

5

10

DOOR AND RAMP EVACUATION UNIT FOR PASSENGER TRANSPORT
VEHICLES

15

20

25

The present invention refers to a door and ramp evacuation unit for passenger transport vehicles, the purpose of which is to allow the evacuation of passengers by means of unfolding an articulated ramp with a textile floor and side handrails. A special feature is that under normal operating conditions the ramp remains folded and stored in the interior of two vertical "U" cross - section beams which form part of the cabin, and also that it requires no energy source other than manual operation for it to be unfolded.

30

This invention has its application in the field of passenger transport and, more specifically, in two sectors: train and underground train carriages.

The different means of passenger transport currently in existence do not at present dispose of mechanisms which allow for the rapid evacuation of passengers in case of emergency.

35

In those cases where a form of transport does dispose of a means of evacuation, the evacuation system is very large and requires an energy source to operate it.

At present, air transport is the only form of transport which, in general, disposes of an emergency evacuation system: inflatable chutes. These emergency chutes require either the existence of energy sources to produce the compressed air necessary to inflate the chutes, or rechargeable canisters.

Evidently, having a passenger evacuation mechanism for emergency situations which requires an energy source to operate it creates the inherent problem of a blockage of this evacuation mechanism in the event of the absence of electrical, pneumatic or hydraulic energy due to breakdown. Another problem is the size of the evacuation mechanism, as although it is a piece of equipment for use in emergencies it has to be kept available in the means of transport at all times.

The clear solution to this series of drawbacks would consist of an articulated mechanism which occupies a minimum space when folded and does not require energy sources to operate it.

Nevertheless, to date the existence of equipment which is able to carry out the set of functions described is unknown.

The proposed evacuation mechanism for forms of passenger transport comprises a door and ramp evacuation unit.

This door and ramp unit has the purpose of allowing the rapid evacuation of passengers from a means of transport, especially land transport, such as a rail vehicle; with the special feature that, under the normal operating conditions of the vehicle, this unit is completely retracted, while the exit opening is closed by the door, whereas in an emergency the door and ramp may be opened and extended to provide a safe evacuation route.

The door and ramp unit comprises a door and a ramp mounted between two lateral beams which border the

evacuation opening. The door is articulated at its upper edge, opens outward and is subdivided horizontally in two foldable sections. The ramp, for its part, is articulated in one of its smaller sides with the lower end of the lateral beams and is transversely subdivided into two articulated and foldable frames.

The lateral beams are "U" in cross - section, with their hollow side facing forward. In turn, the frames which form the ramp are composed of two longitudinal beams, the longitudinal beams of each frame coming together when the ramp is folded for storage in the "U" cross - section beams. The floor of the ramp is situated upon the longitudinal beams, this floor being composed of a textile sheet fixed upon movable crosspieces along the frames, which allow the floor to be gathered up when the ramp is folded.

The longitudinal beams of each frame are joined at their ends by fixed crosspieces. When the ramp is folded, the fixed longitudinal beams pass across the evacuation opening and constitute an obstacle to the use of the opening as a normal door for passage.

According to a second solution offered by the present invention each of the frames composing the ramp is composed of two independent parallel longitudinal beams connected to each other and to the longitudinal beams of the other frame only through the axis of articulation between the two frames. In this manner, when the ramp is folded and its longitudinal beams are withdrawn into the lateral "U" cross - section beams, the evacuation opening remains completely free and may be used as a normal door.

Another feature of this second solution is that the frames are connected with the lateral "U"- beams by cables which control suspension and folding.

The suspension cables of the frames are fixed at the upper end to a manually operated winch or retrieving

device, which is situated slightly behind and above the "U"- beams. At their lower end, these cables are connected to the frames so as to coincide with the ends of the axis of articulation between the same. The winch or retrieving device has a lock pin which prevents accidental unwinding of the cable.

When extraction of the ramp is desired, the locking pin of the winch is removed and the frames are pushed slightly outward, until they are able to continue to fall due to their own weight. To prevent them from falling abruptly, the winch or retrieving device is equipped with a braking device, the features of which are already known, which slows down the unwinding of the cable. To retract the ramp it is necessary only to operate the winch or retrieving device by means of the corresponding crank, giving rise to the winding up of the cable which pulls upon the frames and brings about their raising.

The folding and unfolding operation is also assisted by the cables which control folding, which pass between the "U" - beams and the opposing longitudinal beams of the external frame. They are attached to the "U"- beams at points situated slightly above the point of articulation between the said beams and the opposing longitudinal beam of the inner frame. These cables are attached to the longitudinal beams of the end frame at points which are aligned transversely, close to the axis of articulation between the two frames, and they are supported on lifters affixed to these longitudinal beams which give rise to the shortening of the cable when the ramp is being hauled up, bringing about the folding of the two frames. The length of this cable, the anchorage points of the same and the lifter on which it is supported are calculated so that variation in the length of the cable allows the frames to unfold, during the descent of the same, and to fold during its elevation.

In this way the lowering and unfolding of the frames and the raising and folding of the same are achieved without the need for springs or operating mechanisms.

According to this second solution, the longitudinal beams which form the frames are composed of profiles which present a double "C" section, both of which are superimposed and directed in perpendicular directions, with the opening of the upper "C" pointing inward, facing each other in the longitudinal beams of each frame so as to form guide rails which receive the ends of the crosspieces, which are able to slide along the longitudinal beams. The opening of the lower "C" points downwards and holds a cable for moving the crosspieces. The lower "C" shapes of the aligned longitudinal beams of the two frames face each other when the ramp is folded.

The foldable door is connected to the lateral "U"-beams by two pneumatic cylinders and lateral cables which are attached at one end to the external section of the door and pass over a roller or guide mounted on the internal section of the said door, to be affixed at their free end to the adjacent lateral "U"- beam. In this way, the door is opened by pushing the same outward. During the turn involved in opening, aided by the pneumatic cylinders, the cable connected to the external section pulls on the same, bringing about its folding upon the inner surface of the internal section of the door. When the latter is being closed, pulling it downward, the cable permits the gradual fall of the end section until it reaches a position where it forms a prolongation of the internal section when the door reaches the frame or outer edge of the exit opening.

The features described, as well as others peculiar to the invention, as included in the claim, are set out below in greater detail with the aid of the accompanying drawings, which show a non-restrictive example of how the device could be constructed.

In the drawings:

Figure 1 shows a view in complete perspective of the completely folded door and ramp evacuation unit for forms of passenger transport.

5 Figure 2 shows a view in complete perspective of the semi-unfolded door and ramp evacuation unit for means of passenger transport.

10 Figure 3 shows a view in complete perspective of the completely unfolded door and ramp evacuation unit for means of passenger transport.

Figure 4 is a detail of the door and ramp evacuation unit for means of passenger transport.

Figure 5 is a perspective view of a second door and ramp unit made in accordance with the invention.

15 Figure 6 is a view of the same unit mounted on the front of an underground or surface train carriage.

Figure 7 is a diagrammatic vertical view of the door and ramp unit shown in figure 6.

20 Figure 8 is a top plan view of the ramp, with the floor of the same partially interrupted in its central area.

Figure 9 is a side elevation of the central area of the ramp as shown in figure 7, at a larger scale.

25 Figure 10 corresponds to detail A of figure 9, at a larger scale.

Figure 11 shows detail B of figure 7, at a larger scale.

Figure 12 is a partial plan view of the articulation zone of the ramp as shown in figure 11.

30 Figure 13 shows the circuit of the cable which controls the folding and unfolding of the floor of the ramp.

35 Figure 14 is a cross-section of the ramp, taken along the X-X cross - section line of figure 8, at a larger scale.

Figure 15 is a similar view to figure 7, with the ramp in folded position.

Figure 16 is a similar view to figure 15, at a larger scale, showing the upper part of the lateral beams, with the frame folded.

Figure 17 is a cross-section of one of the lateral "U"- beams, housing the longitudinal beams of the folded frames.

In accordance with the invention and in the light of these figures (figure 1, figure 2, figure 3 and figure 4), the evacuation mechanism in the planned emergency systems consists of an articulated and glazed door which opens outward (1), of an articulated textile-floored ramp (7) equipped with side handrails (11) and of a folding aluminium footplate (10).

Under normal operating conditions the ramp is folded and housed inside two vertical "U"- beams (15) which form part of the supporting structure of the unit.

The main feature of this evacuation system for emergency situations refers to the fact that it is an articulated mechanism which occupies minimal space when folded and does not require energy sources for its operation.

The articulated door (1) opens outward and pivots upon hinges (2) situated in the upper part of the supporting structure of the unit. To open the door it is necessary to push a crossbar (3) in the inner surface of the door whereupon the door raises by means of the action of springs located in the hollow spaces available in the upper part of the cabin at both sides.

The evacuation ramp is comprised of a rectangular aluminium frame which is articulated at the middle (4). There is a series of movable crosspieces (5) along the length of this frame upon which the material of the ramp floor is rivetted. The frame (4) is comprised of four

aluminium beams "U" - shaped in cross - section which house in their interior a cable (8) which gives tension to the floor at the same time as it helps to bear the flexion stresses transmitted to the beams.

5 The two lower beams (4) are rigidly joined to each other by means of fixed crosspieces (6). The lower fixed crosspiece has a foot (9) which is the point of contact of the ramp with the ground. It is of sufficient height to clear that of the rails. The upper fixed crosspieces (6)
10 are joined to the upper and lower beams (4) at both sides of the central articulation of the frame. These fixed crosspieces (6) force the left and right-hand lateral structures of the ramp to move jointly, thereby increasing the reliability of the system.

15 A sheet of compound material which forms the ramp floor (7) extends over the fixed (6) and movable (5) crosspieces.

 When the ramp floor (7) is folded, it is housed in a container located in the upper part of the door (14). The
20 folded frames are stored in two vertical "U" cross - section beams (15) which form part of the supporting structure of the unit.

 To facilitate evacuation of passengers, the ramp is equipped with a handrail (11) on either side. These
25 handrails are formed of a steel cable covered with a sheath of fireproof material. Each cable is attached to supports (12) mounted on the lateral beams (4) with articulated joints. When the ramp is folded, the supports of the handrail (12) are housed in recesses made for this purpose
30 in the lateral beams (4).

 In the retracted position the floor (7) remains gathered up in two upper and lower sections which are joined at one end to the central fixed crosspieces (6). The other end of each floor section is rivetted to the first
35 and last mobile crosspiece (5) and the ends of these

mobile crosspieces are joined to each end of a tension cable (16). When the ramp is folded, one end of the tension cable (16) comes from the movable crosspiece in the upper part of the lower beam (4). Subsequently, the cable passes downwards through the inside of the lower beam (4) and penetrates the upper beam (4) through its lower end, which is joined to the floor of the train. The cable continues upwards through the inside of the upper beam (4) until its other end joins the first movable crosspiece (6) of the upper beam (4).

The folding footplate (10) folds upon the plane of the cabin floor and turns on hinges mounted in the structure of the floor. This plate allows the evacuation of passengers from carriage to carriage and prevents the accidental unfolding of the ramp as it covers the place where it is housed in the "U"- columns (15). In normal operation mode, the footplate (10) remains in vertical position.

On the basis of the above-mentioned mounting arrangement, the unfolding system of the evacuation mechanism is activated manually which pushes the upper beams (4) outward. When the upper beams (4) go beyond the vertical position, the lower ones (4) begin to separate due to the effect of their own weight and thus the frame extends completely. The unfolding of the handrail (11) is carried out simultaneously owing to the action of the upper cable which is joined to the cabin and to the central supports (12) of the handrail and pulls upon the central support when the upper beam (4) turns, unfolding it into its vertical position. The lower support of the handrail (12) is moved into its position by a torsion spring (13) which joins it to the lower beam (4). This spring is housed inside the support (12), the cross-section of which is in the form of a "U" and which is activated when the head of the central support (12) of the handrail leaves its housing in the lower beam (4).

The unfolding of the floor (7) begins when the upper and lower beams (4) start to separate due to the lengthening of the cable (16), which is outside the beams (4) because the latter are unfolding. Since the total
5 length of the cable is constant, the section which remains stored inside the beams reduces so that the ends of the cable (16) move along the interior guide rails of the beams and pull upon the movable crosspieces (15). The floor (7) is unfolded in this way. When the frame (4) is completely
10 unfolded, the tension cable (16) extends along the lower part of the beams, forming a truss (16) supported on a central support (17) at the level of the central articulation (4) of the frame. This truss (16) helps to bear the flexion stresses upon the beams.

15 According to the solution of figures 5 to 17, the frame (103) is connected to the beams (101) by means of a pair of suspension cables (109) and a pair of folding cables (110).

20 Figure 6 shows the door and ramp unit of figure 5 fitted to the front opening (111) of a railway vehicle (112). The opening (111) is delimited by the beams (101), and the internal section (104) of the door (102) is joined by hinges onto the upper edge of the said opening.

25 Each of the frames (106) and (107) which form the ramp (103) is composed of two independent longitudinal beams, which are referred to by numbers 113 and 114 on frame 106 and by numbers 115 and 116 on frame 107. The two longitudinal beams of each frame are connected with each other and with the two longitudinal beams of the other
30 frame by means of an axis of articulation (108) between the two frames.

35 Between the two longitudinal beams which form each frame, crosspieces (117) are mounted which are able to move along these longitudinal beams and to which there is affixed an upper textile sheet (118) which will constitute

the floor of the ramp.

Figure 8 shows the sheet (118) interrupted in its middle area, showing the crosspieces (117) and the axis of articulation (108) between the two frames.

5 The suspension cables (109) of the ramp (103) are connected at their lower ends to points on the frame which coincide with the ends of the axis of articulation (108). At their upper end these cables (109) are connected to a winch or retrieving device (119) (figure 7), which is
10 activated manually and is of known construction, which is equipped with a lock pin, which, when extracted, allows the cable to unwind freely, controlled by a braking system that is a part of the winch itself (119).

15 The folding cables (110), for their part, are connected at their upper end to a fixed point (120) on the beams (101), while their lower end is fixed to the longitudinal beams (113) and (114) of the external frame (106) at transversely aligned points close to the axis of articulation (108) and which rest upon lifters (121)
20 (figure 9) which have an eccentric curved profile respecting the axis of articulation (108), giving rise to shortening of the cable (110) on raising the ramp and applying traction to the external frame (106) during this raising operation, bringing about the folding of the
25 sections (106) and (107) which take on the shape shown in figure 15, in which the two longitudinal beams (113) and (115) on the one side remain affixed to each other, as do longitudinal beams (114) and (116) on the other side of the ramp, being held within the "U" beams (101).

30 The door (102) is connected with the beams (101), as may best be seen in figures 5 and 7, by two pneumatic cylinders (122), which slide between the internal section of the door and the above-mentioned beams, and which by a cable (123) one end of which is affixed to the end section
35 (105) of the door, passing through a roller or guide (124)

mounted on the internal section (104) of the door and which is ultimately affixed to a point (125) of the beams (101), this cable being of such a length that on closing the door sections 104 and 105 remain extended, while on opening the said door the cable applies traction to section 105 giving rise to its folding, as is shown in figure 7.

Longitudinal beams 113 and 114 of the external frame (106) of the ramp are terminated by short legs at their ends, which are to serve as supports when the ramp is extended, figures 5, 6 and 7. On the other hand, longitudinal beams 115 and 116 of the inner frame (107) terminate, as may best be seen in figures 11 and 12, in arched sections (127) that are hinged onto the lower end of the beams (101) at the axis (28) set between the plates (129) and to which the beams are affixed.

Between the plates (129) on the one side and the other there is also affixed an articulated footplate (130) which on extracting the ramp (103) covers the space between the floor of the vehicle (112) and the floor (119) of the ramp, while on folding and storing the said ramp, the footplate (130) remains raised and is located inside the door (102).

Figure 14 shows the cross - section of the two longitudinal beams of which the ramp frame is composed, between which the crosspieces (117) are mounted. These longitudinal beams have a double "C" cross-section, superimposed, the upper "C" of which, having reference number 131, is open to the interior of the profile, thereby facing each other in the longitudinal beams of the same frame. The lower "C" shape, having reference number 132, is open to the bottom, such that on folding the ramp and the longitudinal beams on the same side coming together, in the manner shown in figure 17, the lower "C" of the same are in the position of facing each other.

Along the length of the upper "C" (131) of the longitudinal beams of both frames there is a centre guide

(133), constructed of a round part affixed by bolts (134). The crosspieces (117) are mounted on these guides and are finished by a lug (135) on one side which rests on the corresponding guide (133), while on the opposite side they are equipped with a circular bearing (136) that is mounted on the corresponding guide (133) along which they are able to slide. Consecutive crosspieces (117) are located with the lug (135) and the bearing (136) on opposite sides.

All of the crosspieces (117) are connected to each other by the sheet of fabric (118) affixed to the upper surfaces of the same. The crosspieces at the end of the ramp, shown with number 117a in figure 13, are also connected to each other by a cable (137) which passes through the rollers (138) affixed to the external ends of the longitudinal beams, then going on to run through the inner part of the lower "C" (132) of the said longitudinal beams, in the manner shown and as may be seen in figure 17. The cable (137) may also include a tensioner (39). The end crosspieces 117a may also be connected to each other by a recovery spring (140), figure 13.

As the cable (137) is of constant length, it applies traction to the crosspieces at the end (117a) when the ramp is unfolded, giving rise to the unfolding of the floor (118) of the same.

As may be seen in figures 5, 9 and 10, the ramp (103) when in its extended position is reinforced by a lower truss at each side. Each truss is composed of two rods (140) that are articulated at their adjacent ends to a lower arm (41) hinged onto the longitudinal beams (115 and 116) of the inner frame (107), while the external ends of the rods are connected to sliders (142) which are held within the lower "C" shape (132) of the longitudinal beams, as may best be seen in figure 17, and which are able to slide along the end section of the longitudinal beams of the two frames, restricted on the inside by a run stop

(143), figure 10. The length of the rods (140) is calculated in such a manner that on unfolding the ramp they are pulled taut into the position shown in figures 5 and 9, while on folding the said ramp the sliders (142) move
5 towards the outside of the longitudinal beams and the arm (141) folds down over the longitudinal beams (115) and (116) of the inner frame, occupying the position shown in figure 15.

When the unit as described is in its inoperative and
10 folded position, the ramp (133) is folded, while the longitudinal beams (113) and (115) on the one side are joined together, as are the longitudinal beams (114) and (116) on the other side, all of them being held within the beams (101), in the manner and as is shown in figure 15. In
15 this position the crosspieces (117) are moved towards the upper part of the folded frames, as may best be seen in figure 16, while the textile floor (118) is folded and the crosspieces (117) are held against each other. The whole set of these crosspieces and the fabric (118) is held
20 within an upper chamber (145) which runs between the beams (101). The door (102), with sections (104) and (105) extended, closes the evacuation exit on the outside. Figures 15 and 16 show the upper axis (46) for the articulation of this door.

25 When it becomes necessary to evacuate a vehicle, such as a railway carriage, the door (102) is opened, to which end it is sufficient to push the same towards the outside, giving rise to its swinging upwards, at the same time as the end section (105) folds. It then folds down towards the
30 outside of the footplate (130). In this situation the passengers occupying the vehicle or carriage may pass directly to another carriage connected to the first or located after it.

In the case of the carriage which it is wished to
35 evacuate being at one end, once the door (102) is open then

the ramp (103) is unfolded, to which end it is sufficient to loosen the mechanism (119) of the lock pin and push towards the outside of the ramp which, due to its own weight, will gradually descend on the cable (109) being freed, at the same time as unfolding occurs due to the increase in length of the cable (110). During this unfolding the rods (140) are tightened and the arm (141) is unfolded, thereby forming the lower trusses.

The ramp is folded by using the mechanism (119) which takes up the cable (119), pulling on the ramp and bringing about the elevation of the same, at the same time as the cable (110) is gradually shortened, this giving rise to the folding of the two frames, until the position shown in figure 15 is once again attained. The mechanism (119) is then locked and the door (102) is brought down.

CLAIMS

1.- A DOOR AND RAMP UNIT FOR THE EVACUATION OF PASSENGER TRANSPORT VEHICLES, characterised in that it is comprised of a unit including an articulated door (1) and a foldable textile - floored ramp (7) equipped with handrails (11) at the sides, which under normal working conditions remains folded and is held within the inside of two vertical beams having a "U" shaped cross-section (4) and which form a part of the cabin, and the extending of which requires no source of energy except for manual activation.

2.- A UNIT according to claim 1 characterised in that the unfolding of the evacuation ramp is carried out manually by the action of springs (13) which push the articulated frame outward, following which it unfolds due to the action of its own weight.

3.- A UNIT according to the above claims, characterised in that the door (1) is articulated at a hinge (2) at the top and opens outward by means of certain springs (13).

4.- A UNIT according to the above claims, characterised in that the handrail (11) is joined to the frame (4) by means of supports articulated at their bases, and which unfolds simultaneously with the frame (4) due to the action of the upper cable which is attached to the cabin and to the central supports (12) of the handrail.

5.- A UNIT according to the above claims, characterised in that the evacuation ramp (7) is comprised of an articulated frame (4) along which there are a series of mobile crosspieces (5) and other fixed crosspieces (6) giving the frame the necessary rigidity and unitary strength.

6.- A UNIT according to the above claims, characterised in that the floor of the ramp (7) is comprised of sheets of compound material rivetted to mobile



crosspieces (5), the two ends of the said fabric being joined by a tensioner cable (8) to ensure that the surface is tight, and a foldable footplate which covers a small gap at the start of the ramp.

5 7.- A UNIT according to the above claims, characterised in that it allows the floor sheets to be folded and unfolded by means of sheet springs, due to the action of a tensioner cable (8) to which both ends of the mobile crosspieces (5) are joined and which moves along the
10 frame (4) when the latter is unfolded, pulling the sheets which constitute the floor of the evacuation ramp.

8.- A UNIT according to claim 1, characterised in that it comprises two lateral parallel beams having a "U" - shaped cross - section which delimit the width of the
15 evacuation hatch and which are so placed that the channel in them faces outward; a foldable door in two sections that opens outward and which is mounted on the two above-mentioned beams according to an upper horizontal axis; and a ramp that is articulated at one of its shortest sides to
20 the lower end of the "U" - beams and which is subdivided crosswise in two articulated frames, which are held when folded within the said "U" - beams and which carry movable crosspieces to which a textile sheet is affixed.

9.- A UNIT according to claim 8, characterised in that
25 each one of the above-mentioned frames is composed of two parallel and independent longitudinal beams, these being connected to each other as well as to the longitudinal beams of the other frame at the articulated axis of the two frames, the said frames being connected to lateral "U" -
30 shaped beams by suspension and folding cables; the longitudinal beams of which are composed shapes having double "C" cross-sections, superimposed and perpendicular in direction, so that the upper "C" with its opening pointing downwards, facing the longitudinal beams of each
35 frame, thereby forming guides to receive the ends of the



crosspieces, and being able to slide along the said longitudinal beams, while the lower "C" is in the position of having its opening pointing downwards, this holding a cable for moving the said crosspieces, these lower "C" openings facing the aligned longitudinal beams of the two frames when the ramp is being folded.

10.- A UNIT according to claim 9, characterised in that the suspension cables for the frames are affixed at their upper end to a winch or manually activated mechanism for rewinding them in, this being located slightly behind and above the "U" - shaped beams, while their lower ends are connected to the frames at the ends of the axis of articulation between the said frames.

11.- A UNIT according to claim 9, characterised in that the cables for folding the frames run between the "U" - shaped beams and the opposing longitudinal beams of the end frame, being affixed to the "U" - beams at a point located slightly above the point between where the said beams articulate with the opposing longitudinal beam of the inner frame, while the said cables are affixed to the longitudinal beams of the external frame at points which are aligned crosswise, close to the axis of articulation between the two frames, and resting upon levers solidly joined to the said longitudinal beams, these giving rise to shortening of the cable during the raising of the ramp, thereby bringing about the folding action between the two frames.

12.- A UNIT according to claim 9, characterised in that under each longitudinal beam there runs a rod, the exterior end of which fixed to a slider that is held within the lower "C" of the said longitudinal beam, and which is able to slide throughout the external section of the same, restricted by an interior run stop, while at its innermost end the two rods at each side are connected to a lower foldable arm, this being joined in articulated form to the



longitudinal beam of the inner frame on the corresponding side, close to the axis of articulation between the two frames.

5 13.- A UNIT according to claim 9, characterised in that the cables for moving the crosspieces of the frames runs within and along the lower "C" of the aligned longitudinal beams of both frames, resting upon rollers mounted at the external end of the said longitudinal beams and connected at its free ends to the adjacent external crosspiece of the frames, and each of these said cables
10 having a freeable tensioner set within it.

14.- A UNIT according to claim 13, characterised in that the free ends of each one of the cables for moving the crosspieces are connected by an intermediate traction
15 spring.

15.- A UNIT according to claim 9, characterised in that the foldable door is connected to the "U" - shaped beams by two pneumatic cylinders, mounted between the said beams on the inner section of the door, as well as by
20 lateral cables which are affixed at their far end to the end section of the door, passing through a roller or guide mounted on the inner section of the said door, and which are joined at their free ends to the adjacent "U" - beam.

16.- A UNIT according to claim 9, characterised in that within the upper "C" - shaped groove of the
25 longitudinal beams of the frames there is affixed a longitudinal rod forming the guide for the crosspieces of the frames, the ends of the crosspieces of which are finished at one end by a small leg or lug which rests upon the said guide, while their opposite end is equipped with
30 a circular bearing that is mounted on the guide, these lugs and bearings occupying alternating positions in consecutive crosspieces.

DOOR AND RAMP EVACUATION UNIT FOR PASSENGER TRANSPORT
VEHICLES

5

SUMMARY

10

15

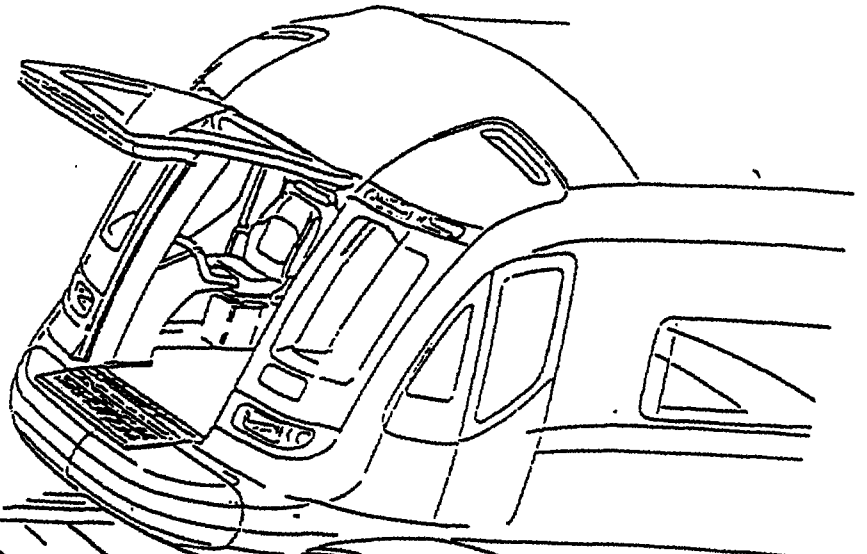
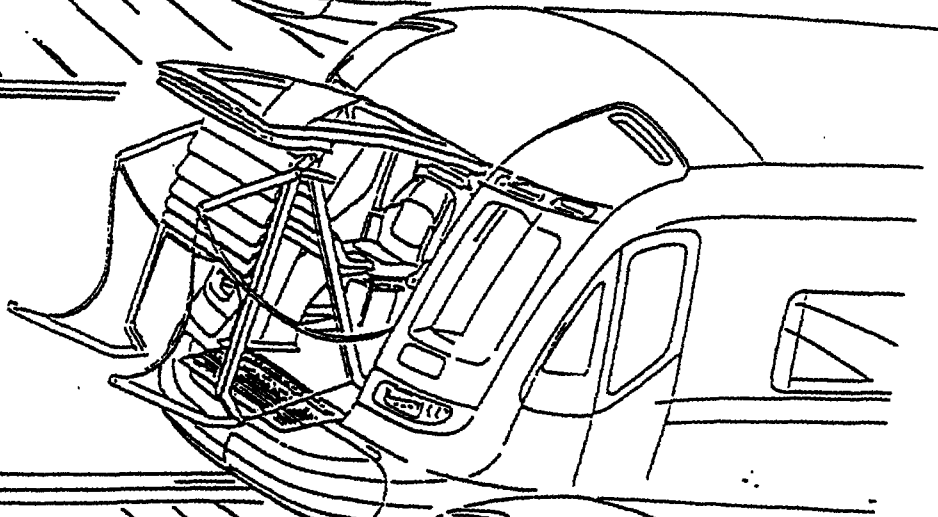
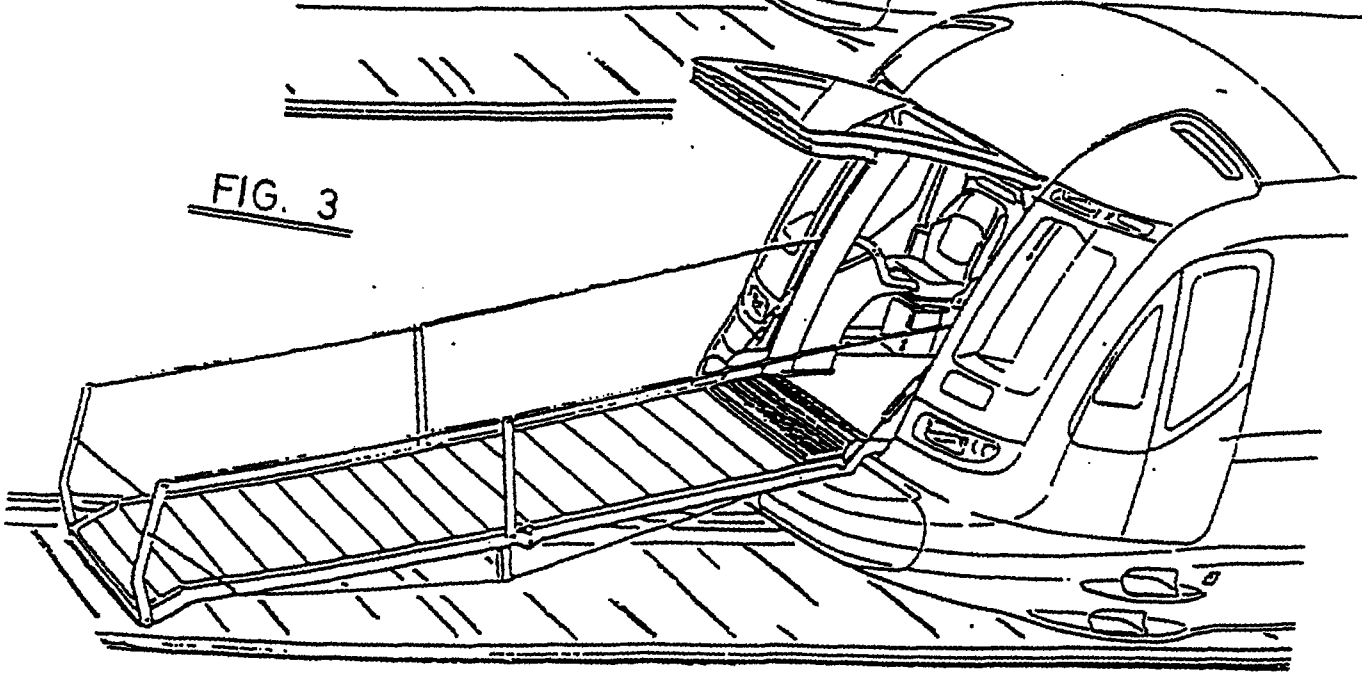
20

A unit composed of a door and ramp for the evacuation of passengers from means of transport, comprising two lateral beams "U" shaped in cross-section, (1) which are set at the borders of the width of the evacuation exit; a foldable door (2) with its axis of articulation at the top, and opening outward; and a foldable ramp (3) subdivided crosswise into two articulated frames (6 and 7), each of which is comprised of two longitudinal beams (13-14) and (15-16) connected by the axis of articulation (8) of the frames and which may be held in the folded position within the lateral "U" - shaped beams (1). The ramp (3) is connected to the structure of the "U" - beams by suspension cables (9), which are connected at their upper end to a winch or manually activated mechanism, and is also connected by a cable for folding (10) of constant length.

THIS SHEET HAS BEEN
REPLACED

This Sheet Has Been Replaced



FIG. 1FIG. 2FIG. 3

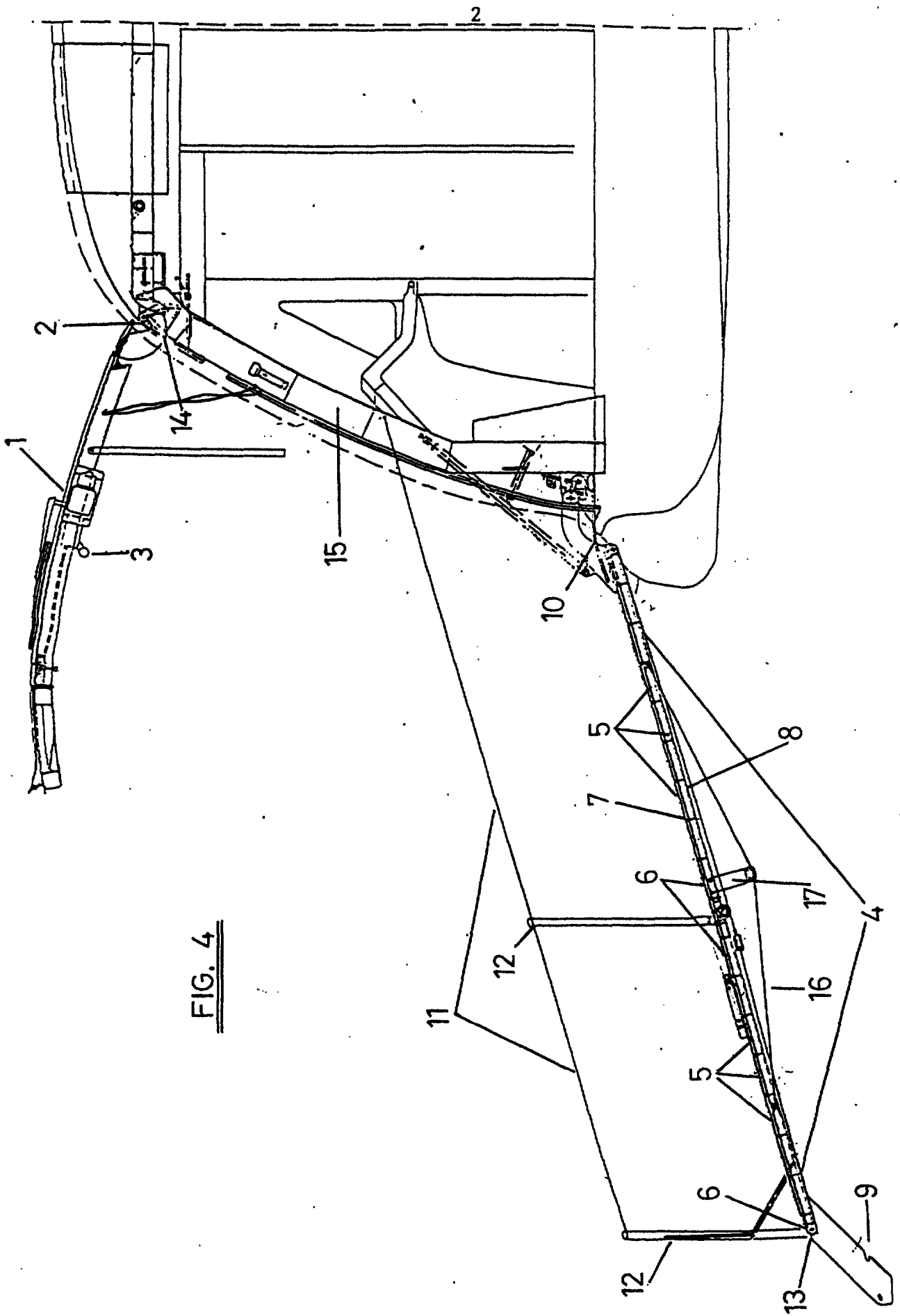


FIG. 4

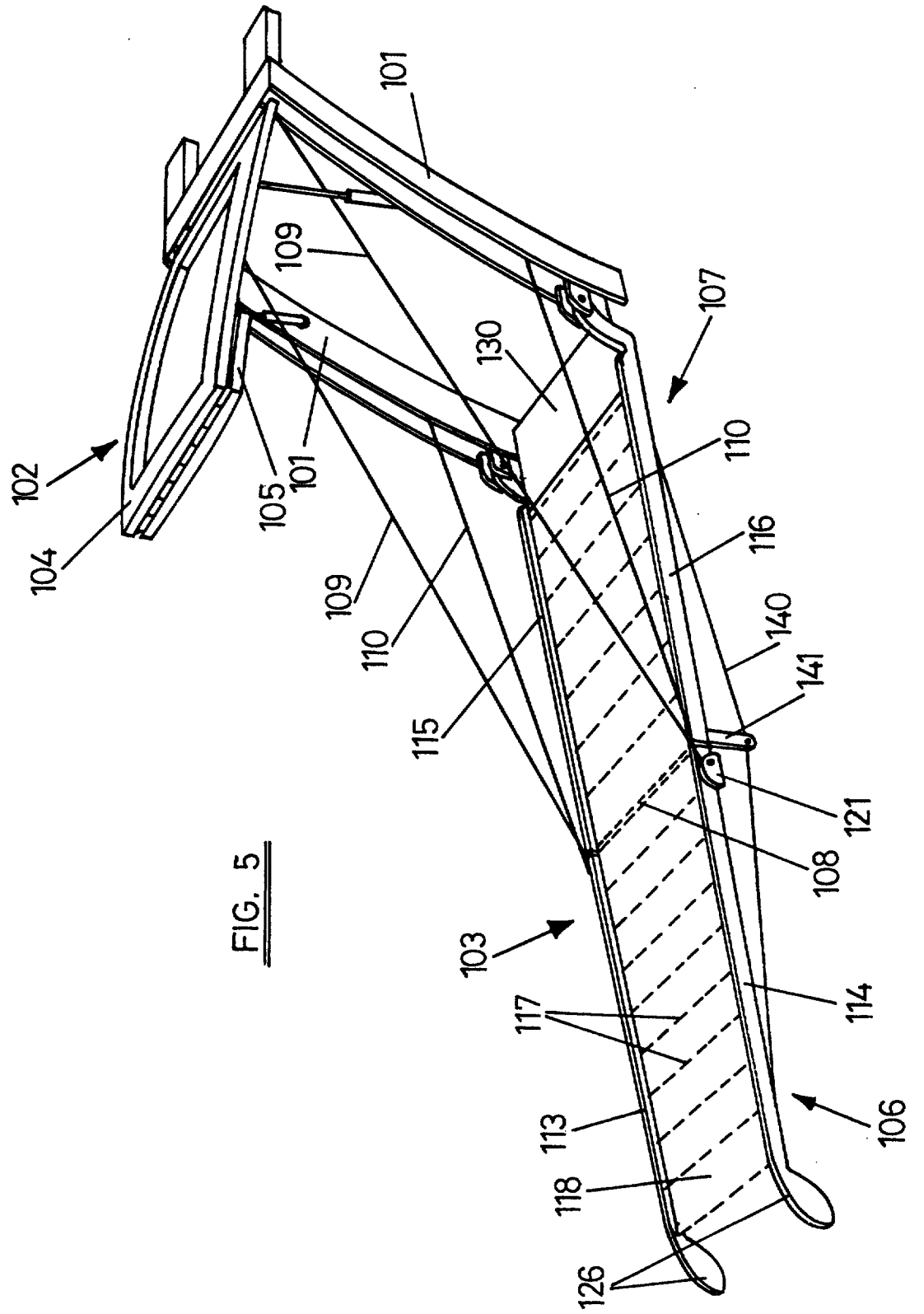
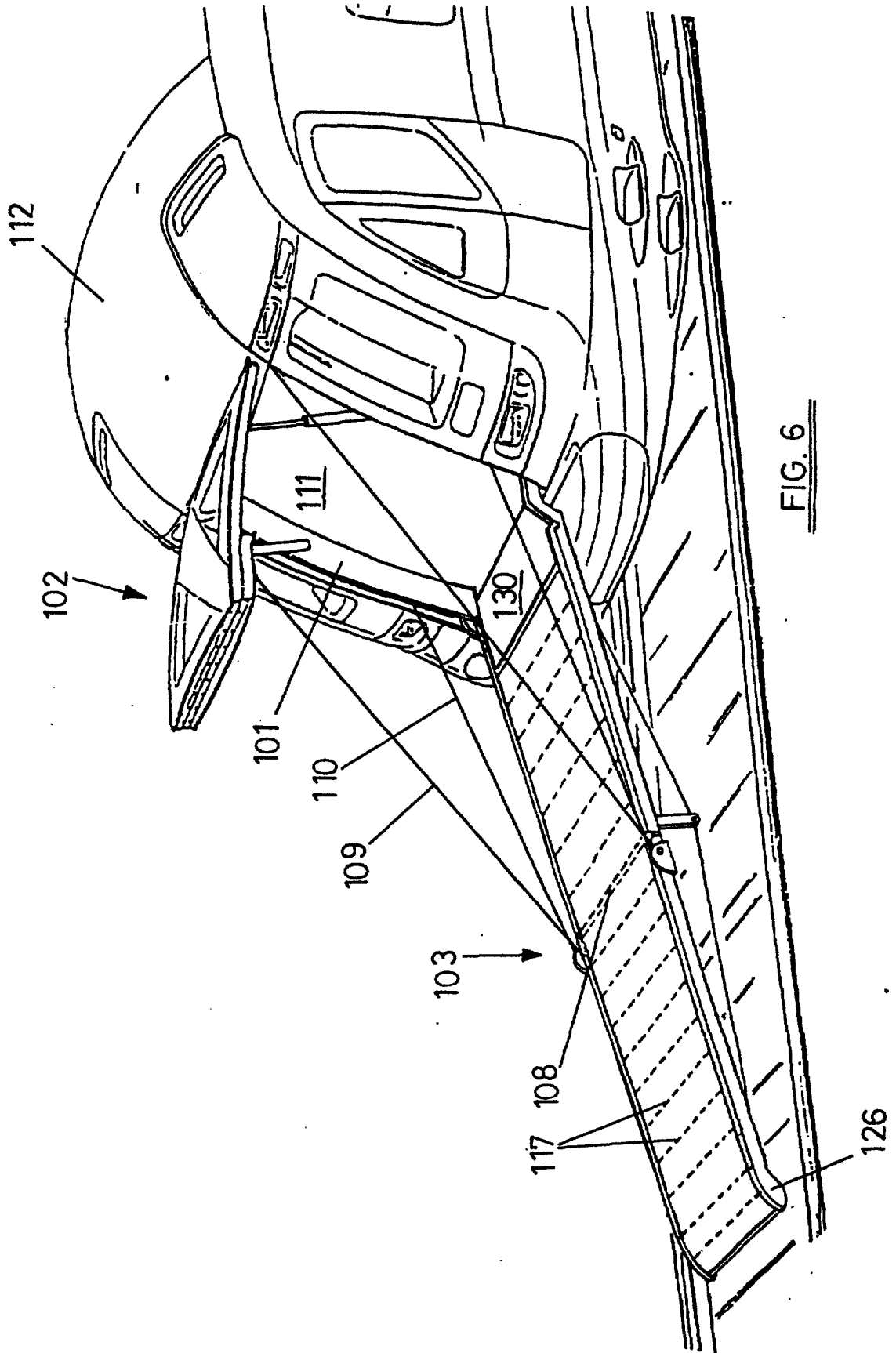


FIG. 5

FIG. 6

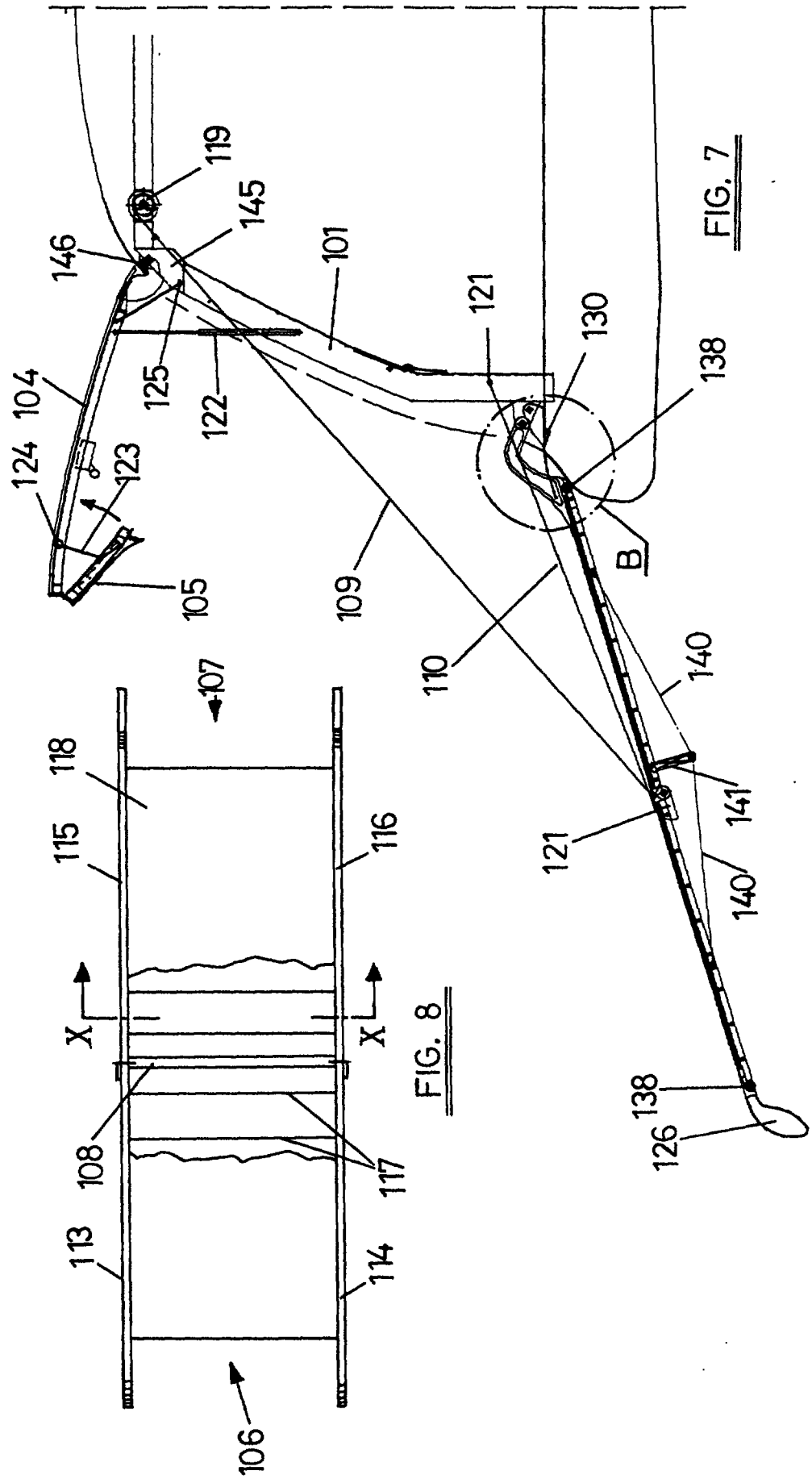
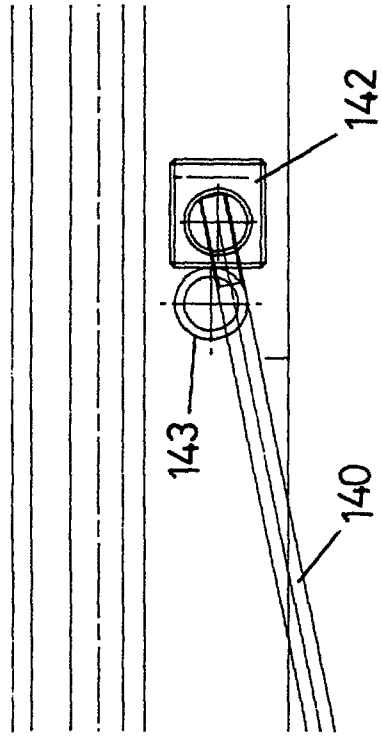
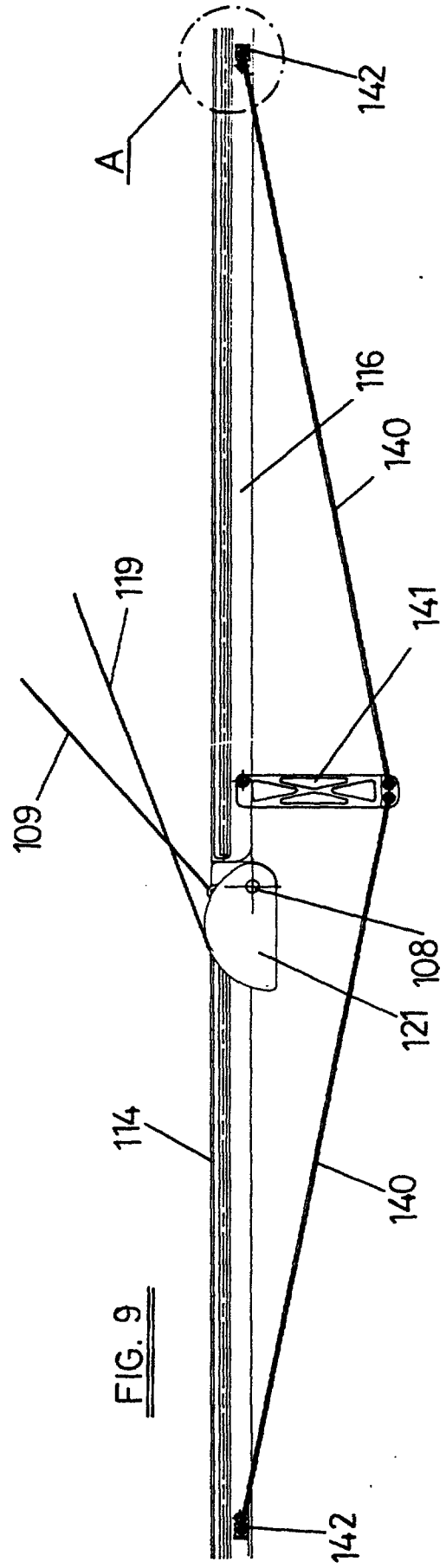
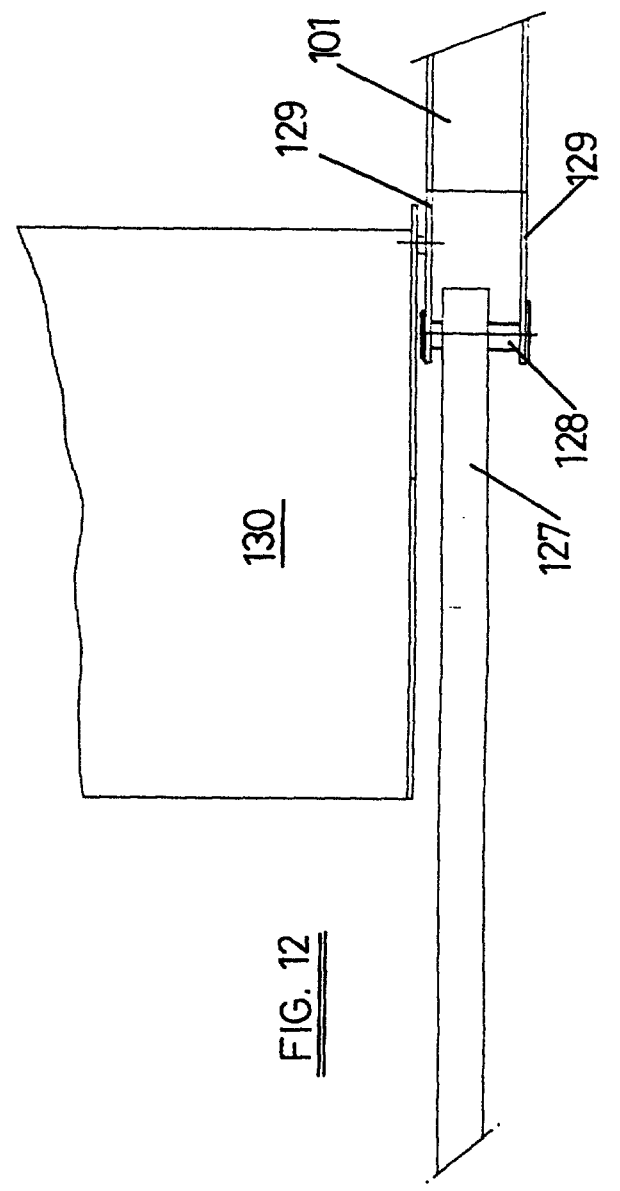
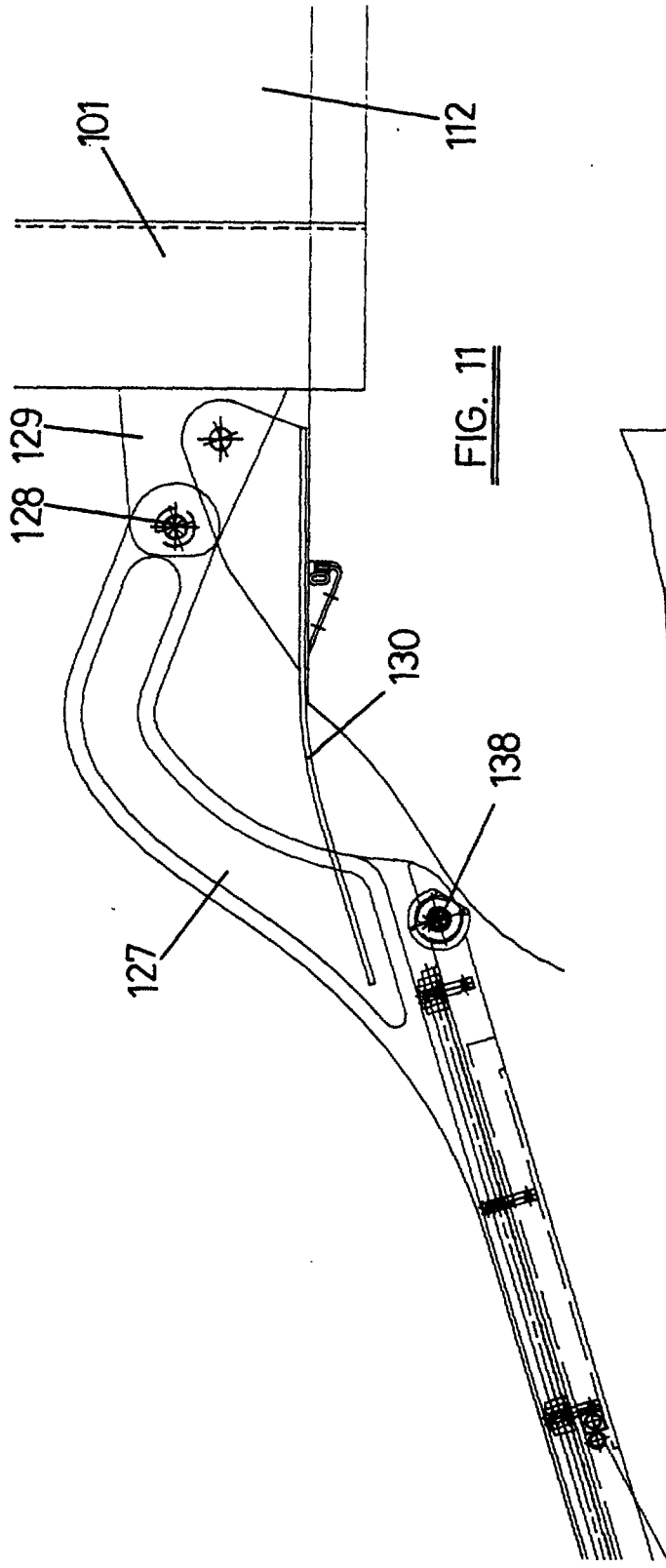
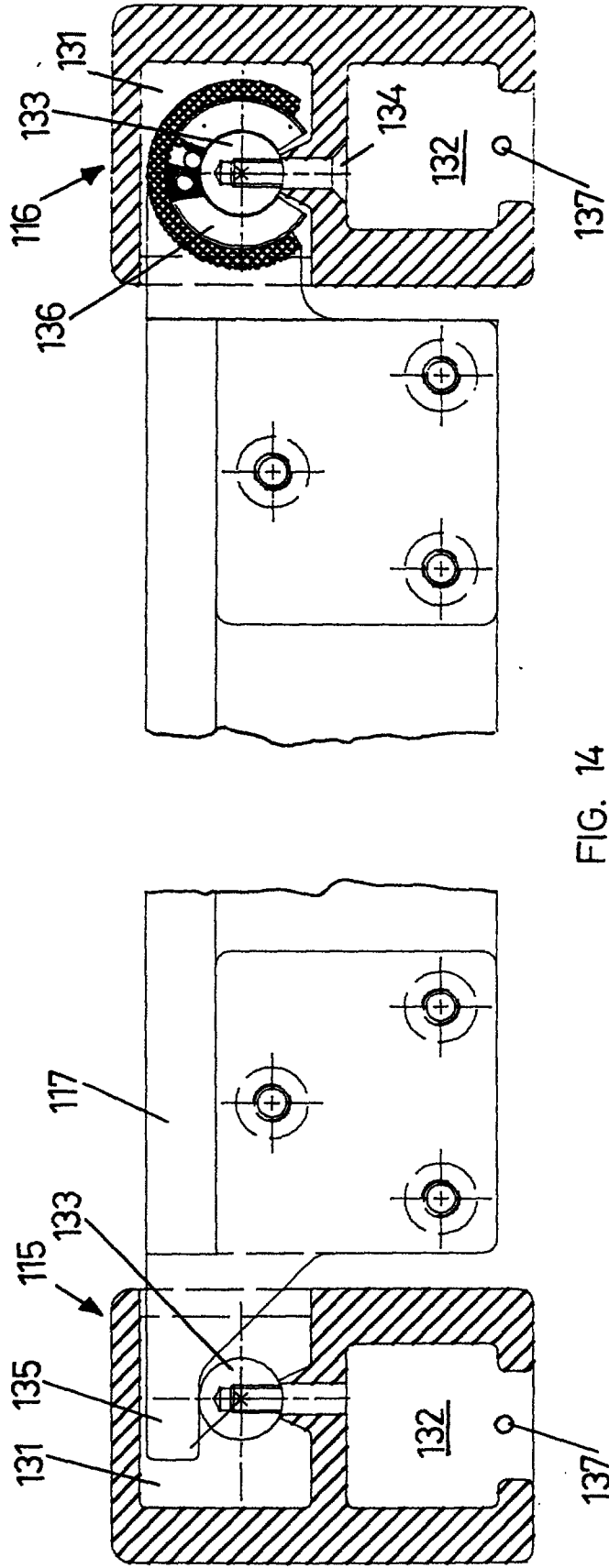
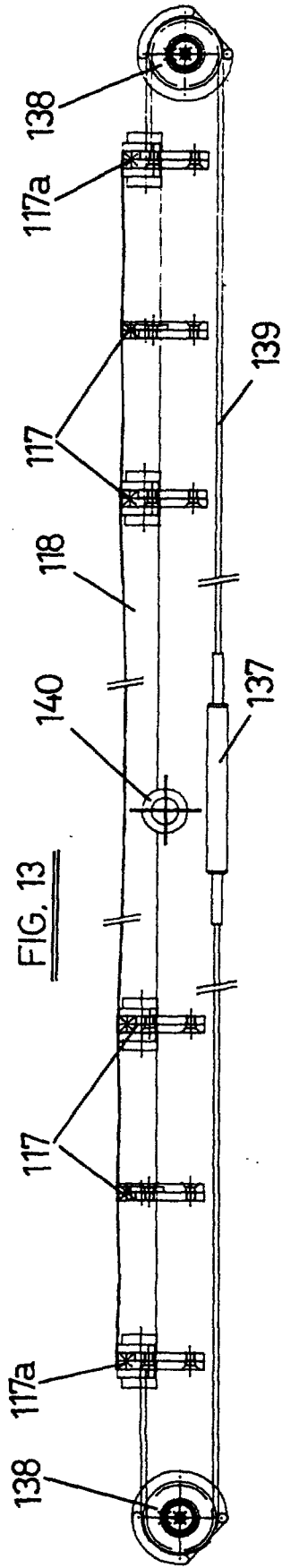
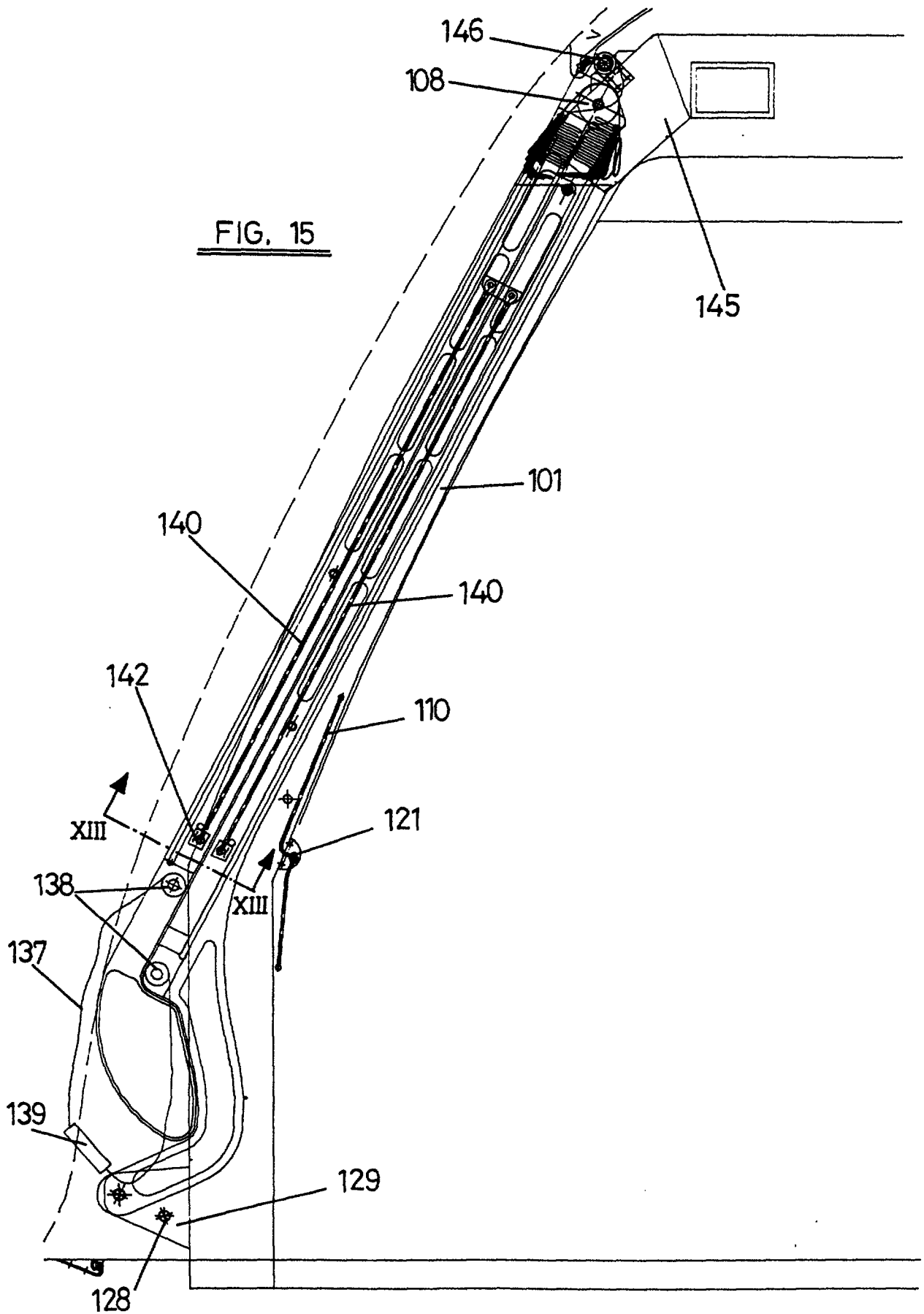


FIG. 10FIG. 9







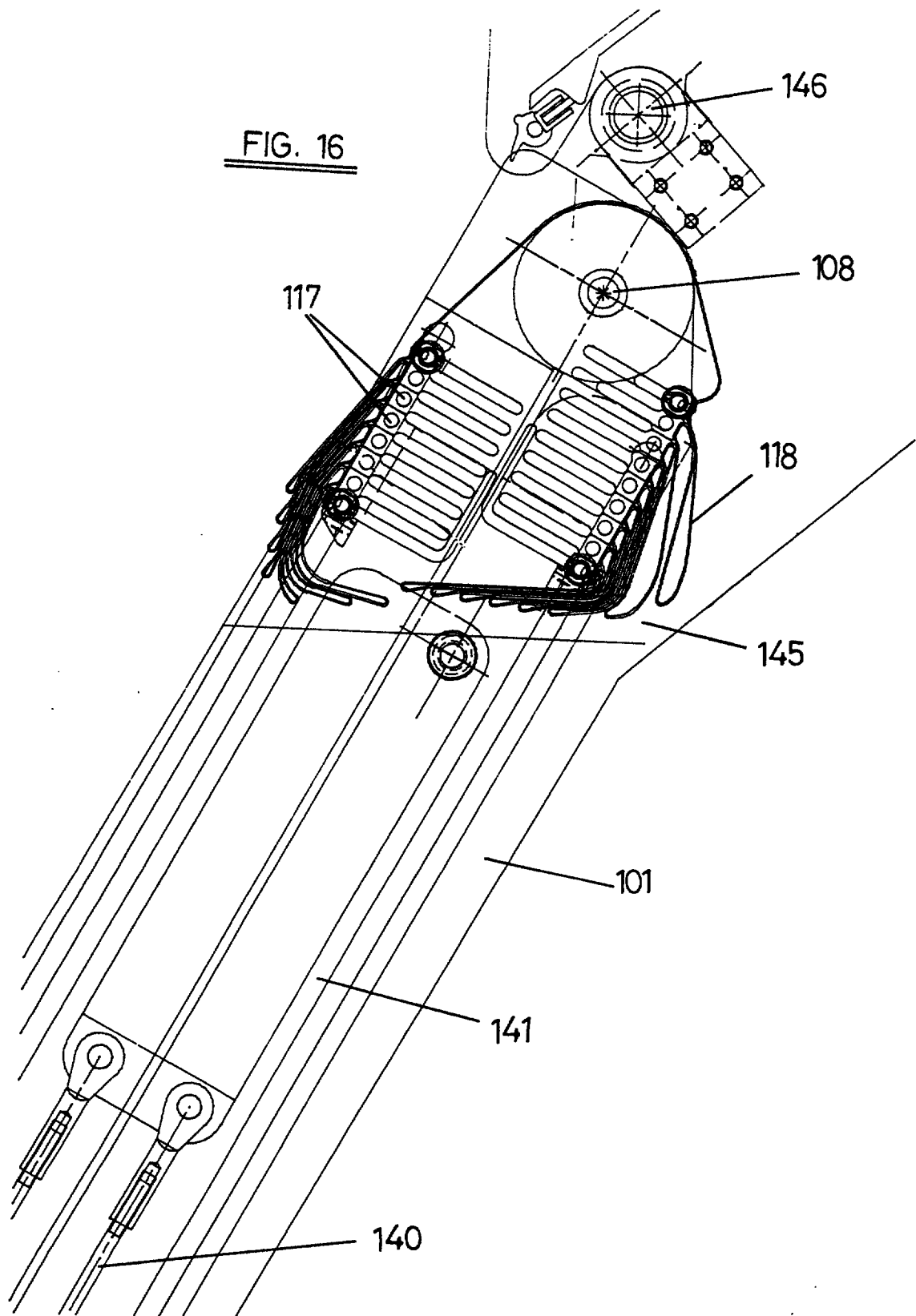
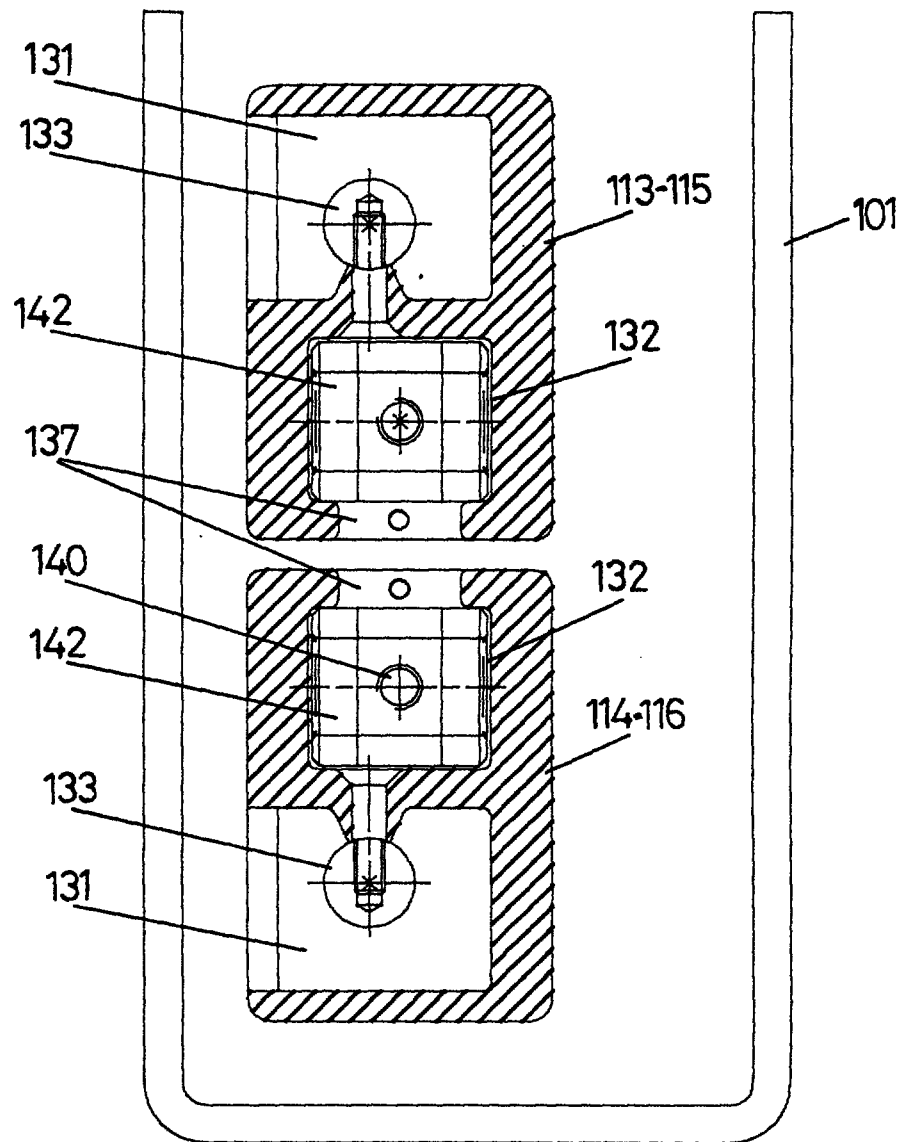


FIG. 17

9703774-1
122

DOOR AND RAMP EVACUATION UNIT FOR PASSENGER TRANSPORT
VEHICLES

ABSTRACT

A unit composed of a door and ramp for the evacuation of passengers from means of transport, comprising two lateral beams "U" shaped in cross-section, (1) which are set at the borders of the width of the evacuation exit; a foldable door (2) with its axis of articulation at the top, and opening outward; and a foldable ramp (3) subdivided crosswise into two articulated frames (6 and 7), each of which is comprised of two longitudinal beams (13-14) and (15-16) connected by the axis of articulation (8) of the frames and which may be held in the folded position within the lateral "U" - shaped beams (1). The ramp (3) is connected to the structure of the "U" - beams by suspension cables (9), which are connected at their upper end to a winch or manually activated mechanism, and is also connected by a cable for folding (10) of constant length.

FIGURE 4

