April 15, 1969 G. D. BOSE ET AL 3,438,514

APPARATUS FOR LIFTING AND ALIGNING BUILDING MATERIAL

Filed May 22, 1967 Sheet 1 of 2

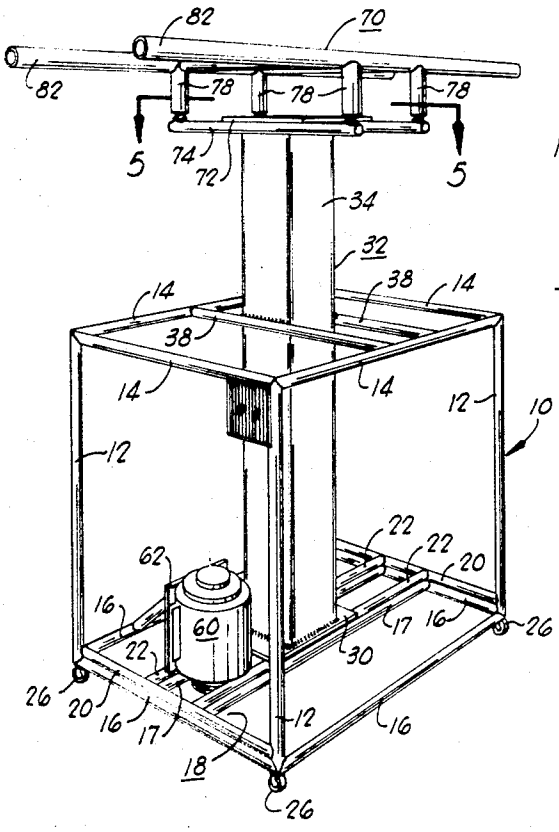

Fig. 1

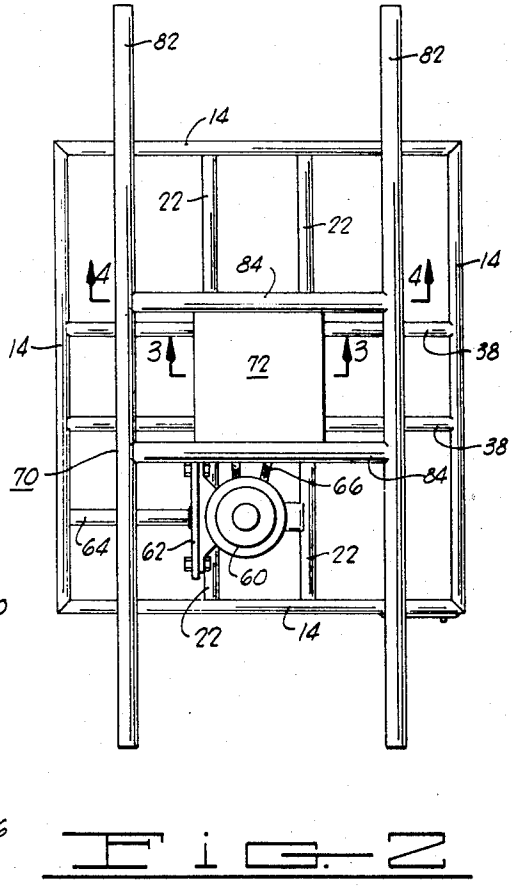

Fig. 2

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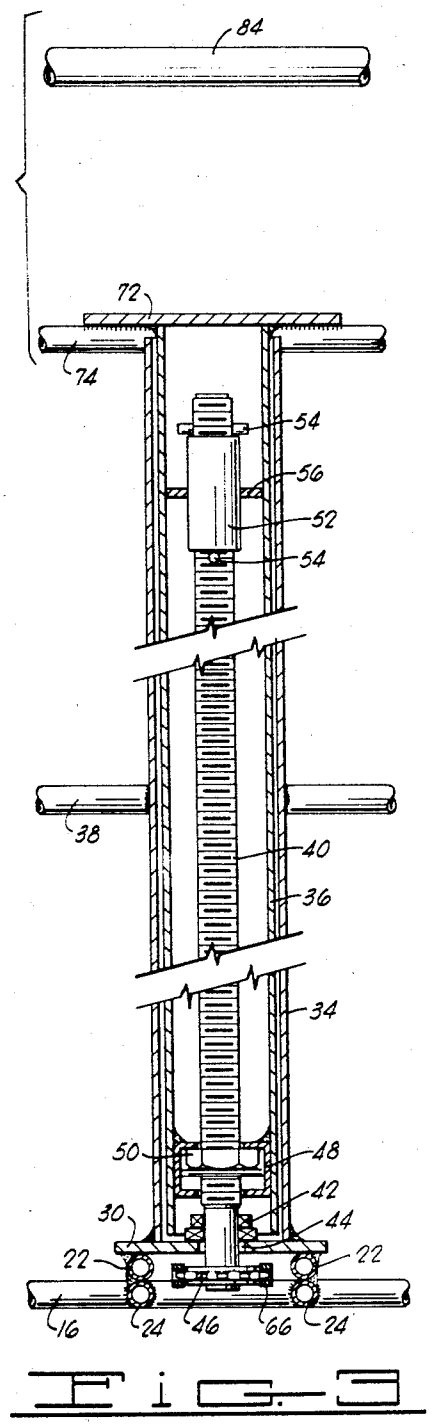

Fig. 3

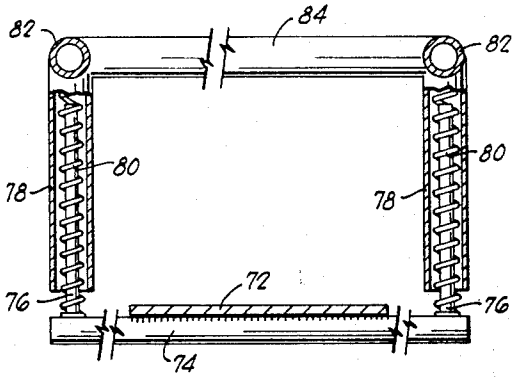

Fig. 4

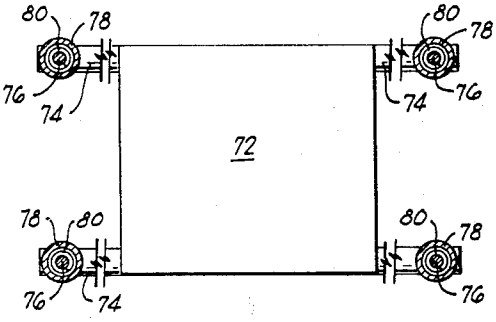

Fig. 5

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United States Patent Office 3,438,514 Patented Apr. 15, 1969

3,438,514

APPARATUS FOR LIFTING AND ALIGNING BUILDING MATERIAL

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Filed May 22, 1967, Ser. No. 639,967
Int. Cl. B25j 3/00; B65g; B66f 3/18
U.S. Cl. 214—1 7 Claims

ABSTRACT OF THE DISCLOSURE

A powered lift for elevating sheetrock or the like to a substantially horizontal position adjacent a ceiling. The device includes a frame having vertically extending, telescoping sleeves and a motor mounted thereon, with the motor driving the inner sleeve through a screw jack connection for elevating the inner sleeve relative to the outer sleeve. The inner sleeve has a material supporting structure movably secured to the upper end thereof, and resiliently biased to a substantially horizontal position by a plurality of spring elements. The spring elements are yieldable to permit a monoplanar sheet of building material carried by the supporting structure to be depressed from a horizontal plane by a force acting downwardly on the sheet at any point on its upper surface.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to devices used for the purpose of elevating building materials to a location adjacent a ceiling so that such materials can be attached or secured to the ceiling with a minimum of difficulty. More particularly, but not by way of limitation, the present invention relates to jack or elevator type devices of the sort used for lifting substantially monoplanar sheets of building materials, such as sheetrock or he like, to a location adjacent a ceiling in which the sheetrock is in a substantially horizontal position, and is readied for a securement to the ceiling with a minimum amount of handling by the carpenter or craftsman.

Brief description of the prior art

A number of jacks, hoists and elevating devices have heretofore been proposed for permitting a carpenter to mechanically elevate a large and heavy sheet of building material, such as sheetrock or wall board, from approximately floor level to a position adjacent a ceiling to which such building materials are to be secured. Many of these devices include supporting platforms or structures upon which the sheet of building material is initially placed in a horizontal position. The supporting structure is then mechanically raised by a screw jack, or a hydraulic lift of some type, or other suitable device, until the horizontally extending sheet is pressed against, or is immediately adjacent, the rafters or other ceiling substructure to which the sheet is to be secured.

Frequently, particularly in older houses, the ceilings are not precisely horizontal, or are not in exact parallelism with the floor. In some other structures, the ceilings are characterized in having imperfections in the manner in which the rafters or lathing are constructed so that the sheetrock or other finishing material must be warped or bent to some extent in order to accommodate it to the ceiling. Where buildings having defects or non-uniformities of the type described are encountered, the sheetrock or building material lifts heretofore provided present some difficulty in use. This is due to the fact that, in almost every instance, the apparatus provided is constructed so that the sheetrock or other monoplanar

sheet of building material is raised upwardly in a position in which it occupies a plane extending substantially horizontally with respect to the floor. In such situations, it is necessary for the carpenter or sheetrock craftsman to bodily fit the sheetrock to the ceiling which is defectively constructed, or is for some reason, out of precise parallelism with respect to the floor. Thus, it may be necessary for the carpenter to manually lift one side of thee sheetrock off of the supporting structure of the elevator in order to lift it up to the ceiling after it has been secured along one edge to the ceiling, or he may have to exert considerable manual force to bend the sheetrock to the contour of the ceiling.

Brief description of the present invention

The present invention provides an improved apparatus for elevating monoplanar sheets of building material to a position in which they can be easily and quickly secured to a ceiling or other overhead structure. The improvement in the apparatus of the invention is felt to reside primarily, though not exclusively, in the provision in the apparatus of means which permits the sheet of building material to be firmly supported from below despite the necessity to elevate or depress one or more corners or portions of the sheet as it is installed on the ceiling. Broadly described, the apparatus of the present invention comprises a frame, a pair of vertically extending, telescoping members mounted on the frame, a material supporting structure secured to the upper end of one of the telescoped members, a prime mover supported on the frame, and means drivingly connecting the prime mover to one of the telescoped members for elevating said one telescoped member relative to the other telescoped member. The material supporting structure includes a plurality of vertically extending, spaced rigid support elements, a plurality of horizontally extending, spaced support elements, and resilient means supporting the horizontally extending support elements on the vertically extending support elements. The horizontally extending support elements can thus move relative to the remainder of the apparatus to accommodate necessary departures from a true horizontal plane of substantially monoplanar building materials rested on, and supported by, the material supporting structure.

In a preferred embodiment of the invention, a motor or other prime mover mounted on the frame drives one of the telescoping members in vertical reciprocating movement through a screw jack mechanism in which a threaded shaft driven in rotation by the prime mover engages a threaded nut secured to, and movable with, the telescoping member which is to be elevated by actuation of the prime mover. It is also a preferred construction of the invention to make each of the telescoped members tubular in construction and to extend the shaft of the screw jack mechanism concentrically in the inner tubular member to cause this member to move upwardly within a surrounding tubular member, and by this means to elevate a material supporting structure secured to the upper end of the inner tubular member.

By the described construction, the carpenter is permitted to achieve a major object to the present invention, i.e. the fitting and accommodation, with a minimum of manual exertion, of sheetrock and other monoplanar building materials to ceilings which are not in parallelism with the floor, or which have local deformities or departures from uniformity which require the sheet of building material to be adjusted in its position.

An additional object to the present invention is to provide a power driven, automatically operated apparatus for lifting sheetrock and the like from a position relatively close to the floor to a location in juxtaposition to a ceiling to which the material is to be secured.

A further object of the invention is to provide an improved device for lifting, with a minimum of effort, a large, substantially monoplanar sheet of building material to a position of securement on a ceiling or other overhead structure in a building or the like.

A further object of the invention is to provide an apparatus for lifting sheet building materials to an overhead location, which apparatus is relatively simple and inexpensive in construction, but which is mechanically strong and characterized in having a long and trouble-free operating life.

Additional objects and advantages of the invention will become apparent as the following detailed description of the invention is read in conjunction with the accompanying drawings which illustrate the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a perspective view of one embodiment of the lifting apparatus of the present invention.

FIGURE 2 is a plan view of the lifting apparatus of the invention.

FIGURE 3 is a section taken along line 3—3 of FIGURE 2.

FIGURE 4 is a section taken along line 4—4 of FIGURE 2.

FIGURE 5 is a section taken along line 5—5 of FIGURE 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

In the following detailed description of the invention in which reference is made to the accompanying drawings, a combination referred to in the description which includes a plurality of subcombinations will be designated in the drawings by a reference character having an arrowhead-carrying lead line associated therewith. Subcombinations which include a plurality of elements will be designated by underlined reference numerals having plain lead lines, and individual elements of structure will be designated by reference characters which are not underlined, and which are associated with plain lead lines having no arrowheads.

Referring now to the drawings in detail, and particularly to FIGURE 1, the lifting apparatus of the invention includes a main supporting frame desginated generally by reference numeral **10** and including vertically extending bars or rods **12** interconnected by horizontally extending upper rods **14** and horizontally extending lower rods **16**. A pair of transverse rods **17** extend between two of the horizontally extending lower rods **16**. A generally H-shaped subframe designated generally by reference numeral **18** is secured to the horizontally extending lower rods **16**, and functions to provide reinforcement for the frame and additional support for an elevating assembly hereinafter described. The subframe **18** includes a pair of horizontally extending end members **20** which are secured between the vertically extending rods **12**, and a pair of spaced parallel transverse supporting rods **22** which are superimposed on, and welded or otherwise suitably secured to, the coextending transverse rods 17 welded between two of the horizontal lower rods **16** of the main frame. Disposed at the corners of the main frame and secured to the lower side of the horizontally extending lower rods **16** are a plurality of casters **26** which permit the lifting apparatus of the invention to be easily moved from one location to another.

A support plate **30** is secured to the upper side of the spaced transverse supporting rods **22** of the subframe **18**, and the support plate **30** is used to support the weight of an elevating assembly designated generally by reference character **32**. The elevating assembly includes, in the illustrated embodiment, an outer tubular member **34** which has its lower end secured to the support plate **30**, and an inner tubular member **36** which is telescoped in the outer tubular member **34** and is axially movable with

respect thereto. Both of the tubular members **34** and **36** are preferably rectangular or square in transverse cross section. For the purpose of further reinforcing the frame **10** and stabilizing the outer tubular member **34**, a pair of parallel cross members **38** are secured between two opposed horizontally extending upper rods **14** of the framework **10** and bear against, and are secured to, opposite sides of the outer tubular member **34**.

For the purpose of driving the inner tubular member **36** in vertical reciprocation with respect to the outer tubular member **34**, an elongated threaded shaft **40** extends upwardly inside the inner tubular member and is supported at its lower end in a thrust bearing **42** mounted on the upper side of the support plate **30**. The lower end portion of the threaded shaft **40** extends through an aperture **44** provided in the support plate **30**, and a sprocket **46** is keyed to the lower end of the threaded shaft below the support plate. A nut housing **48** is secured to the internal walls of the inner tubular member **36** and closely surrounds and encloses a threaded nut **50** which engages the threads of the threaded shaft **40** but is prevented from rotating relative to the tubular member **36** by reason of its close proximity to the nut housing **48**. The nut housing **48** also functions to limit the axial travel of the nut with respect to the threaded shaft **40**.

Near its upper end, the threaded shaft **40** carries a sleeve **52** which coaxially surrounds the shaft and is prevented from moving axially along the shaft by the pins **54**. The sleeve **52** has secured thereto a circumferential flange **56** which extends outwardly to the walls of the inner tubular member **36** and thus, by virtue of the square or rectangular cross-sectional configuration of the inner tubular member, prevents rotation of the sleeve relative to the inner tubular member as the threaded shaft **40** is driven in rotation. The sleeve **52** and circumferential flange **56** thus function as a guide for retaining the upper end of the threaded shaft **40** in alignment with respect to the inner tubular member **36** during the operation of the device as hereinafter described.

For the purpose of driving the threaded shaft **40** of the elevating assembly **32** in rotation about its longitudinal axis, a reversible motor **60**, or other suitable prime mover, is mounted on the frame **10** by any suitable means, and, in the illustrated embodiment, is shown as bolted to a vertically extending plate **62** which is welded to the transverse supporting rod **22** of the subframe **18**. The vertically extending plate **62** is braced by a diagonal bar or rod **64** which extends from the upper edge of the plate to a horizontally extending lower rod **16** of the frame **10**. The motor **60** carries a sprocket (not visible) which is drivingly connected by a suitable chain **66** to the sprocket **46** on the lower end of the threaded shaft **40**. A switch **68** utilized to close an electrical circuit to deliver power to the motor **60** can conveniently be mounted on the frame **10** in the manner depicted in FIGURE 1.

A material supporting structure designated generally by reference character **70** is secured to the upper end of the inner tubular member **36** for vertical reciprocation therewith. The material supporting structure includes a horizontally extending rectangular plate **72** which is welded or otherwise suitably secured to the upper end of the inner tubular member **36**. Secured along two parallel edges of the plate **72** are a pair of parallel bars or rods **74** which bracket or pass on opposite sides of the outer tubular member **34** when the inner tubular member **36** is lowered to move the material supporting structure **70** to the position depicted in FIGURES 1 and 3. Secured to the opposite ends of each of the bars **74** are upwardly extending bars or rods **76** of relatively small diameter (see FIGURE 4). A pair of relatively large diameter tubular members **78** are telescoped over the rods **76** located at each end of each of the bars **74**, and are yieldingly retained in spaced axial relation with respect to the rods **76** by a helical spring **80** or other resilient element in the manner depicted in FIGURE 4. Thus, where the helical

springs are used, these springs can be placed around the rod **76** and extended upwardly beyond the free end thereof.

At its upper end, each of the tubular members **78** is secured to a horizontally extending material supporting runner **82**, so that two of these runners extending in parallelism are provided and afford support for a monoplanar sheet of building material rested thereon. The material supporting runners **82** are also connected by support elements **84** which extend parallel to each other and horizontally between the runners (see FIGURE 2). It will be noted in referring to FIGURES 2 and 4 that the construction of the material supporting structure **70** is such that a monoplanar sheet of building material may be firmly supported upon the runners **82** and cross members **84**, which are in turn supported upon the rods **76** by the springs **80**. The springs, however, resiliently and yieldingly mount the runners **82** and cross members **84** so that, if it should be desired to depress the sheet of building material from a horizontal plane to accommodate it to a ceiling which is out of parallelism with the floor, or in some way distorted, such realignment or repositioning of the sheet of building material can be accomplished merely by depressing the one side or corner of the building material to achieve the position sought.

OPERATION

In utilizing the lifting apparatus of the invention for elevating the sheet building materials to a location adjacent a ceiling to which they are to be secured, the carpenter first moves the apparatus to the desired location by pushing on the frame **10** to cause the apparatus to roll on the casters **26**. In some instances, it may be desirable to move the sheetrock or other building material with the lifting apparatus, and in this case, prior to moving the apparatus in the manner described, the sheet of building material is raised upwardly and positioned on the runners **82** and cross members **84** of the material supporting structure **70**. This is accomplished, of course, at a time when the motor **60** has been energized to drive the threaded shaft **40** in a direction which lowers the inner tubular member **36** and the supporting structure carried thereby to its lowermost position as depicted in the drawings.

When the lifting apparatus has been moved to a position below the portion of the ceiling to which the sheet of building material is to be attached, the reversible motor **60** is energized to drive the shaft **40** in a rotational direction such that the inner tubular member **36** is moved upwardly by its engagement with the shaft **40** through the nut **50**. The inner tubular member **36** can move freely with respect to the outer tubular member **34**, and upward movement of the inner tubular member can be continued until the nut housing **48** strikes the retaining pin **54** near the upper end of the threaded shaft **40**. At or prior to this time, the material supporting structure **70** secured to the upper end of the inner tubular member **36** will have been moved into juxtaposition to the ceiling, and the sheet of building material carried thereby will either flatly abut the ceiling, or at least a portion of the building material will contact the ceiling.

In the event that the ceiling does not extend parallel to the floor upon which the lifting apparatus is supported, or in the event of a local non-uniformity in the ceiling, the sheet of material can nevertheless be pressed into flat abutting relationship to the rafters or lathing by continuing to elevate the material supporting structure **70** for a slight distance. As one portion of the sheet of building material contacts the ceiling under these circumstances, its movement will be arrested and the result will be that that portion of the runners **82** which supports this part of the sheet material will also be arrested and one or both of the runners will be depressed with respect to the rods **76** by distortion of the helical springs **80**. This adjustability inherent in the lifting apparatus of the present invention overcomes a difficulty which has been experienced by carpenters and craftsmen in using sheetrock lifts and other structures as previously constructed for the purpose of securing large, substantially monoplanar sheets of building materials to a ceiling.

From the foregoing description of the invention, it will have become apparent that the present invention provides an improved lifting apparatus for lifting or elevating sheets of building material from the floor or other relatively low level to a position adjacent a ceiling with a minimum of manual manipulation being involved in locating the material at the precise position where it is to be secured to the ceiling. The apparatus is relatively inexpensive to construct, has relatively few moving parts, and is characterized in having a long and trouble-free life.

Although a preferred embodiment of the invention has been described in the foregoing specification and illustrated in the drawings, many changes and innovations can be effected in the described and depicted structure without departure from the basic principles of the invention. Changes of this type which continue to rely upon these principles are deemed to be circumscribed by the spirit and scope of the invention except as the same may be necessarily limited by the accompanying claims or reasonable equivalents thereof.

We claim:

1. Lifting apparatus comprising:

a frame;

an elevating assembly mounted on said frame and including a vertically extending member movable in vertical reciprocation relative to said frame;

a prime mover mounted on said frame and drivingly connected to said elevating assembly for moving said member upwardly and downwardly relative to said frame;

a material supporting structure secured to the upper end of said vertically extending member and including material supporting runners;

a plurality of horizontally spaced, vertically extending rods mounted atop said vertically extending member;

spring guide means on said runners aligned with said rods; and

a plurality of springs positioned between said rods and spring guide means and resiliently spacing said runners above said rods.

2. The lifting apparatus defined in claim **1** wherein said elevating assembly is further characterized to include a second vertically extending member telescopingly engaging said first vertically extending member and connected to said frame.

3. The lifting apparatus defined in claim **2** wherein said telescoped members are tubular, and said elevating assembly is further characterized as including:

a threaded shaft extending upwardly inside the innermost of said telescoped tubular members and connected to said frame;

a nut threadedly engaging said shaft and connected to said first-mentioned vertically extending member; and

means connecting said prime mover to said shaft for driving said shaft in rotation when said prime mover is energized.

4. The lifting apparatus defined in claim **3** wherein said spring-guide means comprises a plurality of tubular members corresponding in number to said rods and each extending over and around one of said rods, and wherein said means including said rods comprises:

a substantially horizontal plate secured to the upper end end of said first-mentioned vertically extending member; and

horizontally extending bars secured to said plate and each having a plurality of said vertically extending rods secured thereto.

5. The lifting apparatus defined in claim **1** wherein said spring-guide means comprises

a plurality of tubular members corresponding in number to said rods and each extending over and around one of said rods; and

wherein said means including said rods comprises:

a substantially horizontal plate secured to the upper end of said vertically extending member; and

horizontally extending bars secured to said plate and each having a plurality of said vertically extending rods secured thereto.

6. Apparatus for elevating substantially monoplanar sheets of building materials while such sheets are horizontally positioned comprising:

a pair of telescoped tubular member having one of said members movable vertically relative to the other of said members;

a threaded rod extending inside the innermost of said pair of tubular members;

a nut threadedly engaging said rod and connected to said one member;

means for rotating said rod;

a plurality of spaced, horizontally extending, substantially parallel bars mounted on the upper end of said vertically reciprocating member for vertical reciprocation therewith;

a plurality of runner elements spaced vertically from said bars and each extending in a generally horizontal direction;

a plurality of horizontally spaced springs positioned between said runner elements and bars to resiliently support said runner elements on said bars;

a pair of horizontally spaced, vertically extending rods on each of said bars and each concentrically surrounded by, and providing alignment for, one of said springs; and

spring guide means on each of said runner elements receiving and aligning said springs with said runner elements.

7. Lifting apparatus comprising:

a frame;

an elevating assembly mounted on said frame and including a vertically extending member movable in vertical reciprocation relative to said frame;

means mounted on said frame for vertically reciprocating said vertically extending member relative to said frame; and

a material supporting structure secured to the upper end of said vertically extending member and including

a horizontally extending plate secured to the upper end of said vertically extending member and movable therewith;

a plurality of rods secured to said horizontally extending plate and projecting horizontally therefrom;

material supporting runners spaced vertically above said rods; and

resilient means yieldingly supporting said runners at four spaced points, and extending between said runners and said rods at locations on said rods spaced from said horizontally extending plate.

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U.S. Cl. X.R.

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