W. E. BOEHCK.

PORTABLE ELEVATOR.

APPLICATION FILED JULY 14, 1920.

1,409,906.

Patented Mar. 21, 1922.

3 SHEETS—SHEET 1.

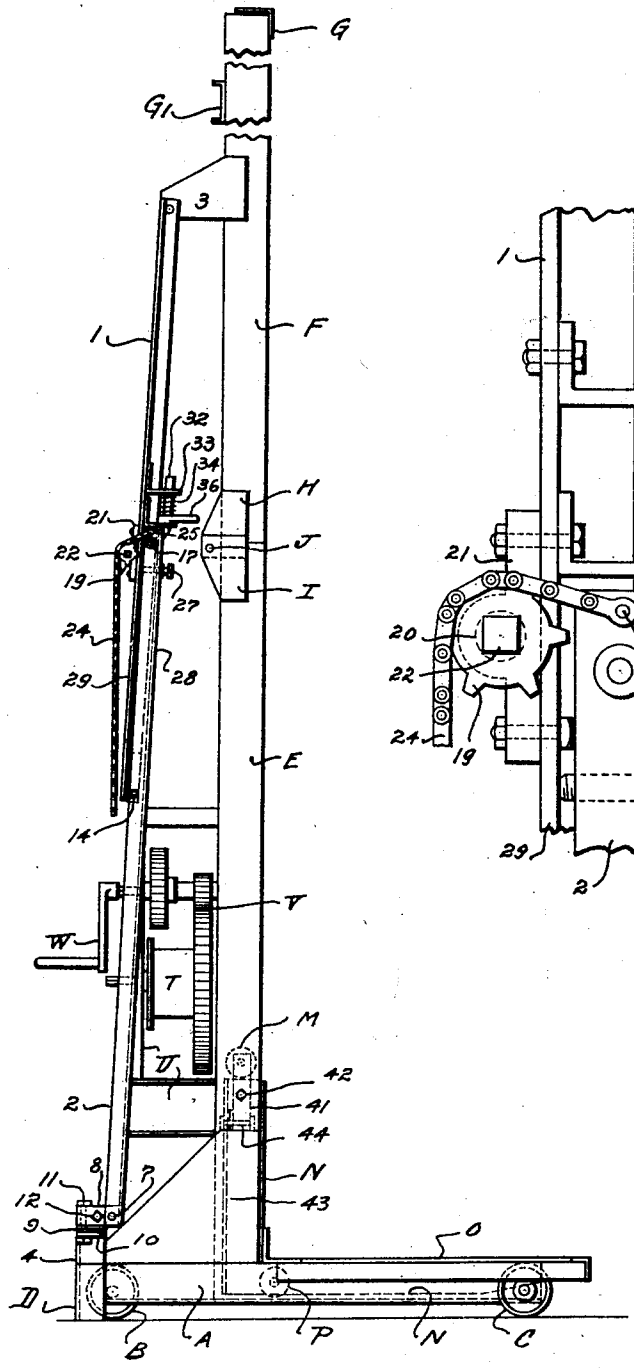


Fig. I

Fig. VI

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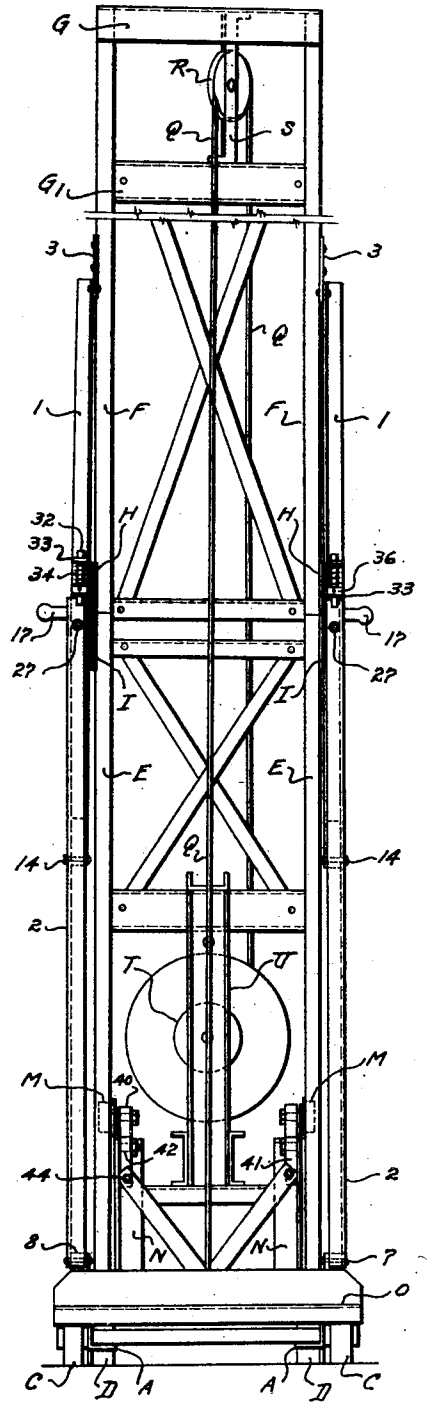


Fig. II

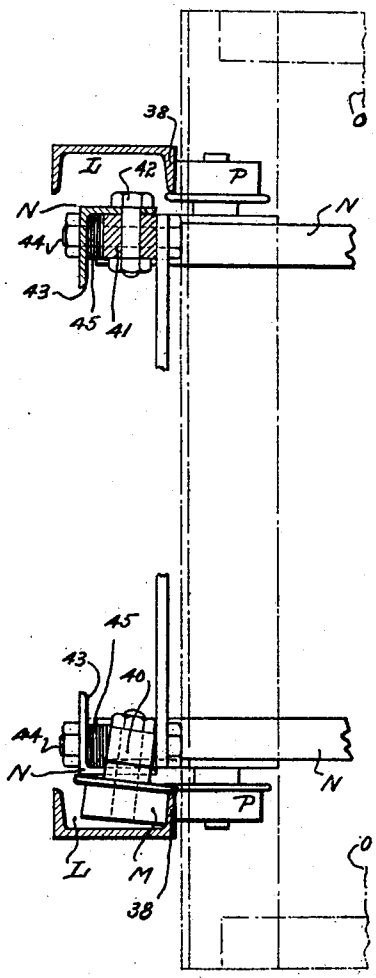


Fig. V

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3 SHEETS—SHEET 3.

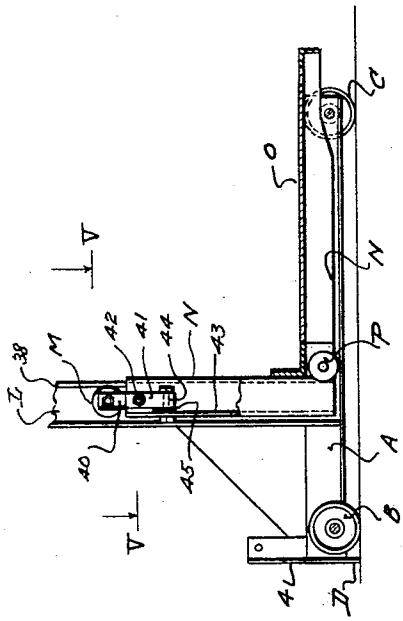


Fig. IV

Fig. III

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PORTABLE ELEVATOR.

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Application filed July 14, 1920. Serial No. 396,307.

To all whom it may concern:

Be it known that I, WILLIAM EDWARD BOEHCK, a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Portable Elevators, of which the following is a specification.

The present invention relates to improvements in that class of portable elevators in which the frame is made partly collapsible, that is, comprises a plurality of sections foldable one upon another, and capable of vertical alignment in order to provide a continuous guideway for the raising and lowering of a cantilever platform.

An important object of the invention is to produce a portable elevator of the class mentioned affording a safe and convenient arrangement of parts that will enable the operator to stand on the side remote from that where the frame sections are collapsed, when moving the same into or out of folding position.

Another object is the production of a portable elevator of the type set forth having foldable links functioned to brace the frame sections when standing erect for operation, but collapsible coincidentally therewith oppositely to the folding of the sections.

A further object is to provide means automatically operating to interlock the said collapsible links, independently of the frame sections, when set up alongside thereof, for the discharge of their normal function.

Still another object is the provision of a collapsible linkage of the nature referred to, so constructed and applied to the folding frame sections as to insure a comparatively increased leverage for their manipulation.

A still further object is to supply a ready and effective means for correcting the alignment of the frame sections, through a simple adjustment of the fulcrum for the lowermost member of the said linkage, separate from the frame.

An additional object is to furnish means for taking up the sag of the cantilever platform usually resulting from long and hard usage, and to this end, to equip the platform with guide rollers mounted so as to permit a change in the initial position thereof relatively to the frame.

A general object is to devise a novel mode of construction for a sectional portable elevator of the character described, including a practical arrangement of parts, all positioned for convenient operation, as well as readily manufactured and assembled, besides favoring low cost of production.

Other objects and advantages of the invention will become apparent as the specification proceeds.

With the aforesaid objects in view, the invention consists of the novel combinations and arrangements of parts hereinafter described in their preferred embodiments, pointed out in the subjoined claims, and illustrated on the annexed drawings, wherein like parts are designated by the same reference characters throughout the several views.

In the said drawings,—

Figure I is a broken side elevation of a sectional portable elevator embodying one form of the present invention, the entire frame thereof being in an erect position;

Fig. II is a rear elevation, that is, a view looking at that side of the portable elevator which carries the platform and usually stands hindmost as the machine is being moved from place to place;

Fig. III is a view similar to Fig. I, but showing the sectional frame and linkage thereof in a collapsed condition;

Fig. IV is a fragmentary sectional elevation of the lower part of the elevator, disclosing the means employed for rectifying an eventual sag or uneven depression of the cantilever platform;

Fig. V is a transverse section on the line V—V of Fig. IV, the same being drawn on a considerably enlarged scale;

Fig. VI is a broken side elevation, likewise enlarged, of an intermediate portion of the collapsible links, representing the manner in which their inner ends are made to lap one over the other and locked together in operative position.

Generally described, the portable elevator constituting the subject matter hereof comprises a normally erect frame carried by a movable base or truck and composed of flexibly jointed sections, some of which are foldable upon others that remain relatively stationary. The interrelative movement of the frame parts is controlled by similarly jointed and concurrently collapsible links attached at their outer extremities to rigid elements connected with the movable truck

and the foldable sections, respectively. These links are made to lap over one another at their inner ends, one of which projects outwardly from the joint thereof when the linkage is in a collapsed state. The projecting end is used as a lever for normalizing the position of the links and the frame sections controlled thereby. When righted, the links serve to brace the frame from that side where the raising mechanism for the platform is located, and they further operate to check the descent of the folding frame sections at the time of collapse, thus protecting the said mechanism. The linkage is so disposed that in order to manipulate it, either to align or to fold the frame sections, the operator must stand on the side of the elevator remote from the moving sections during their ascent and descent. Connection between foldable frame sections and the outer extremities of the upper links is established intermediately of the latter named sections, so that no part of the linkage can swing over or extend out beyond the top ends of the sections as they are being collapsed, and consequently the operation of folding may be accomplished in a restricted space, and likewise the restoring of the movable parts to their normal positions. A small windlass, or equivalent gearing, is provided on the linkage and connected with the lever end thereof in such a manner as to assist in raising it, or in gradually lowering the same, according as the frame sections are being aligned or folded. An automatic locking means and a stop are further provided to maintain the links properly in their respective positions after they are normalized, and to preclude rattling or undue vibration thereof while the elevator is operated. Moreover, the linkage is made vertically adjustable as a whole, to permit rectification in the alignment of the frame sections, if required. Finally the invention includes a similar adjustment in the mounting of the cantilever platform, enabling the latter to present always a level surface to the wares that are deposited thereon or removed from the same.

The advantages of the invention as here outlined are best realized when all of its features and instrumentalities are combined in the one and same structure, but useful devices may be produced embodying less than the whole.

It will be obvious to those skilled in the art to which the invention appertains, upon becoming conversant with the details thereof, that the same may be incorporated in several different constructions. The accompanying drawings therefore, are submitted merely as showing the preferred examplification of the invention.

In accordance with ordinary construction, this portable elevator comprises a truck A, consisting of a base portion mounted on wheels B and C, located at the front and rear respectively. The front part of the truck has supporting legs D, raised and lowered therewith by mechanism (not shown) and adapted, by bearing upon the floor over which the truck travels, to prevent displacement thereof while the elevator is being loaded or unloaded.

Upon the opposite sides of the truck or base portion aforesaid are mounted parallel uprights or standards, each composed of two or more sections E, F, the upper ones of which are united by transversely disposed members G and G_1. The lower sections E are fixed to the base or truck, whereas the upper sections F are rendered movable, each through a flexible connection. By preference, this connection consists of a pair of mated plates, H, I, hinged together by means of a pivot pin J, at or near the juncture of the fixed section E with the movable section F, in each instance, these sections being made to abut squarely one upon the other, as represented in the drawings hereto annexed. The parts E, F, and G constitute the frame of the portable elevator, the upper end of which is foldable or collapsible upon the lower end of the same, due to the connection herein shown and described. The frame, including both its fixed lower portion and its collapsible upper end, is suitably braced horizontally and diagonally, in the manner illustrated.

The aforementioned uprights or standards are preferably made of channel-iron, affording oppositely facing guideways, as L, the rear wall of which is engaged inwardly by rollers M, mounted at the upper end of a right-angled carrier N, for a platform O, and outwardly by other rollers P, pertaining to the lower end of the said carrier. The platform O, it will be noted, is of the cantilever type and is rigidly fastened to the bottom part of the carrier by its inner end, extending thence over the rear half of the truck A, beyond which it projects at the outer end. It is understood that the rollers M and P serve to guide the carrier N, with the platform O thereon, up and down along the said guideways.

A wire cable, as Q, is usually employed to keep the platform carrier N properly suspended during vertical reciprocation between the aligned frame sections hereinbefore described. This cable is made fast at one end to the carrier, and after being passed over the sheeve R, journalled in a hanger S, swingingly mounted intermediate the cross-beams G and G_1 of the frame, is attached by its other end to a rotatable drum T. A suitable mounting U, for this drum, is secured to the lower rigid portion of the frame. The drum is rotated therein, either to wind or unwind the cable Q, and consequently raise or lower

the carrier N with the platform O, through the agency of a train of gears, as V, and a hand-crank W, or other power transmitting instrumentality.

The parts so far described, with reference to the accompanying drawings, do not differ very materially from the construction ordinarily followed, excepting certain details that will be brought out hereinafter. But, while these parts are not specifically claimed, it should be understood that all combinations thereof with coacting novel elements of the improved structure herein disclosed will be considered and treated as appertaining to the invention and coming within the scope of the subjoined claims.

The links previously referred to are denoted by the reference numerals 1 and 2. When aligned with one another, these links occupy a slightly inclined position approaching substantial parallelism with the vertical frame, forwardly thereof. The upper links 1 are pivotally connected at their outer ends in offset relation to the foldable sections F of the frame, by plates 3, or other projections, secured to the intermediate portions of the said sections. The lower links 2, are similarly connected, also at their outer ends, with extensions 4 of the supporting legs D of the base, opposite and independently of the fixed frame sections E. Thus, positioned, the links act as toggle-braces to the upper foldable portion of the frame, which they keep from collapsing, until flexed themselves from their extended condition.

It may occur, through wear or other causes, that the upper sections F will not properly register with the under sections F so as to provide rectilinear guideways for the rollers of the platform carrier. In order to remedy this defect, the conjoined links 1 and 2 are made adjustable in a vertical direction, so that the distance between the plates 3 and the legs D may be increased or decreased to admit of the sections F being moved either rearward or forward to secure correct alignment of the channels therein with those of the sections E. For that purpose, the outer ends of the lower links 2 are pivotally attached, as at 7, each to an arm 8, resting on shims 9, carried by a bracket 10, secured to the extension 4, of the supporting leg D, on each side of the truck A, forwardly. A bolt 11, passing through the superposed arm, bracket and shims, holds the latter in place, in each instance, permitting them to be removed one or more at the time, or added to, as required to obtain the desired adjustment of the links and consequent correction in the alignment of the frame sections. Another bolt 12, passing through the arm, at right angles to the bolt 8, clamps the former to the upper end of the leg D.

An articulation, which may consist of a pivot 14, is provided between the links 1 and 2, enabling them to be collapsed in the manner represented in Fig. III. It will be seen, of course, that the collapsing of these links effects the folding of the upper part of the frame. Furthermore, it will be observed that as they are being flexed on their said articulation, the links spread out in opposite directions, both forwardly and rearwardly of the frame, and in so doing extend but a short distance from the front and rear ends of the truck, respectively. This permits the elevator to be stationed in close quarters, whether the frame thereof be kept upright or folded.

As shown, the inner ends of the said links are arranged to lap one over another, allowing the upper ends of the lower links 2, preferably, to project above or beyond the pivots 14. These ends of the lower links are provided with outwardly extended handles, as 17, and utilized as levers for the purpose of straightening the linkage, by raising the several members thereof to their upstanding positions, when the folded frame sections are normalized, and also for collapsing the parts, when they are moved in the reverse direction.

The said lapping ends of the links, on either side of the frame, are also furnished with a small windlass, in order to assist in straightening, or even collapsing, the linkage with the foldable sections thereto connected, particularly in elevators of heavy type and large dimensions. This windlass may consist of a sprocket wheel 19, fixed to a shaft 20, journalled in a bearing 21, on the lower end of the upper link 1, and having a square end 22, adapted to receive the shank of a crank (not shown). Over this wheel runs a chain 24, one end of which is attached, as at 25, to the upper portion of the lower link 2, while the other end thereof may hang loose, or else be secured to any convenient point of support, if preferred. The operation of this windlass is obvious, and therefore needs no further explanation.

A stop is provided between the above-described lapping ends of the upper and lower links, to prevent outward flexure and insure proper alignment when they are brought together in raising the folded frame sections. This stop, as shown, may consist of a screw 27, passing through a flange 28, of the lower link 2, and bearing with its inner end against a similar flange 29, of the upper link 1. A jam-nut 30, arranged to be forced against the outer face of the flange 28, will hold the screw firmly in position, in a manner that is well understood.

Coacting with the said stop, is a latch 32, which automatically engages also the outer face of the flange 28 of the lower link 2, at the time the inner end of the screw impinges on the corresponding face of the flange 29 of the upper link 1. The latch 32

is slidable in a pair of brackets 33, bolted to the said flange 29, directly above the upper extremity of the lower link 2, and it is normally urged downward exteriorly of the said flange 28 of the latter, by a helical spring 34. The point of the latch is suitably bevelled, as at 35, so that the said upper extremity of the lower link can easily be forced past the same when the linkage is being straightened out, the spring returning the latch after recession. A handle 36, on the stem of the latch, serves to raise it, when the linkage is to be collapsed.

As before stated, the rollers M and P, that guide the platform carrier N in its vertical movement along the channelled side members of the frame, bear respectively upon the inner and outer faces of the rear flanges of these members, which flanges are specifically designated by the reference numeral 38. It is understood that the opposite inner faces of the channels in the said members are bevelled, as usually rolled out, while their outer faces or sides are straight. Consequently, it has been the custom hitherto to use bevelled rollers inside the channels, and straight-faced rollers outside. The employment of bevelled rollers, however, is open to the objection that their marginal and basal peripheries run at differential speeds from the madian circumference, and therefore cause a slippage which produces considerable friction, consumes power and interferes with the smooth running of the cantilever platform. In the present invention it will be observed, both the guide-rollers M and the guide-rollers P are straight faced, so that they may be made to run all at a uniform circumferential velocity. This result is obtained by setting the axes of the upper rollers M and lower rollers P on divergent lines, as clearly indicated in Fig. V. Due to the divergence in the setting, the peripheries of the rollers M bear fully against the inner faces of the rear flanges 38 of the said channels, precisely in the same manner as the peripheries of the rollers P bear upon the outer faces of the said flanges. To effect the desired result, the rollers M are mounted each on a bevelled portion 40, of an arm or lever 41, intermediately fulcrumed on a side member of the carrier N. As shown, the arm or lever 41 can be swung to a limited extent on a pivot bolt 42, so that the upper bevelled portion 40 thereof will approach the adjacent flange 38, and cause the roller M to bear squarely on the latter. The opposite or lower end of the arm is carried toward a flange 43, pertaining to the carrier N, and rigidly held thereto by a bolt 44, passing through the said arm, the last named flange, and a number of interposed shims 45.

The said shims 45 perform an important function, in that they provide a means of adjustment for the guide-rollers above described, which makes it possible to maintain the surface of the cantilever platform level at all times. It is known that the outer end of this platform is liable to sag after long usage or on account of heavy weights frequently dropped thereon, which occasions a considerable wear of the guide rollers. The sagging or unevenness of the platform can easily be corrected in the present invention, through a judicious employment of the shims 45 aforesaid. It will be understood that as the guide rollers M and P wear out, as also the flanges 38 upon which they bear, a re-adjustment of the relative positions originally assigned to these elements becomes necessary in order to rectify the resulting displacement of the carrier and its platform. Now, the rectification can be quickly accomplished simply by removing some of the shims 45. This will enable the lower end of the lever or arm 41 to be swung farther toward the flange 44 of the carrier N, and consequently the upper end of the lever or arm to get nearer to the flange 38, thereby setting the roller M in closer contact therewith. Obviously, this readjustment of the roller M, through the said arm or lever, will operate to straighten up the position of the carrier N, and through it cause the platform O thereon to assume its normal level.

While a certain preferred embodiment of this device has been shown and described, it will be understood that changes in the form, arrangements, proportions, sizes and details thereof may be made, without departing from the scope of the invention as defined by the appended claims.

Having described my invention what I desire to secure by Letters Patent and claim, is:—

1. A portable elevator including in combination, a load carrying element, sectional frame members therefor holdable one upon another, and a collapsible linkage arranged to control the folding members and to restore them to normal position, said linkage having a part wherewith the folding and unfolding can be effected.

2. A portable elevator including in combination, a foldable frame, a load carrying element vertically movable therealong, and collapsible links adapted to fold or unfold said frame and having their outer ends in offset relation to the corresponding ends of the same.

3. A portable elevator including in combination, a load carrying element, a supporting frame therefor composed of upper and lower sections foldable one over the other, and toggle-links at opposite sides of said frame controlling the interrelative movement of its said sections, the outer end

of one of said links remaining on the same side of the folding point of the sections irrespective of the movements thereof.

4. A portable elevator including in combination, a load carrying element, a sectional frame therefor comprising a foldable upper part and a non-folding lower portion, and actuating links for said frame held in pivoted relation to both said foldable part and said non-folding portion, the inner ends of said links extending beyond their point of connection to afford them rigidity when in an erect position.

5. A portable elevator including in combination, a load carrying element, a supporting frame for the same composed of upper and lower sections foldable one toward the other, and a collapsible linkage for said frame attached at one end intermediately of the upper section.

6. A portable elevator including in combination, a load-carrying element, a supporting frame for the same having a part foldable to one side thereof, and means operable to control the movements of said part from the opposite side of said frame, said means consisting of collapsible links extending one beyond the other at their point of interconnection.

7. A portable elevator including in combination, a load carrying platform, sectional frame members therefor foldable one relatively to the other, and collapsible linkage for folding or unfolding one of said members operable from the side of said platform, the lower element of said linkage being extended on said side to constitute operating means for the foldable member.

8. A portable elevator including in combination, a load carrying element, a partly foldable frame therefor, a plurality of interconnected links capable of exerting a toggle-action on said frame, and rigid connections extending out from the latter to which the outer ends of said links are respectively attached, the inner end of one set of the links being extended to serve as a lever whereby the foldable frame can be operated.

9. A portable elevator including in combination, jointed frame members, and means for controlling the folding thereof composed of links pivotally connected intermediately of each other and by their outer ends in offset relation to said members at different levels.

10. A portable elevator including in combination, a frame having a foldable section, and a collapsible linkage for controlling the latter consisting of members interconnected so as to lap one over the other, the overlapping of said members constituting the means for operating the linkage.

11. A portable elevator including in combination, a partly foldable frame, and jointed links for controlling the folding part of said frame comprising members one end of which extends beyond the joint with the other, the extending end affording the leverage wherewith the links are operated.

12. A portable elevator including in combination, a sectional frame composed of normally aligned members, a load supporting element guided thereby, a collapsible linkage composed of interbracing parts for controlling the displaceable member of said frame, and means permitting adjustment of said parts longitudinally and positively in either direction to correct disalignment of the members.

13. A portable elevator including in combination, a frame having an upper part foldable upon a lower portion, a load-supporting element guided by said frame, a self-bracing linkage pivotaly connected relatively to said part and said portion serving to keep the same normally aligned, and means for changing one of the pivotal connections to rectify positively the alignment of the frame.

14. A portable elevator including in combination, a foldable frame, a linkage for controlling the folding or unfolding thereof consisting of jointed members, and a stop connected with said linkage arranged to limit the interrelative movement of said members when said frame is placed in erect position.

15. A portable elevator including in combination, a frame having a foldable section, a linkage for controlling the movement of the latter composed of interconnected members collapsible relatively to each other, and a lock carried by said linkage serving to maintain its said members in rigid position subsequently to their being straightened out to unfold said section.

16. A portable elevator including in combination, a frame having a foldable upper portion, collapsible links for controlling the folding and unfolding of said portion consisting of pivotally connected members, and automatic means capable of holding said members in interlocked relation.

17. A portable elevator including in combination, a frame having sections foldable one upon the other, a linkage for controlling the movements of the foldable section composed of collapsible members, and a device connected up with said members adapted to change their interrelative positions to effect the folding or unfolding of said section.

18. A portable elevator including in combination, a movable truck, a supporting element forming part thereof, superposed frame members carried by the truck foldable one relatively to the other, a collapsible linkage for controlling the movements of the

foldable member, and adjustable means connecting said element with the lower end of said linkage arranged to compensate irregularities therein and between said members.

19. A portable elevator including in combination, vertically disposed frame members, a cantilever platform carrier reciprocable along the same, interspaced rollers on opposite sides of said members guiding said carrier, and oscillatable means for adjusting the initial location of the axes of said rollers relatively to the carrier in order to rectify the position of the platform.

20. A portable elevator including in combination, upright frame members, a cantilever carrier vertically movable therealong, a load supporting platform on said carrier, guide rollers for the latter bearing upon opposite sides of said members in spaced relation to one another, and an oscillatable element for angularly varying the position of the upper roller with respect to the carrier, whereby the latter is tilted to maintain said platform in level condition.

21. A portable elevator including in combination, normally erect frame members, a cantilever platform carrier movable up and down the same, guide rollers for said carrier engaging said members on opposite sides thereof at a distance from one another, and a fulcrumed mounting for the upper one of said rollers adjustably held to the carrier so as to permit a change in its position and that of the platform.

22. A portable elevator including in combination, a frame having guide members with oppositely disposed bevelled bearing faces, a cantilever platform carrier vertically movable along said members, straight treaded guide rollers arranged to travel in spaced relation on the opposite faces of the latter, and oscillatable means affording diverging axes for said rollers whereby the treads of the latter are held in parallelism with said faces.

23. A portable elevator including in combination, a frame composed of vertically disposed channel members, having internally bevelled flanges, a cantilever platform carrier reciprocable along the same, interspaced straight treaded guide rollers for said carrier engaging one flange of each channel member on opposite sides thereof, pivoted levers having axes for the upper ones of said rollers, the axes being divergent from the pivots of said levers so as to hold the treads of the upper rollers in parallelism with the inner faces of the flanges, and means for oscillating the levers whereby the position of the platform can be rectified.

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