Jan. 14, 1964 A. F. CHIUZZI 3,117,765

LIFTING DEVICE

Filed March 27, 1962

FIG. 1

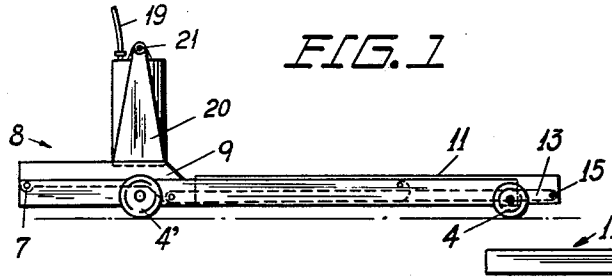


FIG. 2

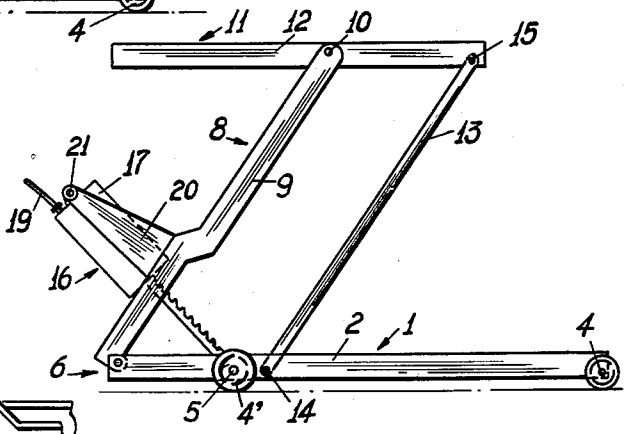


FIG. 3

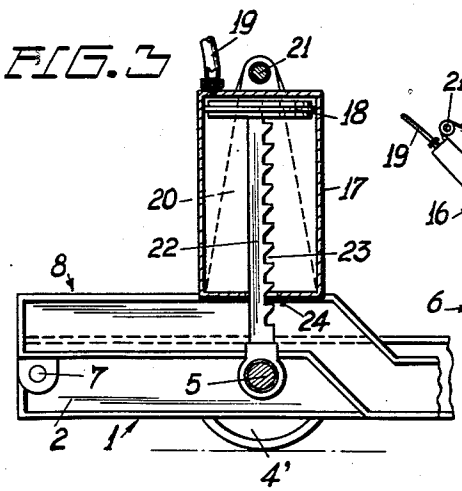


FIG. 4

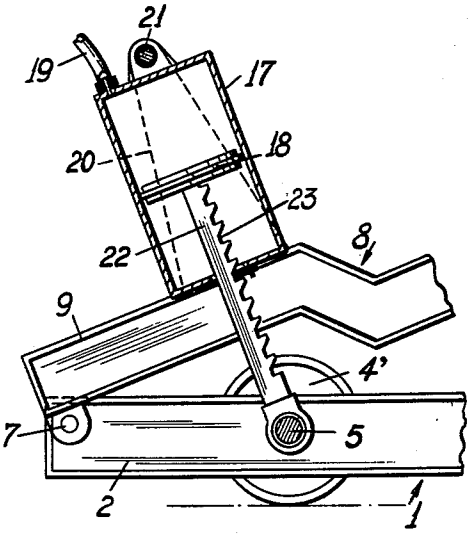


FIG. 5

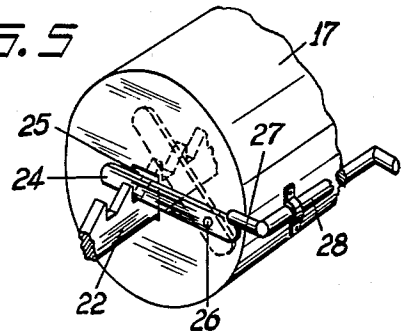
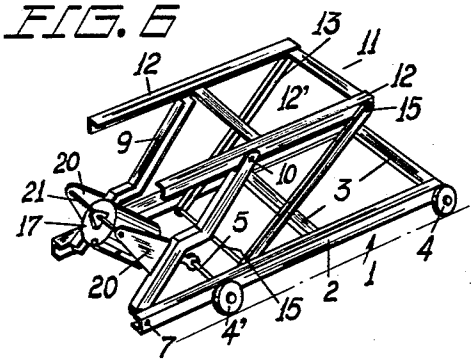


FIG. 6



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LIFTING DEVICE

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This invention concerns an elevator device for freight in general, and more especially for the purpose of lifting motor vehicles, and it is based on the ample experience which practice has offered through a long series of ratchets, jacks and other lifting devices, the specific excellence of which is remarkably shown during the first period of their use as loading machines, but after a short time of service the classic devices invariably become inoperative and in a certain way notably dangerous because of the effects which can be produced by a rapid lowering of the platform which supports the load, especially when an operator is working or maneuvering under that load, whether a vehicle or similar object. The invention is designed so as to be capable of lifting the vehicle, for instance at levels chosen by the operator, and in such a way that with the device in question it is possible, not only to furnish a supporting platform analogous to what is known already, but additionally and complementarily a frame system which supports the load, in this case a vehicle in accordance with the example described, at a chosen level, normally or considerably elevated and in such a way that same is maintained firm and that its change of position depends from the operator, who can thus work freely and especially under the chassis, without fear of possible trouble resulting from eventual and rough descents, which might occur if the device as described were constructed with the classic organs and elements, the results of which are already well known. In general the device consists of a base structure which for its displacement and maneuverability according to the operator's wishes, is mounted on wheels, and of a platform to sustain or support the vehicle, which platform is operated by a system forming a parallelogram of hinged joints. The mentioned base structure and one of the branches which constitute the parallelogram are connetced so as to form a frame which can be moved angularly by means of a displaceable piston rod lodged in a cylinder which, in turn, is mounted with relative articulation on corresponding supports of the mentioned hinged frame.

The piston which moves inside of the cylinder can be driven by means of whatever fluid, be it hydraulic or air or other, suitable for the purpose.

The invention also has in view other accessory objects, which will become clear in the course of this report.

In order that this invention may be clearly understood and easily put into practice, same has been represented by way of example and in one of its preferential forms of execution, in the drawings attached to this report, and in which:

FIG.1 is a schematic view of the device in non-operative position;

FIG. 2 is a view of the same lifting device functioning as a support, i.e. with the loading platform completely elevated;

FIG. 3 represents a partial detail of the control device for the elevation and descent of the platform body;

FIG. 4 is a view identical to the previous one, showing the disposition of the elements of the lifting device, which can be moved by means of the control device;

FIG. 5 is a perspective detail of the locking and fastening elements of the platform in the control device for the operation of the elevator; and finally;

FIG. 6 is a general and perspective view, on a smaller scale, of the lifting device itself.

In all the figures mentioned above the same reference numbers indicate simliar or corresponding parts.

Following the construction form as represented in the drawings, in accordance with this invention, the lifting device comprises a base structure 1 constituted by two rigid plates 2, placed parallel and at relative distance one from the other, and maintained in their position by means of adequate crosspieces 3. This base structure is the support of the whole, and is in turn provided with wheels 4 and 4', which permit its displacement as may be desired. The aforementioned plates 2 may have any appropriate characteristic and have been illustrated, as an example which is not restrictive, as channel iron, with one set of wheels 4 at one of their ends and the other set 4' near the opposite end, placed in such a way that the set of wheels indicated with reference 4' is sustained rotatively on a shaft 5 which should preferably extend to the whole width of the distance existing between the two plates 2 previously mentioned.

As may be appreciated from the drawings, at the free end 6 of said plates 2 an articulated frame 8 has been hingedly mounted by means of adequate articulation shanks 7, a frame 8 which in turn, also consists of two channel irons 9 equally placed parallel and maintained in that way be appropriate rigid means.

The opposite ends of the bars 9 of the frame 8 are pin-jointed by 10 to a support platform 11 consisting of a set of angle irons at a certain distance one from the other 12 and which follow the parallelism indicated in the already mentioned elements 1 and 8 for the inherent purposes of the lifting device.

As a complement to the frame 8 which can move angularly, a set of arms 13 are foreseen, substantially parallel with the bars 9 of the frame 8. These arms 13 are, in turn, pin-jointed with their corresponding ends 14 and 15 to the bars 2 and 12 respectively of the elements 1 and 11; and in this manner these mentioned parallel arms 13 and the bars 9 of the frame 8 constitute, with bar 2 and 12, an articulated parallelogram, in such a way that when the platform supporting the loaded vehicle rises, it remains constantly in a strictly horizontal position and in this way also the cargo which is lifted, remains in the required horizontal position. The walls of the support platform 11 are kept in place by means of crossties 12'.

As can be deduced from the above description, the platform 11 can go down completely and, in turn, also rise in respect of the base structure 1, as to this effect the parallel bars 9 and 13 have been foreseen; but the operative action of this articulated device is maintained through a pushing system in general indicated with reference 16, in which a cylinder 17 has been foreseen in the interior of which a pistonhead 18 works, in th usual way, driven by a fluid suitable for this purpose; this fluid is injected through a conduit 19 properly placed in the upper part of the very cylinder 17. This cylinder 17 is mounted, suspended by a pair of support plates 20 solidary with the frame 8 by means of an articulation point 21 at the highest end of said plates 20. In consequence, the cylinder is sustained with relative articulation and operationally connects the mentioned frame 8 with the base structure 1.

On the other hand, the piston 18 carries rod 22 with a carved or applied section of teeth 23, of the type of saw teeth, thus obtaining with this form of achievement a set of ratchet teeth. The rod 22, in turn, is firmly sustained, but with articulated friction, by shank 5 of the wheel element 4'.

As seen from the description, when pressure fluid is injected through the conduit 19, the piston 18 tends to be displaced in the direction of the arrowhead 8, in FIGURES 3 and 4, and as the teeth 23) are placed to favour the descent of the rod, there will be no inconvenience whatsoever for the same to tend and move in the direction of the base structure 1, but as the free end of the rod 22 exercises a bearing operation on the shank 5, the

result of this displacement action of the piston 18 is an operational reaction in the assembly of piston and cylinder 17, since the latter, as said before, is coupled to the frame 8 and as this frame is, in turn, pin-jointed by a point at 7 the consequence of this effect of reaction is that the frame 8 is pulled by the support 20 of the cylinder 17 at the articulation point 21 and as the base structure cannot be driven, the frame 8 will rise and articulating at 7 will move angularly, carrying with it the support platform 11. For the reasons set out above and in cooperation with the parallelogrammic bars, the support platform 11 rises in a remarkably horizontal position.

The teeth operating as a ratchet 23 constitute a means of safety and of retention of the operative action which has just been mentioned and for this purpose use is made of a detention mechanism, the object of which is to allow the clearance of the teeth when the cylinder is pushed upwardly, but to detain and fasten the rod when the pressure pushing the cylinder has ceased, as soon as the latter has reached the final point of its run, as is shown by the dotted line, FIGURE 2. This is to say that at the moment of establishing the detention of the displacement of the cylinder, to sustain the platform in the chosen position, this detaining element, which consists of an oblong steel flat 24, interposes itself in the opening 25 of the passage of the rod to fasten the latter and to assure the angle position of the frame 8 and the horizontal position of the platform 11. This detainer 24 is the helping element to resist the load imposed on the platform 11, seeing that the fluid within the chamber of 17 above the piston becomes a pushing element and thus an element of retention of the position of the cylinder.

Presently there exist piston elements which are also fluid-driven, but due to the many contingencies of fluid-escape, the piston stayed without a positional detention element and therefore the platform corresponding to the support went down with the danger which could result therefrom through lack of prevision of the operator or failure of the machine. Consequently the detention element 24 constitutes a means of total security to avoid the possibility of the cylinder moving downwardly and provoking the unforeseen descent of the support platform 11.

The detention element 24 is pin-jointed at 26 close to the farthest end of the rod 22 and in such a way as to constitute a lever, when the mentioned articulated end, which has a small free extension, rises, a pushing piece 27 falls in, connected to a control rod 28, which can be operated from the outside of the cylinder 17. And as can be clearly seen from FIGURE 5, this hinged disposition of the detainer 24 does not prevent the displacement of the cylinder when pressure is injected in the cylinder chamber, because, as said before, the mentioned teeth 23 work as ratchet teeth and the detainer 24 as a pawl. To obtain the unblocking of the teeth 23 the rod 28 is operated in a counterclockwise direction, thus provoking the clearance of the teeth line 23 and, therefore, when the graduated pressure within the cylinder chamber 17 ceases, it remains free for the corresponding descent of the platform 11.

The invention in the form as herebefore described, is clearly to be seen and does not need further explanation for those acquainted with the subject.

It is evident that various modifications can be made in the construction or in details, without abandoning the sphere of this invention, which is clearly determined in the following claims.

I claim:

1. A lifting device comprising, in combination, first frame means; second adjustable frame means extending substantially parallel to said first frame means and adapted to receive a load; a pair of substantially parallel arm means respectively pivotally connected at opposite ends thereof to longitudinally spaced portions of said first and second frame means and being tiltable from a rest position extending substantially parallel to said frame means to a raised position inclined to said frame means; support means fixed to and projecting upwardly from one of said arm means and having a free end above said one arm means; telescoping moving means including a first telescoping means and a second telescoping means movable with respect to each other between a collapsed and an extended position, one of said telescoping means being connected at one end thereof to said free end of said support means for pivotal movement about an axis and the other of said telescoping means being pivotally connected at one end thereof to a portion of said first frame means which is, when said arm means are in said rest position and said telescoping moving means in said collapsed position, located in a plane passing substantially normal to said arm means through said axis; and means cooperating with said telescoping moving means for moving the latter from said collapsed to said extended position to tilt said arm means from said rest to said raised position so as to raise said second frame means and a load received thereby with respect to said first frame means, whereby due to the pivot arrangement of said telescoping moving means a relatively small force is required to raise said second frame means.

2. A lifting device comprising, in combination, first frame means; second adjustable frame means extending substantially parallel to said first frame means and adapted to receive a load; a pair of substantially parallel arm means respectively pivotally connected at opposite ends thereof to longitudinally spaced portions of said first and second frame means and being tiltable from a rest position extending substantially parallel to said frame means to a raised position inclined to said frame means; support means fixed to and projecting upwardly from one of said arm means and having a free end above said one arm means; telescoping moving means including cylinder and piston means movable with respect to each other between a collapsed and an extended position, one of said last mentioned means being connected at one end thereof to said free end of said support means for pivotal movement about an axis and the other of said telescoping means being pivotally connected at one end thereof to a portion of said first frame means which is, when said arm means are in said rest position and said cylinder and piston means in said collapsed position, located in a plane passing substantially normal to said arm means through said axis; and means for feeding pressure fluid into said connected end of said cylinder means for moving said telescoping moving means from said collapsed to said extended position to tilt said arm means from said rest to said raised position so as to raise said second frame means and a load received thereby with respect to said first frame means, whereby due to the pivot arrangement of said telescoping moving means a relative small force is required to raise said second frame means.

3. A lifting device comprising, in combination, first frame means; second adjustable frame means extending substantially parallel to said first frame means and adapted to receive a load; a pair of substantially parallel arm means respectively pivotally connected at opposite ends thereof to longitudinally spaced portions of said first and second frame means and being tiltable from a rest position extending substantially parallel to said frame means to a raised position inclined to said frame means; support means fixed to and projecting upwardly from one of said arm means and having a free end above said one arm means; telescoping moving means movable between a collapsed and an extended position and including a cylinder connected at its upper end to said free end of said support means for pivotal movement about a pivot axis substantially normal to the axis of said cylinder, a piston slidable in said cylinder and located adjacent said one end of said cylinder in said collapsed position of said telescoping means, and a piston rod fixed at one end to said piston, extending through the other end of

said cylinder and being pivotally connected at its other end thereof to a portion of said first frame means which is, when said arm means are in said rest position and said cylinder and piston means in said collapsed position, located in a plane passing substantially normal to said arm means through said pivot axis; and means for feeding pressure fluid into said upper end of said cylinder means for moving said telescoping moving means from said collapsed to said extended position to tilt said arm means from said rest to said raised position so as to raise said second frame means and a load received thereby with respect to said first frame means, whereby due to the pivot arrangement of said telescoping moving means a relative small force is required to raise said second frame means.

4. A lifting device comprising, in combination, first frame means; second adjustable frame means extending substantially parallel to said first frame means and adapted to receive a load; a pair of substantially parallel arm means respectively pivotally connected at opposite ends thereof to longitudinally spaced portions of said first and second frame means and being tiltable from a rest position extending substantially parallel to said frame means to a raised position inclined to said frame means; support means fixed to and projecting upwardly from one of said arm means and having a free end above said one arm means; telescoping moving means movable between a collapsed and an extended position and including a cylinder connected at its upper end to said free end of said support means for pivotal movement about a pivot axis substantially normal to the axis of said cylinder, a piston slidable in said cylinder and located adjacent said one end of said cylinder in said collapsed position of said telescoping means, and a piston rod fixed at one end to said piston, extending through the other end of said cylinder and being pivotally connected at its other end thereof to a portion of said first frame means which is, when said arm means are in said rest position and said cylinder and piston means in said collapsed position, located in a plane passing substantially normal to said arm means through said pivot axis; means for feeding pressure fluid into said upper end of said cylinder means for moving said telescoping moving means from said collapsed to said extended position to tilt said arm means from said rest to said raised position so as to raise said second frame means and a load received thereby with respect to said first frame means, whereby due to the pivot arrangement of said telescoping moving means a relative small force is required to raise said second frame means; and releasable arresting means cooperating with said cylinder and with said piston rod for maintaining said telescoping moving means in the extended position thereof.

5. A lifting device comprising, in combination, first frame means; second adjustable frame means extending substantially parallel to said first frame means and adapted to receive a load; a pair of substantially parallel arm means respectively pivotally connected at opposite ends thereof to longitudinally spaced portions of said first and second frame means and being tiltable from a rest position extending substantially parallel to said frame means to a raised position inclined to said frame means; support means fixed to and projecting upwardly from one of said arm means and having a free end above said one arm means; telescoping moving means movable between a collapsed and an extended position and including a cylinder connected at its upper end to said free end of said support means for pivotal movement about a pivot axis substantially normal to the axis of said cylinder, a piston slidable in said cylinder and located adjacent said one end of said cylinder in said collapsed position of said telescoping means, and a piston rod fixed at one end to said piston, extending through the other end of said cylinder and being pivotally connected at its other end thereof to a portion of said first frame means which is, when said arm means are in said rest position and said cylinder and piston means in said collapsed position, located in a plane passing substantially normal to said arm means through said pivot axis; means for feeding pressure fluid into said upper end of said cylinder means for moving said telescoping moving means from said collapsed to said extended position to tilt said arm means from said rest to said raised position so as to raise said second frame means and a load received thereby with respect to said first frame means, whereby due to the pivot arrangement of said telescoping moving means a relative small force is required to raise said second frame means; and releasable arresting means cooperating with said cylinder and with said piston rod for maintaining said telescoping moving means in the extended position thereof, said releasable arresting means including a series of ratchet teeth extending along said piston rod fixed thereto, and a ratchet pawl engaging one of said teeth and being carried by said cylinder.

6. A lifting device comprising, in combination, first frame means; second adjustable frame means extending substantially parallel to said first frame means and adapted to receive a load; a pair of substantially parallel arm means respectively pivotally connected at opposite ends thereof to longitudinally spaced portions of said first and second frame means and being tiltable from a rest position extending substantially parallel to said frame means to a raised position inclined to said frame means; support means fixed to and projecting upwardly from one of said arm means and having a free end above said one arm means; telescoping moving means movable between a collapsed and an extended position and including a cylinder connected at its upper end to said free end of said support means for pivotal movement about a pivot axis substantially normal to the axis of said cylinder, a piston slidable in said cylinder and located adjacent said one end of said cylinder in said collapsed position of said telescoping means, and a piston rod fixed at one end to said piston, extending through the other end of said cylinder and being pivotally connected at its other end thereof to a portion of said first frame means which is, when said arm means are in said rest position and said cylinder and piston means in said collapsed position, located in a plane passing substantially normal to said arm means through said pivot axis; means for feeding pressure fluid into said upper end of said cylinder means for moving said telescoping moving means from said collapsed to said extended position to tilt said arm means from said rest to said raised position so as to raise said second frame means and a load received thereby with respect to said first frame means, whereby due to the pivot arrangement of said telescoping moving means a relatively small force is required to raise said second frame means; releasable arresting means cooperating with said cylinder and with said piston rod for maintaining said telescoping moving means in the extended position thereof, said releasable arresting means including a series of ratchet teeth extending along said piston rod fixed thereto, and a ratchet pawl mounted on said cylinder for pivotal movement about an axis substantially parallel to said piston rod between a locking position engaging one of said teeth and a releasing position located laterally of said teeth; and means cooperating with said pawl for moving the same between said position thereof.

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