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Escape door

Field of invention

The invention relates to an escape door for separating a tube of a traffic tunnel from an escape route under positive air pressure according to the preamble of Claim 1.

5 Prior art

From the prior art, escape doors are known which separate the tube of a traffic tunnel from escape routes. This separation is also important, since during normal operation a positive air pressure of approx. 50 to 80 Pa is present in the escape routes. In the event of an emergency, such as a fire or smoke in the tunnel, the positive air pressure in the
10 escape route is increased to 450 to 500 Pa in order to keep the escape route smoke-free in the event of fire.

Conventional swing doors have the disadvantage that they can be difficult to open against this positive pressure, especially in the event of an emergency, as the positive pressure can affect the entire surface of the door leaf.

15 Therefore, sliding doors are preferably used in the implementation of escape doors, as the opening direction of the sliding door is oriented perpendicular to the positive air pressure. As a result, the opening of a sliding door is associated with a comparatively lower expenditure of force. The protrusions on the walls adjoining the sliding door are necessary for the installation of the sliding doors, but are associated with high costs.

20 FR 2 979 373 A1 discloses a corridor comprising an entrance and an exit. The entrance and exit are each closed by a double door. To prevent traffic peaks and a return from the entrance, both double doors can be opened and shut automatically.

The double doors are so-called pivot sliding doors. A door leaf of the double door comprises a first pivot bearing, which is connected to the door leaf and forms a first pivot

axis, around which the door leaf can be rotated between an open position and a closed position. In the door frame, the first pivot bearing is connected with the opening in a guide on the upper side of the door leaf in the centre of the long sides, said guide being formed along the door frame above the opening. Two lever arms are connected with the door leaf via a second axis of rotation forming a second pivot bearing. The lever arms are attached to the door frame by a third pivot bearing forming a third axis of rotation. Since the aerodynamic force in the case of draughts on the door leaf forms a natural equilibrium of forces, the door leaf cannot be opened or closed by draughts. However, if different pressure conditions prevail on both sides of the double door, then this pivot sliding door is very difficult either to open or to close.

Object of the invention

The object initiating the present invention results from the disadvantages of the described prior art, motivating the further development of a generic escape door, which enables a more cost-effective installation and yet can be opened with minimal effort.

Description

The solution to the stated object is achieved by means of an escape door such that the first axis of rotation is positioned at an off-centre distance from the long sides of the door leaf, whereby the positive air pressure can cause a torque to open the door leaf, which torque can be selected by the position of the first axis of rotation depending on the prevailing positive air pressure in the escape route. The resulting torque is preferably used to raise a closing weight, which embodiment is described below. The magnitude of the torque can be adjusted by selecting the distance of the first axis of rotation or of the first pivot bearing from the long sides.

The fact that the first axis of rotation is not arranged on a long side of the door leaf, as is the case with conventional swing doors, but is located at a distance to the two long sides, means that the air pressure on both sides of the first axis of rotation can act on the door leaf. As a result, the opening force in an escape door, on one side of which a positive pressure prevails, can be converted to an opening aid in a simple and surprising manner, although the door leaf opens in the direction of the positive pressure. Since the positive pressure to both sides of the first axis of rotation acts on the door leaf, the resulting torque acting on the first axis of rotation is independent of the magnitude of the existing positive pressure, however it is dependent on the selected position of the first axis of rotation. The torque is therefore dependent on the selected lever ratios on the door leaf. The escape

door is designed to be barrier-free and can be easily opened and passed through by persons in a wheelchair because the pivoting range of the escape door is much smaller than with a conventional door.

It has proved to be useful if the distance of the first axis of rotation of the long side of the door leaf facing the third axis of rotation has a ratio to the width of the door leaf which is between 1 to 1.4 and 1 to 1.95, preferably between 1 to 1.5 and 1 to 1.8 and more preferably between 1 to 1.6 and 1 to 1.7. With this ratio, there is sufficient torque at the first axis of rotation, which is sufficient for lifting a closing weight.

Expediently, the lever arms have a length whose ratio to the width of the door leaf is between 1 to 2 and 1 to 5, preferably between 1 to 3.5 and 1 to 4.5, and more preferably between 1 to 3 and 1 to 4. In connection with the above-mentioned position information of the first axis of rotation, the present choice of length of the lever arms causes the door leaf to be completely opened and is at an angle of approximately 90 degrees to the door frame when the first pivot bearing is shifted towards the third pivot bearing.

The invention is also preferably characterised in that a force acts on the first pivot bearing, whereby a closing aid is realised, which causes an independent closure of the door leaf. This embodiment leads to the fact that the door leaf is always automatically transferred from the open position to the closed position. In this case, the force required to overcome the closing force during the opening of the door leaf is provided by the torque acting on the first axis of rotation.

In a preferred embodiment of the invention, a device is provided by which the closing movement can be braked. This closes the door leaf in a controlled manner without resulting in the door falling into the latch unbraked at high speed.

Expediently, the device is an air brake, which is realised by a pressure cylinder, wherein the air outlet speed of the air expressed from the cylinder during the closing of the door leaf is adjustable with a valve. The air brake makes it possible for the closing speed to be reduced and for the door leaf to be dampened and to pass into the closed position in a controlled manner. It is also conceivable that the closing process is controlled by a pressure spring in addition to or instead of the air brake.

In a particularly preferred embodiment of the invention, the force is selected such that it compensates for the contact pressure of the positive air pressure acting on both sides of the first axis of rotation. The force can counteract the torque acting on the first axis of rotation. As a result, the force acting as a closing force can be overcome during opening and the opening force is still low.

The invention is also preferably characterised by the fact that the force is caused by a

weight, which is connected by means of a cable to the first pivot bearing. This type of closing force is realised by a virtually maintenance-free device. In addition, the weight can be adjusted precisely and without effort to the required closing force by placing or removing weight plates.

- 5 In a further preferred embodiment of the invention, the first pivot bearing is connectable to the door leaf at a plurality of suspension points. The plurality of suspension points makes it possible that the distance between the first pivot bearing and thus the first axis of rotation of the first and second long side of the door leaf is variable. Since the off-centre arrangement, as already described above, causes a torque on the door leaf to adjust or
10 change the magnitude of the torque by adjusting the distance of the first pivot bearing. The possibility of determining the suspension point of the first pivot bearing means that the torque can be adjusted as a function of the positive pressure prevailing in the escape route.

- In a further preferred embodiment of the invention, at least one locking bolt is arranged on
15 the door leaf, which can be extended by an intumescent material and can be latched in the door frame. By an intumescent material is to be understood, in the context of this invention, a material which increases in volume under heat. In most cases, such materials form a heat-resistant hardened foam, which seals a fire door against fire by forming an insulation layer. The intumescent material is received in the door leaf in a recess. The
20 locking bolt is also received in the recess and closes the recess. When heat is applied to the door leaf, the intumescent material reacts and expands. As a result, the locking bolt is partially pushed out of the recess and latched in the door frame. In the event of a fire, the escape door is locked after the response time of the intumescent material has passed.

- It proves to be advantageous if a fireproof seal is arranged on the first and second long
25 side and the upper side of the door leaf. As a result, the escape door is not only locked in the event of a fire, but also sealed gas-tight. Since the door leaf of the escape door according to the invention performs a rotating and sliding movement, fireproof seals which engage with conventional doors for use, however, are unsuitable.

- In a particularly preferred embodiment of the invention, the fireproof seal is realised by a
30 metal profile, which can be extended by an intumescent material, wherein the side of the metal profile facing the door frame may be provided with a fire protective tape. The metal profile and the intumescent material may be received in a recess on the sides of the door frame or are preferably received in an angled rail which is attached to the sides of the door frame. The recess formed between the door frame side and the rail is partially filled
35 with intumescent material. The metal profile is inserted outermost into the recess. So that

the intumescent material and the metal profile do not fall out of the recess, they are bonded into the recess, without the bond hindering the movement of the metal profile when exposed to heat. Upon expansion of the intumescent material due to the action of heat, the metal profile is pressed out of the recess on the door frame.

- 5 In order to improve the sealing effect between the metal profile and the door frame, the metal profile may be provided with a fire protective tape.

Expediently, at least one lowering sill is arranged on the lower side of the door leaf, which can be extended from the bottom when closing the door frame. As a result, the door leaf is circumferentially sealed with respect to the door frame by the lowering sill and fireproof seals. The lowering sill comprises a rubber seal, which is pressed to the floor. The rubber seal is so flexible that unevenness of the floor can be compensated for and the lowering sill is therefore able to seal the door leaf gas-tight even against uneven floors. For example, a bolt arranged on the door leaf, which is pressed into it when the door leaf is closed, can trigger the extension of the lowering sill. The lowering sill may be suspended on a linearly moving rocker on the door leaf. A linear shift of the lowering sill triggered by the bolt also leads to a vertical movement of the lowering sill downwards. It would also be conceivable that a fireproof seal described above is arranged on the lower side of the door frame.

In a further preferred embodiment of the invention, the first pivot bearing is connected to a rolling carriage, which is displaceable along the upper side of the door frame. The first pivot bearing can therefore be linearly moved along the door frame. The upper side of the door frame can serve as a running rail for the rolling carriage.

Further advantages and features will become apparent from the following description of an embodiment of the invention with reference to the schematic drawings. In the drawings (not to scale):

- Fig. 1: an axonometric front view of a closed escape door;
Fig. 2: the escape door of Fig. 1 with removed door frame panels;
Fig. 3 a detail view of the upper side of Fig. 2;

- Fig. 4: an axonometric front view of the opened escape door;
- Fig. 5: the escape door of Fig. 4 with removed door frame panels;
- Fig. 6: a detail view of the upper side of the opened escape door;
- Fig. 7: a detail view of the second long side with a locking bolt that is ejectable in the event of fire and fireproof seals on the upper side of the door leaf;
- Fig. 8: a sectional view through the second long side with fireproof seals,
- Fig. 9: an axonometric view of a fireproof seal and
- Fig. 10: an axonometric view of the lower side of the door leaf with extendable lowering sills.

In the Figs. 1 to 6, an escape door is shown, which is designated as a whole by the reference numeral 11. The escape door 11 separates the tube of a traffic tunnel from an escape route. The escape route is under positive pressure, in order to displace the smoke from the escape route in the event of smoke formation. In the event of an emergency, the positive pressure in the escape route is increased from approx. 50 Pa to 450 to 500 Pa to ensure that no smoke can penetrate into the escape route.

In the manner of the prior art, the escape door comprises a door leaf 13 and a door frame 15, in which the door leaf is rotatably arranged. To enable identification of the escape route, a pictogram 16 is provided on the door leaf 13. The escape door 11 comprises first, second and third pivot bearings.

The first pivot bearing 17 is not arranged on the edge of the door leaf as in conventional doors but is designed at a distance from the long sides 31, 33 of the door leaf 13. The door leaf 13 is rotatable about the first pivot bearing 17, which is linearly displaceable on the door frame 15 on the upper side of the door leaf 13. As shown in Figs. 2,3,5 and 6, the first pivot bearing 17 is fastened to a rolling carriage 19.

The rolling carriage 19 slides along the upper side of the door frame 13, which acts as a rail for the carriage 19. The first pivot bearing 17 is guided linearly on the door frame by the rolling carriage 19.

The first pivot bearing 17 is fastened eccentrically to the upper side of the door leaf 13.

A second pivot bearing 21 is arranged between the first pivot bearing 17 and the long side of the door leaf 13, which is farther away from the first pivot bearing 17. The second pivot bearing 21 is formed as an upper and a lower second pivot bearing 21a, 21b, which are
5 fixed to the upper side or the lower side of the door leaf.

On the second pivot bearings 21a, 21b respectively the first end of a lever arm 23a, 23b is articulated. The second ends of the lever arms 23a, 23b are connected to each other with an axis 25. The axis 25 is rotatably mounted on the door frame 15 with third pivot bearings 27a, 27b.

10 The escape door is equipped with a panic bar 29. If the panic bar 29 is pressed, a door latch is withdrawn. Preferably, the panic bar 29 or a pressure plate extends between the second long side 33 and the first axis of rotation 17 so as not to unnecessarily reduce the passage. The door leaf 13 pivots with the second long side 33 into the escape route. The distance of the first pivot bearing 17 to the long sides of the door leaf 13 is selected to be
15 off centre. The distance to the first long side 31, which faces the axis 25, is greater than the distance to the long side 33 facing away from the axis 25. Preferably, the ratio of the distance between the first pivot bearing 17 and the first long side 31 to the broad side of the escape door 13 is between 1 to 1.6 and 1 to 1.7. For example, the distance between the first pivot bearing 17 and the first long side is 804 mm and the door width is 1360 mm,
20 which corresponds to a ratio of 1 to 1.68. Through the off-centre arrangement of the first pivot bearing 17, the positive air pressure prevailing in the escape route can cause a torque, which can be adjusted depending on the magnitude of the positive air pressure by selecting the distance of the first pivot bearing 17 of the first long side 31. The torque is greatest at the beginning of opening and is reduced by the fact that the door leaf is
25 pivoted and there is a pressure equalisation between the tunnel tube and the escape route. If the first pivot bearing were arranged in the centre, then no torque would be present since the pressure forces would cancel each other out in this case.

If the door leaf is opened, the torque causes the door leaf 13 to rotate about the first pivot bearing 17. In this case, the second long side 33 rotates in the direction of the escape
30 route and the first long side 31 rotates in the direction of the tunnel tube. The second and third pivot bearings 21, 27, which are connected to each other with the lever arms 23a, 23b, cause the rolling carriage 19, together with the first pivot bearing 17, to move in the direction of the axis 25. The door leaf 13 performs a rotational movement and a sliding movement when opening and is forcibly guided by the lever arms 23a, 23b. There is
35 therefore a corresponding position along the upper door frame for each opening angle.

The torque causes a rotational and sliding movement in the opening direction of the door leaf 13 by the present pivot bearing-lever arm construction.

The length of the lever arms 23a, 23b is to be selected depending on the position of the first pivot bearing 17. Only when the length of the lever arms 23a, 23b is adapted to this position can the door leaf 13 fully open. The opening position is shown in Figs. 4 to 6. In this embodiment, the length of the lever arms 23 a, 23 b is dimensioned such that the door leaf is at an angle of 90 degrees to the door frame 15.

In the above-mentioned dimensioning example, the length of the lever arms 23a, 23b is 400 mm. The ratio of the length of the lever arms 23a, 23b to the width of the door leaf is preferably between 1 to 4 and 1 to 3.

A weight 37 can be attached on the first pivot bearing 17 or the rolling carriage 19 via a cable 35. The weight 37 is dimensioned such that it reduces or cancels the torque acting on the first pivot bearing 17 during opening. The weight 37 may, for example, be chosen such that the door leaf 13 is in equilibrium during opening and does not open automatically by the torque, or only with a reduced opening force. The weight 37 can serve as a closing aid. During the opening of the door leaf 37, the weight is pulled upwards, since the rolling carriage 19 moves in the direction of the axis 25. In the opening position of the door leaf 13, the weight 37 is in its highest position, from which it moves downwards. As a result, the door leaf 13 is automatically pulled into the closed position. Due to the pressure equalisation, no torque is present on the first pivot bearing 17 when closing the door leaf 13, which would counteract the weight 37 when closing the door leaf 13.

So that the door leaf 13 does not strike uncontrollably by lowering the weight 37, the closing force is decelerated. This can be effected by a pressure spring, which is compressed, for example, by the rolling carriage at the end of the closing process. It is also possible that a pressure cylinder acting as an air brake is provided and compressed in this air during the closing process and has a damping effect on the moving door leaf 13. The air outlet of the compressed air can be controlled from the pressure cylinder via a valve that controls the airflow. As a result, the damping effect of the pressure cylinder can be adjusted. In the Figs. 7 to 10 fire protection elements are shown, which seal or lock the door leaf 13 against the door frame 15 in the event of fire. In Fig. 7, two locking bolts 39 are shown, which are arranged within the door leaf 13.

The locking bolt 39 can be extended by an intumescent material and locked in the door frame 15. The intumescent material is received in a recess of a holder 41. The locking bolt 39 is also received in the recess above the intumescent material and closes the recess. When exposed to heat on the door leaf 13, the intumescent material reacts and expands.

As a result, the locking bolt 39 is partially pressed out of the holder 41 and locked in the door frame 15. In case of a fire, the escape door 11 is locked after the response time of the intumescent material has elapsed. In Fig. 7 fireproof seals 43 are also shown, which are attached to the upper side of the door leaf 13.

5 The fireproof seals 43 are preferably arranged in pairs on the upper side, the first long side 31 and the second long side 33 in order to ensure the closure of the distances between the door leaf 13 and the door frame 15 with respect to combustion gases and smoke with maximum reliability and to ensure fire safety. As Fig. 8 shows in detail, the fireproof seal 43 comprises a rectangular metal profile 45, an intumescent material 47 and
10 a rail 49, which forms a recess 51. The side of the metal profile 45 facing the door frame 15 may be provided with a fire protective tape 53. The metal profile 45 and the intumescent material 47 are preferably received in an angled rail 49, which is attached to the sides of the door frame 15. The recess 49 is partially filled with intumescent material 47. The metal profile 45 is inserted outermost into the recess 47. So that the intumescent
15 material 47 and the metal profile 45 do not fall out of the recess 47, they are bonded into the recess 47, without the bond obstructing the movement of the metal profile 45 when exposed to heat. Upon expansion of the intumescent material 47 as a result of the effect of heat, the metal profile 45 is pressed out of the recess onto the door frame 15. In order to improve the sealing effect between the metal profile 45 and the door frame 15, the
20 metal profile 45 is provided with a fire protective tape 53.

In Fig. 10, a pair of lowering sills 55 is shown. The lowering sills 55 are arranged on the lower side of the door leaf 13 and can be extended out of the lower side when closing the door leaf 13. As a result, the door leaf 13 is circumferentially sealed with respect to the door frame 15 by the lowering sill 55 and the fireproof sealing strips 43. For example, a
25 bolt arranged on the door frame 15, which penetrates into the door leaf 13 during the closing of the door leaf, can cause the lowering sills 55 to extend. In the closed state of the door leaf 13, the lowering sills 55 are gas-tight to the floor.

The escape door 11 according to the invention is inexpensive to install, since it requires no protrusion in the wall area for installation, such as might a sliding door. The door frame
30 15 of the escape door 11 can be mounted directly in front of a wall opening. A conventional door cannot be used as an escape door because the opening force, especially in the event of an emergency, is much too large. The escape door 11 uses a pivoting-slide movement, in which the opening force is independent of the existing pressure difference between the tunnel tube and the escape route. The size of the torque
35 acting on the door leaf, which results from the positive pressure when opening the door leaf 13, can be adjusted by the choice of the position of the first pivot bearing 17. By the

selection of the magnitude of the weight 37, the effect of the torque can be reduced or compensated. The weight 37 acts as a closing aid and automatically pulls the door leaf out of any open position. In the event of fire, the fireproof seals 43, together with the lowering sills 55, allow a gas-tight seal of the door leaf 13 against the door frame 15. The

5 locking bolts 39 lock the escape door 11 when the response time of the intumescent material has elapsed and this expands.

Legend

11	Escape door
13	Door leaf
15	Door frame
16	Pictogram
17	First pivot bearing
19	Rolling carriage
21a	Upper second pivot bearing
21b	Lower second pivot bearing
23a,23b	Lever arms
25	Axis
27a	Upper third pivot bearing
27b	Lower third pivot bearing
29	Panic bar
31	First long side
33	Second long side
35	Cable
37	Weight
39	Locking bolt
41	Holder
43	Fireproof seal
45	Metal profile
47	Intumescent material
49	Rail
51	Recess
53	Fire protective tape
55	Lowering sill

PATENTKRAV

1. Flugtdør (11) til adskillelse af et rør i en trafikunnel fra en flugtvej, som er underlagt et luftovertryk, hvilken flugtdør omfatter:

- 5 - et dørblad (13), der kan lukke åbningen mellem tunnelrøret og flugtvejen,
- et første drejeleje (17), der er forbundet med dørbladet (13), og som danner en første rotationsakse, omkring hvilken dørbladet (13) kan dreje mellem en åben stilling og en lukket stilling, og
- 10 - en dørramme (15), der omrammer åbningen, og på hvilken det første drejeleje (17) er anbragt, hvor
- det første drejeleje (17) er forskydeligt i en føringsbane, som er dannet langs med dørrammen over åbningen, kan forskydes og ved oversiden af dørbladet (13) er forbundet med dette i en afstand fra langsiderne (31, 33),
- 15 - to håndtag (23a, 23b) er forbundet med dørbladet (13) ved hjælp af et andet drejeleje (21a, 21b), der danner en anden rotationsakse, og som er fastgjort til dørrammen (15) ved hjælp af et tredje drejeleje (27a, 27b), der danner en tredje rotationsakse (25), og
- den første, anden og tredje rotationsakse er orienteret parallelt, og luftovertrykket kan virke på begge sider af den første rotationsakse på dørbladets over-
- 20 flade, som er orienteret mod flugtvejen,

kendetegnet ved, at den første rotationsakse er anbragt i en ekscentrisk afstand fra dørbladets langsider (31, 33), således at luftovertrykket kan forårsage et drejningsmoment til åbning af dørbladet (13), som er uafhængigt af det fremherskende luftovertryk i flugtvejen.

25

2. Flugtdør ifølge krav 1, kendetegnet ved, at forholdet mellem afstanden af den første rotationsakse af den langside (31) af dørbladet (13), der vender mod den tredje rotationsakse (25), og bredden af dørbladet (13) ligger mellem 1 til 1,4 og 1 til 1,95, fortrinsvis mellem 1 til 1,5 og 1 til 1,8 og mest foretrukket mellem 1 til 1,6 og 1 til 1,7.

30

3. Flugtdør ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at håndtagene (23a, 23b) har en længde, hvis forhold til bredden af dørbladet er mellem 1 til 2 og 1 til 5, fortrinsvis mellem 1 til 3,5 og 1 til 4,5 og mest foretrukket mellem 1 til 3 og 1 til 4.

5

4. Flugtdør ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at en kraft påføres det første drejeleje (17), således at en lukkehjælp implementeres, der forårsager en automatisk lukning af dørbladet (13).

10

5. Flugtdør ifølge krav 4, kendetegnet ved, at der er tilvejebragt en anordning, hvormed lukkebevægelsen kan bremses.

15

6. Flugtdør ifølge krav 5, kendetegnet ved, at anordningen er en luftbremse, der implementeres af en trykcylinder, for hvilken luftudløbshastigheden af den luft, der trykkes ud af cylinderen ved lukning af dørbladet (13), kan reguleres med en ventil.

7. Flugtdør ifølge krav 5, kendetegnet ved, at anordningen implementeres af en trykfjeder.

20

8. Flugtdør ifølge et hvilket som helst af kravene 4 til 7, kendetegnet ved, at kraften vælges på en sådan måde, at den udligner pressekræfterne af det luftovertryk, der virker på begge sider af den første rotationsakse.

25

9. Flugtdør ifølge et hvilket som helst af kravene 4 til 8, kendetegnet ved, at kraften er forårsaget af en vægt (37), der er forbundet med det første drejeleje (17) ved hjælp af et kabel (35).

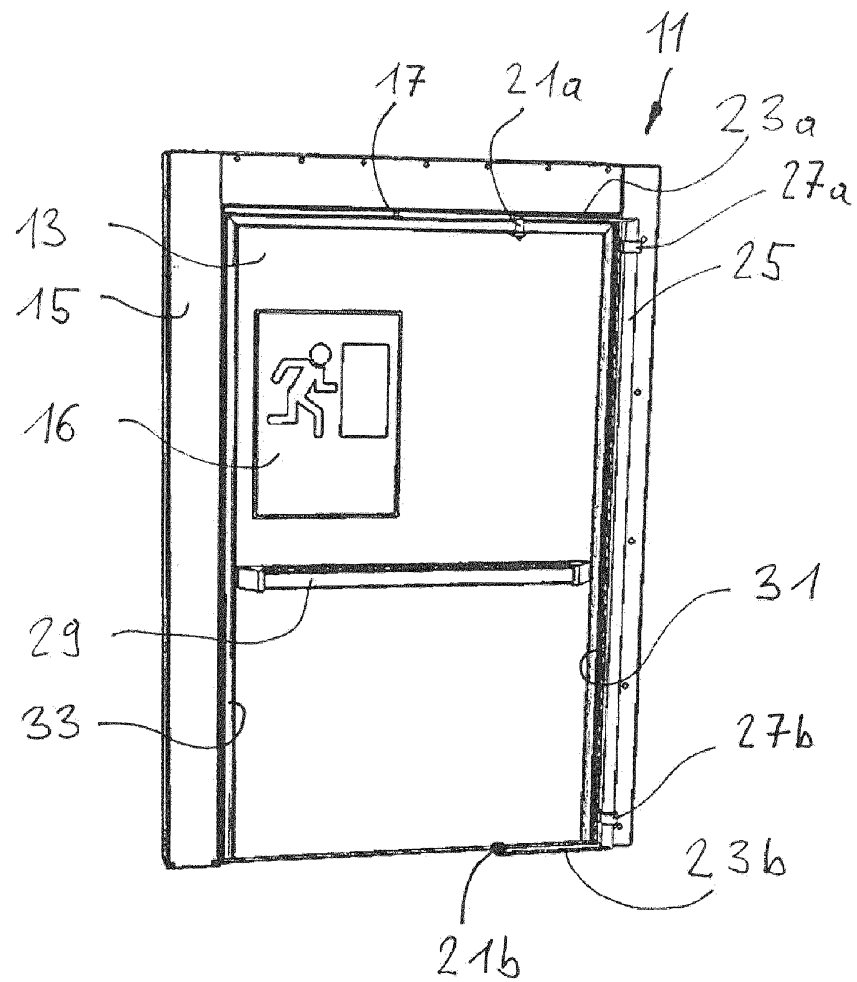
30

10. Flugtdør ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at det første drejeleje (17) kan forbindes med dørbladet (13) ved en flerhed af ophængningspunkter.

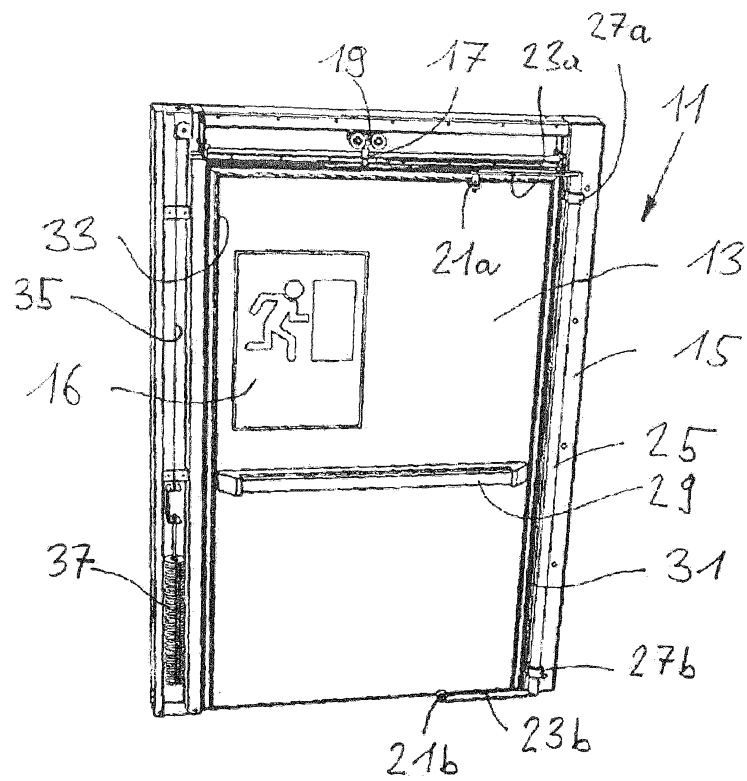
35

11. Flugtdør ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at der på dørbladet (13) er anbragt mindst én låsebolt, der kan forlænges gennem et kvældende materiale, og som kan låses i dørrammen (15).

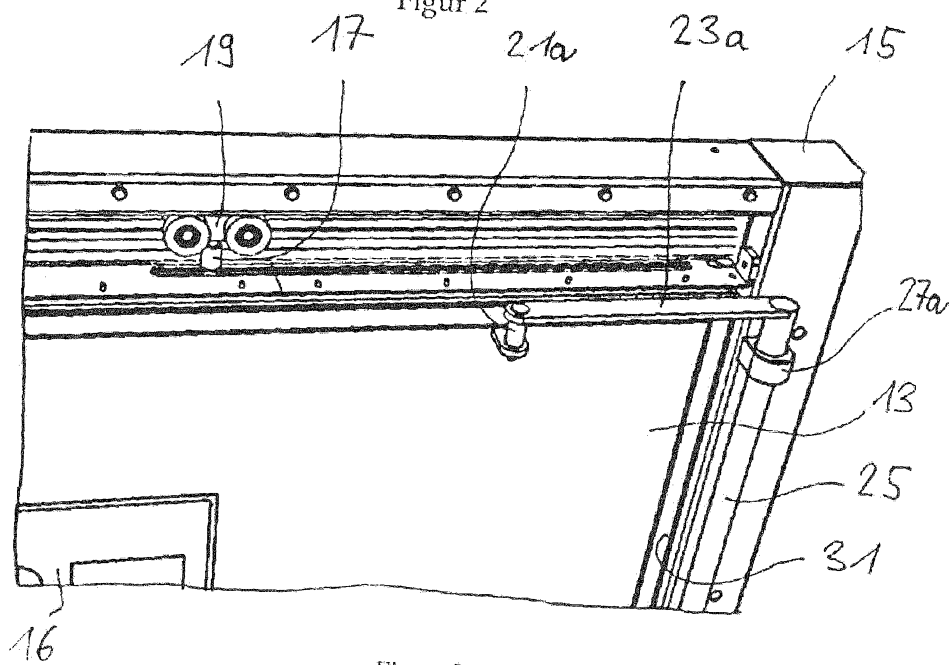
12. Flugtdør ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at en brandsikker forsegling er anbragt på den første og anden langside (31, 33) og på oversiden af dørbladet (13).
- 5 13. Flugtdør ifølge krav 12, kendetegnet ved, at den brandsikre forsegling er implementeret af en metalprofil, som kan forlænges gennem et kvældende materiale, hvor den side af metalprofilen, der vender mod dørrammen, kan være forsynet med et brandsikkert bånd.
- 10 14. Flugtdør ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at der ved undersiden af dørbladet (13) er anbragt mindst én forsænket karm, som kan forlænges fra undersiden ved lukning af dørbladet (13).



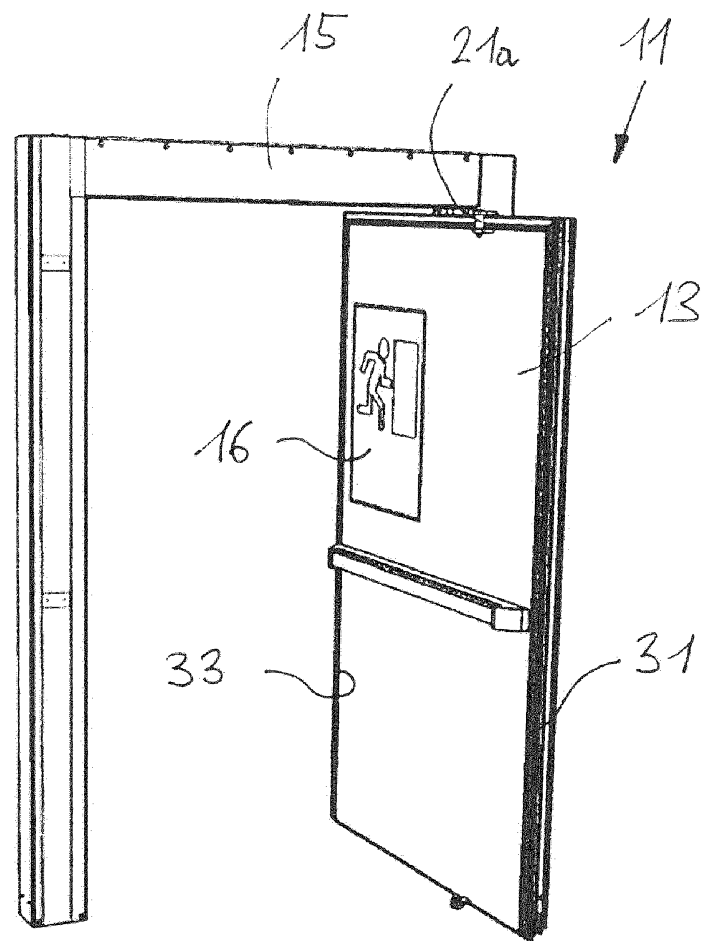
Figur 1



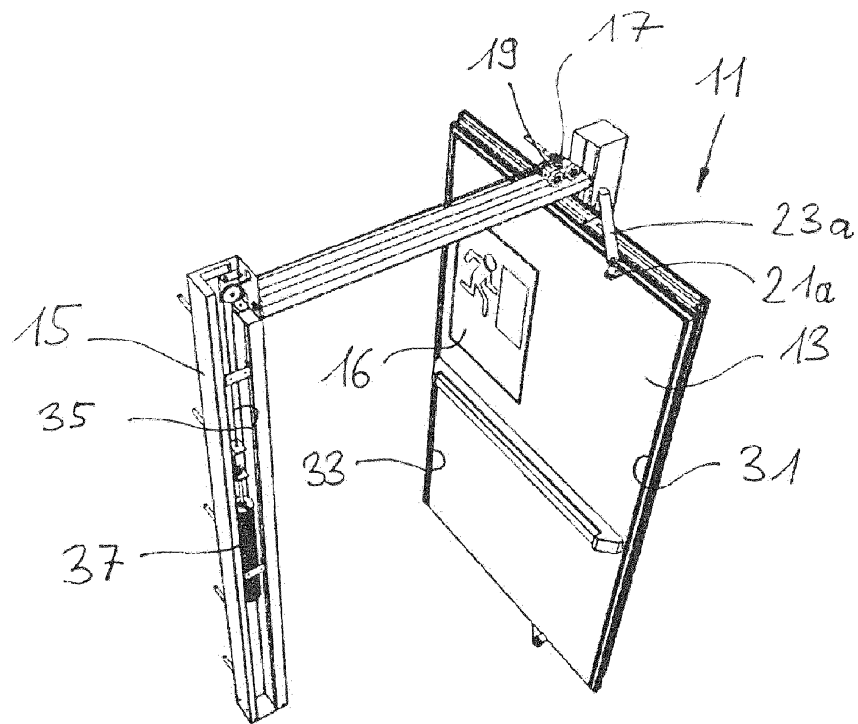
Figur 2



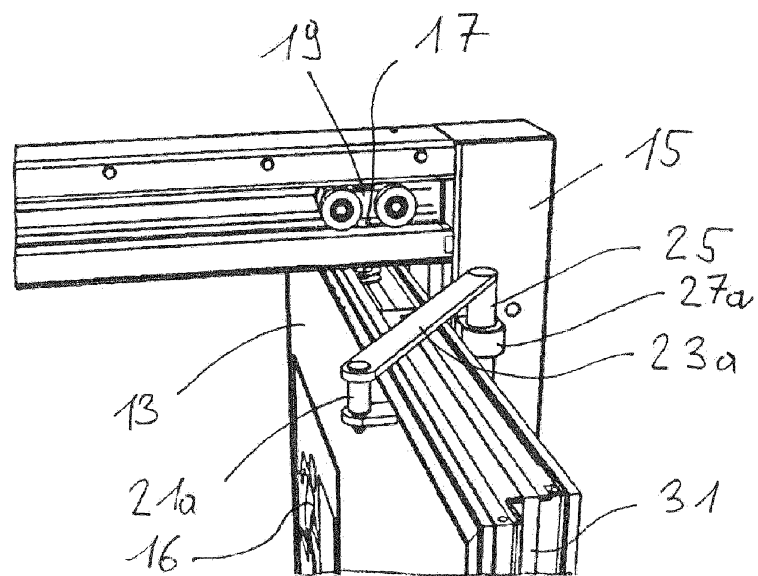
Figur 3



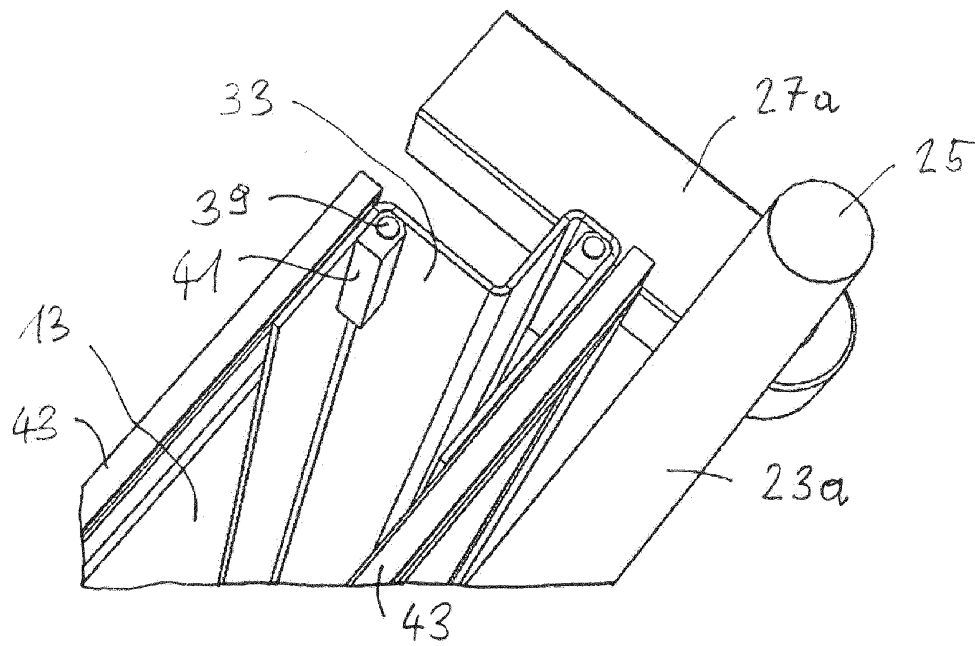
Figur 4



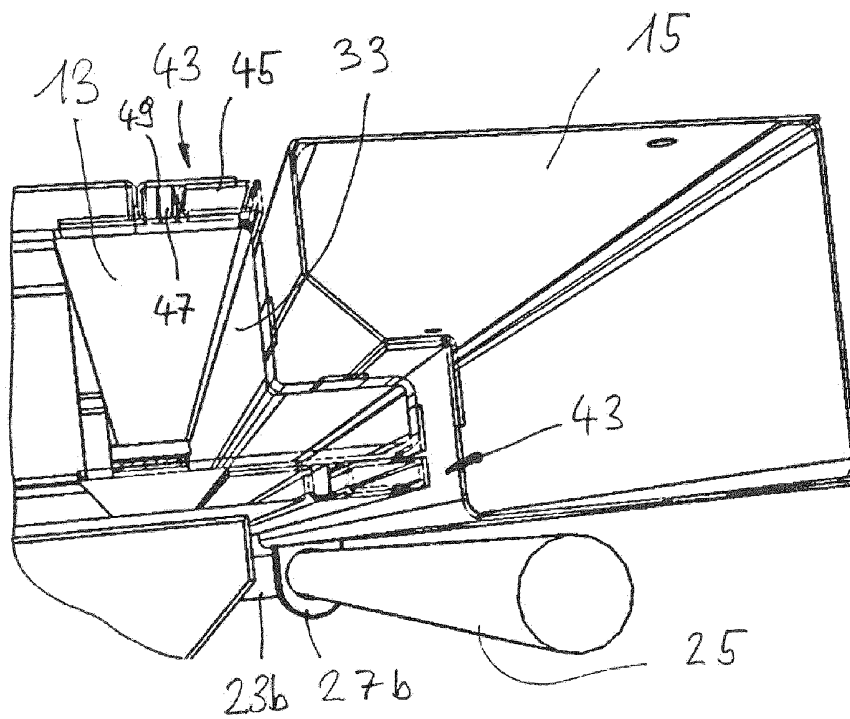
Figur 5



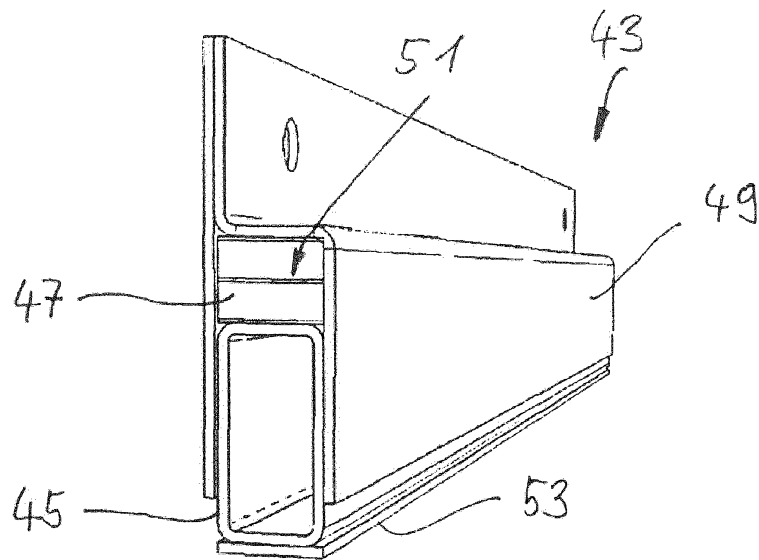
Figur 6



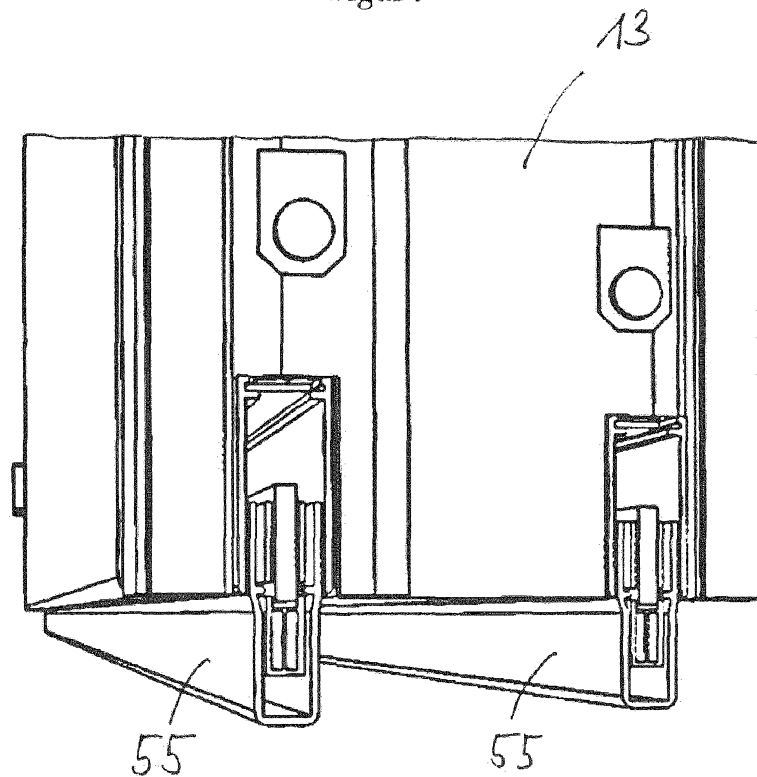
Figur 7



Figur 8



Figur 9



Figur 10