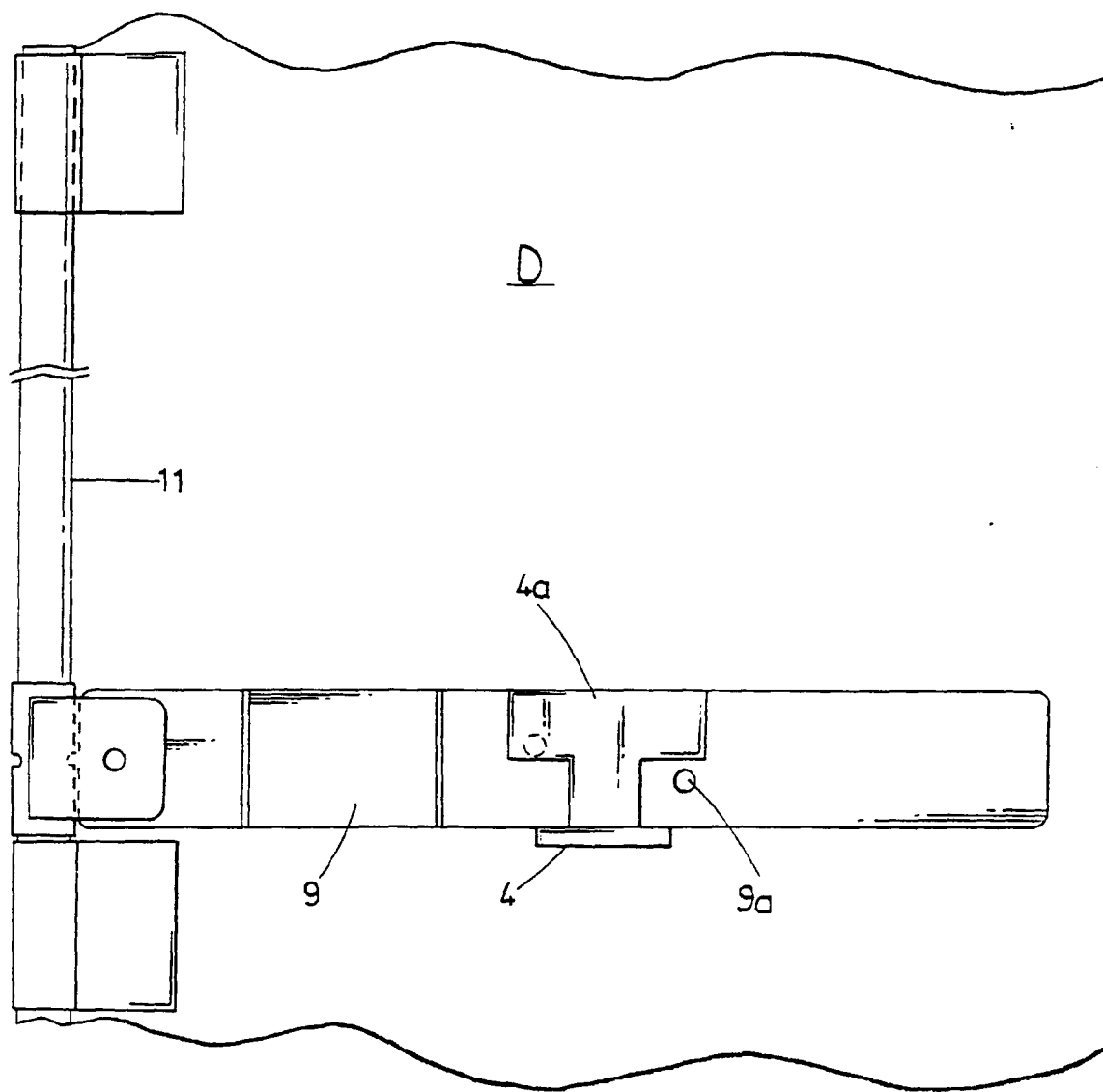


Fig. 2

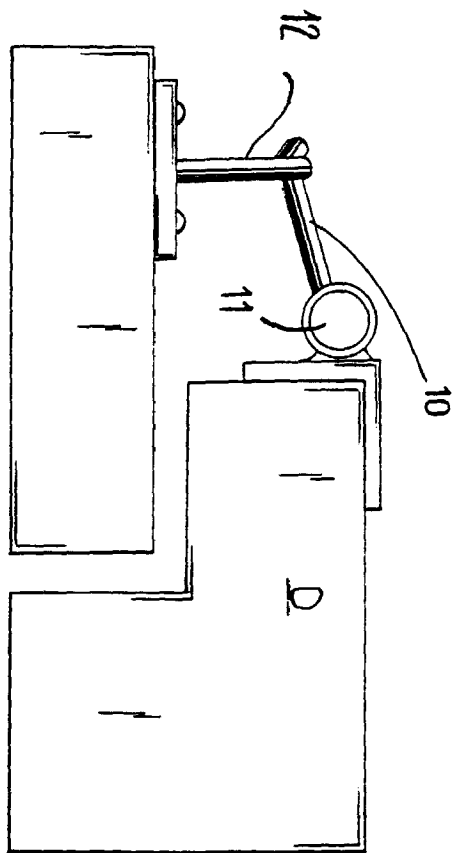


Fig. 3

Fig. 4

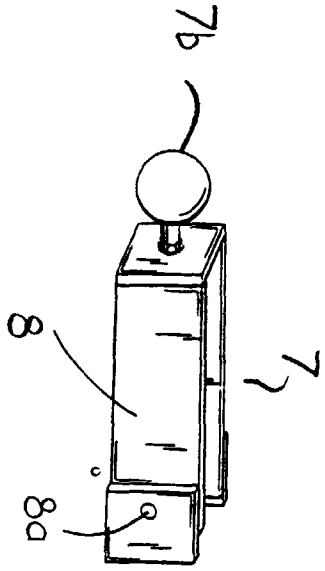
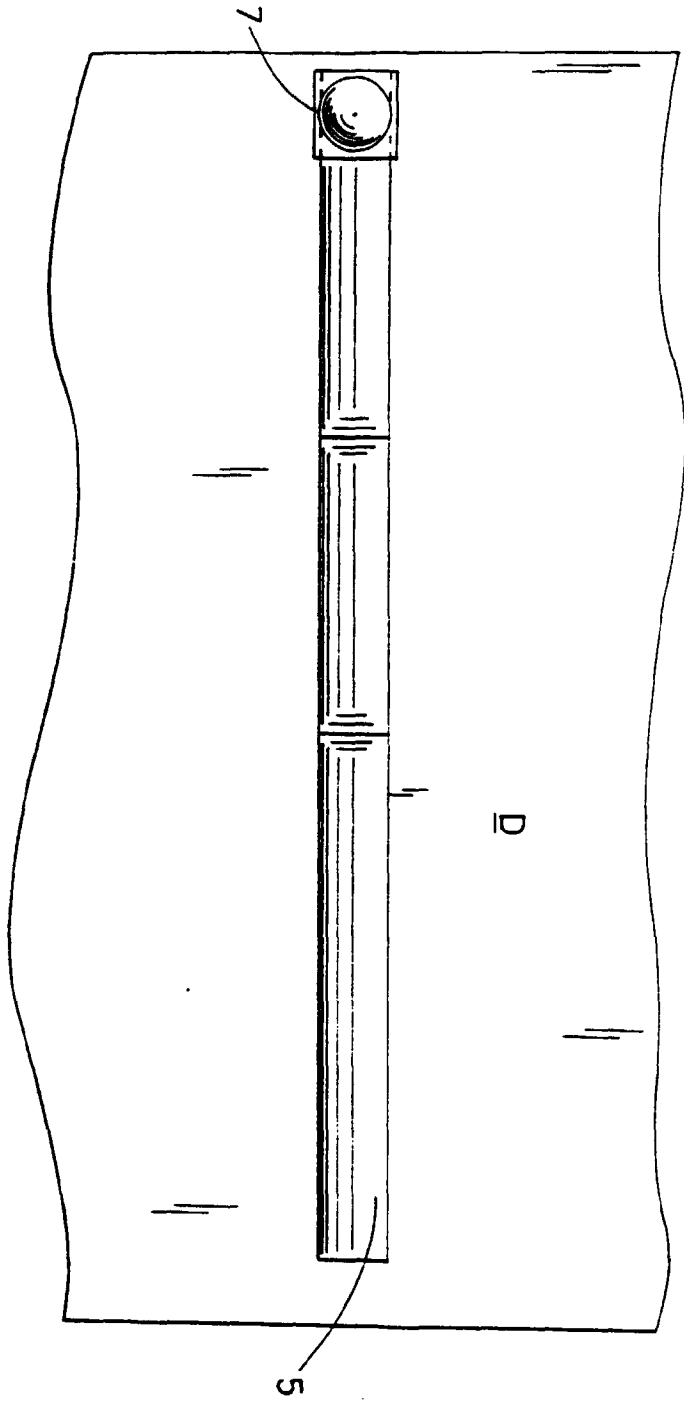


Fig. 4a



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 98 85 0074

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB 720 764 A (THE IMPERIAL COLD STORAGE AND SUPPLY COMPANY LIMITED) 29 December 1954 * page 1, line 89 - page 2, line 42; figures 1-3 *	1,3,4,7	E05B63/24 E05B65/00
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X	US 2 473 205 A (JOSEPH J. JAZWIECK) 14 June 1949 * column 1, line 42 - column 3, line 46; figures *	1,7	
A		3	
X		1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E05B
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 7 October 1998	Examiner Vacca, R
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 85 0074

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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07-10-1998

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