Aug. 8, 1944. G. QUAYLE 2,355,328

SPRING CUSHIONED LIFT TRUCK

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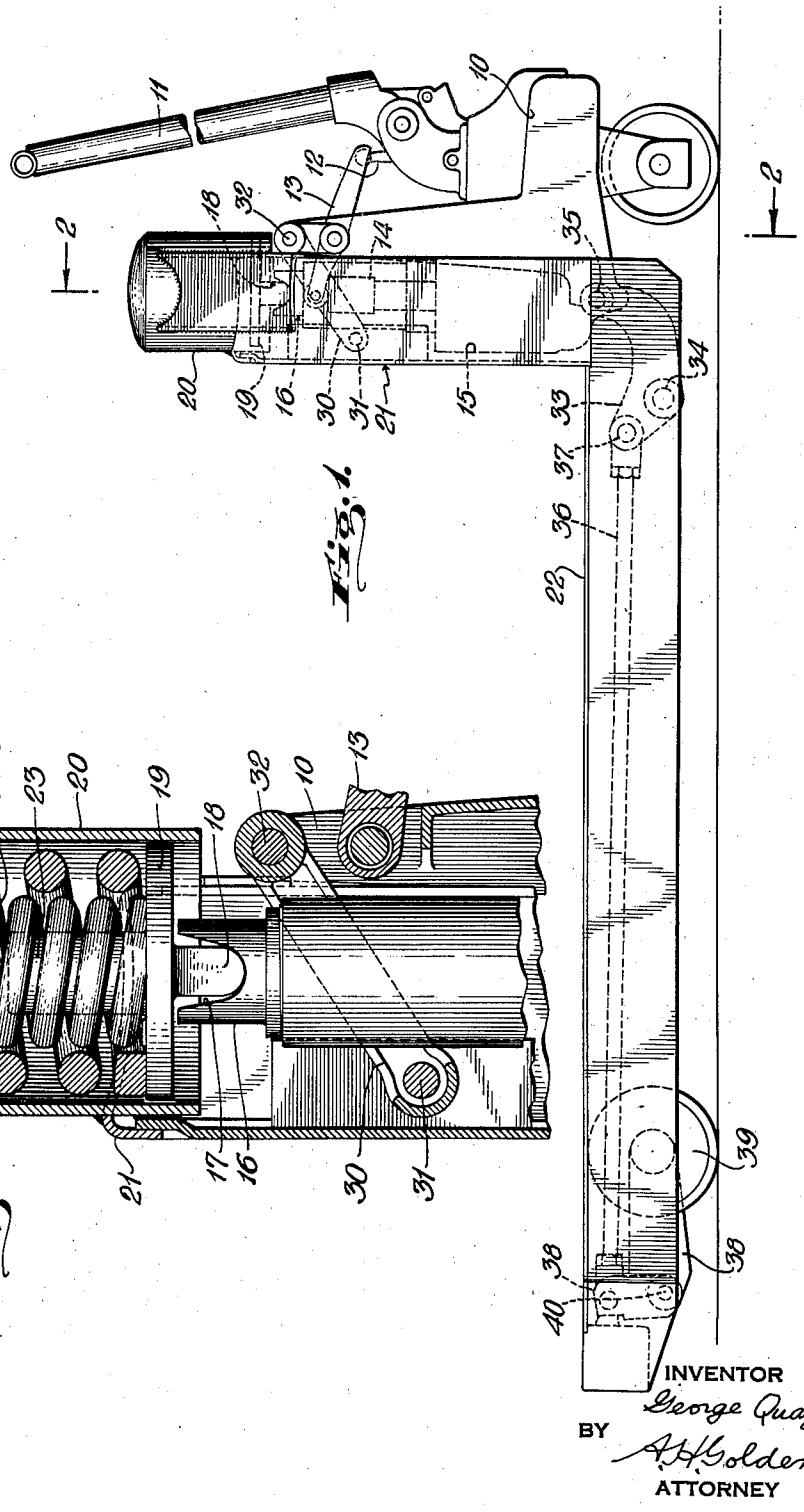


Fig. 1.

Fig. 3.

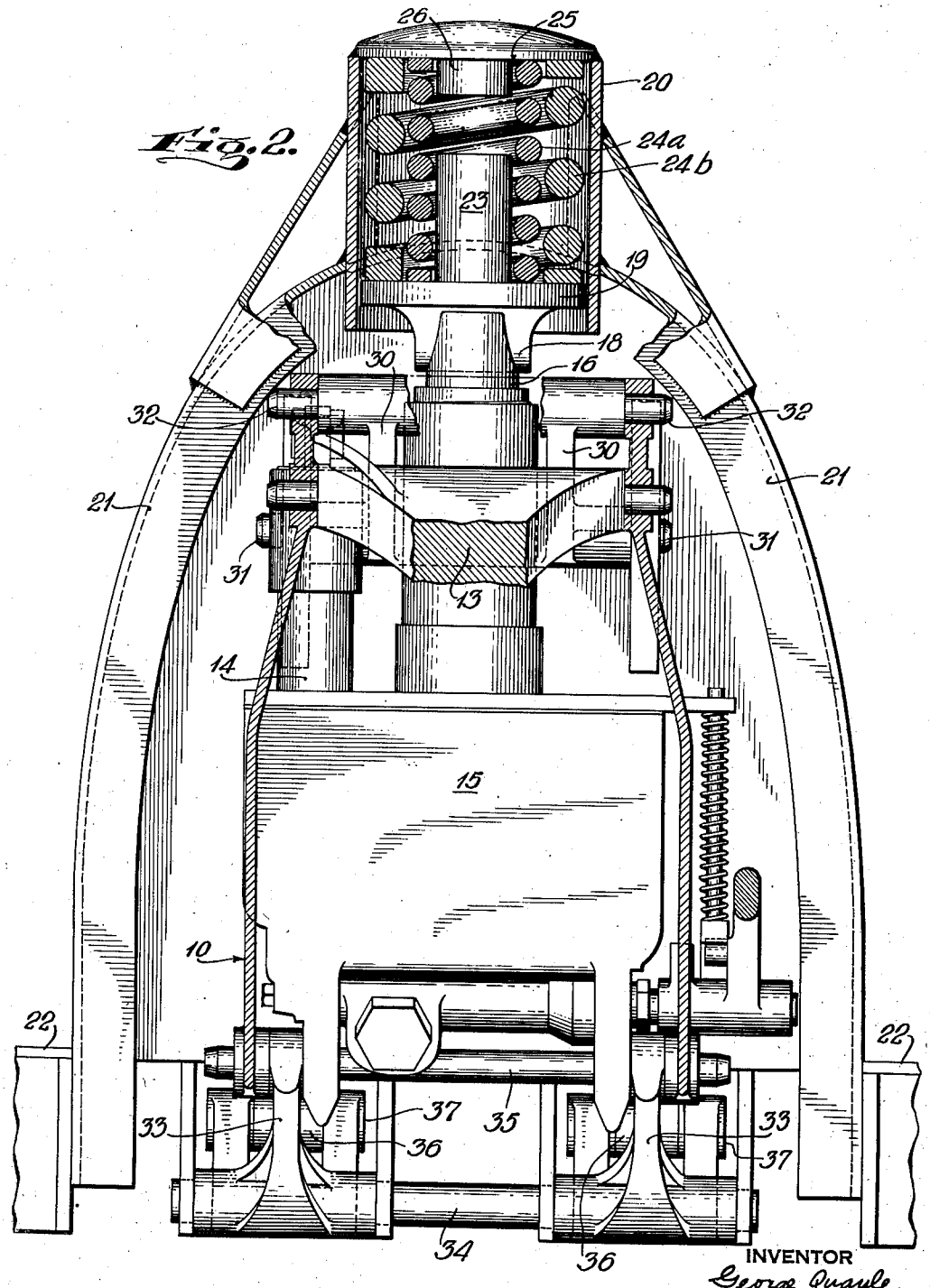
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Fig. 2.



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2,355,328

SPRING CUSHIONED LIFT TRUCK

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Application July 23, 1941, Serial No. 403,646

7 Claims. (Cl. 254—2)

This invention relates to a lift truck of the type in which an elevating frame or platform is lifted relatively to a main frame or lifting head, through operation of a suitable lifting mechanism. More particularly, my invention relates to a truck of the type shown in my Patent No. 2,309,138 issued January 26, 1943.

In trucks of the class described, it is customary for a thrust member to be operated through the intermediary of a lifting handle or lifting treadle, whereby to apply lifting pressure to the elevating frame or platform. In the truck of my patent supra, I utilize a hydraulic lifting unit in which a ram applies lifting pressure to the elevating platform. The invention of this application relates more particularly to means through which a ram or other thrust imparting member may apply lifting pressure to the elevating platform.

As a feature of my invention, the lifting pressure of the ram is applied through the medium of a spring. In this way, the load is elevated more smoothly than might otherwise be possible. Also, since the platform of a hydraulic truck is preferably sustained in elevated position by the ram of the hydraulic lift unit, the spring through which the lifting thrust is applied serves to cushion the elevating platform relatively to the ram as the truck moves over a rough floor or other terrain.

As a more detailed feature of my invention, there is mounted on the elevating platform a movable thrust accepting member which is spring pressed relatively to the elevating platform and is adapted, preferably, at one end thereof, to receive lifting thrust from the ram. Even more particularly, this member may be in the form of a disc or plunger, with spring guiding means for the spring or springs which maintain it in spring pressed relation to the elevating platform.

As a further feature of my invention, the thrust accepting member is preferably mounted in a cylindrical chamber formed on the elevated platform, and with a portion of the member in thrust accepting relation to the ram.

As a further feature of my invention, the surface on the thrust accepting member which bears against the end of the ram, and the end surface of the ram itself, are formed so that pivotal movement between the two surfaces is possible during the lifting operation, while sliding movement between the two surfaces is also possible to allow for such weaving as may occur between the elevating frame and the main frame.

I have thus described my invention generally in order that the construction which I shall hereinafter describe in detail, may be better understood, and in order that my contribution to the art may be fully appreciated. It should be understood moreover, that any invention may be embodied in forms other than that herein shown and described, so that my patent claims should be sufficiently broad to prevent the utilization, with impunity, of my invention by others in different mechanical forms.

For a detailed description of my invention I shall now refer to the drawings in which Fig. 1 is an elevation of a truck of the type to which my invention may be applied. Fig. 2 is a vertical section taken along lines 2—2 of Fig. 1. Fig. 3 is an enlarged vertical section through a part of Fig. 1 and illustrating the coaction between the thrust receiving member and the upper end of the ram.

Referring now more particularly to the drawings, and especially Fig. 1, reference numeral 10 indicates the lifting head of a hydraulic truck, on which is supported for pivotal movement a steering and lifting handle 11, which through a vertical strut 12 rotates a lever 13 for actuating a pump contained within the cylinder 14 of the hydraulic lift unit 15.

The ram of the hydraulic lift unit 15 is indicated by reference numeral 16 and extends upwardly from the hydraulic lift unit in a manner well understood in the art and clearly set forth in my application supra. The upper end surface of the ram 16 is formed as shown at 17 in Fig. 3 for sliding and pivotal coaction with a rounded lug 18 depending from the disc portion 19 of what I term a thrust receiving member. The disc 19 is formed for sliding movement within a cylindrical bearing chamber 20 secured as by welding or any other suitable way, to a vertically extending standard 21 of the elevating platform 22. While I show a cylindrical chamber 20 which is circular in cross section, it should be well understood that the cylindrical chamber 20 may be of any other cross sectional shape, and that the disc 19 may also be of any suitable shape for cooperation therewith.

Extending from the upper surface of the disc 19 is a pin 23 which serves as a guide for telescoping springs 24a and 24b which rest at one end against the disc 19 and at the other end against the surface 25 of the cylindrical chamber 20. A suitable abutment 26 extends from the surface 25 and serves to guide the upper ends of the springs 24a and 24b and to maintain them in proper operating relation to the chamber 20. It will now be appreciated by those skilled in the art that as ram 16 moves vertically to impart lifting pressure to the thrust receiving member

through the depending lug 18, the thrust is in turn imparted to the end of the cylindrical chamber 20 and the vertical standard 21 of the elevating platform, through the intermediary of the springs 24a and 24b. It will also be appreciated that since it is the ram 16 acting through the thrust receiving member, that maintains the elevating platform 22 in any elevated position to which it may be moved by the ram 16, the springs 24a and 24b will cushion the elevating platform relatively to the lifting head 10 and ram 16 as the truck is moved over a rough terrain.

During the lifting operation it will be appreciated that there may be some lateral weaving between the lifting head 10 and ram 16, on the one side, and the elevating platform 22 and its vertical standard 21 on the other side. This weaving may take place without disturbing the mounting of the hydraulic lift unit 15 and its ram 16 due to the particular coaction between the rounded surface of the depending lug 18, and the form of the surface 17 of the ram 16. These surfaces are so formed that sliding as well as pivotal movement between the ram 16 and the lug 18 are possible. Those skilled in the art will appreciate the value of this particular construction.

While the general construction of my lift truck does not form part of this invention it is thought best to outline the relation of the several parts thereof whereby the elevating platform is lifted relatively to the lifting head as thrust is imparted thereto by the ram 16 through the intermediary of the depending lug 18, disc 19 and the springs 24a and 24b.

The upper end of the standard 21 is pivotally connected to the upper end of the lifting head 10 through upper links 30 pivoted at 31 to the standard 21 and at 32 to the upper end of the lifting head 10. Lower links 33 are pivoted to the elevating platform at 34, and through a shaft 35 to the lower portion of the lifting head 10. As the elevating platform is moved vertically on the links 30 and 33 relatively to the lifting head, the links 33 are rotated in a clockwise direction. In so rotating, they will move to the right the rods 36 pivoted thereto at 37. The rods 36 are in turn connected to the rear links 38 which carry the rear wheels 39. Pull on the rods 36 causes rotation of the links 38 about the pivot shaft 40 whereby to raise the rear end of the platform 22 on the wheels 39, this lifting being simultaneous with the lifting of the forward end of the platform on the upper and lower links 30 and 33 respectively.

The hydraulic unit 15 is itself pivoted on the same shaft 35 through which the links 33 are pivotally connected to the lifting head 10. The entire hydraulic lifting unit 15 may therefore pivot freely relatively to the lifting head, while the ram 16 pivots freely relatively to the lug 18 of the thrust receiving member, to follow the upward movement of the elevating platform. It is thought that the brief description thus given is sufficient to set forth the relation of my invention herein claimed to the type of truck in which it may be utilized. For a more detailed description of the particular type of truck, reference may be had to my earlier application supra.

I now claim:

1. In a truck of the class described, a main frame, an elevating frame, means mounting said elevating frame for upward lifting movement relatively to said main frame, a hydraulic lift unit pivoted at its lower end on said main frame, a ram forming part of said hydraulic unit extending vertically upwardly toward said elevating frame, a cylindrical chamber formed on said elevating frame, a thrust receiving device slidably mounted in said chamber and bearing at its lower end on the upper end of said ram, and a spring in said chamber interposed between said thrust receiving device and the end of said chamber and through which lifting movement is imparted to said elevating frame by said ram and thrust receiving device.

2. In a truck of the class described, a main frame, an elevating frame having a vertical standard, a cylindrical chamber formed on the upper end of said standard, a thrust receiving plunger mounted for sliding movement in said cylindrical chamber, a hydraulic lift unit pivoted at its lower end on said main frame, a ram forming part of said lift unit and bearing at its upper end against the lower end of said plunger, and a spring interposed between the upper end of said plunger and said elevating frame and through which lifting movement is imparted to said elevating frame by said ram and plunger.

3. In a truck of the class described, a main frame, an elevating frame having a vertical standard, a cylindrical chamber formed on the upper end of said standard, a thrust receiving plunger mounted for sliding movement in said cylindrical chamber, a hydraulic lift unit pivoted at its lower end on said main frame, a ram forming part of said lift unit and bearing at its upper end against the lower end of said plunger, the upper end of said ram and the lower end of said plunger being formed to allow pivotal and sliding movement between said ram and said plunger.

4. In a truck of the class described, a main frame, an elevating frame, means mounting said elevating frame for upward lifting movement relatively to said main frame, a thrust mechanism mounted on said main frame, a thrust member forming a part of said thrust mechanism and movable relatively thereto for imparting lifting movement to said elevating frame, a cylindrical chamber formed on said elevating frame, a thrust receiving device slidably mounted in said chamber and bearing at its lower end on the upper end of said thrust member, and a spring in said chamber interposed between said thrust receiving device and the end of said chamber and through which lifting movement is imparted to said elevating frame by said thrust member and thrust receiving device.

5. In a truck of the class described, a main frame, an elevating frame, means mounting said elevating frame for upward lifting movement relatively to said main frame, a thrust mechanism mounted on said main frame, a thrust member forming a part of said thrust mechanism and movable relatively thereto when imparting lifting movement to said elevating frame, a thrust receiving device mounted for movement on said elevating frame and spring pressed relatively to said elevating frame and against said thrust member, whereby said thrust member imparts lifting movement to said elevating frame through the medium of said thrust receiving device and said spring.

6. In a truck of the class described, a main frame, an elevating frame, means mounting said elevating frame for upward lifting movement relatively to said main frame, a hydraulic lift unit pivoted at its lower end on said main frame, a ram forming part of said hydraulic unit extending vertically upwardly toward said elevating

frame and movable relatively to said hydraulic lift unit to raise said elevating frame, a thrust receiving plunger, means mounting said plunger for movement relatively to a part of said elevating frame, the lower end of said plunger bearing against the upper end of said ram, and a spring interposed between a part of said plunger and said elevating frame for yieldingly resisting movement of said plunger on said mounting means relatively to said elevating frame, the lifting movement of said ram imparting lifting movement to said elevating frame through the medium of said plunger and said interposed spring.

7. In a truck of the class described, a main frame, an elevating frame, means mounting said elevating frame for upward lifting movement relatively to said main frame, a hydraulic lift unit pivoted at its lower end on said main frame for vertical swinging movement on an axis transverse of the truck, a ram forming part of said hydraulic unit extending vertically upwardly toward said elevating frame, a thrust receiving device having a surface against which bears the upper end of said ram, means whereby said thrust receiving device is movably mounted relatively to said elevating frame, and a spring between said thrust receiving device and said elevating frame for yieldingly resisting movement of said thrust receiving device relatively to said elevating frame when said ram imparts thrust to said thrust receiving device.

GEORGE QUAYLE.