Sept 17, 1957 L. KORNGOLD ET AL 2,806,607

SELF-LEVELING PLATFORM TRUCK

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Fig. 1

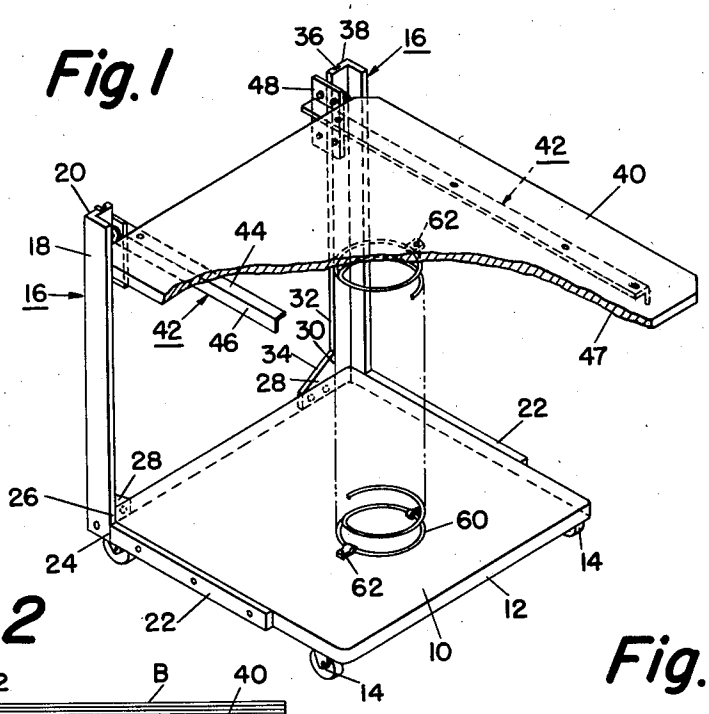


Fig. 2

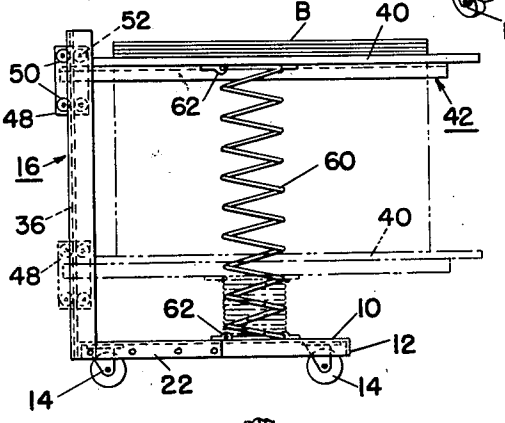
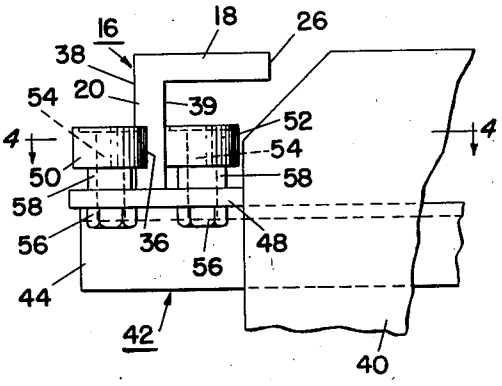


Fig. 3



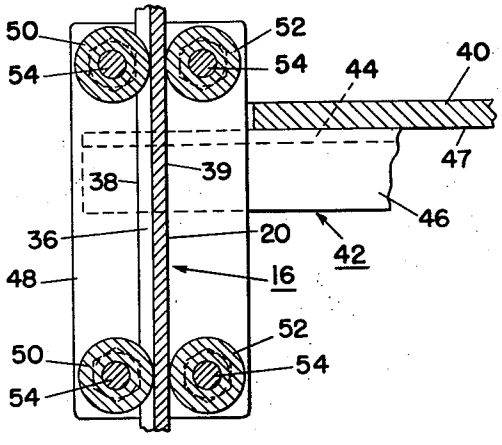


Fig. 4

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SELF-LEVELING PLATFORM TRUCK

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6 Claims. (Cl. 211—49)

The present invention relates to self-leveling platform trucks and the like; it being an object of this invention to provide a novel spring-supported platform truck which is extremely simple and inexpensive to manufacture and, at the same time, operates easily and efficiently so as yieldably to support a stack of objects or work pieces in such manner that, as the stack or pile is added to, or subtracted from, the platform moves vertically to maintain the top of the stack or pile at generally the same height.

For the purpose of illustrating the invention, there is shown in the accompanying drawing one form thereof which is presently preferred and which has been found in practice to give satisfactory results; it being understood however that this invention is not limited to the precise arrangements and instrumentalities illustrated, and that various changes and modifications can be made without departing from the spirit or essential attributes of the invention.

Referring to the accompanying drawings in which like reference characters indicate like parts throughout:

Figure 1 is a perspective view of a self-leveling platform truck embodying the present invention, parts being broken away better to reveal the construction thereof.

Figure 2 is a side elevational view of the platform truck of Fig. 1; the platform being shown in solid lines in elevated position with minimum load, and being shown in dash-dot lines in lowered position with maximum load.

Figure 3 is an enlarged fragmentary plan view showing one of the vertical posts and the movable carriage supported thereon.

Figure 4 is an enlarged fragmentary cross-sectional view of the post and carriage of Fig. 3.

The embodiment of Figs. 1–4 includes a generally rectangular base 10 of sheet metal or the like having a downwardly bent peripheral apron 12. Four swivel casters 14 are secured to the underside of the base, at the corners thereof, enabling it to be moved easily from place to place even when heavily loaded.

Extending upward from the back corners of the base 10, are a pair of vertical posts 16, which may be angle irons of generally L-shaped cross-section, the lower ends of which fit outside the base apron 12 and are bolted thereto. Thus, each post has one wall 18 directed toward the front of the base and in contact with a side apron, and another wall 20 in contact with the back apron and directed inwardly, i. e., toward the center of the back apron.

An elongated flat metal bar 22 is welded, as at 24, to the lower end of the vertical free edge 26 of each side wall 18 and extends forwardly therefrom along the major part of the side apron to which it is bolted at spaced intervals. A generally triangular flat metal brace 28 is welded, as at 30, to the lower end of the vertical free edge 32 of each back wall 20. The lower edge of each brace is bolted at two spaced points to the back apron of the base and has an inclined edge 34 which extends generally diagonally intermediate the back apron and the

edge 32, which it meets at a point appreciably above the level of the base.

In this way, each vertical post is securely and rigidly connected to the base by a bar 22 and a brace 28 which, being at right angles to each other, provide ample support for the post.

A vertical groove or track 36 is formed on the outer face 38 of the back wall 20 of each post 16, a slight distance inward of the free edge 32, as best shown in Figs. 3 and 4.

A generally rectangular platform 40, of plywood or other suitable material, which may extend somewhat beyond the front edge of the base 10 is supported for vertical movement on the posts 16 in a manner to be hereinafter described.

Thus, the platform 40 may be provided with a pair of laterally spaced horizontal supporting arms 42 extending longitudinally (i. e. from the front to the rear) of the platform and preferably terminating somewhat short of the front edge of the platform. Each of the arms 42 may be an angle iron of generally L-shaped cross-section with a horizontal top wall 44 and a depending vertical wall 46; the bottom wall 47 of the platform 40 resting on the horizontal wall 44 of the arm 42 and being fastened thereto in any conventional manner, as for example by a plurality of longitudinally spaced screws extending through suitable holes in the wall 44.

The supporting arms 42 extend rearwardly beyond the rear edge of the platform 40 and a carriage plate 48 is mounted upon the protruding rear end of each arm 42. As best shown in Figs. 1, 3 and 4, each plate 48 is vertically disposed and is welded to the end of the vertical wall 46 (which is disposed at the laterally outer edge of the arm 42) and extends appreciably above and below the arm 42.

Mounted at the upper end of the plate are a pair of rollers 50 and 52; the roller 50 being disposed adjacent the rear edge of the plate 48, while the roller 52 is disposed adjacent the front edge of said plate. Each roller may be rotatably mounted on a pin 54 extending through a suitable hole in the plate 48 and secured thereto, in generally horizontal position, by a nut 56 disposed on the inner face of the plate. A collar 58 mounted on the pin 54, at the outer face of the plate 48 serves to space the roller somewhat away from the plate.

As shown in Fig. 4, the two rollers 50 and 52 are at the same height and are spaced apart a distance corresponding to the thickness of the post back wall 20 at the vertical groove 36.

At the lower end of the plate 48, there are mounted a pair of rollers 50 and 52 identical with those at the upper end, as described hereinabove.

The two pairs of rollers 50—52 are positioned upon the post 16 so that each of the rollers 50 is within the vertical groove 36 on the outer or rear face 38 of the back wall 20, while each of the rollers 52 bears against the inner or front face 39 of said wall 20. The axial dimension of each spacing collar 58 is approximately the same as the distance from the free edge 32 of the wall 20 to the groove 36. Thus, the outer face of the carriage plate 48 bears slidably against the free edge 32 when the rollers 50 are disposed within the groove 36, as shown in Fig. 3.

In this way, the carriage-and-roller assembly is maintained rigidly in predetermined relationship to the post 16 while being free to slide easily up or down the post. That is, it has been found that the three-point contact between each post and the corresponding carriage-and-roller assembly, as provided by the opposed pairs of rollers 50—52 (which contact the opposite wall faces 38 and 39) and the plate 48 (which contacts the wall edge 32 in a plane at right angles to the planes of contact of

the rollers), is extremely effective in preventing twisting or tilting of the plate **48** relative to the post **16**.

It can readily be seen that the two carriage-and-roller assemblies mounted on the two posts **16** provide a most rigid vertically movable support for the platform **40** and enables the platform to maintain its correct horizontal position even under the twisting torque generated when a heavy load is placed on the platform at the unsupported front end thereof.

A helical compression spring **60** extends vertically intermediate the base **10** and the platform **40**; the lower end of the spring being fastened to the top wall of the base and the upper end of the spring being fastened to the bottom wall **47** of the platform **40** in any suitable manner, as for example by a plurality of pipe straps **62**.

The helical spring **60** is fairly large in diameter to provide adequate supporting area generally at the center point of the platform. For example, with a platform which is 36" long and 28" wide, a spring of about 7" outside diameter may be used.

The spring preferably is located precisely halfway between the side edges of the platform. However, under certain circumstances, it is desirable to locate the spring somewhat closer to the back edge of the platform **40** than to the front edge. For example, with a platform which is 36" long, the center of the spring **60** may be about 15" from the back edge of the platform.

The length (i. e. the axial dimension) of the spring **60** is such that, when it is supporting only the weight of the platform and associated parts (i. e. when there is no work load on the platform), the platform will be maintained at a level just below the tops of the posts **16**. When a work load is placed upon the platform, the added weight will depress the platform and compress the spring until the latter exerts sufficient additional upward force to stabilize the platform at a new lower level. Obviously, the extent to which the spring is compressed and the degree to which the platform is depressed are proportional to the size of the added load.

Where the load consists of a uniform stack of more or less thin flat articles, as for example the stack of burlap bags B shown in Fig. 2, the weight of the stack is proportional to its height.

It is obvious that, by selecting a spring **60** of proper strength, it is possible to make the extent of downward movement of the platform corresponding approximately to the extent of increase in the height of the stack. In other words, as each successive bag B is added to the stack on the platform **40**, the added weight of that bag will cause the platform to move downward a distance equal to the thickness or horizontal dimension of the bag, so that the top of the stack or pile remains at the same level even though the height of the stack has increased.

This adjustment is illustrated in Fig. 2, wherein the platform **40** is shown, in solid lines, in upper position (i. e. depressed only slightly from its uppermost unloaded position) and supporting only a small stack of bags weighing relatively little. Fig. 2 also shows the platform **40**, in dash-dot lines, as it appears when in depressed position under the weight of a large stack of bags. In both cases, the top of the stack is as the same level; the increase in stack height having been compensated for by the corresponding lowering of the platform.

Conversely, if bags were removed from the large stack of the fully loaded depressed platform, the platform would rise, under the pressure of the spring **60**, a distance corresponding to the height of the removed bags, so that the top of the stack would still remain at the original level.

According to mass production principles, most efficient operation is achieved where a worker performs the same task under identical conditions. When the task involves the removal from, or addition to, a stack of individual articles or work pieces, maximum efficiency is attained when the top of the stack is always at the same height, most convenient for the worker, so that he does not have

to stoop or bend down to a depleted stack or lift upward to reach the top of an excessively high stack.

The novel self-leveling platform truck solves this problem by aways maintaining the top of the stack at the same convenient level even though the size of the stack increases or decreases.

For example, a stack of burlap bags to be cleaned or inspected can be loaded onto a self-leveling platform truck, which is then wheeled over to the operator. As each bag is removed from the top of the stack for cleaning or inspection, it is transferred by the operator to another empty self-leveling hand platform truck; the empty platform of which is approximately at the same level, initially, as the top of the full stack on the first truck.

As the operation is repeated continually, the bags are gradually transferred from the first truck to the second. In other words, the size of the bag stack on the first truck gradually diminishing while the size of the cleaned or inspected bag stack on the second truck correspondingly increases. However, since the platform of the first truck is rising under reduced weight, while the platform of the second truck is falling under increased weight, the tops of the two stacks remain at the same level throughout, so that the operator works in identical fashion throughout.

When the operation has been completed, the second truck is wheeled away and the bags unloaded therefrom (for shipment or further treatment), while the first now-empty truck is wheeled away and reloaded with a new batch of bags to be inspected or cleaned. The two trucks are then wheeled back to the operator and the procedure is repeated. Naturally, for greater efficiency, there should be two sets of trucks for each operator, so that, while he is working on one pair of trucks, others can be loading and unloading the other pair to have them ready for him when he has finished with the first pair.

It has been found that the relatively simple and inexpensive self-leveling platform trucks of the present invention pay for themselves many times over in increased production. Additionally, the extremely simple, rugged and rigid construction keeps maintenance and repair at a minimum and keeps the trucks in service with the least possible time lost for repair of breakdowns, etc.

The present invention may be embodied in other specific forms and, therefore, the foregoing embodiment is to be considered in all respects merely as illustrative and not restrictive; reference being made to the appended claims as indicating the true scope of this invention.

Having thus described our invention, we claim as new and desire to protect by Letters Patent the following:

1. A self-leveling platform truck comprising a generally rectangular horizontal base, movably supported on casters or the like, a pair of spaced angle irons mounted at the back corners of said base and extending vertically upward therefrom to serve as posts, a generally horizontal platform being at least as wide and long as said base extending forwardly from said posts, a relatively large diameter helical compression spring disposed substantially forward of said posts and at the transverse center of the platform, said spring extending vertically intermediate the base and the platform with its lower end fastened to the base and its upper end bearing against the underside of the platform, said spring providing direct underlying support for the platform, and means for mounting said platform upon said posts whereby it is free to move vertically therealong while rigidly maintaining its generally horizontal position, said mounting means comprising a pair of carriage members immovably affixed to the platform adjacent the posts, each carriage member having vertically-spaced aligned pairs of horizontally spaced rollers mounted thereon, the rollers of the two pairs being disposed on opposite sides of the flat vertical wall formed by one leg of the upright angle iron post and being constructed and arranged to bear against the two opposite faces of the aforesaid vertical wall, said spring being constructed and arranged to be compressed vertically a distance corresponding generally to the height of

a stack of more or less flat work pieces placed on the platform whereby the top of the platform-supported stack will always remain at substantially the same level as work pieces are added to or removed from the stack, the platform shifting vertically to compensate for the change in the height of the stack.

2. A construction according to claim 1 wherein the flat vertical wall of each post extends transversely of the base and terminates in a vertical free edge, and wherein each carriage member is a generally flat vertical plate disposed at right angles to the vertical post wall and adjacent the vertical free edge thereof, and wherein the rollers are spaced somewhat away from the plate so that they bear against the front and back faces of the transverse vertical post wall in a vertical plane spaced somewhat away from the vertical free edge of said post wall.

3. A construction according to claim 2 wherein one of the faces of the transverse vertical post wall is provided with a vertical groove spaced somewhat away from, and extending parallel to, the free edge, one of the rollers of each pair fitting within the groove and being guided thereby during vertical movement.

4. A construction according to claim 1 wherein the posts are mounted at opposite back corners of the base and are generally L-shaped in cross-section, each post having an inwardly directed flat transverse vertical wall with an innermost vertical free edge and wherein each carriage member is a generally flat vertical plate disposed in sliding relationship to the vertical free edge of the adjoining post wall and extending at right angles to said wall, and wherein the rollers are mounted on the outer face of each carriage plate so that the two rollers of each pair bear against the front and back faces respectively of the adjoining post wall.

5. A construction according to claim 4 wherein the rollers are spaced somewhat away from the carriage plate whereby the two rollers of each pair bear against the two faces of the post wall in a vertical plane spaced somewhat away from the vertical free edge of said post wall.

6. A construction according to claim 5 wherein one of the faces of each flat vertical post wall is provided with a vertical groove spaced somewhat away from the innermost vertical free edge thereof, one of the rollers of each pair on each adjoining carriage plate fitting within the groove whereby the rollers and the carriage plate are guided accurately along the post during vertical movement.

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