

[54] **TRANSPORT SYSTEM PARTICULARLY UPRIGHT CABLEWAY, AERIAL CABLEWAY OR OVERHEAD RAILWAY**

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[58] **Field of Search**..... 104/89, 173; 105/148, 150, 329, 343, 348, 349, 377; 42/339, 345, 379, 386

[56] **References Cited**

UNITED STATES PATENTS

3,347,173 10/1967 Carlevaro 105/329 S

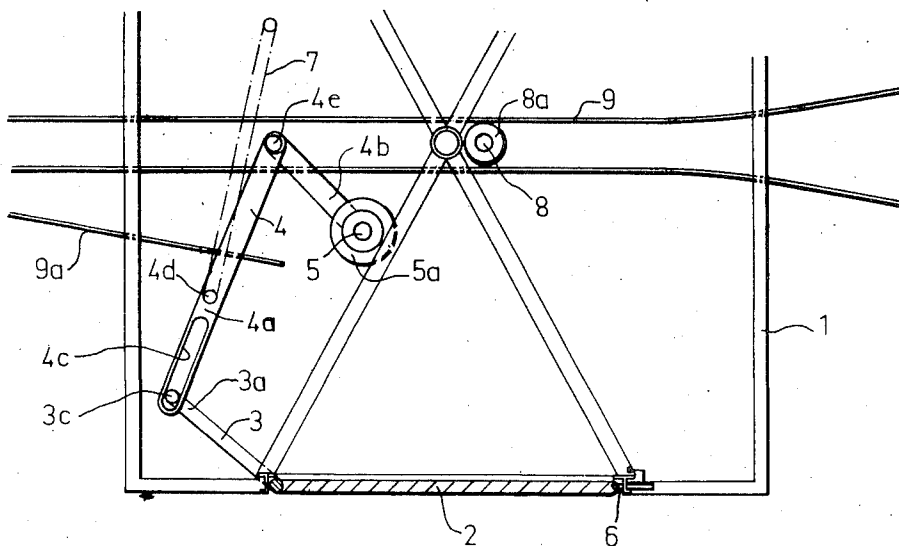
3,556,016 1/1971 Pomagalski et al..... 105/150
3,556,014 1/1971 Rudkin, Jr. 105/329 SC

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[57] **ABSTRACT**

A transport system, especially an upright cableway, aerial cableway or overhead railway wherein each cabin is provided with a door which, when closed, is locked and can be opened from the outside. Each door is equipped with a spring-loaded control lever provided at one end with a control pin. At each station there is provided at least one stationary control rail for displacing the control pin in a direction perpendicular to the direction of travel of the cabin and from a first into a second terminal position. In the first terminal position the door is closed and in the second terminal position the door is opened.

3 Claims, 9 Drawing Figures



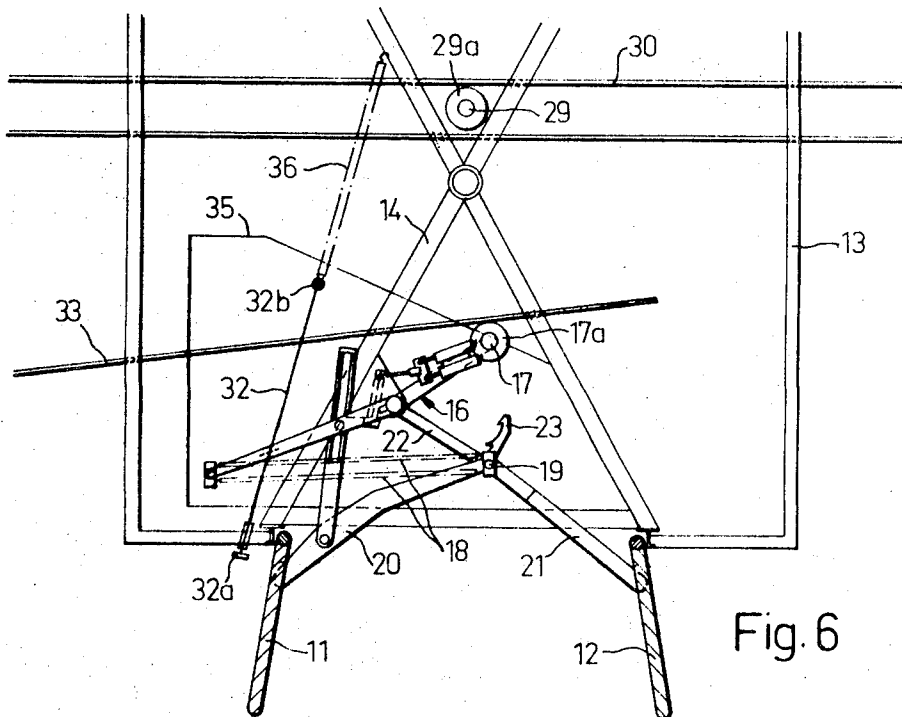


Fig. 6

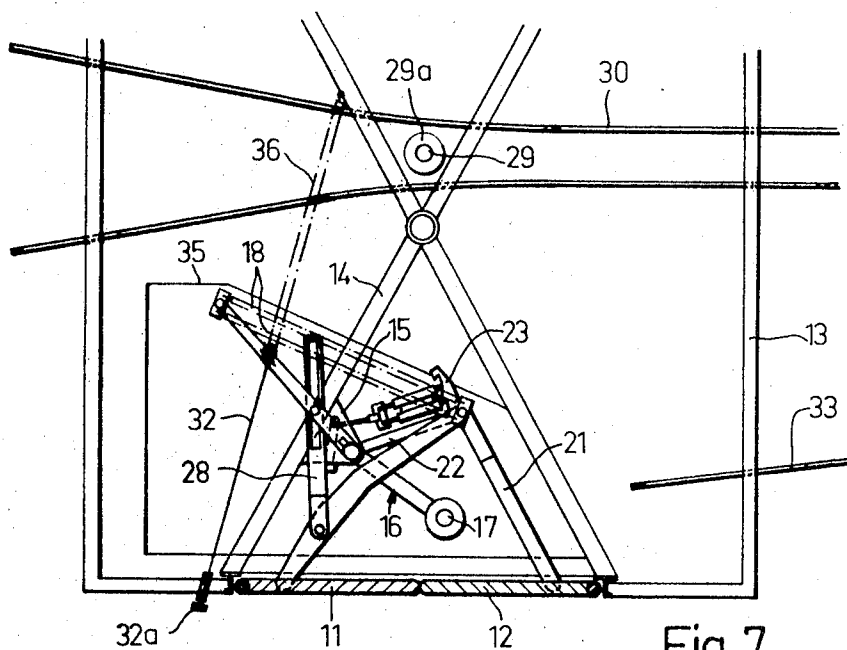
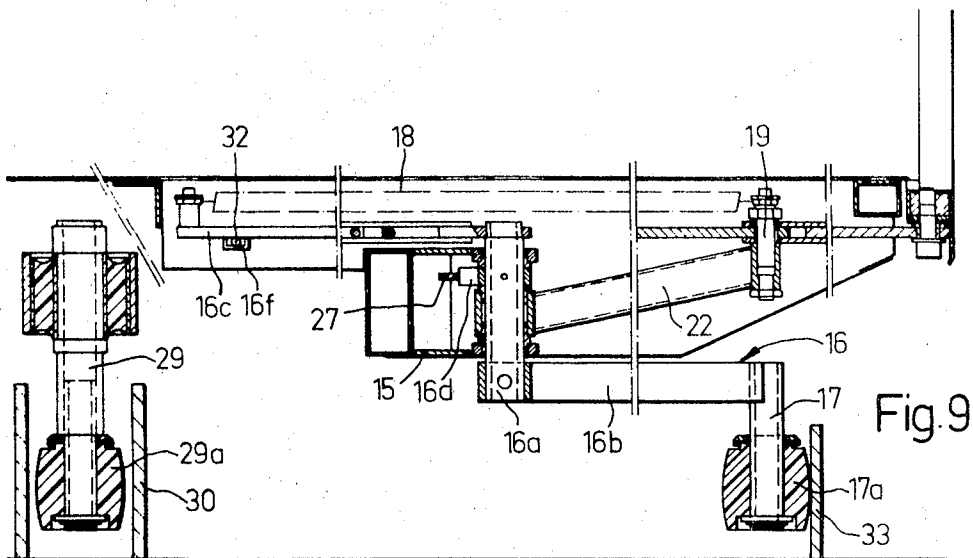
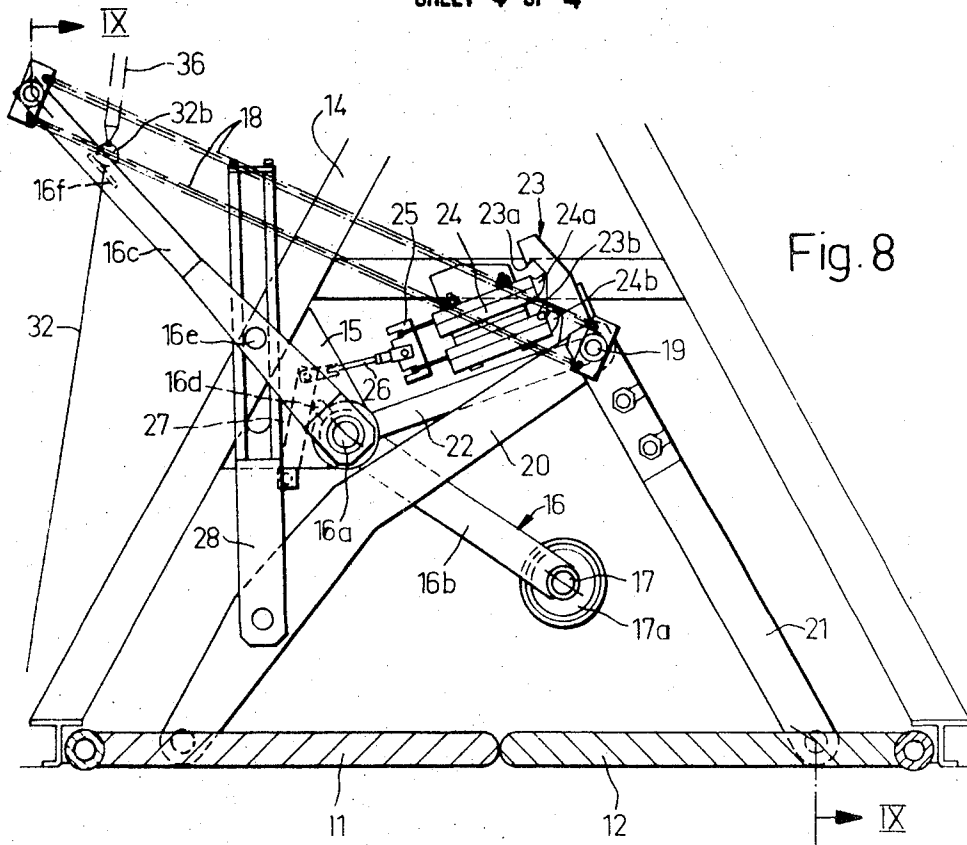


Fig. 7

SHEET 4 OF 4



TRANSPORT SYSTEM PARTICULARLY UPRIGHT CABLEWAY, AERIAL CABLEWAY OR OVERHEAD RAILWAY

BACKGROUND OF THE INVENTION

The present invention broadly relates to transport systems and, more particularly, to a new and improved construction of upright or standing cableway, aerial cableway or overhead railway.

It is standard practice for upright cableways and aerial cableways, also an elevated or overhead railway, for reasons of safety, to design the cabins not accompanied by an operator during their transport functions such that their doors are locked when closed and can only be opened from the outside. With these type cabins it has also already been proposed to arrange a control rail at the station which unlocks the door locking mechanism via mechanical transmission means in order that the unlocked door can be opened by the passengers in the cabin prior to departure. Mechanisms which automatically open the door or even mechanisms which close the doors, have not heretofore been used for the cabins of the previously mentioned transport systems because the constructional expenditure required for such purposes is much too great in relation to the price of the small cabins or gondolas. This is predicated upon the fact that, among other reasons, such gondolas or cabins do not have any electrical hardware so that mechanical transmission systems are required which are only then permitted to be incorporated into the transport system if it can be absolutely demonstrated without doubt that such are truly reliable in operation. Up to now this high degree of security in operation has not been capable of realization for mechanical devices having limited constructional expenditure, so that transport systems are not equipped with such devices, instead the work in opening and closing the cabin doors is carried out by the operating personnel.

SUMMARY OF THE INVENTION

Hence, from what has been stated above it should be recognized that the prior art is still in need of a transport system of the mentioned types designed in a manner to overcome the previously explained drawbacks and limitations. It is a primary objective, therefore, of this invention to provide such type transport systems constructed and designed to effectively and reliably overcome the limitations and shortcomings of the prior art constructions.

Another and more specific object of the present invention relates to a novel construction of transport system having a foolproof and highly reliably operating cabin door actuating mechanism by means of which it is possible to dispense with the use of expensive operating personnel which normally heretofore were only briefly and intermittently used.

Another and more specific object of the present invention relates to a transport system equipped with a purely mechanical mechanism for automatically unlocking, opening, again closing, and locking the doors of each cabin at the cabin stations.

Still a further significant object of the present invention relates to a new and improved construction of transport system equipped with mechanism for reliably and automatically operating the doors as the cabin is at a station, thereby dispensing with the need to employ

expensive operating personnel simply for this purpose, hence improving the economies of the transport system, while still affording the requisite safety and safeguards against unintentional or unauthorized manipulations of the cabin doors.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the invention contemplates that each door is operatively connected with at least one spring-loaded control lever provided at one end with a control pin. At each station there is provided at least one stationary control rail serving for displacing the control pin in a direction perpendicular to the direction of travel of the cabin and from a first terminal position into the second terminal position, whereby the door in the first terminal position is closed and in the second terminal position however is opened.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIGS. 1 and 2 are respective simplified illustrations in plan of a portion of an aerial cableway cabin with the equipment for opening and closing a single-wing cabin door, the floor of the cabin being omitted for purposes of clarity in illustration, and with FIG. 1 showing the door in closed position and FIG. 2 in open position;

FIG. 3 is a cross-sectional view of the arrangement depicted in FIG. 2, taken substantially along the line III—III thereof;

FIGS. 4—9 likewise schematically illustrate details of a second embodiment of cableway transport system, the cabin possessing a double-wing door, and wherein:

FIGS. 4—7 enlarged respective plan views illustrating the door opening- and closing mechanism, FIGS. 4 and 5 showing the mechanism as used for opening the cabin door, whereas FIGS. 6 and 7 illustrate the mechanism as used for closing the cabin door;

FIG. 8 is an enlarged sectional view showing details of the arrangement depicted in FIG. 4; and

FIG. 9 is a cross-sectional view taken along the line IX—IX of FIG. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Describing now the drawings, considering initially the first exemplary embodiment of the invention as depicted in FIGS. 1—3 of the drawing, it should be understood the aerial cableway cabin wall is designated by reference character 1 and the single-wing door by reference character 2. The cabin door 2 is rigidly connected with a guide arm 3 arranged beneath the floor of the cabin. The end 3a of the guide arm 3 is hingedly connected with play to an arm 4a of a control lever 4, the other arm 4b of which is provided at its end with a control pin 5 carrying a control roller or roll 5a. The play between the guide arm 3 and the control lever 4 may be provided for instance in that the arm 4a is equipped with an elongate slot 4c in which is guided a pin 3c attached to the end 3a of the guide arm 3. It would of course also be possible to inter-exchange the slot and pin arrangement or to provide other means for obtaining the desired play between the guide arm 3 and the control lever 4.

Continuing, it will be observed that a spring 7 is attached at location 4d to the control lever 4, the other end of this spring 7 being attached to the cabin floor or at a carrier or support specifically arranged beneath the cabin floor. As should be readily apparent from the drawing the arrangement is undertaken in such a manner that the spring 7, when the door 2 is approximately halfway open, is located above the point of rotation 4e of the control lever 4.

Moreover, reference numeral 6 designates a spring-loaded locking mechanism which, upon closing the cabin door 2, snaps-in and retains the door closed, and further which, as is well known in the art, although not particularly shown in the drawing, can be opened from the outside against the force of the spring, by means of a door grip or key and additionally by means of some suitable type of stationary control rail via a rod or Bowden cable.

Furthermore, as will be readily recognized by referring to FIGS. 1 - 3 there is attached to the bottom of the cabin floor a guide pin 8 equipped with a roller or roll 8a. At the region of a cabin station this guide pin 8 is guided at the lower portion of a floor rail 9 so as to prevent rocking of the cabin, and therefore to ensure, by means of the control rail 9a attached to the ground, positive guiding of the control roller 5a connected with the control pin 5. Hence, when the cabin depicted in the position in FIG. 1 moves further towards the left, then, the control pin 5 will be displaced perpendicular to the direction of travel of the cabin by the control rail 9a; in other words in the case under consideration this control pin 5 will be displaced upwards in the illustration of FIG. 1. Consequently, the control lever 4, loaded by the spring member 7, will be rocked in counterclockwise direction so that the door 2 will be opened and, as best seen by referring to FIG. 2, will be fixedly retained in its open position by the spring member 7.

Now for the purpose of closing the door it is possible to use a stationary stop or impact member 10 which engages with the top or lower region of the cabin door. Hence, if the cabin moves further to the left in the showing of FIG. 2, then the door 2 will impact against the stationary stop 10 and the door will be pushed closed and completely closed by the action of the spring member 7 and held in the closed position by the snap-type lock mechanism 6. However, it would be also possible to use a further rail corresponding to the rail 9a which, through the agency of the control pin 5 and the lever 4, ensures for closing of the door.

Naturally it is not necessary to arrange the previously described mechanism beneath the cabin floor; such can be also arranged in an intermediate floor or false bottom of the cabin, at the roof of the cabin, or in an area between the cabin roof and the inner roof of such cabin.

The second embodiment of the invention to be described hereinafter in conjunction with FIGS. 4 - 9 also concerns an aerial cableway. However, in this instance each cabin is equipped with a double-wing door arrangement 11, 12. The individual door wings have been designated by reference numerals 11 and 12, and the wall of the cabin by reference character 13. Here also the cabin floor has again been conveniently omitted for the purpose of improving clarity in illustration, the line 35 representing the edge of a removable floor cover

which when removed renders readily accessible from above the mechanism to be described hereinafter.

Now at a support or carrier 15 welded to a traverse 14 there is arranged a bearing for a pivot pin 16a of a control lever 16. This control lever 16 is equipped with two arms, a shorter arm 16b and a longer arm 16c. At the end of the shorter lever arm 16b there is disposed a control pin 17 provided with a control roller or roll 17a. On the other hand, the outer end of the other arm 16c is connected via two springs 18 with a pin 19 which interconnects both ends of the guides or control members 20 and 21, the other ends of which are each hingedly connected with one of the door wings 11 and 12, as shown. By means of a third guide or control member 22 the pin 19 is hingedly connected with the pin 16a, so that this pin 19 can rock or pivot about the stationary pin 16a. These details can be best recognized by referring to the showing of FIG. 8, wherein it should be also apparent that at the guide or control member 22 there is arranged a claw rod 23 having two claw members 23a and 23b which, together with the lengthwise displaceable bolts or locks 24a and 24b of the lock component 24, form an arresting mechanism and retain the door 11, 12 in closed position. The bolts or locks 24a and 24b can be retracted against the force of springs not visible in the drawing, by means of the balance or beam 25 and the tension or draw rod 26 hingedly connected with the guide or control rod 27 and owing to the action of the cam 16d rigidly connected with the control lever 16, so that the claw rod 23 and therefore the three guides or control members 20, 21 and 22 are released. The guide member 28 serves to establish the requisite operable connection between the three guides or control members 20, 21 and 22 and the control lever 16. As should be apparent from FIG. 8, this guide member 28 is hingedly connected with play to the control lever 16 and without play to the guide member 20.

Now as best seen by referring to FIGS. 4 and 5 if the cabin arrives at a station, then the guide pin 29, secured somewhat resiliently to the cabin floor and which carries at its one end a guide roller 29a, will be guided into the guide rail 30 in order to prevent any excessive rocking of the cabin. The control pin 17 with its control roller 17a is then displaced by the control rail 31 perpendicular to the direction of cabin travel, i.e., upwardly in the showing of the drawings, so that the control lever 16 rotatably mounted by means of the pivot pin 16a is rotated against the force of the springs 18. During this rotary or pivotable movement the cam 16d initially presses against the guide rod 27 and rocks such, whereby the arresting mechanism 23, 24 is released through the action of the tension rod 26. The bolt 16e at the lever arm 16c is displaced within the slot of the guide member 28 until it impacts against the end of the slot and then during further rocking movement displaces the guide 28 in such a manner that by means of both of the guides 20 and 21 the opening movement of the door wings 11 and 12 is initiated. Now as soon as the door wings have opened somewhat more than one half of their full extent, i.e., then when the springs 18 have moved past the axis of rotation of the control lever 16, then there occurs a complete opening of the doors by the force of the springs 18. Hence, the mechanism assumes the position illustrated in FIG. 5 wherein the door wings 11 and 12 are held open by the spring force, however these door wings can also be manually

closed against the force of such springs. To again open the doors it is only necessary to pull upon the free end 32a of the tension cable 32 serving as an emergency opening mechanism and which tension cable is guided through the guide 16f at the lever 16, the other end of this tension cable 32 being provided with a random thickened portion 32b and secured by a helical spring 36 to the cabin chassis. Consequently, the previously described door opening operation can be likewise carried out.

Upon leaving the station, and as best seen by referring to FIGS. 6 and 7, the aerial cableway cabin travels past a second control rail 33 whereby the mechanism is operated in the sense of closing the doors 11 and 12. The control rail 33 displaces the control pin 17 with the control roller 17a again in a direction perpendicular to the direction of cabin travel, however this time in the direction towards the cabin door. Consequently, the control lever 16 is rocked in clockwise direction against the force of the springs 18, so that the pin 16e guided at the slot of the guide member 28, as soon as it bears against the end of this slot, entrains this guide member so that the closing operation of both door wings 11 and 12 is initiated. This closing operation is terminated by the springs 18 as soon as such have moved past their dead-center position. At the end of the closing operation the arresting mechanism 23, 24 also snaps-in. Such, as is also known for the locks of automobile doors, is constructed as a double-stage locking device in order that the arresting mechanism can also then fixedly hold the door if, for instance, owing to ice or snow or interference by an object, such as a ski pole, it is not yet completely closed.

As should be apparent from the preceding described embodiments, the inventive apparatus possesses an extremely simple disturbance-free construction, especially suitable for use during rough weather conditions and which reliably opens the doors at given stations, holds the doors open, again shuts the doors and holds such closed, and wherein the door wings in order to prevent accidents when they are in their open position are elastically retained in such open position. Of course, the equipment can be modified by carrying out certain constructional changes without departing from the spirit and scope of the inventive concepts. Thus, for instance, it is not necessary that the described mechanism be arranged beneath the passenger space or cabin region, it could also be arranged above such. Furthermore, it would also be possible to accommodate the control rail at the region of the cabin suspension instead of at the station floor, provided that the necessary transmission elements are present, such as for instance rods or Bowden- or flexible cables.

While there is shown and described present preferred

embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims. Accordingly,

What is claimed is:

1. A transport system, especially upright cableway, aerial cableway or elevated railway, comprising at least one cabin, each cabin having a door which in its closed position is locked and can be opened from the outside, a locking mechanism for each door, control rail means provided at each station, means cooperating with said control rail means for acting upon said locking mechanism to open the latter, said cooperating means comprising at least one spring-loaded control lever provided for the cabin door, said control lever being equipped at one end with a control pin, said control rail means comprising at least one stationary control rail provided at each station for displacing the control pin in a direction perpendicular to the direction of travel of the cabin from a first terminal position into a second terminal position, wherein the door in the first terminal position is closed and in the second terminal position is opened, the door of the cabin is constructed as a double-wing door, and wherein both wings of each such door are connected via a respective first and second guide member with a third guide member, means defining a fixed point of rotation, said third guide member being pivotably connected with said fixed point of rotation, and an arresting mechanism provided for at least one of the three guide members in order to retain said guide members in a position in which the door is closed.

2. The transport system as defined in claim 1, further including a connection bolt for connecting together said three guide members, the spring loading said control lever connecting the opposite end of said control lever remote from said control pin with said connection bolt for said three guide members, said spring loading said control lever, when the door is approximately halfway opened, being located over the point of rotation of the control lever.

3. The transport system as defined in claim 2, wherein said control lever is connected with play via a fourth guide member with one of said three guide members in such a manner that during rocking of the control lever from a first terminal position into a second terminal position such initially acts upon said arresting mechanism and releases such before it pivots the guide members hinged with the door wings, and wherein when the door is opened at least one door wing can be elastically rocked through a limited angle without acting upon said control lever.

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