

April 8, 1947.

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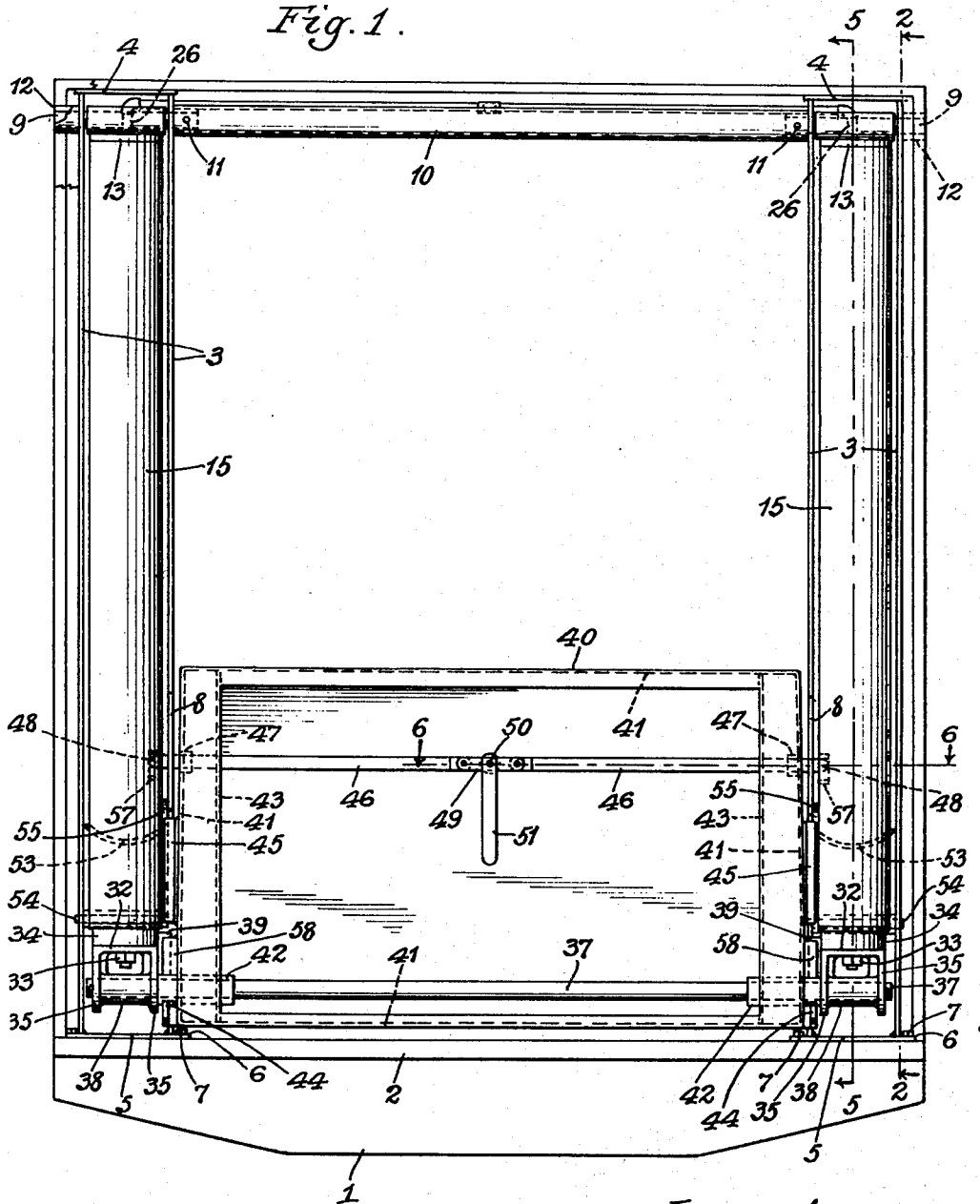
2,418,494

TWIN LIFT

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4 Sheets-Sheet 1

Fig. 1.



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2,418,494

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4 Sheets-Sheet 2

Fig. 3.

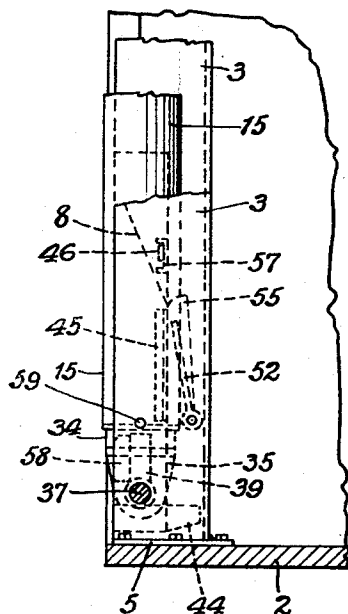
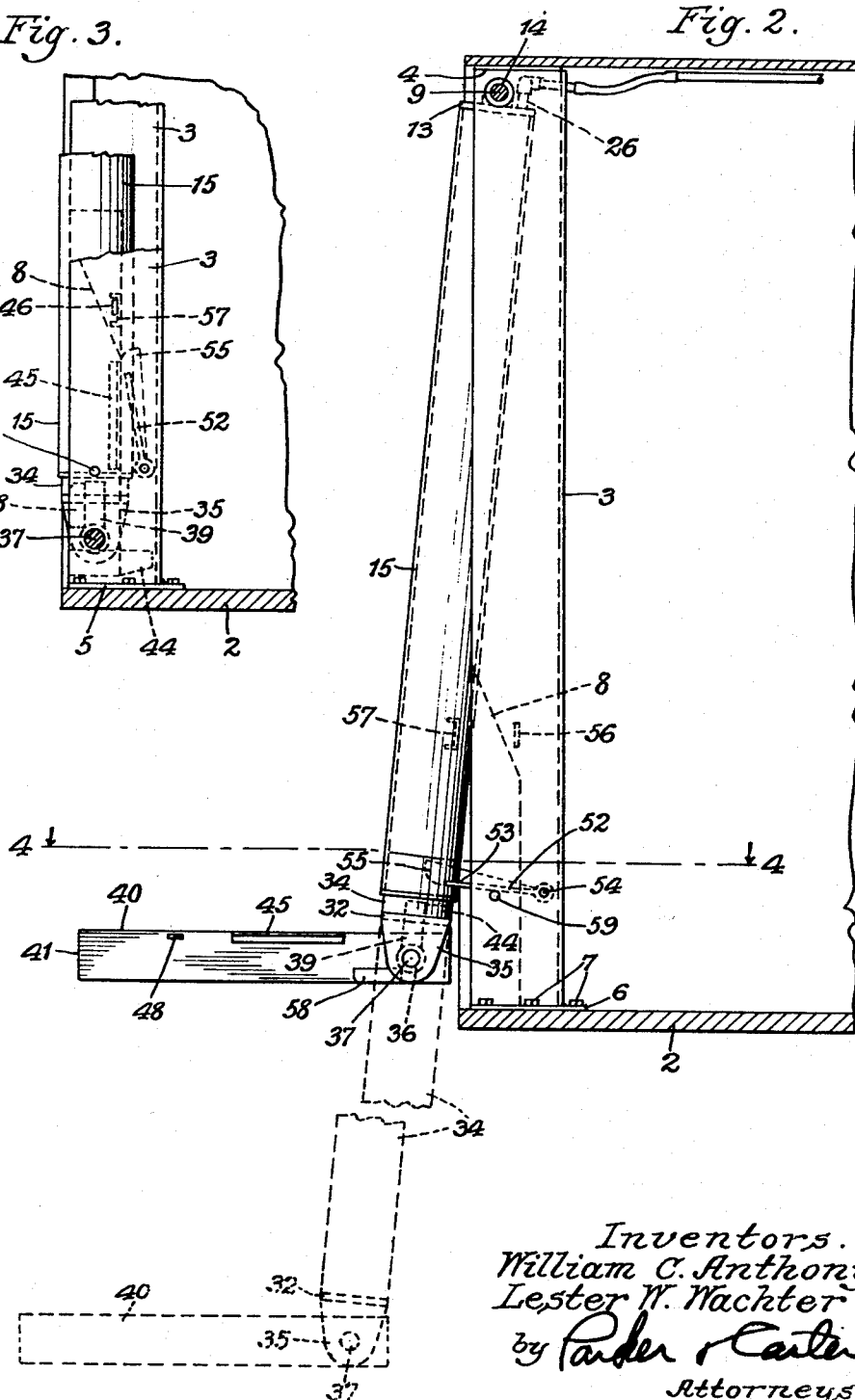


Fig. 2.



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TWIN LIFT

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4 Sheets-Sheet 3

Fig. 4.

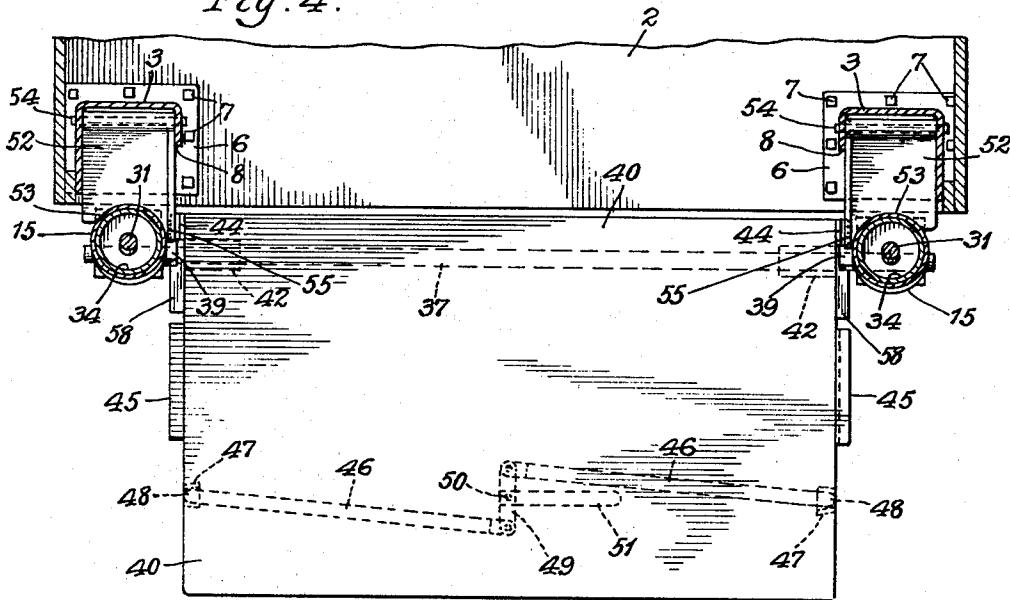
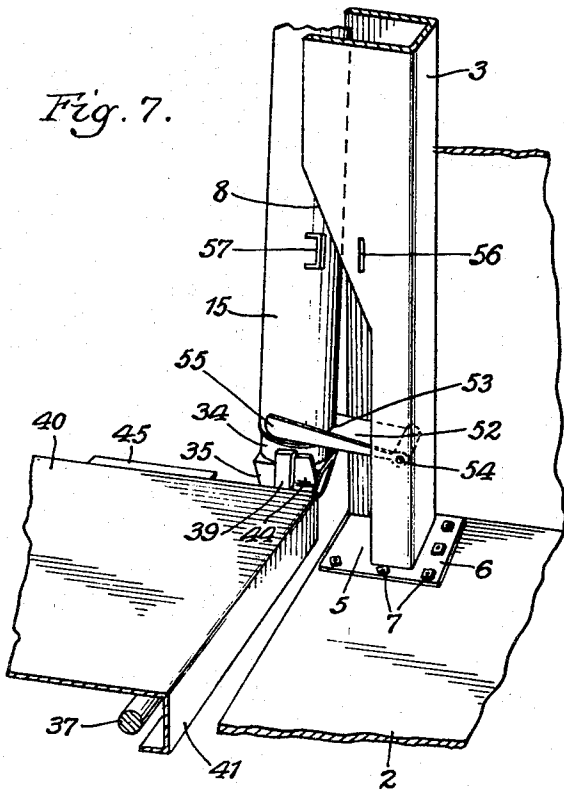


Fig. 7.



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TWIN LIFT

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4 Sheets-Sheet 4

Fig. 6.

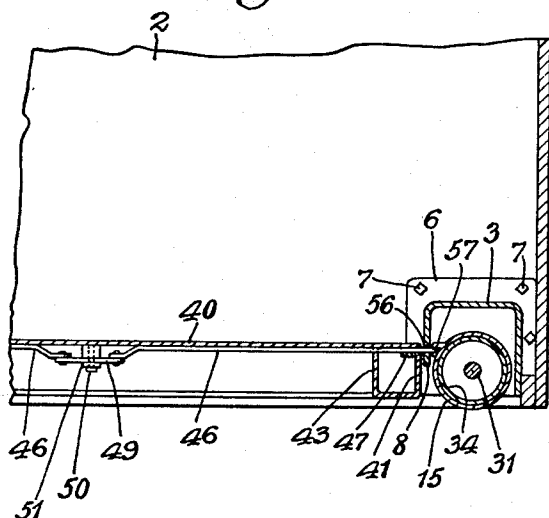


Fig. 8.

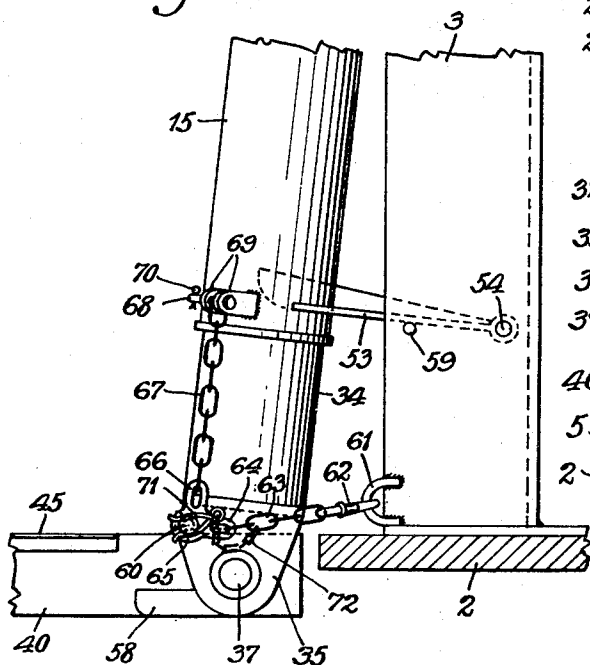
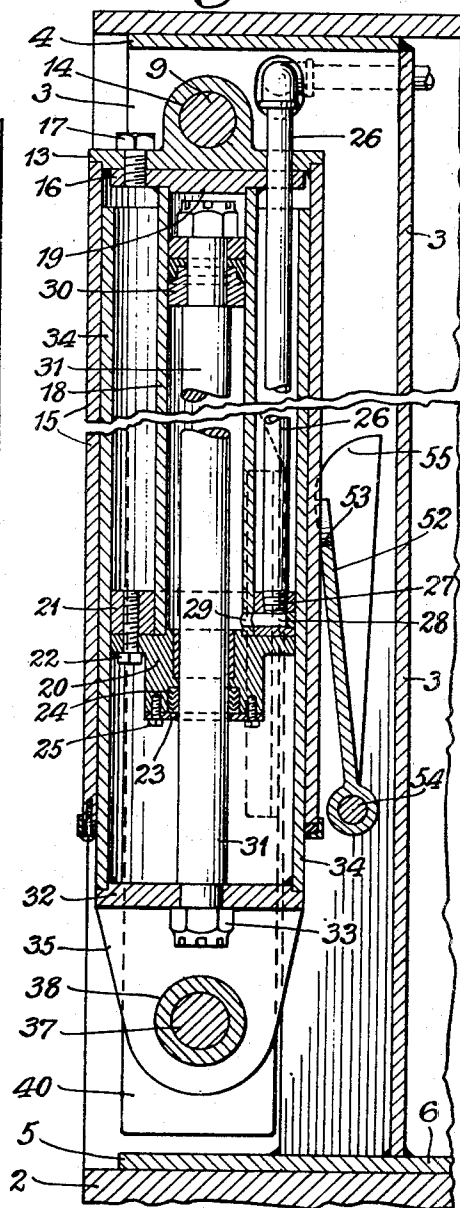


Fig. 5.



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UNITED STATES PATENT OFFICE

2,418,494

TWIN LIFT

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Application February 16, 1945, Serial No. 578,170

22 Claims. (Cl. 187-17)

1

This invention relates to a hoist, and particularly to a hoist suitable for mounting upon a vehicle, although it is not limited to that purpose and might be mounted upon a stationary support. It has for one object to provide a raising and lowering platform or elevator for use in connection with vehicles.

Another object is to provide a mechanism of the type indicated using a plurality of fluid pressure cylinders.

Another object is to provide a mechanism of the type indicated in which means are provided for moving the platform somewhat rearwardly during raising and lowering.

Another object is to provide means for latching the platform, the cylinders and their support in fixed relation when the platform has been raised to the maximum and is inactive.

Other objects will appear from time to time throughout the specification and claims.

This invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a rear elevation with the platform raised and latched in raised position;

Figure 2 is a longitudinal vertical section taken at line 2-2 of Figure 1, with the platform lowered and the cylinders swung outwardly from their support;

Figure 3 is a view generally similar to Figure 2, but showing only the lower portion of the cylinder with the platform raised;

Figure 4 is a section taken at line 4-4 of Figure 2 on an enlarged scale;

Figure 5 is a vertical section taken at line 5-5 of Figure 1, and showing the cylinder assembly;

Figure 6 is a detailed section taken at line 6-6 of Figure 1, illustrating the latching mechanism on an enlarged scale;

Figure 7 is a perspective view showing the means for holding the cylinders in outward position with the platform in lowered position; and

Figure 8 is a side elevation of a modified locking or latching means, with parts shown in section.

Like parts are indicated by like characters throughout the specification and the drawings.

The device may be mounted on almost any suitable support. One satisfactory association of the device is with a large truck or large trailer, and it may be mounted at the rear of that member or on the side of that member. Where in the specification and claims reference is made to the fact that the cylinder assembly may be swung to the rear or to the side, this language is to be taken as meaning that the cylinder assembly may be swung out of or partially away from the means which support them. If the total device is mounted at the rear of a truck, this will be rearward swinging. If the device is

2

mounted at the side of a truck, this will be to the side or laterally. If the device is mounted on a platform, it may be movable or stationary. The swinging will be either to the end or to the side, and in any event, the swinging involved occurs when the cylinders which support the platform are swung outwardly so that their lower ends move away from the supporting means within which they are partially enclosed when the platform is in the raised and inactive position. As shown, the device is mounted upon a vehicle frame. 1 designates a transverse frame member and 2 designates a floor or floor member.

The supporting mechanism comprises a plurality of frame-like members, one for each cylinder assembly. As shown, these frame-like members are designated by the numeral 3 and are of generally channel section. Each is preferably closed at the top, as by a member 4, and at the bottom by a member 5. The member 5 includes a flange portion 6 which is of sufficient width to support the member and to provide means for fastening it to the body or frame by bolts 7 or otherwise.

One flange, preferably the inner flange, of each of the frame members 3 is cut away, as indicated in Figure 2 at 8. The cut away portions 8 of the flanges of the frame members 3 in the particular form here shown are positioned on the side of the device—that is to say, upon the side facing inwardly with respect to the total assembly.

A trunnion member 9 is supported adjacent the top of each frame member 3. Two trunnion members may be joined by a tube 10, which is secured to each of them by bolts or screws 11 or otherwise. Each trunnion member may have a collar 12 at its outer end.

Mounted for movement about each of the members 9 is a cylinder head 13 of a piston and cylinder assembly. This cylinder head is provided with a member forming a generally cylindrical cavity 14 in which the member 9 is received. Fixed to each cylinder head 13 is a housing member 15 of generally cylindrical shape. Fixed also to the cylinder head 13 is an inner cylinder head 16 which may be secured to it by screws 17 or otherwise. Fixed to the inner cylinder head 16 is a cylinder 18. This cylinder may at its upper end be seated upon a raised portion 19 which, in the form shown, is integral with the cylinder head 16. The cylinder 18 is closed by a cylinder head 20 at its lower end, which is secured to a guide portion 21 by screws 22 or otherwise. The cylinder head 20 is closed by an adjustable packing gland 23 which is arranged to compress packing 24 by means of screws 25 or otherwise.

A fluid conduit 26 passes through the cylinder

3

heads 13 and 16 and downwardly to the guide member 21, where its inner end 27 is seated in a tapped opening formed in the member 21 and communicates with a passage 28 formed also in the member 21. This passage 28 is in register with a perforation or opening 29 formed in the wall of the cylinder 18, and through it pressure fluid enters and leaves the cylinder 18.

30 is a piston mounted for movement within the cylinder 18 and secured to a piston rod 31. This piston rod passes outwardly through the cylinder head 20 and is secured to a closure member 32 by means of a nut 33 or otherwise. Fixed to the closure member 32 is a cylindrical housing 34. The cylindrical housing 34 fits within the cylindrical housing 15 and engages it with a sliding fit.

Formed integrally with the closure member 32 is a pair of ears 35, 35. These ears are perforated, as at 36, to receive a rod 37. The rod passes across from one cylinder to the other and engages the platform, as will be described below. In the particular form here shown, the ears 35 are joined by an integral tubular section 38, although this tubular section might be omitted, if desired.

As shown, where two cylinder assemblies are used, each may be considered as having an inner and an outer face. The inner face is that which is directed toward the other cylinder and toward the platform which is supported between them. Each of the inner ears 35 is provided with a stop member 39 which is generally axially aligned with the cylinder.

A platform 40 is mounted upon the shaft 37 and is preferably of rigid construction. As shown, it has downwardly depending flanges 41 around its edges. Tubular members 42 are positioned within or upon the platform and engage the outermost flange 41 and inner stiffening flanges 43. The rod 37 passes through the members 42 and thus the platform is mounted for rotation with respect to the rest of the device as a whole.

The platform is provided, preferably adjacent each end, with a stop 44 which, when the platform is in the lowered position such as shown in Figure 2, engages the stop 39 to hold the platform in generally horizontal position.

The platform is also preferably provided along each side with a cam contacting member 45. Mounted on the platform and preferably beneath its upper surface is a pair of latch members 46, 46. These members adjacent their outer ends pass through guides 47, 47 and are provided with rounded ends 48 which extend outwardly beyond the outer ends of the platform and accomplish latching. At their inner ends the latch members 46 are pivoted to a member 49 which is supported at its center, as at 50, and is provided with a handle 51. The members 46 are pivoted to the member 49, and when the latter is tilted by movement of the handle 51 to the right or the left, the latch members are drawn inwardly or moved outwardly, depending upon the direction of movement of the member 49 and the handle 51.

Reference has been made above to the fact that the cylinder assemblies are mounted to move or swing outside of their housings—that is to say, outside of the members 3. As shown in Figure 2, the cylinders have been thus swung. This is accomplished merely by pulling the platform to the left, as shown in Figure 2, and this causes the cylinders to swing outwardly. The cylinders are held in this outward position by supporting members 52. These members may be generally

4

flat and provided with semi-circular or curved or notched outer ends 53. One of such members is pivoted, as at 54, within each of the support members 3 and each is provided along one side with a cam portion 55.

As a means for latching the parts together when the cylinders are within their supports, the latch construction above described is provided, and the inner flange of each support 3 adjacent the cut away portion 8 is provided with an opening 56. Each of the cylindrical housing members 15 is provided with a stirrup-like member 57. When the platform is in the raised position and the cylinders are swung into their supports, the guides 47, the openings 56 and the stirrups 57 are in alignment, and when the handle 51 is then moved to carry the latch members outwardly, the end of each latch extends through one opening 56 and into the corresponding stirrup 57 and thus holds or latches the platform, the cylinder assembly and the supports together.

58 is a stop on the platform adapted to engage the stop 39 on the housing 15. There may be two stops 39 and two stops 58.

The modified latching means shown in Figure 8 accomplishes two purposes. It prevents the cylinder assemblies from swinging too far out and it supports the load of the platform and other parts in any predetermined plane—for example, the same plane as that of the floor member 2. As shown, the member 35 may be provided with a pin or projection 60. This projection may be formed in or positioned upon one of the members 35 or upon all of them. Ordinarily it will be formed on one of each pair of these members, so that there will be a pin at each side of the total assembly.

Each of the members 3 has fixed upon it a member 61 which, as shown in Figure 8, receives a snap hook 62, the snap hook being attached to a chain 63. The chain is secured to one arm or branch 64 of a generally triangular link 65, which link may be positioned upon the pin or projection 60. The opposite end 66 of the link 65 receives one end of a chain 67. The other end of the chain may be engaged upon a pin 68 which is received by the ears 69, 69 fixed upon the cylinder 15. The pin 68 is headed as shown and may be held against accidental displacement by a cotter pin 70, or otherwise.

The pin or projection 60 is grooved and may receive a spring locking member 71 which holds the link 65 in the position shown in Figure 8. The spring locking member 71 may be secured to the chain 63 by a chain or cord 72.

No synchronizing means has been shown for controlling the movement of the two cylinders to retain them always in synchronism as they are raised and lowered. For most purposes no synchronizing means is necessary and the cylinders, even though unequally loaded, will move satisfactorily and will retain the platform substantially horizontal. If synchronizing means are desired or if in the case of very large devices in which the cylinder assemblies are positioned very far apart, a synchronizing means appears desirable, it is within the contemplation of the invention that it be added.

When the cylinders 15 and 34 are in the extended or dotted line position of Figure 2, and when they are in any position intermediate the upper or lower limits for raising or lowering the platform 40, they constitute together a rigid extensible column capable of acting as a cantilever support for the elevating gate during the

5

raising and lowering cycle and while held in the displaced or outwardly swung position shown in full lines in Figure 2. It is important for structural strength that there be a substantial overlapping of the cylinders 15 and 34 at all times, so that the fully extended column formed when the cylinders are in their most extended position will not buckle, but will continue to act as a substantial and effective cantilever to hold the platform 40, whether raising or lowering, and its load away from the vehicle and in the clear so that it can be moved readily.

Although we have shown an operative form of our invention, it will be recognized that many changes in the form, shape and arrangement of parts can be made without departing from the spirit of the invention, and our showing is therefore to be taken as, in a sense, diagrammatic.

The use and operation of this invention are as follows:

The device generally as shown is mounted on any suitable support. It will be mounted with the supporting members 3 preferably fairly near one edge so that when the platform is to be used for raising or lowering, it will extend over the edge in the manner in which the platform as shown in Figure 2 extends over the edge of the floor 2.

Whether the assembly is mounted at the rear or at the side of a vehicle or other support, it will be associated with means for supplying pressure fluid. When inactive the parts will be latched in the position shown in Figure 1 in which the cylinders are generally within their supports, the platform is raised to approximately a vertical position, and the parts are latched together.

If now it is desired to lower the platform, it will first be unlatched and then will be swung toward the horizontal. At the same time, the operator will pull rearwardly on it and thus the cylinder assemblies will move partially out of their supports. The members 52 will be carried by gravity downwardly to the position of Figure 2 and will stop in that position and will thus hold the cylinders outwardly. The valve controls for the pressure fluid may then be manipulated to permit fluid to escape from within the cylinder 18, and the pistons of the two cylinders will then descend under the influence of gravity. This descent may continue until the platform rests upon the ground or some other stop or it may be stopped at any time by the operator who controls the pressure fluid.

Assuming now that the platform is at the lower limit of some desired excursion and the operator wishes to use it to raise a load, the load is put onto the platform, pressure fluid is directed inwardly through the conduit 26 and into the cylinder 18. As pressure builds up under the piston 30, the latter is raised and carries with it the platform. This raising is continued until the platform has moved as high as desired. Ordinarily the platform will be raised until its upper surface is approximately on the same level as the floor of the vehicle or platform which carries the assembly and the load will be moved onto the vehicle or other support. The up and down movement of the platform may be continued as long as necessary.

When no further raising or lowering is desired, the platform is raised to the position generally shown in Figure 2, in which it lies above the floor of the vehicle. The operator will then raise the platform by tilting it about its pivot 37 to a

6

generally vertical position. When this movement occurs, the cam members 45 on the platform contact the cam portions 55 of the members 52 and swing them upwardly, thus permitting the cylinder assemblies to swing inwardly into their supports 3. When all of the parts have been moved so that the latch guides 47 are in register with the slots 56 and the stirrups 57, the handle 51 is moved to carry each latch through one of the slots 56 and into engagement with the corresponding stirrups 57. The parts are thus all latched together and will remain so until positively removed from that position. The movement of the platform, when raised, is limited by the contact of the stops 58 with the stops 39.

As pointed out above, the cylinders 15 and 34, when they are in the full line position of Figure 2, constitute a cantilever for holding the platform 40 and any load which it may carry out of contact with the body. As the cylinders 15 and 34 are moved apart along the dotted line position of Figure 2, they still constitute a cantilever of varying length, which serves to hold the platform 40 and its load, either during raising or lowering, away from the vehicle and in the clear. This cantilever action occurs during the time that the cylinder assembly is held in the outwardly swung position by means of the supporting member or members 52.

The structure shown in Figure 8 accomplishes two purposes. It will be obvious that should the hoist of this invention be mounted upon the rear of a truck or other vehicle, there might be a tendency for the hoist to swing too far to the rear, particularly should the vehicle be driven up an incline. The chain or chains 63 prevent this and they hold the cylinders 15 in contact with the stops 53 and prevent outward swinging.

Sometimes, when carrying flat articles, they project beyond the end of the body and at that time or at other times, it may be necessary to maintain the platform 40 on a general level with the body floor 2. While the hydraulic mechanism can hold the gate at this point or level, it is often more convenient to rely upon other means and the chain or chains 67 may then be called into use. When positioned as shown in Figure 8, these chains limit the outward movement of the cylinder 34 with respect to the cylinder 15 and so when the parts are in the position of Figure 8, the load of the platform and associated parts and whatever may be carried by the platform at that time is carried upon the chain or chains 67 rather than upon the hydraulic system.

We claim:

1. In combination in a platform elevating assembly, a pair of hydraulic raising means, a fixed support for each, each raising means being movably supported adjacent its upper end by its support, and adapted to move outwardly from said support, each support being provided with a member which in one relative position of the parts interfits with one hydraulic means, a platform pivoted between the free ends of said hydraulic means, and a member rigidly connecting parts of the free ends of both hydraulic means, and carrying said platform.

2. In combination in a platform elevating assembly, a pair of hydraulic raising means, a fixed support for each, each raising means being movably supported adjacent its upper end by its support, and adapted to move outwardly from said support, each support being provided with a member which in one relative position of the parts interfits with one hydraulic means, a rigid

7

platform pivoted between the free ends of said hydraulic means, and a member rigidly connecting parts of the free ends of both hydraulic means, and carrying said platform.

3. In combination in a platform elevating assembly, a pair of hydraulic raising means, a fixed support for each, each raising means being movably supported adjacent its upper end by its support, and adapted to move outwardly from said support, each support being provided with a member which in one relative position of the parts interfits with one hydraulic means, a platform pivoted between the free ends of said hydraulic means, and a member rigidly connecting parts of the free ends of both hydraulic means, and carrying said platform, and latching means adapted to latch said platform to each support.

4. In combination in a platform elevating assembly, a pair of hydraulic raising means, a fixed support for each, each raising means being movably supported adjacent its upper end by its support, and adapted to move outwardly from said support, each support being provided with a member which in one relative position of the parts interfits with one hydraulic means, and a platform pivoted between the free ends of said hydraulic means, and a member rigidly connecting parts of the free ends of both hydraulic means, and carrying said platform, and latching means adapted to latch said platform to each support, and to latch each support to one of said hydraulic raising means.

5. In combination in a platform elevating assembly, a pair of hydraulic raising means, a fixed support for each, each raising means being movably supported adjacent its upper end by its support, and adapted to move outwardly from said support, each support being provided with a member which in one relative position of the parts interfits with one hydraulic means, a platform pivoted between the free ends of said hydraulic means, and a member rigidly connecting parts of the free ends of both hydraulic means, and carrying said platform, and latching means carried by said platform and adapted to latch said platform to each support, and to latch each support to one of said hydraulic means.

6. In combination in a platform elevating assembly, a pair of hydraulic raising means, a fixed support for each, each raising means being movably supported adjacent its upper end by its support, and adapted to move outwardly from said support, each support being provided with a member which in one relative position of the parts interfits with one hydraulic means, a rigid platform pivoted between the free ends of said hydraulic means, and a member rigidly connecting parts of the free ends of both hydraulic means, and carrying said platform, and latching means carried by said platform and adapted to latch said platform to each support, and to latch each support to one of said hydraulic raising means.

7. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported adjacent its upper end by its support for swinging, and a platform pivotally carried adjacent the lower end of said cylinder assemblies and positioned between them, and stop means to limit the downward pivoting of said platform with respect to said assemblies.

8. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder

8

assemblies, a supporting member for each, each assembly being movably supported by its support, and a platform pivotally carried adjacent the lower end of said cylinder assemblies and positioned between them, and stop means to limit the downward pivoting of said platform with respect to said assemblies, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position.

9. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported by its support, and a platform pivotally carried adjacent the lower end of said cylinder assemblies and positioned between them, and stop means to limit the downward pivoting of said platform with respect to said assemblies, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position, and cam members on said platform and on said latch means, whereby when the platform is raised toward a vertical position, the cylinder latch means are moved out of latching position, and the cylinders are free to return to their position within the supporting means.

10. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported by its support for outward swinging, and a platform pivotally carried adjacent the lower end of said cylinder assemblies and positioned between them, and stop means mounted in part on each cylinder assembly and in part on said platform to limit the downward pivoting of said platform with respect to said assemblies.

11. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported adjacent its upper end by its support for outward swinging, and a platform pivotally carried adjacent the lower end of said cylinder assemblies and positioned between them, and stop means to limit the downward pivoting of said platform with respect to said assemblies.

12. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported adjacent its upper end by its support, each support shaped with parts adapted in one relative position to underfit a portion of the cylinder assembly which it carries, and a platform pivotally carried adjacent the lower end of said cylinder assemblies and positioned between them, and stop means to limit the downward pivoting of said platform with respect to said assemblies.

13. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported by its support, and a platform pivotally carried adjacent the lower end of said cylinder assemblies and positioned between them, and stop means mounted in part on each cylinder assembly and in part on said platform, to limit the downward pivoting of said platform with respect to said assemblies, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position, cam members on said platform and on

said latch means, whereby when the platform is raised toward a vertical position, the cylinder latch means are moved out of latching position, and the cylinders are free to return to their position within the supporting means.

14. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported adjacent its upper end by its support, each support shaped with parts adapted in one relative position to interfit with a portion of the cylinder assembly which it carries, and a platform pivotally carried adjacent the lower end of said cylinder assemblies and positioned between them, and stop means mounted in part on each cylinder assembly and in part on said platform to limit the downward pivoting of said platform with respect to said assemblies, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position, cam members on said platform and on said latch means, whereby when the platform is raised toward a vertical position, the cylinder latch means are moved out of latching position, and the cylinders are free to return to their position within the supporting means.

15. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported adjacent its upper end, by its support, each support shaped with parts adapted in one relative position to interfit with a portion of the cylinder assembly which it carries, and a platform pivotally carried adjacent the lower end of said cylinder assemblies and positioned between them, and stop means mounted in part on each cylinder assembly and in part on said platform to limit the downward pivoting of said platform with respect to said assemblies, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position, cam members on said platform and on said latch means, whereby when the platform is raised toward a vertical position, the cylinder latch means are moved out of latching position, and the cylinders are free to return to their position within the supporting means.

16. In combination in a platform elevating assembly, a pair of hydraulic raising means, a fixed support for each, each raising means being movably supported adjacent its upper end by its support, and adapted to move outwardly from said support, each support being provided with a member which in one relative position of the parts interfits with one hydraulic means, a platform pivoted between the free ends of said hydraulic means, and a member rigidly connecting parts of the free ends of both hydraulic means, and carrying said platform, said hydraulic means comprising cantilevers for holding and guiding said platform.

17. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported by its support, and a platform carried adjacent the lower end of said cylinder assemblies and positioned between them, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position.

18. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported by its support, and a platform carried adjacent the lower end of said cylinder assemblies and positioned between them, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position, said cylinder assemblies comprising, when in the outward position, cantilever means for supporting and guiding said platform.

19. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported by its support, and a platform carried adjacent the lower end of said cylinder assemblies and positioned between them, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position, and means for limiting the outward movement of said cylinder assembly.

20. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported by its support, and a platform carried adjacent the lower end of said cylinder assemblies and positioned between them, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position, and means for limiting the outward movement of said cylinder assembly, said means including a flexible member secured at one end to the cylinder assembly and at the other to a member fixed on one of said supports.

21. In combination in an elevating platform assembly, a pair of hydraulic piston and cylinder assemblies, a supporting member for each, each assembly being movably supported by its support, and a platform carried adjacent the lower end of said cylinder assemblies and positioned between them, and latch members mounted one on each support and positioned to move, when free to do so, to hold a cylinder assembly in outward position, and mechanical means for limiting the outward movement of said piston and cylinder assemblies.

22. In combination in a platform elevating assembly, a pair of hydraulic raising means, a fixed support for each, each raising means being movably supported adjacent its upper end by its support, and adapted in the raised position to fit within said support, and adapted to move outwardly from said support, a platform pivoted between the free ends of said hydraulic means, and a member rigidly connecting parts of the free ends of both hydraulic means, and carrying said platform.

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