United States Patent [19]

Iller

[11] **3,711,882**

[45] **Jan. 23, 1973**

[54] **ELEVATED DOORWAY RETRACTABLE RAMP STRUCTURE**

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[22] Filed: **Feb. 24, 1971**

[21] Appl. No.: **118,337**

[52] **U.S. Cl.** **14/72**, 214/85

[51] **Int. Cl.** **E01d 15/12**

[58] **Field of Search** 214/83.24, 83.26, 85; 14/72

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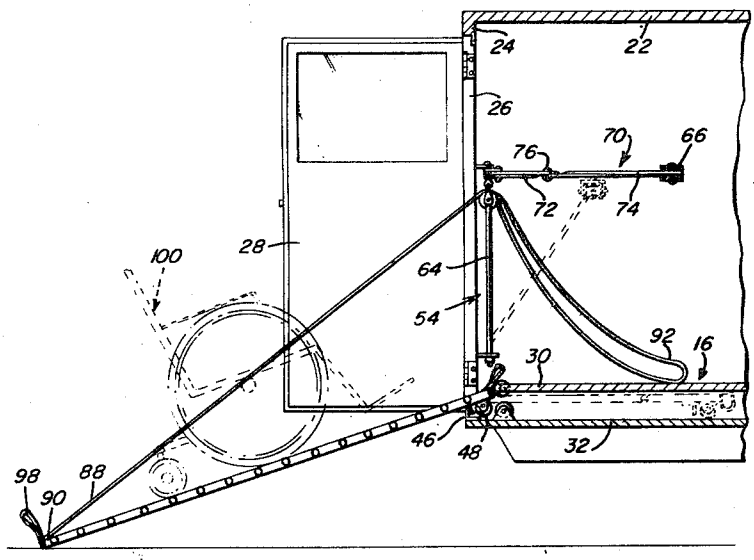
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[57] **ABSTRACT**

A loading and unloading ramp structure for use in conjunction with an enclosure having one upstanding wall with an elevated entranceway formed therein and an interior floor surface having one exposed edge portion extending across the lower portion of the entranceway. The ramp structure comprises an elongated panel and the enclosure includes a horizontally elongated recess disposed beneath the floor surface thereof and having one end opening outwardly of the lower portion of the entranceway. The elongated panel or panel member is slideably endwise receivable within the recess for endwise extension and retraction relative thereto and retracting, extending and supporting tension member sections are provided and operatively supported from the enclosure structure and connected to the elongated ramp member in a manner such that the ramp structure may be extended or retracted either from within the enclosure structure or from the outside thereof and by a person either standing on his feet or seated in a wheel chair.

10 Claims, 11 Drawing Figures



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SHEET 1 OF 3

Fig . 1

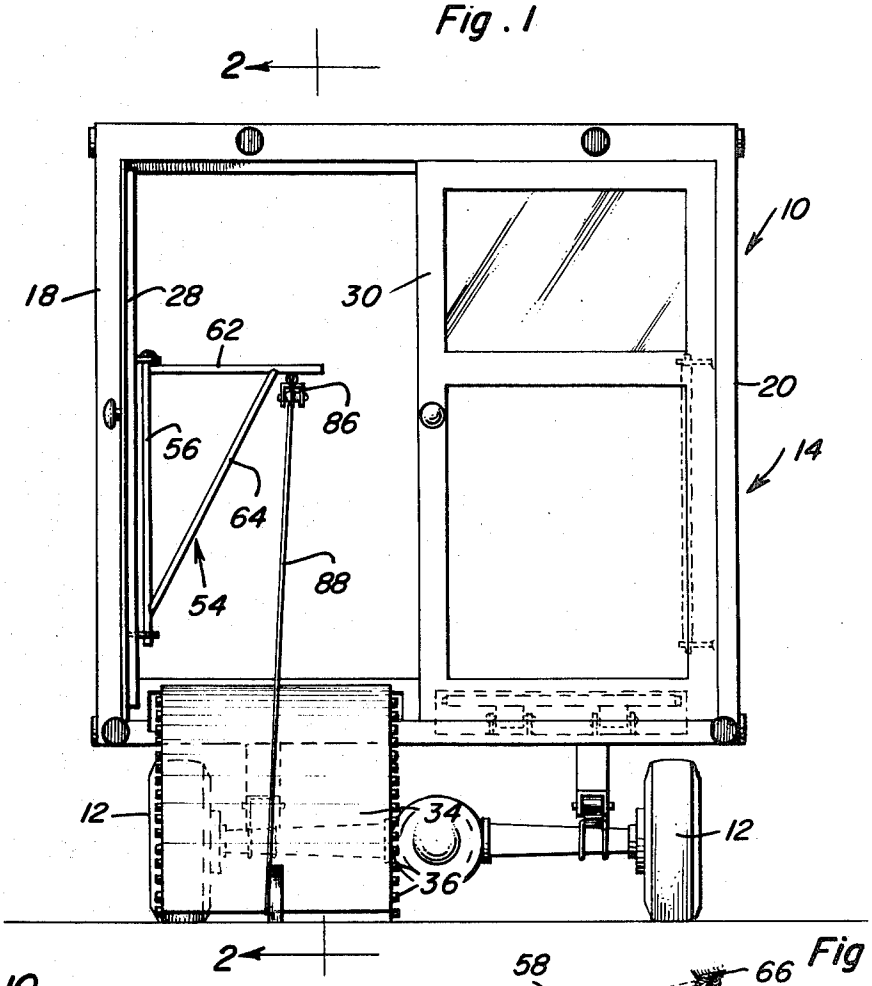


Fig . 10

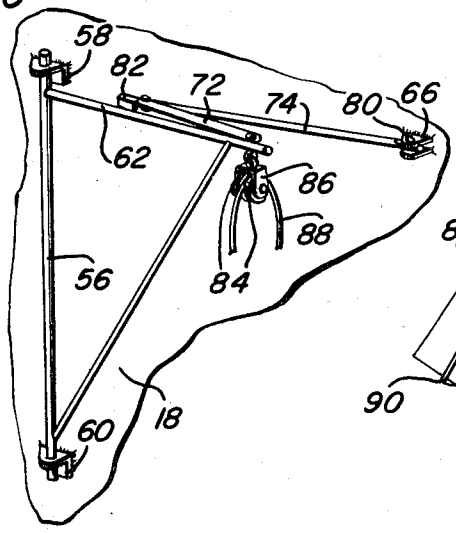
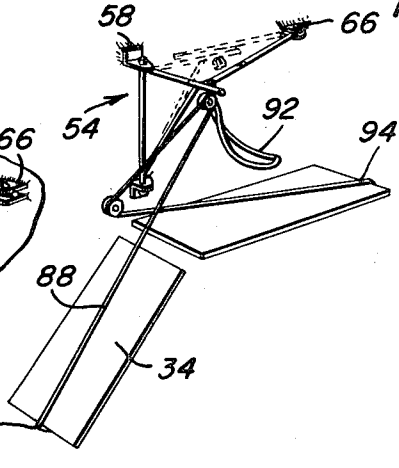


Fig . 8



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Fig. 2

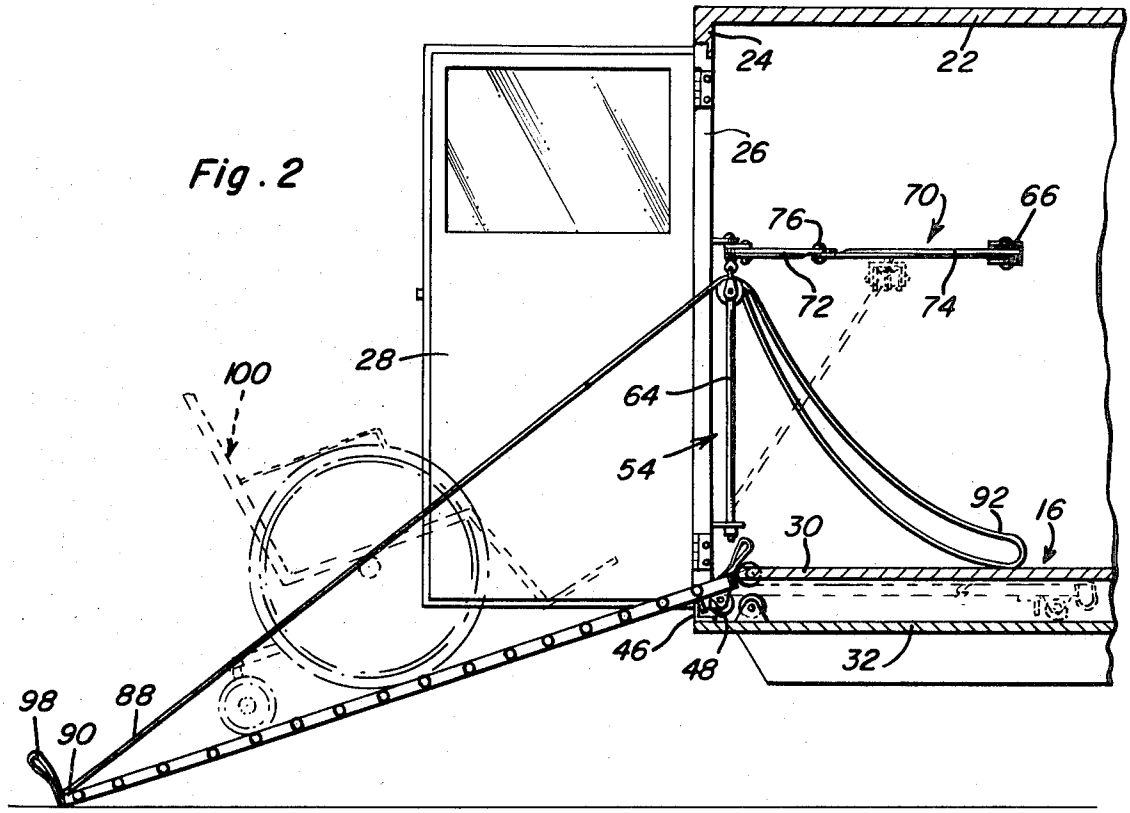


Fig. 3

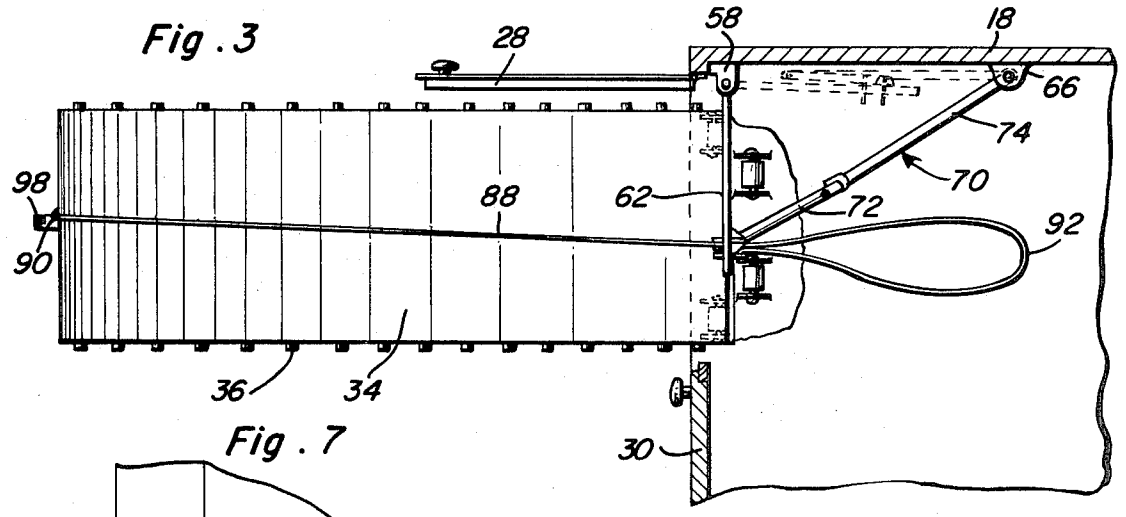
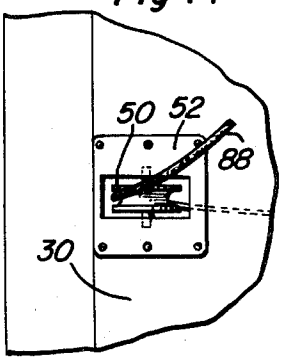


Fig. 7



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Fig. 4

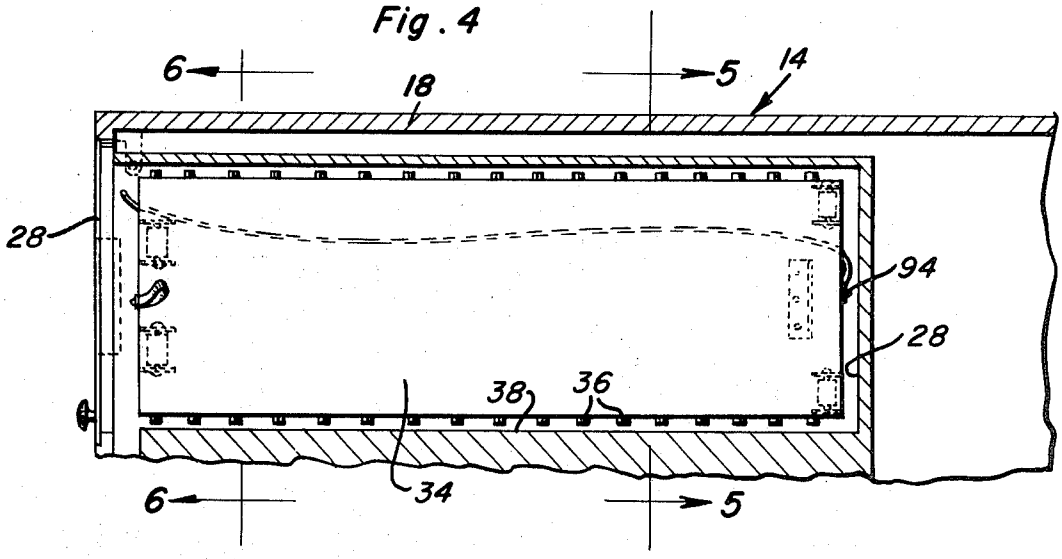


Fig. 5

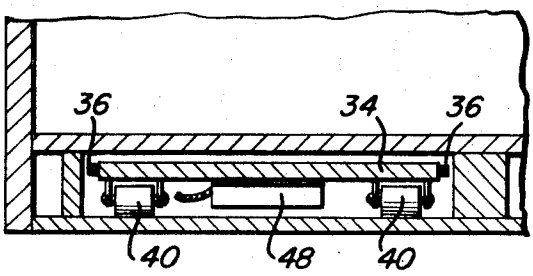


Fig. 6

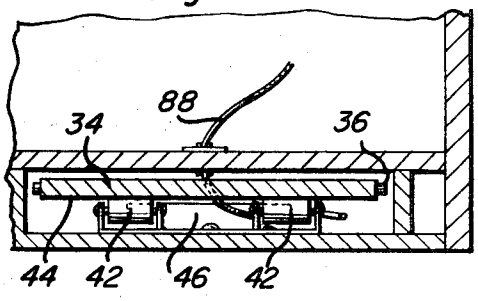


Fig. 9

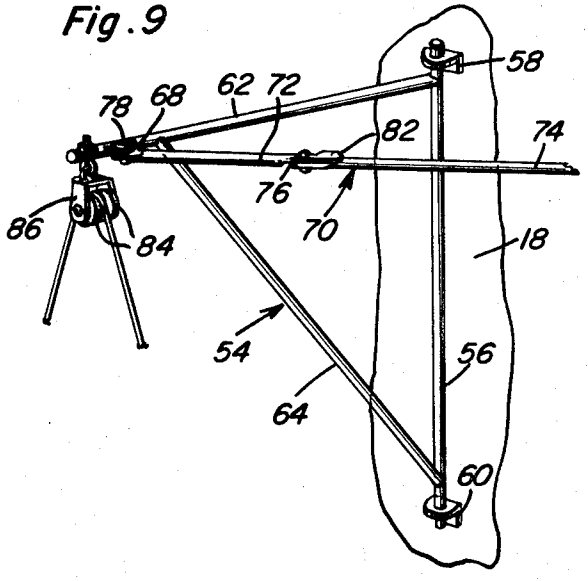
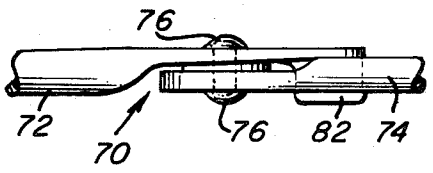


Fig. 11



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ELEVATED DOORWAY RETRACTABLE RAMP STRUCTURE

The elevated doorway retractable ramp structure of the instant invention has been specifically designed for use in conjunction with mobile enclosures such as truckload beds, house trailers and camper bodies, etc. The ramp structure may be effectively utilized by a person confined to a wheel chair as a means for extending and retracting a ramp relative to an elevated doorway of a mobile enclosure whereby that person confined to a wheel chair may gain entrance to the interior of the enclosure or exit from the latter without assistance. The ramp structure may also be utilized as a loading ramp for various articles and in particular a means for loading motorcycles, snowmobiles and other smaller vehicles on the load bed of a larger over-the-road vehicle.

The ramp structure may be used singly and disposed at one side of an associated entranceway or a pair of ramp structures disposed in side by side relation may be operatively associated with the opposite sides of an entranceway. Still further, although the ramp structure of the instant invention is designed to be manually actuated, a full width ramp structure extending substantially entirely across a wide entranceway may be utilized if the extending and retracting tension member sections for extending and retracting as well as supporting the ramp structure are power actuated.

The main object of this invention is to provide a retractable inclined ramp structure for use in moving a load up onto or down from an elevated load bed, either enclosed or exposed.

Another object of this invention is to provide a retractable ramp structure that may be readily incorporated into many different types of existing vehicles with little modification of the vehicle.

Yet another important object of this invention is to provide a retractable ramp structure adapting itself well to be incorporated into the load beds of vehicles presently being manufactured.

A final object of this invention to be specifically enumerated herein is to provide a retractable ramp structure in accordance with the preceding objects which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that will be economically feasible, long lasting and relatively trouble free in operation.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a rear elevational view of a mobile load bed having a closure body operatively associated therewith and with a pair of side by side ramp structures of the instant invention supported from the load bed, one of the ramp structures being in the extended position and the other ramp structures being in the retracted position;

FIG. 2 is a fragmentary longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 2—2 of FIG. 1;

FIG. 3 is a fragmentary horizontal sectional view of the assemblage illustrated in FIG. 2;

FIG. 4 is a horizontal sectional view illustrating the extended ramp structure of FIGS. 1 through 3 in a fully retracted position;

FIG. 5 is a fragmentary vertical sectional view taken substantially upon the plane indicated by the section line 5—5 of FIG. 4;

FIG. 6 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 6—6 of FIG. 4;

FIG. 7 is a fragmentary enlarged plan view of one side of the load bed illustrating the manner in which the tension member section utilized to extend the ramp structure is guided from the load bed or flooring structure;

FIG. 8 is a schematic view of one of the ramps in both the extended and retracted positions and with the pivoted support arm structure for the extending and retracting tension member sections illustrated in the extended position by solid lines and in the retracted position by phantom lines;

FIG. 9 is a perspective view of the support arm structure in the extended position;

FIG. 10 is a perspective view of the support arm structure in a retracted position; and

FIG. 11 is a fragmentary elevational view illustrating the toggle link connection between the brace portion of the support arm structure.

Referring now more specifically to the drawings, the numeral 10 generally designates a mobile vehicle including support wheels 12 and a body referred to in general by the reference numeral 14 provided with a flooring structure referred to in general by the reference numeral 16. The body 14 includes opposite side walls 18 and 20 projecting upwardly from opposite sides of the flooring structure 16, a top wall 22 extending between the upper marginal edge portions of the side walls 18 and 20 and a rear wall 24 extending between the rear ends of the side walls 18 and 20. The rear wall 24 has an entranceway or access opening 26 formed therein and a pair of horizontally swingable doors 28 and 30 are swingably supported from the opposite side marginal edge portions of the rear wall 24 for movement between rearwardly projecting open positions and transversely extending closed positions closing the entranceway 26.

The flooring structure 16 projects slightly above the rear marginal edge portion of the entranceway 26 and defines a pair of side by side longitudinally extending and rearwardly opening recesses 28. In addition, the flooring structure 16 includes an upper panel or floor surface 30 which terminates rearward a spaced distance forward of a lower panel portion 32 of the flooring structure 16.

A pair of elongated panel-like ramp members 34 are provided and each of the ramp structures or panel members 34 includes a plurality of opposite side longitudinally spaced antifriction or bearing elements 36 for loosely guidingly engaging the side walls 38 of the corresponding recesses 28. In addition, corresponding ends of the ramp members or panel members 34 are provided with opposite side dependingly supported rollers 40 for rollingly engaging the upper surface of the panel portion 32 and the latter, adjacent its rear marginal edge portion, includes a pair of similar elevated rollers 42 disposed at the rear ends of each of the

recesses 28 for rollingly engaging the under surface 44 of the corresponding panel member 34. In addition, the rear marginal edge portion of the panel portion 32 is provided with an upwardly extending stop flange 46 at the end of each recess 28 and the innder end of each ramp or panel member 34 includes a depending stop flange 48 which is engageable with the corresponding stop flange 46 to limit outward extension of that panel member 34.

The rear marginal edge portion of the upper panel portion or floor surface 30 has a pair of transversely spaced openings formed therein in which a pair of pulleys 50 are journalled, the pulleys 50 being supported from mounting plates 52 secured over the aforementioned openings.

With attention now invited more specifically to FIGS. 1 through 3 and 8 through 10, it may be seen that a supporting arm structure referred to in general by the reference numeral 54 is supported from each of the side walls 18 and 20. Each support arm structure 54 includes an upright pivot shaft 56 journalled from a pair of upper and lower brackets 60 secured to and supported from a corresponding side wall and each support arm structure 54 further includes a horizontally outwardly projecting arm 62 which projects outwardly of the upper end of the pivot shaft 56. Also, each structure 54 includes a diagonal brace arm 64 extending and secured between the outer end portion of the support arm 62 and the lower end of the pivot shaft 56. Further, each side wall has a second upper bracket 66 secured thereto and each support arm includes an outer mounting portion 68. A toggle arm assembly referred to in general by the reference numeral 70 and including first and second arm sections 72 and 74 pivotally connected together as at 76 has the free end of its arm section 72 pivotally secured to the mounting portion 68 as at 78 and the free end of its arm section 74 pivotally secured to the bracket 66 as at 80. The arm section 72 includes an abutment flange 82 with which the section 74 is engageable when the sections 72 and 74 are swung slightly past aligned positions and accordingly, the toggle arm structure or assembly 70 is operable to maintain the support arm structure 54 with the support arms 62 and brace arm 64 thereof disposed in an upstanding plane generally normal to the side walls 18 and 20.

The free end of each support arm 62 has a pair of pulley wheels 84 journalled from a pulley block 86 in turn universally supported from the support arm 62. A single tension member 88 has one end thereof secured to the outer end of the corresponding member 34 as at 90 and an intermediate portion of the tension member 88 passes over one of the pulleys or pulley wheels 84. The tension member 88 is then bent back upon itself to form a look 92 and the other end portion of the tension member 88 passes over the other pulley wheel 84 and is passed about the pulley 50 and thereafter attached to the inner end of the corresponding ramp or panel member 34 as at 94. Accordingly, the tension member 88 is bent back upon itself to form a pair of connected tension member sections.

With attention now invited more specifically to FIG. 2 of the drawings, the operation of the ramp structure is as follows. When it is desired to retract the ramp or panel member 34 from the extended position thereof illustrated in FIG. 2 of the drawings to a position fully recessed in the corresponding recess 28, that tension member section attached to the outer end of the ramp or panel member 34 may be pulled upon either by a person disposed within the body 14 or upon the ground. As the tension member section is tensioned, the outer free end of the ramp or panel member 34 is elevated so that the inner end of the panel member 34 will drop below the rear edge of the upper panel portion or floor surface 30. Then, the tension on the tension member 88 is sufficient to cause the panel member 34 to slide rearwardly into the corresponding recess 28. After the panel member 34 has thus been recessed fully into the corresponding recess 28, the toggle arm assembly 70 may be folded so as to swing the support arm structure 54 from the extended position thereof illustrated in FIG. 9 of the drawings to the stored position thereof illustrated in FIG. 10 of the drawings. Thereafter, the corresponding door 28 may be closed.

On the other hand, when it is desired to extend the ramp or panel member 34, the door 28 is opened and lifting strap 98 attached to the outer end of the panel member 34 is lifted so as to lift the rear end of the panel member 34 to an elevation above the stop flange 46 after which the lifting strap 98 may be slightly rearwardly displaced so as to rest the rear end of the panel member 34 on the upper edge of the support flange 46. Then, that section of the tension member 88 anchored to the inner end of the panel member 34 as at 94 may be pulled either from within the body 14 or from outside the latter after the support arm structure 54 has been swung from the collapsed position thereof illustrated in FIG. 10 to the extended operative position thereof illustrated in FIG. 9. As soon as the panel member 34 has been fully extended with the stop flange 48 abutted against the stop flange 46, the inner end edge of the ramp or panel member 34 will be disposed slightly outward of and at the same elevation as the rear end edge of the panel portion defining the floor surface 30 so as to prevent inward movement of the panel member 34 until such time as the outer end of the panel member 34 has been elevated to an almost horizontal position. Of course, the abutting engagement of the stop flange 48 with the stop flange 46 prevents outward movement of the panel member 34 from the fully extended position thereof illustrated in FIG. 2.

It may thus be seen that a person confined to a wheel chair such as that generally designated by the reference numeral 100 in FIG. 2 of the drawings may readily use the ramp structure either to gain entrance to the interior of the body 14 or to exit from the latter. Further, inasmuch as the body 14 is provided with double rear doors 28 and 30 and a pair of ramp structures, an extremely wide load may be loaded into the body 14. Also, a plurality of motorcycles, snowmobiles or other small vehicles may be loaded into the body 14 from the rear thereof by utilizing the side by side ramp structures.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. In combination with an enclosure structure having one upstanding wall with an elevated entranceway formed therein and an interior floor surface having one exposed edge portion extending across the lower portion of said entranceway, an entrance ramp comprising an elongated panel member, said enclosure structure including a horizontally elongated recess disposed beneath said floor surface and having one end thereof opening outwardly of said entranceway, said recess and ramp including coacting guide means slideably endwise receiving said ramp to a position at least substantially fully disposed in said recess and guiding said ramp for endwise extension from said recess to a position with only the inner end of said ramp supported from said enclosure structure and with the outer free end of said ramp swung downwardly for support from a support surface such as the ground, the exposed edge portion of said floor surface including tension member guide means, a flexible tension member section having one end thereof anchored to the inner end of said ramp, an intermediate portion of said tension member being guidingly engaged with said guide member for longitudinal displacement relative thereto.

2. The combination of claim 1 wherein the inner end of said ramp includes a depending stop flange and the outer portion of said recess includes an upwardly projecting stop flange, said ramp stop flange being engageable with the second mentioned stop flange to limit outward displacement of said ramp relative to said recess.

3. The combination of claim 2 wherein the side edges of said ramp and said recess include coacting guide means for guiding said ramp relative to said recess during extension and retraction of said ramp relative to said recess.

4. The combination of claim 1 wherein the rear end of said ramp includes dependingly supported rollers rollingly engaged with the lower extremity of said recess and the outer end of said recess includes upwardly projecting rollers rollingly engaged with the under surface of said ramp.

5. The combination of claim 1 including a second tension member section having one end thereof secured to the outer end of said ramp, an elevated support disposed in elevated position above said exposed edge portion of said floor surface, first and second guide means supported from said elevated support, the first mentioned tension member section being guidingly engaged by said first guide means and the second mentioned tension member section being guidingly engaged with said second guide means.

6. The combination of claim 5 wherein said tension member sections comprise the opposite end portions of a single elongated flexible tension member.

7. The combination of claim 1 wherein the exposed edge portion of said floor surface includes tension member guide means, a flexible tension member section having one end thereof anchored to the inner end of said ramp, an intermediate portion of said tension member being guidingly engaged with said guide member for longitudinal displacement relative thereto, including a second tension member section having one end thereof secured to the outer end of said ramp, an elevated support disposed in elevated position above said exposed edge portion of said floor surface, first and second guide means supported from said elevated support, the first mentioned tension member section being guidingly engaged by said first guide means and the second mentioned tension member section being guidingly engaged with said second guide means, means supporting said elevated support for horizontal shifting between an elevated position generally centered over the outer end of said recess and an elevated position displaced toward one side of said recess and the other end thereof.

8. The combination of claim 1 wherein said enclosure structure includes a pair of spaced side by side horizontally elongated recesses disposed beneath said floor surface at the opposite sides of said entranceway and an elongated panel member slideably endwise received in each of said recesses, said enclosure structure including a pair of double doors each swingable to a closed position closing a corresponding side of said entranceway and the rear end of the associated recess.

9. The combination of claim 1 wherein the inner end of said ramp includes a depending stop flange and the outer portion of said recess includes an upwardly projecting stop flange, said ramp stop flange being engageable with the second mentioned stop flange to limit outward displacement of said ramp relative to said recess, the rear end of said ramp including dependingly supported rollers rollingly engaged with the lower extremity of said recess and the outer end of said recess includes upwardly projecting rollers rollingly engaged with the under surface of said ramp.

10. The combination of claim 9 wherein the inner end of said ramp includes a depending stop flange and the outer portion of said recess includes an upwardly projecting stop flange, said ramp stop flange being engageable with the second mentioned stop flange to limit outward displacement of said ramp relative to said recess.

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