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Walkway protection

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Abstract

A vehicle with a barrier for protecting workers on a walkway at a top of a tank with the vehicle where the barrier has an upper barrier member which in an erected barrier position extends above a perimeter of the walkway, legs supporting the barrier member and the walkway with pivot connections connecting each respective leg to the barrier member, and a ram located between at least one of the legs or an extension of such leg and a base. A gate limits access to the walkway which when closed will also ensure that the barrier is in its lowered position and when open, that the barrier is raised. There is also a ramp to assist in lifting effect by a ram when the barrier is lowermost.

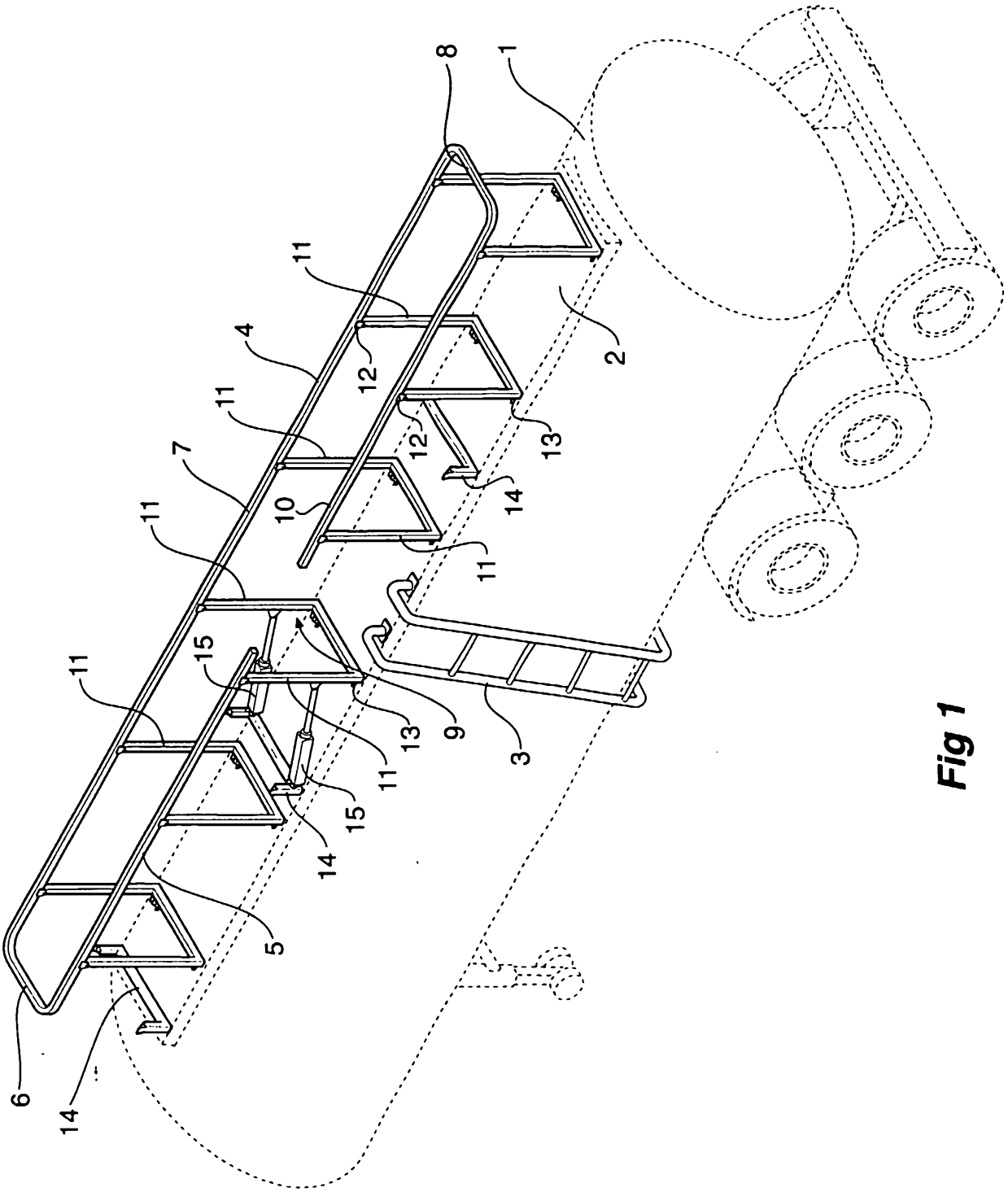

Fig 1

49895 HKS/REC

P/00/011
Regulation 3.2

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Patents Act 1990

COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

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Invention Title:

WALKWAY PROTECTION

Details of Associated Provisional Application:

Australian Patent Application No. PP8061 Dated 8th January 1999

The following statement is a full description of this invention, including the best method of performing it known to us:

This invention relates to walkway protection especially suited for walkways where these are located in a manner that may require a safety barrier where the barrier is required to assume a protection position on the one hand and a storage position on the other.

Such applications include a walkway along the top of the tank of a tanker.

The problem to which this invention is addressed relates to improvements which facilitate the raising or lowering of the barrier by those intending to gain access to the walkway or at the least to provide the public with a useful alternative.

In one form of this invention there is proposed a vehicle with a tank having an uppermost walkway for providing access to outlets in the tank, characterised by including a barrier having of an upper barrier member which in an erected barrier position extends above a perimeter of the walkway, a plurality of legs in spaced apart locations providing support between the barrier member and the walkway and including a lower most pivot connection adjacent the walkway and an uppermost pivot connection connecting each respective leg to a respective portion of the barrier, and a pneumatic or hydraulic ram located between at least one of the legs or an extension of such leg and a base such that by changing the expansion status of the ram, this will effect a change from either a storage to an erected position or an erected position to a storage position of the barrier.

In preference, the barrier is a continuous member extending around almost all of the perimeter and above this, of the walkway leaving thereby an opening for access there through for a person to gain access thereby, when the barrier is in the erected state, of the walkway.

In preference, each of the legs is positioned and pivotally supported so that each of the pivots is pivotal about an axis which is transverse to an elongate direction of the walkway.

When the walkway is lowered, there will at least be some of the barrier in preference even, in the storage position, located across an access location and as such firstly reminds a potential user that the barrier needs to be erected when access is to be gained to the walkway, and secondly, to cause some additional hindrance if caution isn't taken by the potential user until the barrier is erected into its

protecting position.

In preference, there are two either hydraulic or pneumatic rams which are commonly coupled to a supply of fluid at pressure so that in an erected position, the rams are arranged to continuously hold the legs and hence the barrier in an erected position against dislodgment therefrom.

In preference, the respective rams are double acting so that they can be caused also to positively lower the respective legs and thereby positively hold the legs in a storage position against accidental dislodgment.

In preference, the application is for a barrier which is attached to the top of a tanker, so that access can be gained conveniently from a side of the tanker and such that the walkway extends along the top of the tank of the tanker providing thereby access for lids providing top access to the insides of the tank.

Conventionally, such a walkway is without any barrier protection whatsoever and there is a decided danger that someone using such a walkway may trip and therefore potentially fall off the side of the tank with the potential for serious injury.

It is known that workers who may be required to get access to the top most openings in the tank will normally wish to do so quickly and efficiently and are therefore less inclined to proceed through an erection of the barrier process if they can easily avoid this.

In accord with this invention then it is proposed that because the erection is easily accomplishable by activating the release of pressurised fluid into an appropriate pneumatic ram or rams in the one case or hydraulic ram or rams in the other, then there is the potential for such a user to feel inclined to operate the valve thereby removing any manual effort required to lift the barrier or subsequently to remember to lower the barrier after use.

With such an arrangement, it then becomes appropriate and in preference there is provided a ladder by which access to the walkway can be achieved up a side of the tank.

In preference, in conjunction with this, an operating valve is provided that is operated by a lever which in turn forms a part of one or more of the steps such that

upon use of the steps, an activation of the raising of the barrier can be effected.

In preference, access to the top of the tanker is restricted by a gate which is arranged to assume at least two positions, one of which is a closed position and a second of which is an open position, where, in the closed position, there are means to effect operation of a control valve controlling one or more of the rams, so as to have these assume or be maintained in a position with the barrier being lowermost, and where, in an open position, there are means to effect operation of the control valve controlling one or more of the rams, so as to have these assume or be maintained in a position with the barrier being uppermost.

In preference, the gate is positioned such that it will be caused to shut or be maintained in a shut position when the tanker is moving forwardly.

In preference, the gate is supported by hinge means so that it will swing into a shut position by reason of passage of air past the gate when the tanker is moving forward.

In preference, the ram is interconnected to at least one of the legs by a pivot connection which is also a slidable connection with the leg.

One of the problems with an arrangement as described is that at a lowermost position the ram is aligned so as to engage with the leg at an angular relationship which is almost aligned to the pivot support axis of the leg.

What this means is that, in order to lift the leg, the ram will have to exert a relatively very large force to get even a small lifting force as a result. This means that , by using such technology, either the size of the ram must be very large or some of the geometry altered to get some better result. A mere geometry change, however, as such may cause another problem which is that the ram may need to be positioned somewhat higher. In order to get the ram in its lowered position to be as low as possible, there has been devised, in preference for this invention, an arrangement so that there is a first lifting arrangement wherein the ram is directed to engage a ramp as a first stage in effecting a lifting of the barrier. In preference, such a ramp is such that the ramp will divert an initial action of the ram. Such an arrangement may mean that the ram will engage against the leg through a range of positions.

In preference , when the barrier is in its raised position, it is of advantage to ensure that this will then be reliably maintained in this position until it is decided to lower the barrier.

In preference there is provided an interlocking pin controlled by a pneumatic ram interlock which is arranged when the barrier is in its uppermost position, to interengage this with a fixed part of the tanker. In this way the barrier will be maintained in its position by means which are not then dependent on the pressure being maintained in the main ram or rams.

Further summaries of the invention may be obtained by reference to the following description of the preferred embodiments or to the claims accompanying this specification.

This invention, accordingly, will be better understood when described with reference to preferred embodiments which shall be described with the assistance of drawings and wherein:

FIG 1 is a perspective view of a tanker with such a barrier in an erected position on a tank;

FIG 2 is an enlarged view of some of the operating parts of the barrier as shown in Figure 1 and;

FIG 3 shows the same portion of the barrier as shown in Figure 2 where however the barrier is in a storage position,

FIG 4 is a perspective view of a portion of the top of a tanker having a walkway, with a barrier according to a second embodiment showing this in a lowered position.

FIG 5 is the same view as in FIG 4 showing however the barrier in an erected position,

FIG 6 and FIG 7 are side views of the pneumatic ram connected to a leg of the barrier according to the second embodiment with one view, Fig showing this in an erected position and Fig 7 in a lowered position,

FIG 8 is a perspective view of the end of the pneumatic ram according to the second embodiment showing details of a starting ramp,

FIG 9 is a view of an interlock according to the second embodiment where this is intended to engage the erected leg to hold this safely in an erected position while there is positive air pressure in the ram,

FIG 10 is a detail perspective view of a gate according to the second

embodiment where this engages against a valve when closed and is retained in a closed position by a latch,

FIGs 11a AND 11b are views of the gate according to a third embodiment where there is provided a further striker plate to hold the gate open if desired while the walkway is being accessed.

Referring in detail to the drawings and to the first embodiment as shown in Figures 1,2 and 3 , there is a tanker 1 shown in dotted outline with however a walkway 2 which would be expected to have at space locations there along, lids covering openings which would be requiring access from time to time by an operator.

The access to the walkway is by a ladder 3.

The barrier itself is comprised of a continuous length of tubing of square cross-section shown at 4 which extends along a portion 5 of one side of the walkway, across an end at the end of the walkway 2, across the full other side 7 of the walkway 2, across the further end at 8 and then finally back to the other side of the opening 9 with portion 10.

The barrier at 4 is supported by spaced apart legs which are shown generally at 11 which in this case are each comprised of a tube shaped into a U shape with an upper part of each of the legs at typically 12 being pivotally connected to the barrier 4 by a pivot connection where the access of the pivot is transverse and in fact at right angles to the elongate direction of the walkway 2.

Further however, at the immediate bottom of each of the legs 11, there is a further pivot connection shown generally at 13 where again, the axis of the pivot connection is transverse and in fact at right angles to the elongate direction of the walkway 2.

With each of the legs 11 being coupled together by a cross piece, the legs are therefore more closely joined together so that there will be a transfer of force from one to the other, when being changed in position from an erected to a storage position, but also there is provided additional strength to resist sideways displacement motion when in an erected position when acting as a barrier support.

When in a storage position, some of the legs are supported by respective rests 14.

The means for raising or lowering the barrier 4 from a storage position to an erected position or vice versa comprise in this case two pneumatic rams shown at 15 which are connected respectively to each of oppositely located legs 11 by having an outer most pivot connection which again is coupled to the leg 11 by a pivot connection where the axis is transverse to the elongate direction of the walkway and the other end of the body of the pneumatic ram is likewise pivotally connected to a base which is comprised of a portion of the body of the tanker 1.

The advantage of having a continuous barrier member at 4 is that the barrier effect provided by this is therefore more substantial and will resist dislodgment more easily especially sideways dislodgment which is in a direction transverse to the elongate direction of the walkway 2.

This is both because the pivot supports are transverse to the elongate direction of the walkway but it is also because the barrier as a whole is this unitary upper member which extends around above the perimeter of the walkway.

By using pneumatic rams, there can be provided the easiest way for any operator to quickly and conveniently cause erection of the barrier to an erection position and as can be shown especially in Figure 3, when the barrier is in a lowered position or storage position, and end 16 is located across the pathway that an operator would use after climbing the ladder 3.

In this way of course, there will be a maximum potential for the operator to simply throw the switch which will open the valve to effect operation of the respective rams 15.

The rams in this case are of course, double acting so that there will be provided pressure to maintain the erected status of the barrier in the one case or with the reversal of the flow, maintain the storage status of the barrier in the other.

In a second embodiment, as shown on Figures 4 through to 10, access to a top of the tanker 16 is restricted by a gate 17 which is arranged to assume at least two positions, one of which is a closed position as shown in Figure 4 and a second of which is an open position as shown in Figure 5. In the closed position, there is a press button 18 operable under pressure to effect operation of a control valve 19 controlling each of rams 20, so as to have these assume and to be maintained in a position with a barrier 21 being lowermost, and where, in an open position, the

rams 20 are held so as to have these assume and then maintain a position with the barrier being uppermost.

The gate 17 is positioned such that it will be caused to shut or be maintained in a shut position when the tanker is moving forwardly by being supported by hinges 22 so that the gate 17 will swing into a shut position by reason of passage of air against the gate 17 when the tanker 16 is moving forward. A striker 30 is aligned with spring loaded bolt 31 to allow for manual opening of the gate but automatic closing in the event of the gate being closed by wind pressure or simply being slammed shut by a user of the system.

One of the problems with an arrangement as described in the first embodiment is that at a lowermost position each ram is aligned so as to engage with a leg supporting the barrier at an angular relationship which is almost aligned to the pivot support axis of the leg.

To provide an initial better lifting arrangement there is a ramp 22 arranged so that each of the rams 20 will engage against a respective leg 23 through a range of positions which is achieved by having a roller 24 secured to an end 25 of the rod 26 of the ram 20. Member 27 is secured to the end 25 and has, at its other end 28, a rod 30 that is captured by a bracket 29 secured to the leg 23 that allows for relative sliding of of the rod 30 with respect to the leg 23.

This arrangement as a whole then allows for an initial lift to be provided for the end of the ram where it is otherwise at its extreme position which would make it require very high initial pressures and therefore sizes of ram and pressures otherwise to achieve a sufficient lifting result. This also allows for a lower positioning of the end of the ram.

When the barrier 21 is in its raised position, it is of advantage to ensure that this will then be reliably maintained in this position until it is decided to lower the barrier 21. There is thus provided an interlocking pin 33 controlled by a pneumatic ram interlock 34 to interlock with rod 35 which is arranged when the barrier 21 is in its uppermost position, to interengage this with a fixed part of the tanker. In this way the barrier 21 will be maintained in its position by means which are not then dependent on a sufficient pressure being maintained in the main ram or rams 20.

Otherwise, the second embodiment has the features as described in the first

embodiment with a surrounding rail 36 supported by legs 37 each of which are supported by a pivot connection both uppermost 38 and lowermost 40 to the rail 36 and the walkway 41 respectively.

In Figures 11a and 11 b there is shown the same arrangement as in the second embodiment with the same reference figures except that there is shown here a further striker plate 42 which is positioned and shaped so as to be able to latch the gate 17 in an open position while a person accesses the walkway 41. This is then a variation from the second embodiment where the gate is left to swing freely and such that the gate may accidently swing back and close the gate with activation of the valve 19.

In order to avoid this, the use of the further latch 42 is of assistance and there is then a reliance on a person, after climbing down the ladder 43 to release the latch 44 from engagement with the plate and associated aperture and to return the gate 17 to its intercepting position as shown specifically in Fig 11b.

Generally then there is described a significant improvement in relation to foldable barriers for tanks and tankers.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS

1. A vehicle with a tank having an uppermost walkway for providing access to outlets in the tank, characterised by including a barrier having of an upper barrier member which in an erected barrier position extends above a perimeter of the walkway, a plurality of legs in spaced apart locations providing support between the barrier member and the walkway and including a lower most pivot connection adjacent the walkway and an uppermost pivot connection connecting each respective leg to a respective portion of the barrier, and a pneumatic or hydraulic ram located between at least one of the legs or an extension of such leg and a base such that by changing the expansion status of the ram, this will effect a change from either a storage to an erected position or an erected position to a storage position of the barrier.

2. A vehicle as in claim 1 further characterised in that the barrier includes an uppermost member continuously extending around most of the perimeter of the walkway.

3. A vehicle as in either of claims 1 or 2 further characterised in that each of the legs is positioned and pivotally supported so that each of the pivots is pivotal about an axis which is transverse to an elongate direction of the walkway.

4. A vehicle as in any one of the preceding claims further characterised in that there are at least two rams each of which is coupled to a supply of fluid at pressure so that, when the barrier in an erected position, the rams are arranged to continuously hold the legs and hence the barrier in such an erected position against dislodgment therefrom.

5. A vehicle as in any one of the preceding claims further characterised in that each ram is double acting.

6. A vehicle as in any one of the preceding claims further characterised in that access can be gained from a side of the tank.

7. A vehicle as in any one of the preceding claims further characterised in that there is provided a ladder by which access to the walkway can be achieved up a side of the tank and an operating valve that is operated by a lever which in turn forms a part of one or more of steps of the ladder such that, upon use of the steps, an activation of the raising of the barrier is effected.

8. A vehicle with a tank with an uppermost walkway having a barrier including a continuous length of tubing which extends along a portion of one side of the walkway, across an end at the end of the walkway , across a full other side of the walkway , across a further end and then finally back to the other side of the opening with remaining portion of the walkway.

9. A vehicle as in the immediately preceding claim further characterised in that the barrier is supported by spaced apart legs which are each comprised of a tube shaped into a U shape with an upper part of each of the legs being pivotally connected to the barrier by a pivot connection where an axis of the pivot is transverse to an elongate direction of the walkway.

10. A vehicle as in the immediately preceding claim further characterised in that at a bottom of each of the legs , there is a pivot connection where an axis of the pivot connection is transverse to the elongate direction of the walkway.

11. A vehicle as in the immediately preceding claim further characterised in that with each of the legs on a first side of the walkway is coupled by a cross piece with an oppositely positioned leg.

12. A vehicle as in any one of the preceding claims further characterised in that the means for raising or lowering the barrier from a storage position to an erected position and from an erected position to a storage or lowered position comprise at least two pneumatic rams which are connected respectively to each of oppositely located legs by having an outer most pivot connection which is coupled to the leg by a pivot connection where the axis is transverse to the elongate direction of the walkway and the other end of the body of the pneumatic ram is pivotally connected to the vehicle.

13. A vehicle as in any one of the preceding claims further including a gate restricting access to a top of the tank which gate is arranged to assume at least

two positions, one of which is a closed position restricting access and a second of which is an open position allowing for passage therepast, where, in the closed position, there are means operable by the gate in the closed position and arranged to control one or more of the rams, so as to have these assume or be maintained in a position with the barrier being lowermost.

14. A vehicle as in the immediately preceding claim further characterised in that with the gate in an open position there are means to effect operation of the control valve controlling one or more of the rams, so as to have these assume or be maintained in a position so as to move or keep the barrier to or in an uppermost position.

15. A vehicle as in either one of the two immediately preceding claims further characterised in that the gate is positioned, supported and otherwise characterised such that it will be caused to shut or be maintained in a shut position when the tanker is moving forwardly.

16. A vehicle as in any one of the preceding claims further characterised in that the ram is interconnected to at least one of the legs by a pivot connection which is also a slidable connection with the leg.

17. A vehicle as in any one of the preceding claims further characterised in that there is an arrangement so that there is a first lifting arrangement wherein the ram is arranged to engage a ramp as a first stage in effecting a lifting of the barrier.

18. A vehicle as in the immediately preceding claim further characterised in that the ramp is arranged so that it will divert an initial action of the ram.

19. A vehicle as in any one of the preceding claims having an arrangement wherein each respective ram is arranged to engage a respective leg through a range of positions.

20. A vehicle as in any one of the preceding claims further characterised in that there is provided an interlocking pin controlled by a pneumatic ram interlock which is arranged when the barrier is in its uppermost position, to interengage this with a fixed part of the tanker.

21. A vehicle with a barrier substantially as described in the specification with reference to and as illustrated by any one or more of the accompanying drawings.

Dated this 10th day of January 2000

L S BOOTH TRANSPORT PTY LTD
By their Patent Attorneys
COLLISON & CO.

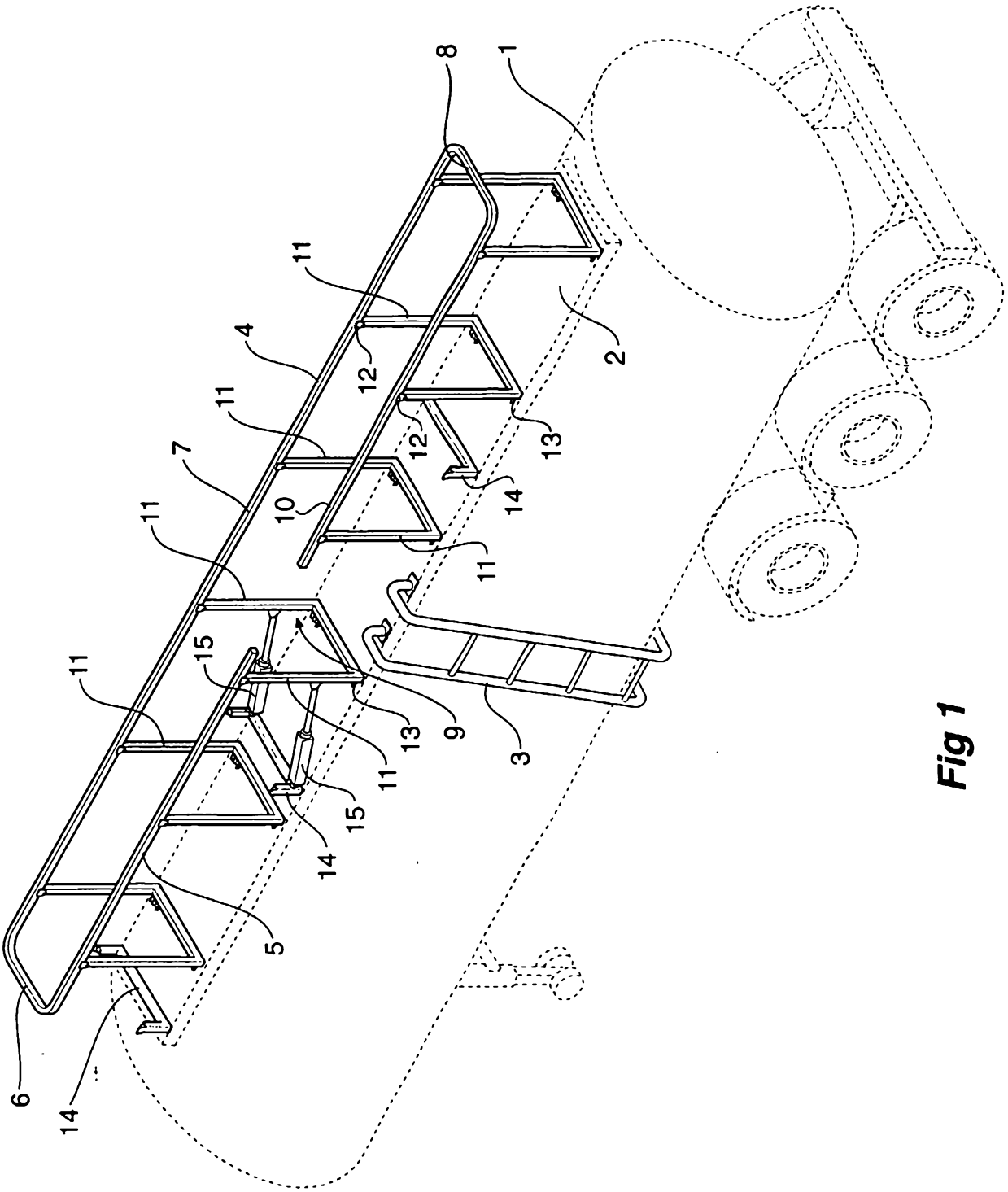

Fig 1

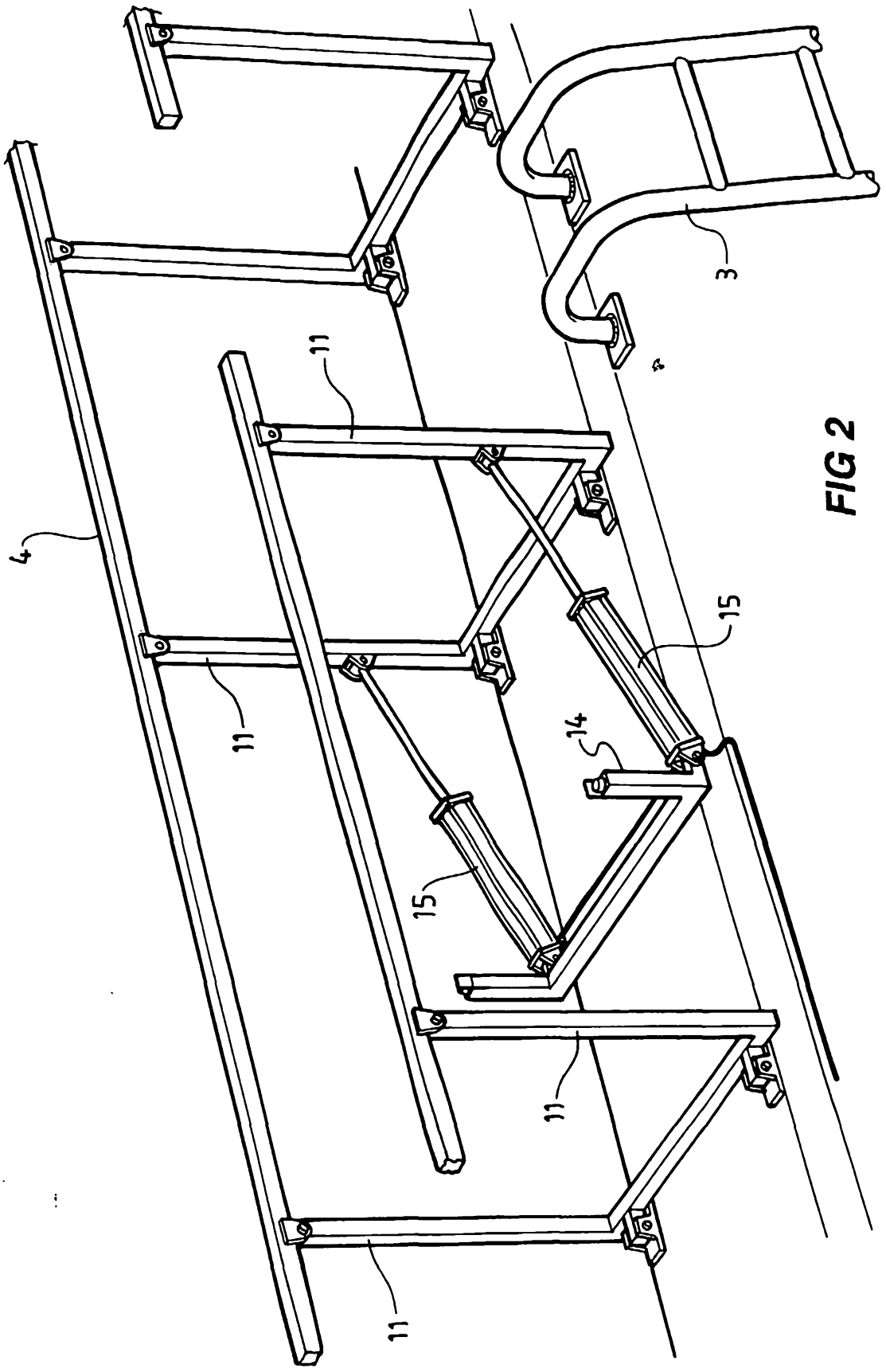

FIG 2

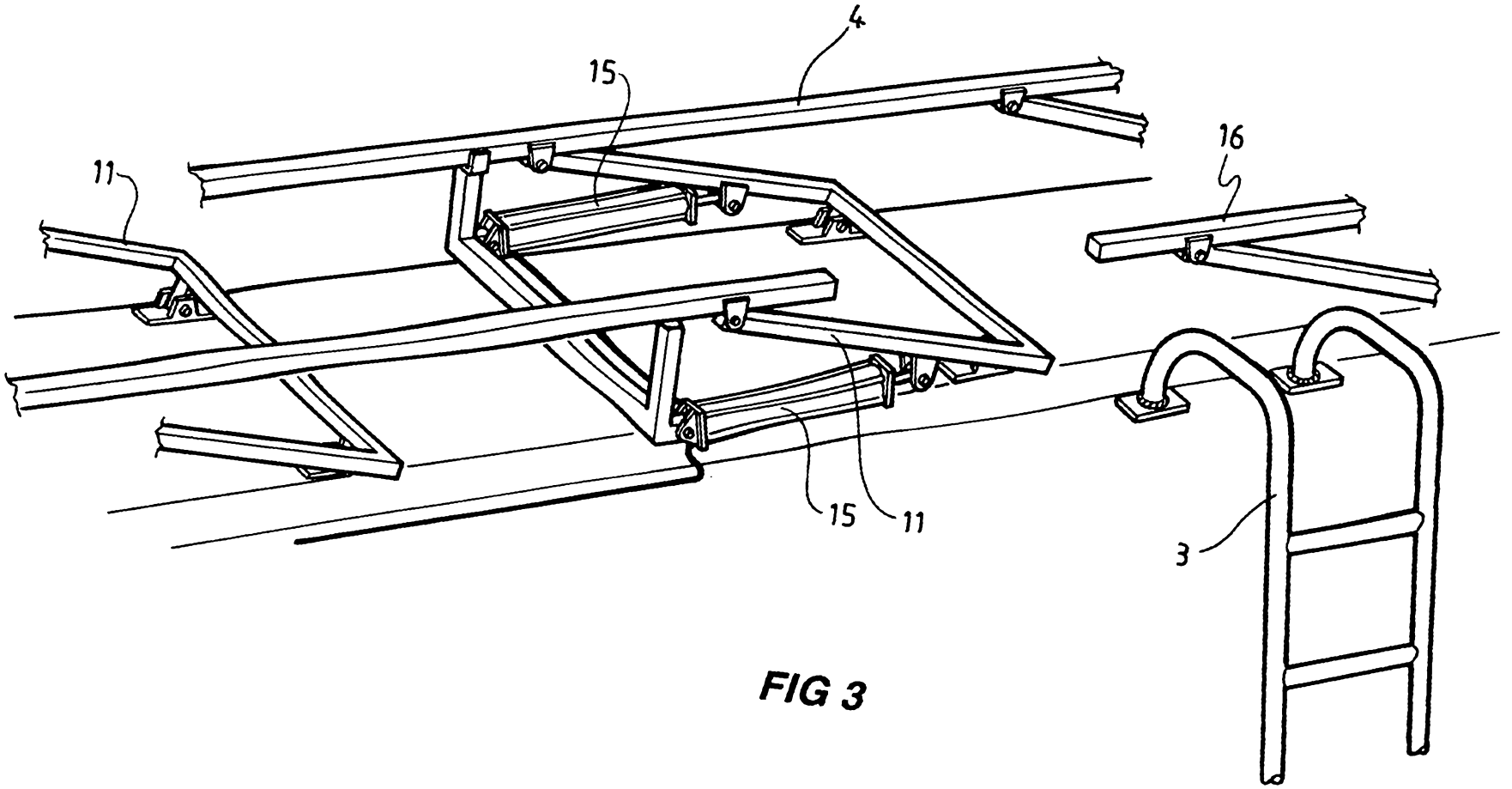

FIG 3

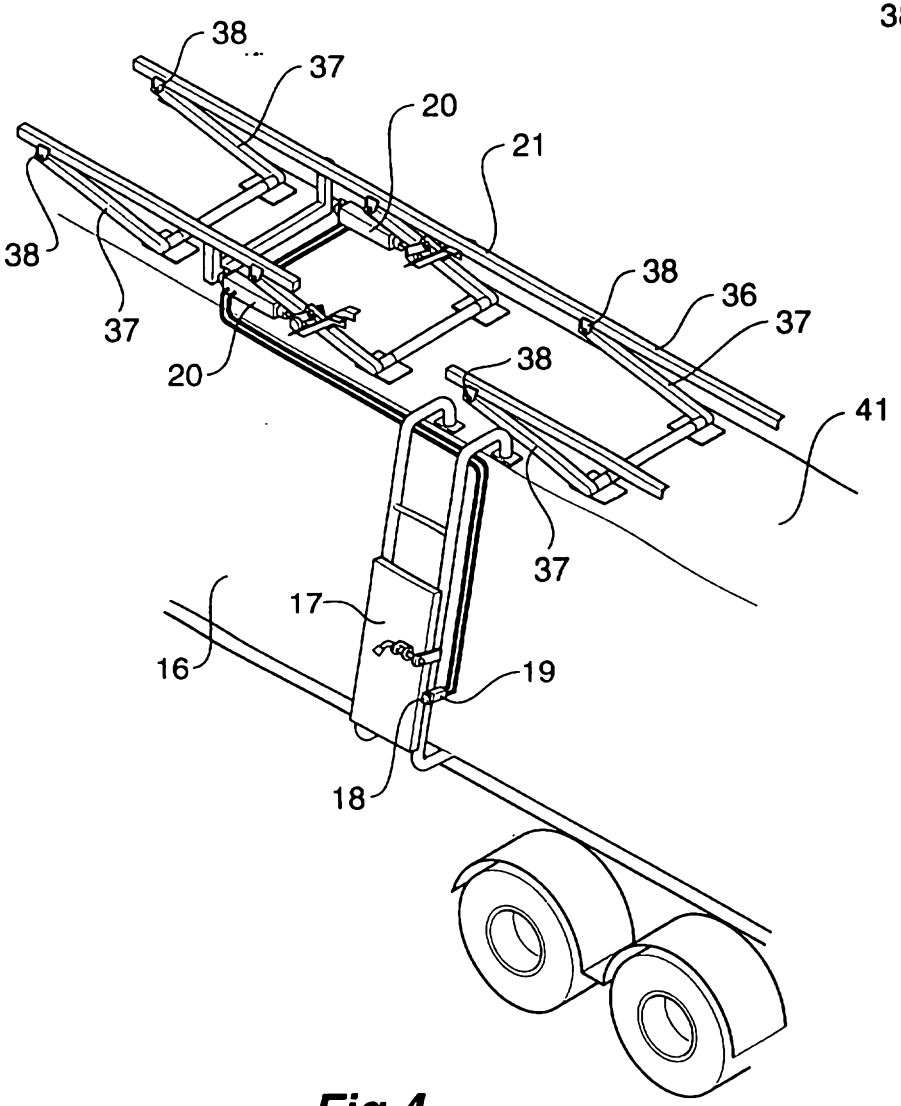
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Fig 4

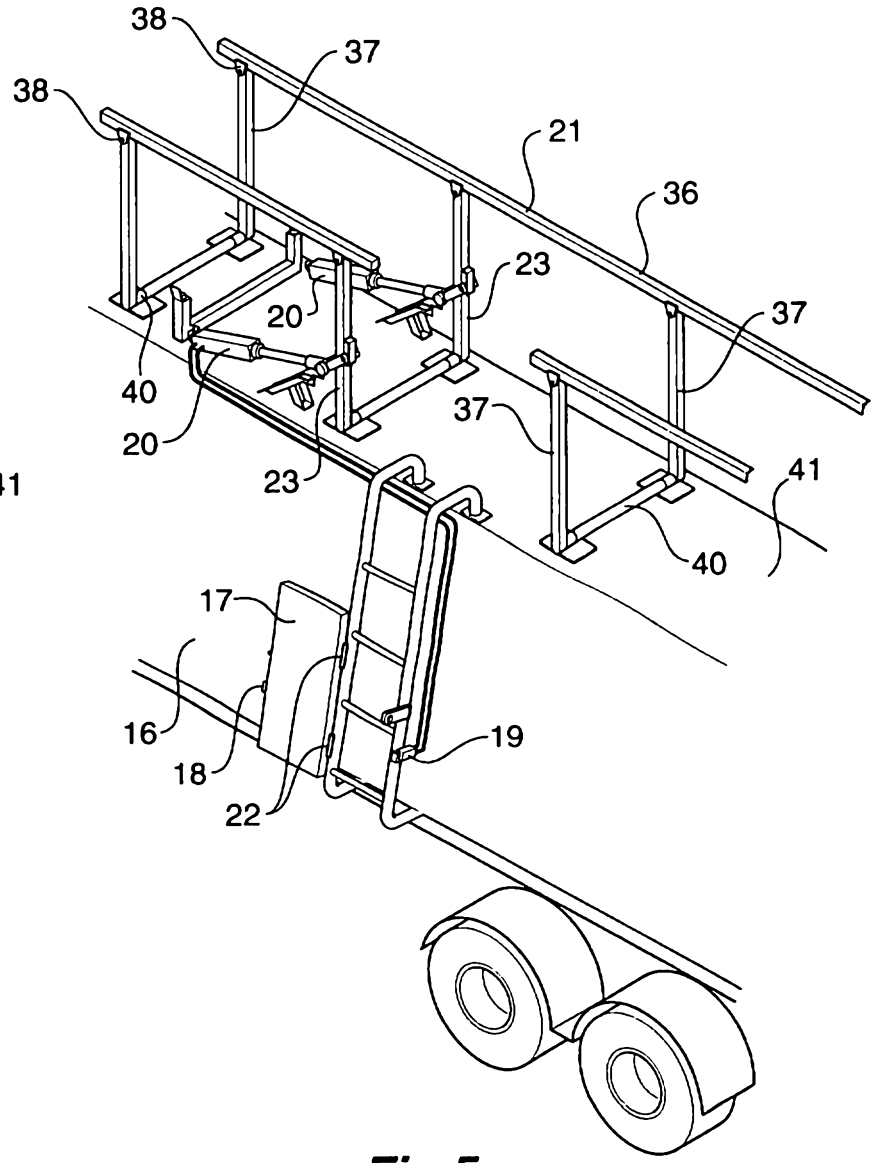
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Fig 5

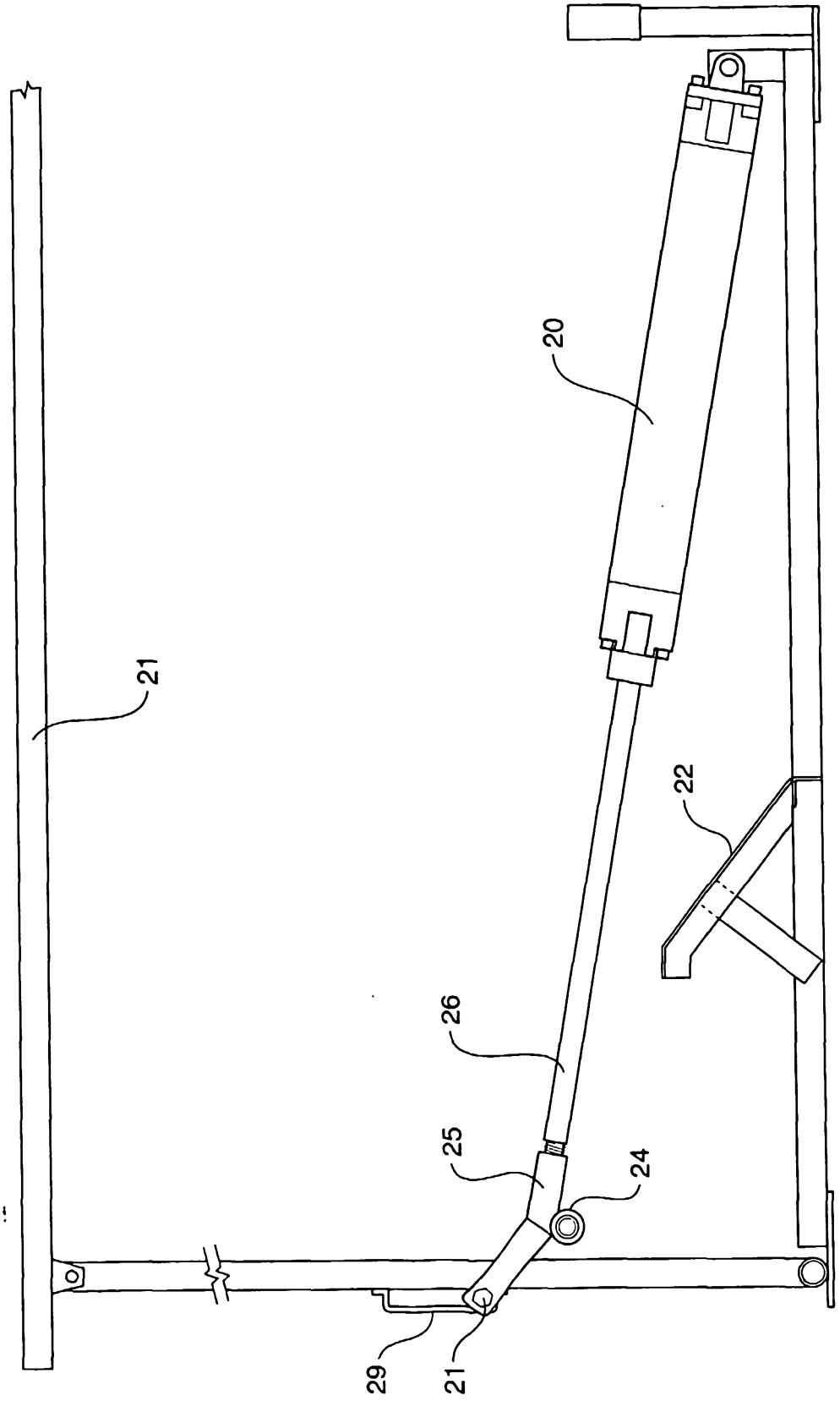

Fig 6

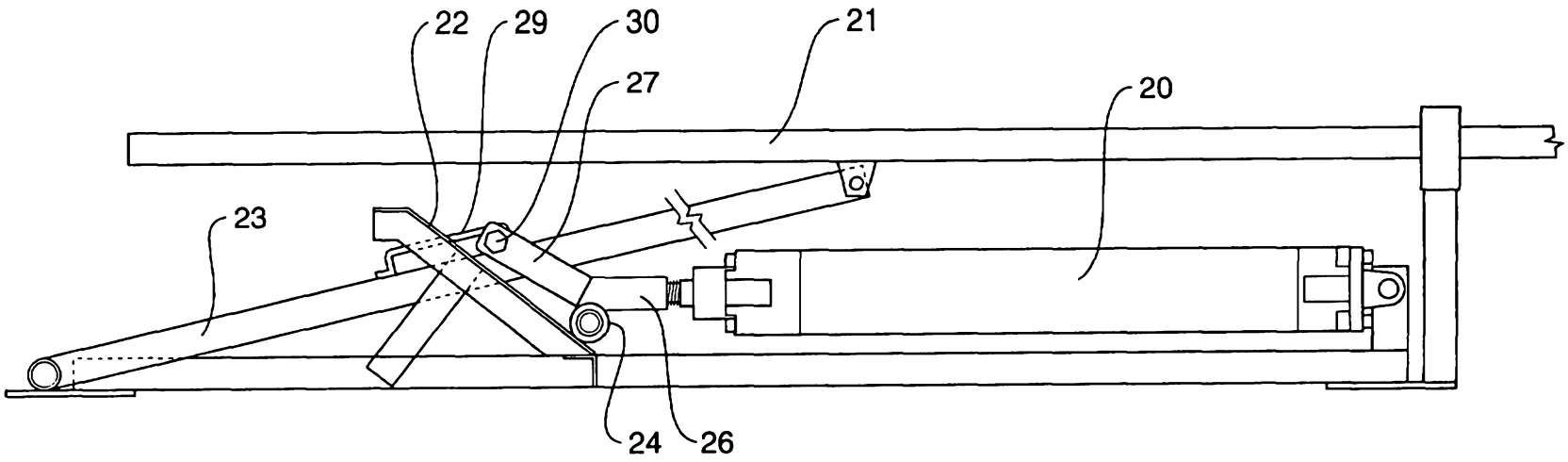

Fig 7

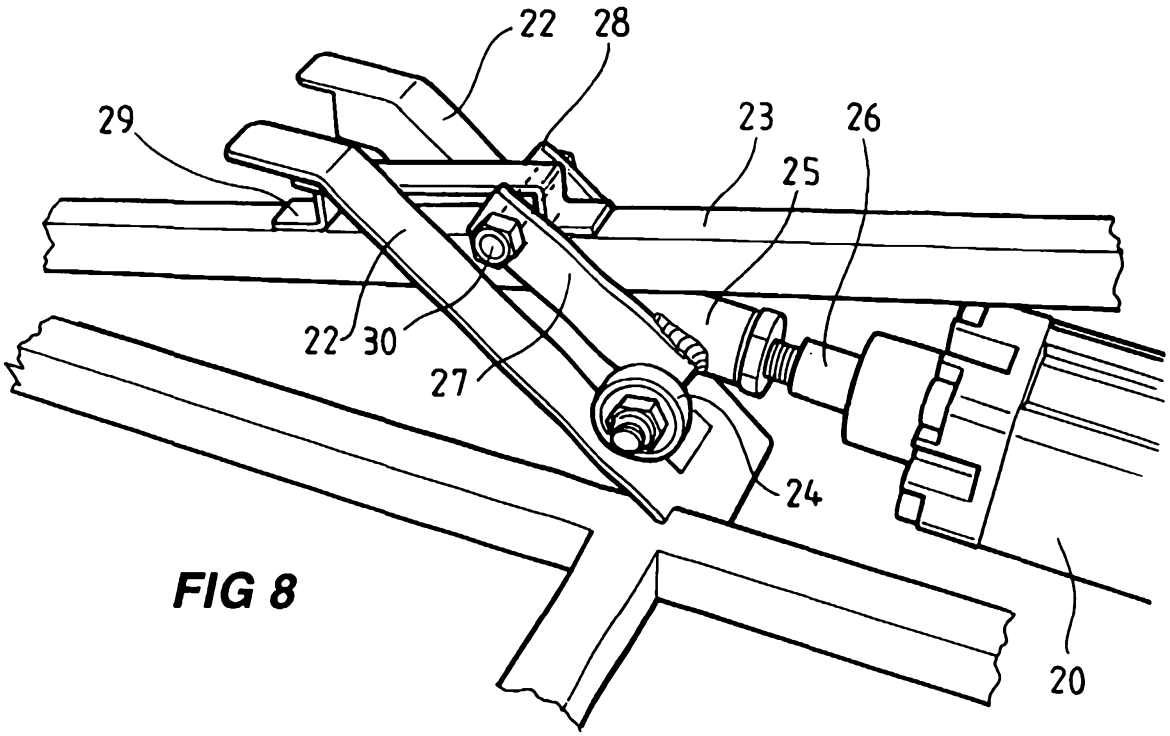

FIG 8

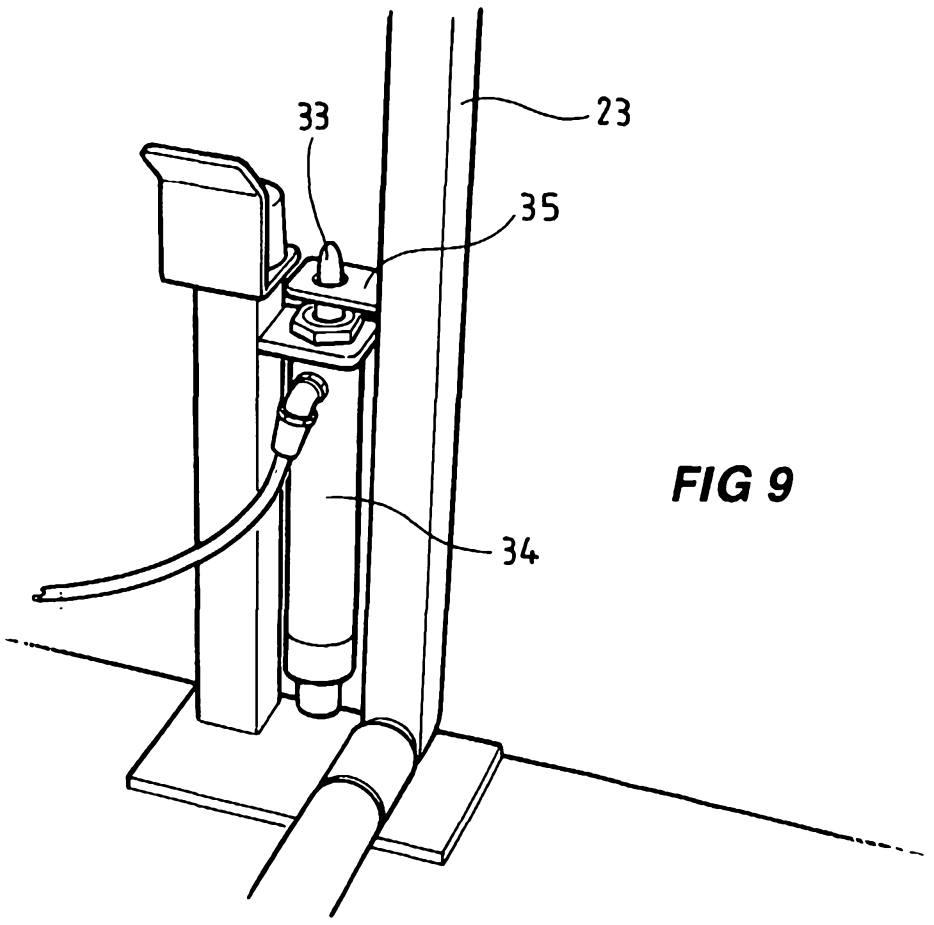

FIG 9

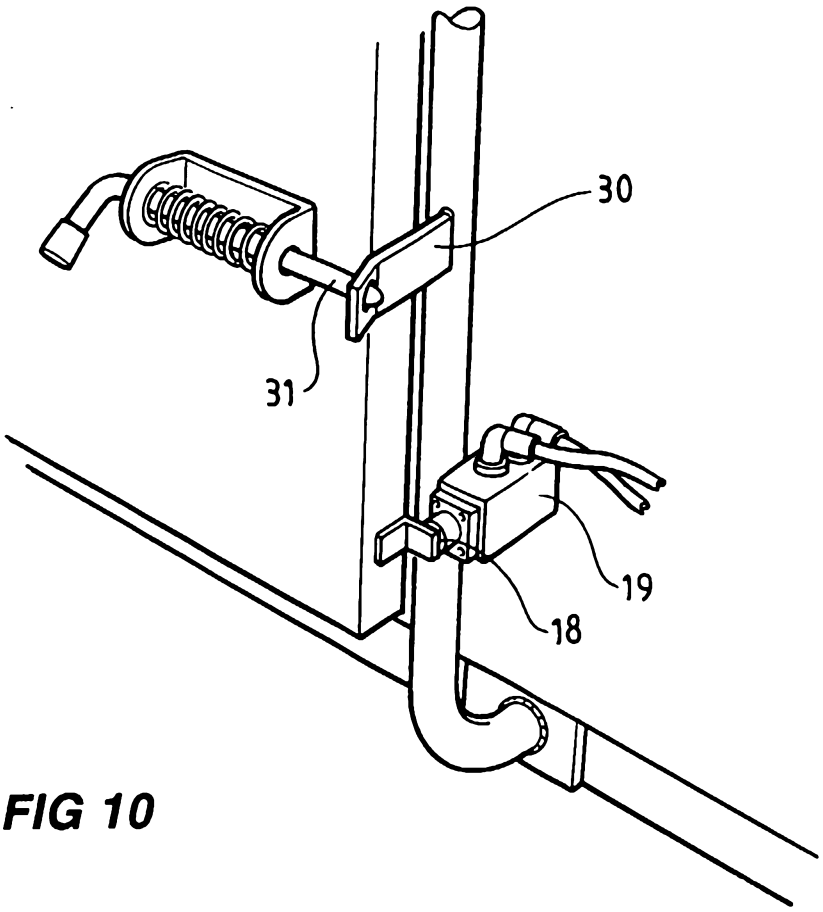

FIG 10

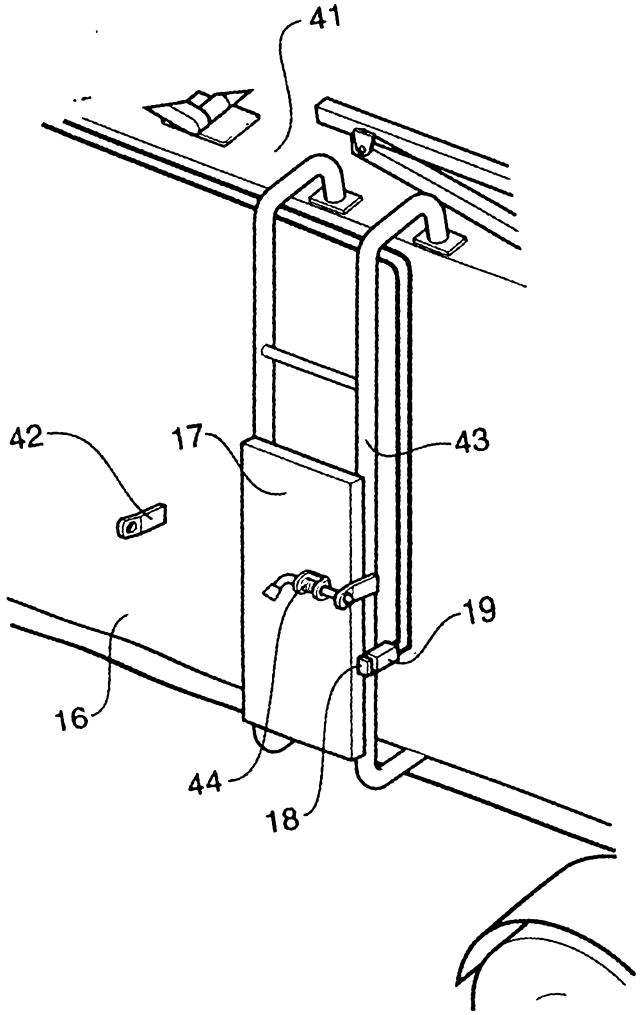

Fig 11a

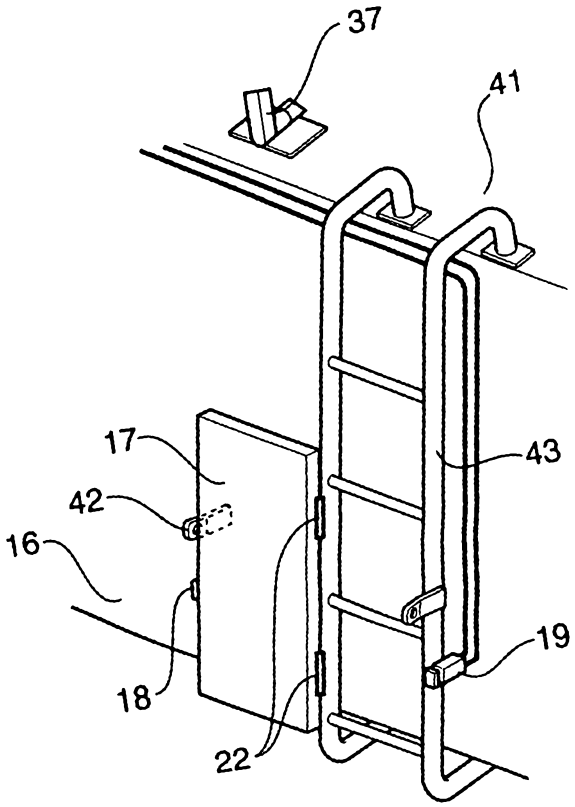

Fig 11b