

July 10, 1962

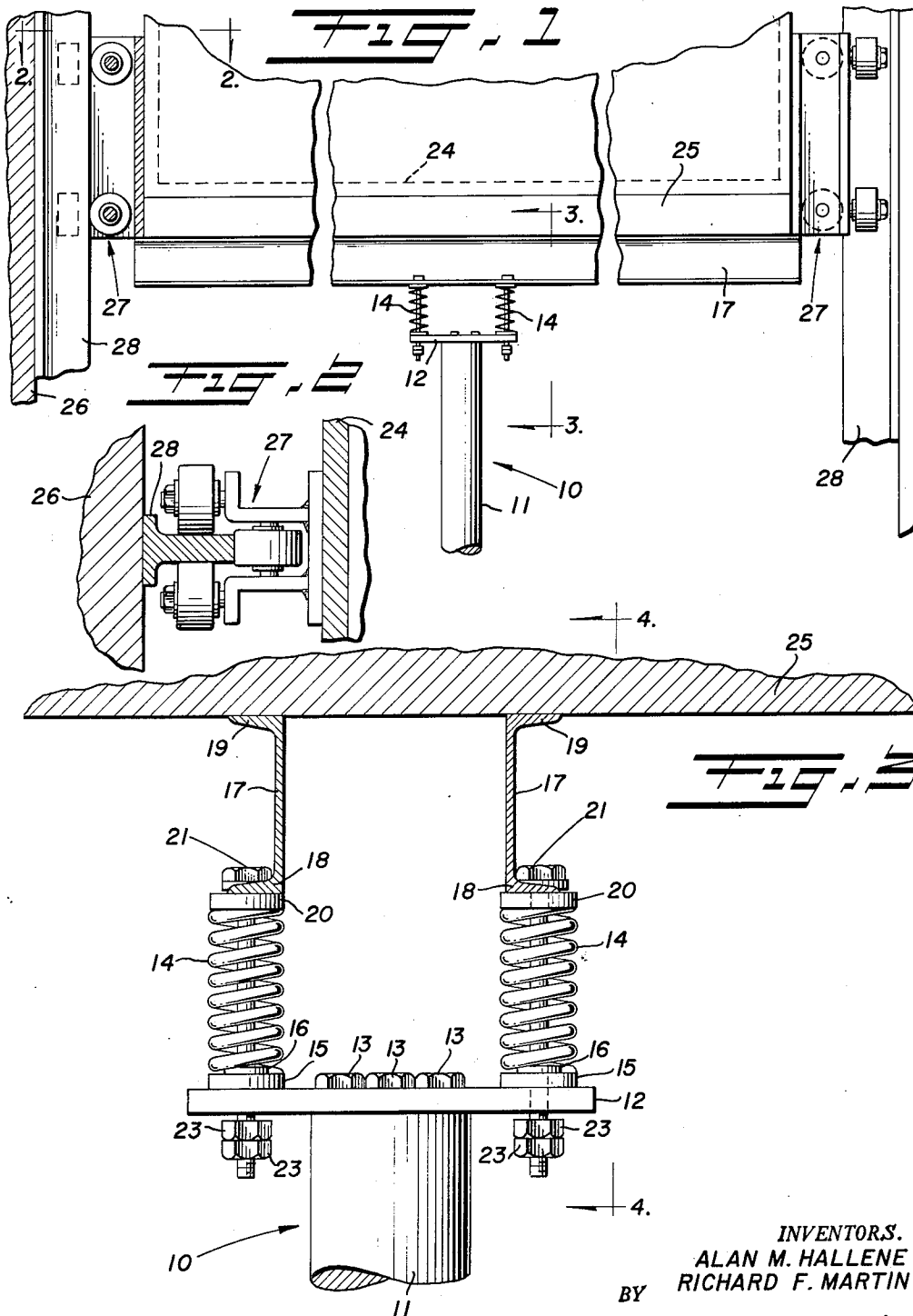
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3,043,401

SHACKLE SPRING MOUNTING FOR HYDRAULIC ELEVATORS

Filed Nov. 3, 1959

2 Sheets-Sheet 1



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FIG. 4

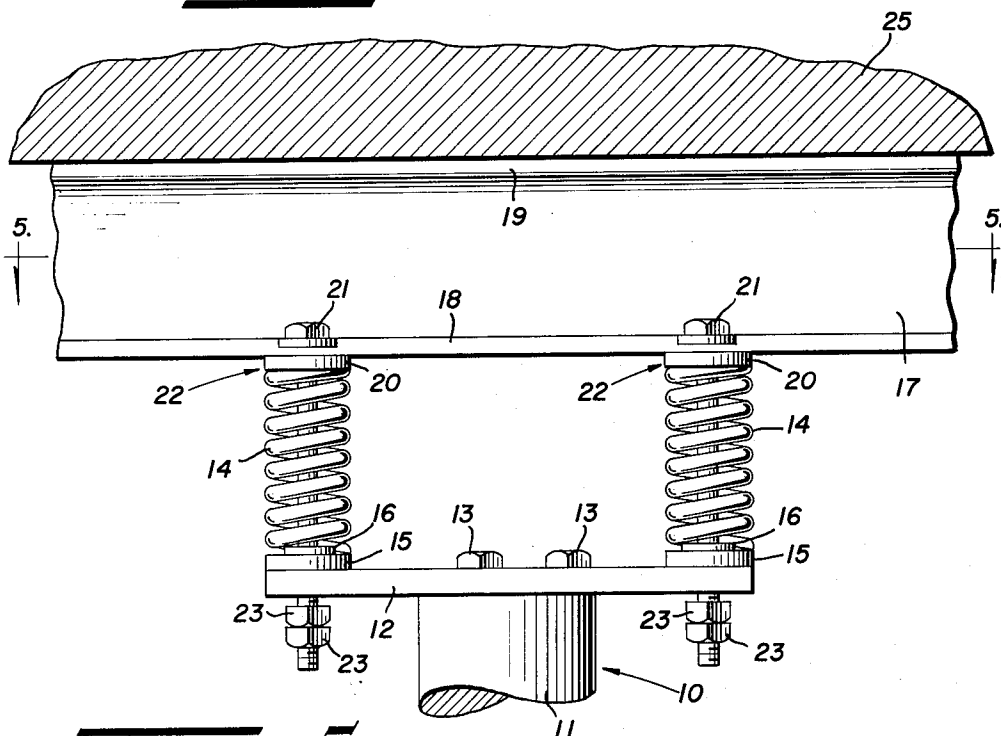
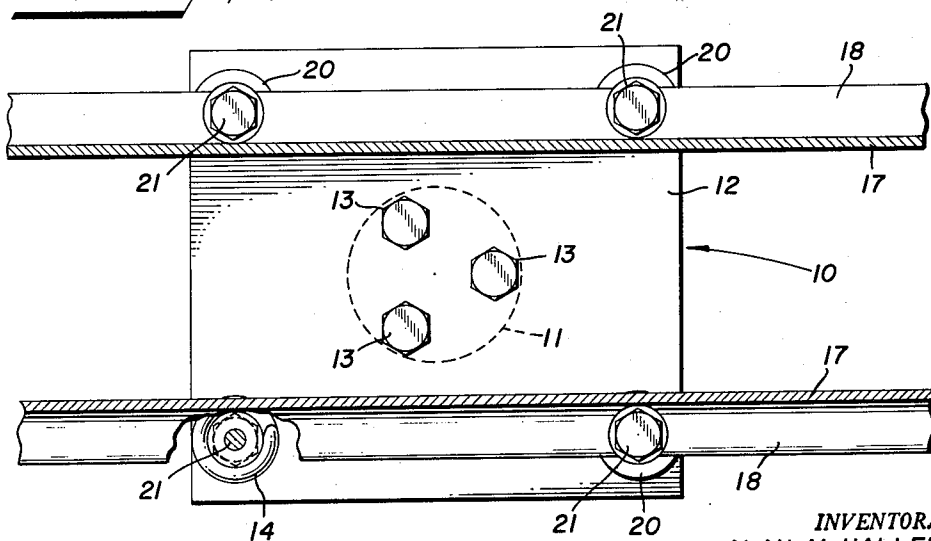


FIG. 5



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**SHACKLE SPRING MOUNTING FOR
HYDRAULIC ELEVATORS**

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Filed Nov. 3, 1959, Ser. No. 850,699

5 Claims. (Cl. 187-17)

This invention relates to a hydraulic elevator, and more particularly to a shackle spring assembly for mounting the elevator car on the piston of the hydraulic lifting means.

Two problems in hydraulic elevator construction are: (1) To isolate the elevator car from vibration generated in the hydraulic lifting means; and (2) to accommodate misalignment between the axis of the hydraulic cylinder and the line of the guide rails in the hatchway. The present invention meets both problems.

The problem of effectively damping the vibration and noise inherent in hydraulic elevating systems has existed for a long time. The kinetic energy developed by the high-pressure fluids pumped into the lifting apparatus is partly dissipated in the form of vibrational forces carried through the lifting ram to the elevator car. Previous attempts to isolate the vibrations from the car by absorbent materials such as thick pads of felt, rubber, or similar dense materials, have not been entirely successful.

Another serious problem in hydraulic elevator operation arises out of the difficulty of sinking a hydraulic cylinder in the ground beneath a building; and then erecting a hatchway in the building and having the guide rails in the hatchway parallel to the axis of the piston. Any misalignment causes the roller or sliding guides on the elevator car to bind on the guide rail at one side of the hatchway; and this effect is, of course, exaggerated as the car travels up the hatchway.

The present invention fully obviates both the above problems by combining steel shackle springs in unique relationship with a commercially available hydraulic elevating system to utilize the excellent vibration absorption qualities of steel springs; and to permit the elevator to cant on the piston and thereby compensate for misalignment of the piston and guide rails.

The principal object of this invention therefore is to provide a new and improved hydraulic elevating system having shackle springs to isolate vibrations and noise generated by the system; and to straighten the elevator car with reference to the guide rails in the shaftway and thus prevent binding of the guides on the rails.

One feature of the invention is the combination of helical compression springs seated atop a hydraulic lifting means to support an elevator car.

Another feature of this invention is a platen surmounting the plunger of the hydraulic lifting means with bearing washers having a centering sleeve to seat the springs upon the platen.

The shackle spring mounting is also advantageous because it helps eliminate starting shock in the car as the elevator starts to move up; and conversely, it helps to relieve the piston and hydraulic system from shocks which occur as passengers or freight move into the car.

Other objects, advantages and features will be more apparent from the following detailed description and drawings wherein:

FIG. 1 is a fragmentary, broken elevational view of a hydraulic elevator embodying the invention, showing the top of the plunger and part of the elevator car and hatchway;

FIG. 2 is a section taken substantially as illustrated along the line 2-2 of FIG. 1;

FIG. 3 is an elevational view of the shackle spring

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assembly, taken substantially as illustrated along the line 3-3 of FIG. 2, on an enlarged scale;

FIG. 4 is a section taken substantially as illustrated along the line 4-4 of FIG. 3; and

FIG. 5 is a horizontal section taken substantially as illustrated along the line 5-5 of FIG. 4, with a portion of a beam and washer broken away to expose the spring end.

Referring to the drawings, there is shown a preferred embodiment of the present invention adapted for use as a freight or passenger elevator. Hydraulic lifting means, generally designated 10, has a pump and a cylinder (not shown) for reciprocating an elevator plunger 11. A metal platen 12 is rigidly secured on top of the plunger by bolts 13 screwed into the plunger, and extends horizontally beyond the periphery of the plunger.

An upright helical compression shackle spring 14 is seated adjacent each corner of the platen in a cuplike washer 15 which has a centering boss 16 extending into the end portion of the spring.

A pair of elongated supporting beams 17 each has a lower flange 18 seated upon two of the four shackle springs, and an upper flange 19. Cuplike washers 20 are interposed between the springs and the flanges 18.

Four mounting bolts 21 which secure beams 17 to platen 12 also cooperate with washers 15 and 20 to provide positioning means, indicated generally at 22, for springs 14, and for this purpose each bolt extends through beam flange 18, through washer 20, and axially through one of the springs 14 and seating washer 15, and through a hole in platen 12. Two nuts 23 are screwed onto the lower end of each bolt, and adjusted to suitably limit maximum vertical spring movement.

An elevator car 24 having a platform 25 surmounts the beams and is secured to upper beam flanges 19 by suitable fasteners (not shown). The elevator car operates in a conventional hatchway 26; and conventional roller or slide guides 27 on the elevator car engage guide rails 28 in the hatchway.

In operation, vibrations from the hydraulic lifting means transmitted up the plunger and across the platen are damped by the shackle springs 14, which are free to compress and thus absorb the vibrations, thereby isolating the elevator car from such vibrations. Likewise, the car "floats" on the platen, so that its guides 27 are properly guided between the guide rails 28 without any tendency to bind if there is misalignment of the cylinder axis and guide rails.

Although a specific embodiment of the invention has been shown and described, it is to be understood that such description is for illustrative purposes only. The invention is to be limited only by the appended claims.

We claim:

1. In a hydraulic elevator, in combination: an elevator hatchway; a plurality of perpendicular guide rails in the hatchway; hydraulic lifting means including a reciprocable elevator plunger extending upwardly into the center of said hatchway; shackle spring means surmounting said plunger; an elevator car; guides on the elevator car engaging said guide rails; means seating said car on said shackle spring means; and means cooperating with said lifting means and car seating means to position said shackle spring means, said spring means affording limited rocking movement of the elevator car on the plunger to compensate for any misalignment between the guide rails and the plunger, and isolating the car from vibrations generated by the lifting means.

2. The combination of claim 1 which includes platen means surmounting the plunger and extending transversely therebeyond, the shackle spring means being seated on the platen means.

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3. The combination of claim 2 in which the shackle spring means consists of a plurality of springs seated adjacent the margins of the platen.

4. The combination of claim 3 in which the means cooperating with the lifting means and car seating means includes a plurality of cup-like washers mounted on the platen, the ends of each spring being seated in a washer, a short centering boss in each washer extending into the center of the spring to prevent lateral movement of the spring, and an inverted cup-like washer surmounting each spring and bearing on the car seating means.

5. In a hydraulic elevator, in combination: an elevator hatchway; a plurality of perpendicular guide rails in the hatchway; hydraulic lifting means including a reciprocable elevator plunger extending upwardly into the center of said hatchway; a platen surmounting said plunger and extending transversely therebeyond; a plurality of cup-like washers mounted at the periphery of the platen, each washer having a short upright centering boss; a plurality

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of shackle springs seated in said washers and retained against lateral movement by the washers and bosses; a plurality of supporting beams surmounting the shackle springs; an elevator car mounted on the beams; and guide means on the elevator car engaging said guide rails, said spring means affording limited rocking movement of the elevator car on the plunger to compensate for any misalignment between the guide rails and the plunger, and isolating the car from vibrations generated by the lifting means.

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