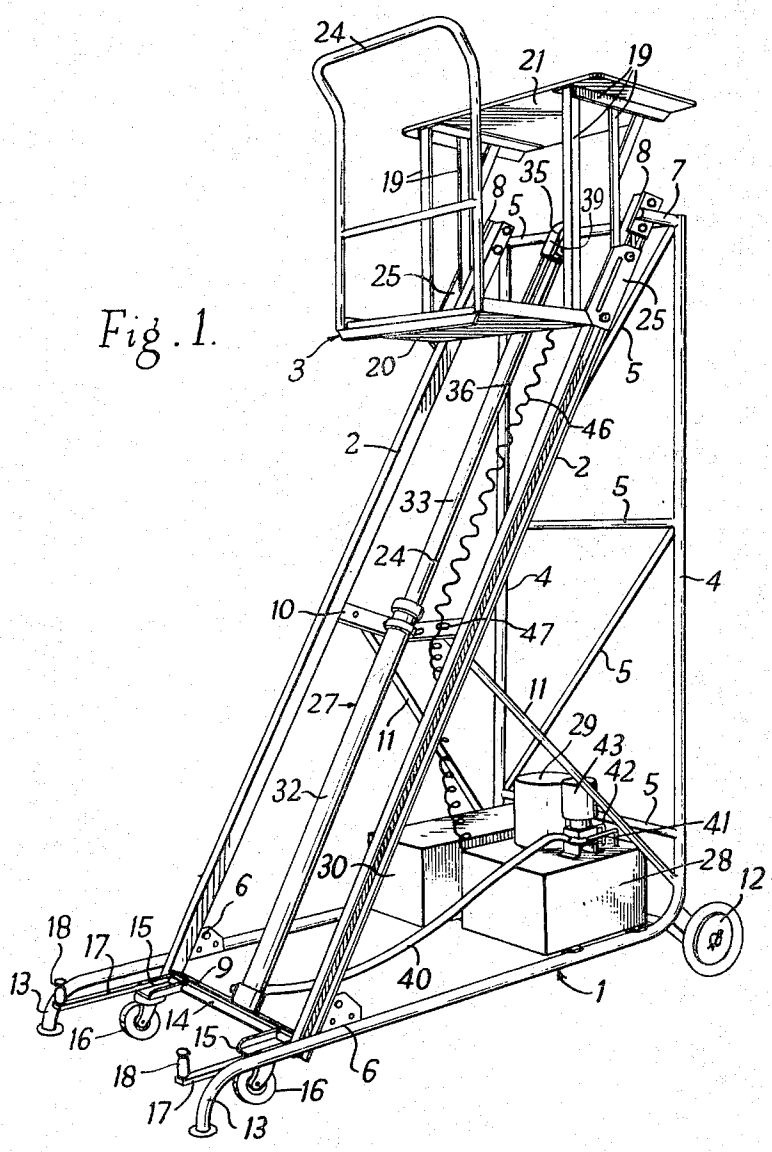
April 6, 1965 L. EVANS ETAL 3,176,794

MOBILE ELEVATING APPARATUS

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Fig. 1.



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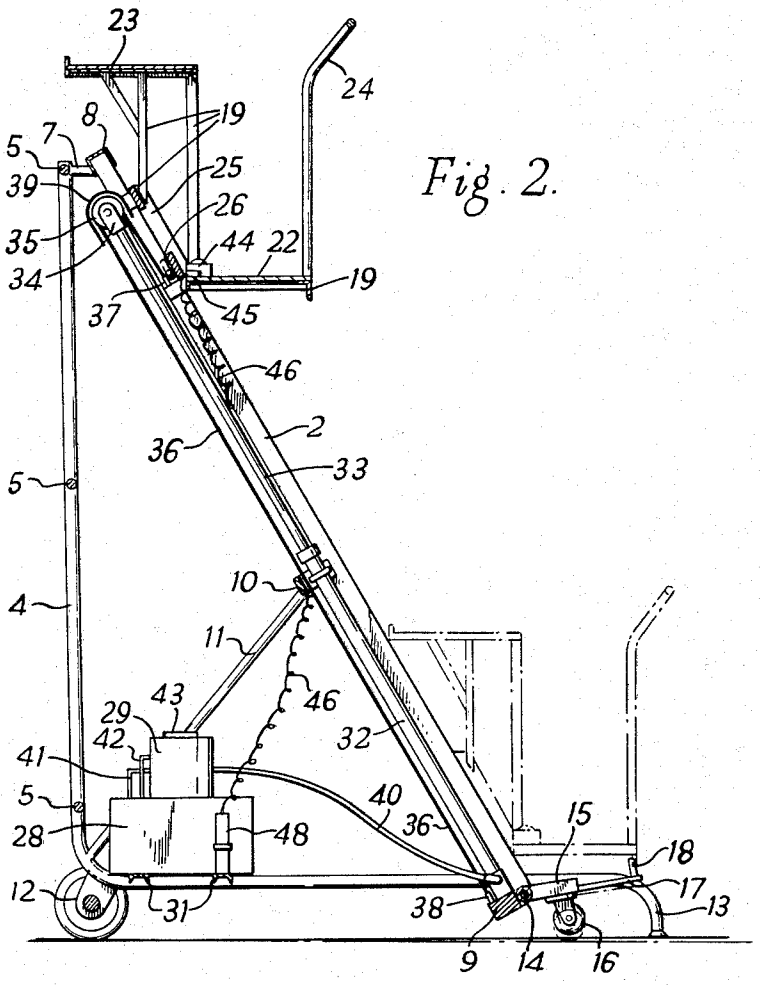


Fig. 2.

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MOBILE ELEVATING APPARATUS

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This invention is concerned with a mobile elevating apparatus, for example for use in stores, warehouses, factories and the like, which provides a means of ready access to elevated locations normally out of reach from the ground or floor, to enable goods or work to be transferred between such locations and ground level.

The elevating apparatus according to the present invention comprises a mobile chassis carrying a guideway which is inclined to the vertical, a carriage supported and guided on said guideway for movement along it, and means controllable from said carriage for raising and lowering the latter, and for arresting it at required positions, along the guideway.

The aim is that the apparatus can be readily moved to a position adjacent the elevated location to be reached, and the operative there travels up and down on the carriage, at his own dictation, to convey goods or work to or from selected elevated locations.

The inclined arrangement of the guideway is particularly advantageous because, in moving across the face of the storage racks or the like with which the elevating apparatus is employed, a larger area can, in effect, be served for each standing position of the apparatus.

Moreover, by virtue of this arrangement, the carriage can, without obstruction, include an auxiliary goods or work support in front of, and at a higher level than, a standing place for the operative on the carriage, and this will obviously greatly facilitate the loading of goods or work to and from the carriage. To this end the carriage may comprise a lower horizontal main operative-carrying platform and an upper horizontal auxiliary goods- or work-carrying platform which is mounted on the carriage so as to extend from a point located vertically above the forward part of the main platform towards the inclined guideway.

The auxiliary goods- or work-carrying platform may terminate at a point just clear of the inclined guideway and in this event it will, of course, be appreciated that the greater the angle between the inclined guideway and the vertical, the longer the auxiliary platform can be. However, the said guideway may be constituted by two inclined members, and in this event the auxiliary platform may extend between these members, this permitting of an even larger goods- or work-supporting area.

A preferred example of an elevating apparatus according to the invention is illustrated in the accompanying drawings, in which:

FIGURE 1 is a general perspective view of the mobile lift or elevator, and

FIGURE 2 is a cross section through the lift or elevator viewed from the rear side of FIGURE 1.

Basically, the elevating apparatus illustrated comprises a mobile chassis, generally designated 1, carrying a guideway constituted by two parallel members 2 which are inclined to the vertical, and a carriage generally designated 3, supported and guided on said guideway for movement along it, i.e. up and down.

The chassis 1 comprises a pair of parallel metal tubes 4 connected together by welded cross braces 5 and bent so as to form a horizontal base frame to which the lower ends of the inclined guideway members 2 are secured by means of welded brackets 6, and a vertical end frame having two horizontal projections 7 carrying brackets 8

to which the upper ends of the members 2 are bolted. The inclined guideway members 2, which are of outwardly facing channel form for the purpose to be described later, are also secured together by welded cross members 9 and 10, the latter member being secured to the tubes 4 by welded stays 11.

The chassis 1 is supported at the one end on wheels 12 and has at the other end feet 13 formed by the downturned ends of the tubes 4. Rotatably mounted in the lower ends of the inclined members 2 is a spindle 14 to which are rigidly secured two angle plates 15 carrying castors 16, and two arms 17 each having an upstanding pin 18.

When the carriage 3 is raised from its lowermost position, i.e. is in a position such as is shown in FIGURES 1 and 2, the chassis 1 is supported on the feet 13 and the castors 16 rest lightly on the ground (see FIGURE 2). The apparatus is, therefore, incapable of travel when an operative on the carraige 3 is working at an elevated location.

However, as the carriage 3 moves into its lowermost position, i.e. the position shown in chain dotted lines in FIGURE 2, the underside thereof engages the upstanding pins 18 and swings the plates 17 downwardly, thereby rotating the spindle 14 and lowering the castors 16 to raise the feet 13 from the ground and take over the support of the chassis. The elevating apparatus can then be easily moved to another working location.

The carriage 3 consists of a metal framework 19 carrying a main operative-carrying platform 20 constituted by a panel 22 of wood, metal or other suitable material, and an auxiliary goods- or work-carrying platform 21 constituted by a panel 23 of similar material. Also mounted on the main platform 20 is a handrail 24 of tubular metal.

The carriage 3 is mounted for movement on the inclined guideway members 2 by shoes 25 which are secured to the metal framework 19 of the carriage. These shoes are in the form of plates disposed at the same inclination to the vertical as the guideway members 2 and having rotatably mounted thereon, through ball or roller bearings, metal wheels (not shown) which run in the channelled members 2.

It will be noted that the shoes 25 extend from the forward corners of the main platform 20 beneath the auxiliary platform 21 so that there is an even distribution of the weight of any load on the carriage. In addition, upward movement of the carriage 3 is limited by abutment of the shoes 25 against the brackets 8.

Also mounted on the metal framework 19 of the carriage 3 are two wheels 26 (one only of which can be seen in FIGURE 2), each being provided with a rubber or nylon rim. These wheels 26 run on the inner sides of the inclined members 2 and serve to sustain any offset loading of the platforms.

Raising and lowering of the carriage 3 is effected by means of a hydraulic unit, generally designated 27, operated by a hydraulic pump 28 and an electric motor 29 which controls the latter and is supplied with an electric current from an accumulator 30. The pump 28, motor 29, and accumulator 30 are supported on two cross members 31 mounted on the chassis 1.

The hydraulic unit 27 comprises a single-acting hydraulic cylinder 32 which is mounted at its lower end on the cross member 9, and also secured to the cross member 10. The ram 33 of the hydraulic cylinder 32 is provided, at the upper end thereof, with a bracket 34 carrying a pulley 35 over which runs a non-extensible cable 36 which is anchored at one end 37 to the carriage 3 and at the other end 38 to the cross member 9. The pulley 35 is enclosed by a cover 39.

The lower end of the cylinder 32 is connected by a

flexible pipe 40 to a connection 41 on the hydraulic pump 28, the latter supplying hydraulic fluid through the connection 41 and pipe 40 to the lower end of the cylinder 32 at required times to extend the ram 33 and thus vary the length of the loop in the cable 36, thereby raising the carriage 3.

The carriage 3 is arranged to be lowered under the action of gravity and against the action of the hydraulic fluid in the cylinder 32, and to facilitate this a valve is provided on the pump 28 for bleeding hydraulic fluid off from the cylinder 32 at required times, this fluid passing through a restrictor valve which retards the rate of flow of fluid out of the cylinder 32 and thus causes the carriage 3 to descend at a slow and uniform speed.

This valve is contained in a pipe 42, which returns the hydraulic fluid from the cylinder 32, the pipe 40 and connection 41 to the pump 28, and is arranged to be opened and closed by an electric solenoid 43 to control the descent of the carriage 3.

Control of the electric motor 29 and hence the pump 28 (raising of the carriage 3) and of the solenoid 43 (lowering of the carriage 3) is performed by two foot-operated switches 44 mounted on the main platform 20 of the carriage 3, one only of which switches can be seen in FIGURE 2. These switches 44 are connected to a common terminal box 45 which is mounted on the main platform 20 and connected by an extensible cable 46, secured by a clip 47 to the cross member 10 supporting the cylinder 32, to a junction box 48 mounted on one of the two cross members 31 supporting the hydraulic pump 28, electric motor 29 and accumulator 30 on the chassis 1.

This junction box 48 is connected by cables (not shown) to the accumulator 30, electric motor 29 and solenoid 43, the electrical circuit being such that operation of one of the foot-operated switches 44 effects energization or deenergization of the solenoid 43 and thus causes descent or arrest of the descent respectively of the carriage 3 and operation of the other foot-operated switch 44 effects starting or stopping of the pump 28 and thus causes ascent or arrest of the ascent respectively of the carriage 3.

We claim:

1. An elevating apparatus comprising a mobile chassis; a guideway rigidly mounted on said chassis at a fixed inclination to the vertical; a carriage arranged above the guideway and comprising guide means cooperating with the guideway whereby the carriage is supported and guided on the latter for movement therealong, a lower horizontal main platform extending rearwardly from the guide means in a direction away from the guideway for carrying an operative, and an upper horizontal auxiliary platform which extends above the guide means forwardly towards the guideway for carrying goods; means for raising and lowering the carriage, and for arresting it at required positions, along the guideway; and means on said carriage for operating the means for raising, lowering and arresting the latter, said chassis having wheels at one end and feet at the other end on which the chassis rests when the carriage is raised from its lowermost position, at least one arm pivoted at one end on the chassis; retractible castors arranged adjacent the feet and rigidly secured to the arm and movable therewith, the other end of said arm being disposed in the path of movement of the carriage upon the guideway, whereby when the carriage is moved to its lowermost position the arm is engaged by the carriage and thereby pivoted downwardly so that the castors are automatically lowered to take up the support of the chassis from the feet and mobilize the apparatus.

2. An elevating apparatus comprising a mobile chassis

which comprises two parallel members bent so as to form a horizontal base frame and a vertical end frame, and cross braces connecting these two members together; two parallel guideway members of outwardly facing channel form mounted on the chassis at a fixed inclination to the vertical, their lower ends being secured to the horizontal base frame of the chassis and their upper ends to the vertical end frame; a carriage arranged above the guideway members and comprising guide means constituted by two inclined shoes in the form of plates carrying rollers which run in the channelled guideway members whereby the carriage is supported and guided on the guideway members for movement therealong, a lower horizontal main platform extending rearwardly from the lower ends of the guide shoes in a direction away from the guideway members for carrying an operative, and an upper horizontal auxiliary platform for carrying goods which extends above the guide shoes from a location disposed vertically above the forward part of the main platform forwardly towards the guideway members, this auxiliary platform being mounted on vertical posts secured at their lower ends to the guide shoes; means for raising and lowering the carriage, and for arresting it at required positions, along the guideway members; said means comprising a single-acting hydraulic piston and cylinder unit mounted on said chassis, a ram secured at one end thereof to the piston of this unit, a pulley mounted on the other end of the ram, a cable running over this pulley and secured at one end to the carriage and at the other end to the chassis so as to form a loop, a hydraulic pump mounted on the chassis for supplying hydraulic fluid to the piston and cylinder unit to project the ram from the unit and shorten the length of the loop in said cable and thereby raise the carriage, an electric motor mounted on the chassis for operating the hydraulic pump, means on said carriage for controlling the electric motor and hence the pump, and valve means for controlling the bleeding of hydraulic fluid from the piston and cylinder unit to allow the carriage to descend under the action of gravity; the horizontal base frame of the chassis having wheels at one end and feet at the other end on which the chassis rests when the carriage is raised from its lowermost position, at least one arm pivoted at one end on the chassis, retractible castors arranged adjacent the feet and rigidly secured to the arm and movable therewith, the other end of said arm being disposed in the path of movement of the carriage upon the guideway members, whereby when the carriage is moved to its lowermost position the arm is engaged by the carriage and thereby pivoted downwardly so that the castors are automatically lowered to take up the support of the chassis from the feet and mobilize the apparatus.

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