

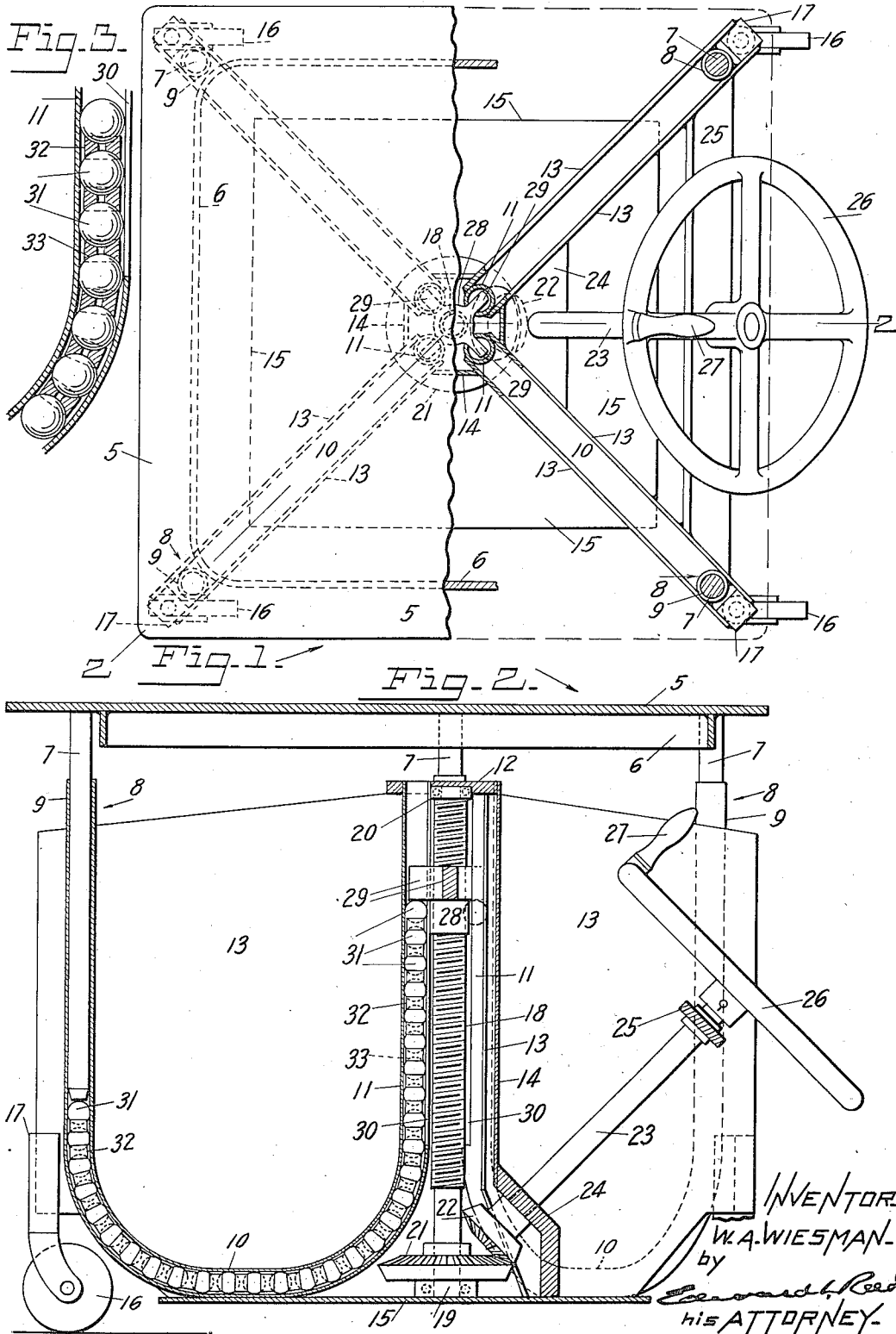
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ADJUSTABLE LOAD SUPPORTING STRUCTURE

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ADJUSTABLE LOAD SUPPORTING
STRUCTURE

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This invention relates to an adjustable load supporting structure and more particularly to a work table of the type commonly used in factories to transport work to and from machines.

One object of the invention is to provide such an adjustable structure which will be simple in construction and can be produced at a low cost.

A further object of the invention is to provide such a structure which can be easily operated to raise and lower the load.

A further object of the invention is to provide such a structure in which the work supporting element and load will at all times be under the positive control of the operator.

A further object of the invention is to provide such a structure which will be of a strong durable construction and of comparatively light weight.

Other objects of the invention will appear as the structure is described in detail.

In the accompanying drawing Fig. 1 is a plan view, partly in section, of a work table embodying my invention; Fig. 2 is a sectional view taken on the staggered line 2—2 of Fig. 1; and Fig. 3 is a sectional detail of a portion of one of the flexible elements.

In the drawing I have illustrated one embodiment of my invention and have shown the same as applied to a portable work table but it will be understood that this particular embodiment has been chosen for the purpose of illustration only, that the invention may take various forms and may be embodied in structures of various kinds.

In the particular embodiment illustrated the structure comprises a base on which a load supporting element is mounted for vertical adjustment. As here shown, the load supporting element is in the form of a flat table top 5, substantially square in contour and having a reinforcing rib or flange 6. This table top is provided with a plurality of downwardly extending rods 7, there being in the present instance one of these rods at each corner of the table top and the several rods constitute plungers which adjustably support the table top and its load on the base.

The base comprises a plurality of tubular elements 8 each having an upright outer portion 9 arranged beneath one of the corners of the table top to receive the corresponding rod or plunger 7, which is slidably mounted in the upright portion of the tubular member. At its lower end the upright portion of the tubular member merges into a transverse portion 10 which extends laterally. In the preferred form each tubular member also comprises an inner upright portion 11 connected at its lower end with the inner end of

the transverse portion 10. The transverse portion 10 has its ends curved about relatively long radii and the interior of the diameter of the tubular member is substantially uniform from end to end. The upright inner portions 11 of the tubular members are preferably arranged beneath the central portion of the table top and each group in an approximately circular formation to provide a central space between them. They are rigidly connected one to the other at their upper ends, as by a top plate 12. The upright portions of each tubular member are connected one to the other by brace plates 13 arranged on the opposite sides of the two upright portions and rigidly connected thereto, as by welding. The plates of adjacent pairs may also be rigidly connected one to the other by plates 14 arranged near the inner edges thereof. A bottom plate 15 is rigidly secured to the lower edges of the brace plates 13 and may also be secured directly to the transverse portions 10 of the tubular members. In this manner the several tubular members and the parts of each tubular member are rigidly connected one to the other and are firmly held against displacement. The base is supported by small wheels or casters 16 which are here shown as carried by brackets 17 mounted between and rigidly secured to the two brace plates of the respective pairs of brace plates, which are here shown as projecting outwardly a short distance beyond the outer upright portions of the tubular members.

A screw 18 is arranged in the central space between the several upright portions of the tubular members and is rotatably mounted at its lower end in a bearing 19 on the bottom plate 15 and at its upper end in a bearing 20 in the top plate 12 and suitable means are provided for rotating the screw. In the construction shown a beveled gear 21 is rigidly secured to the screw near its lower end and meshes with a beveled gear 22 on a shaft 23 which is rotatably supported near its inner end in a bracket 24 secured to the bottom plate 15 and to one of the upright plates 14, and is supported near its outer end in a cross bar 25 secured at its ends to two of the brace plates 13. The shaft is provided at its outer end with means for rotating the same, such as a wheel 26 having a handle 27.

Mounted on the screw is a nut 28 which constitutes a controlling member and is provided with a plurality of radially extending parts 29 which project into the respective upright portions of the tubular members, the latter being provided with vertical slots 30 to permit said parts of the nut to travel longitudinally within the same.

Mounted within each tubular member is a flexible element adapted to connect the corresponding plunger 7 with the corresponding part 29 of the nut and to maintain the plunger at a fixed distance from the nut in all positions of the latter. This flexible element may be of any suitable character which will permit it to follow the contour of the tubular member without binding and which will have sufficient longitudinal rigidity to maintain the desired space between the end of the plunger and the nut. I prefer that the flexible element shall comprise a series of balls 31 of a diameter just enough smaller than the interior of the tubular member to permit their free movement through the latter. The end ball in the outer upright portion of the tubular member has supporting connection with the plunger in that tubular member and the end ball in the inner upright portion of the tubular member has operative connection with the corresponding part of the nut, so that the load on the plunger will be transmitted through the flexible element to the nut. In the present instance the end balls are in direct contact respectively with the end of the plunger and with a part of the nut but this is not essential. In order to maintain the balls in true longitudinal alinement I prefer to interpose between adjacent balls spacing blocks 32 each of which is provided in each face with a bearing recess 33 adapted to receive the adjacent portions of the balls and to permit the latter to rotate freely therein. Such a flexible element has great transverse flexibility but is absolutely rigid in the direction of the length thereof so that it will not yield or be compressed under the weight of the load.

It will be apparent that the table top and the load thereon are supported by the plungers on the flexible elements and that the weight of the load is transmitted through the flexible elements to the nut and therefore the vertical position of the table top is controlled by the position of the nut on the screw. When the screw is rotated in a direction to move the nut downwardly the flexible elements will force the plungers upwardly, and thus elevate the table top and the load. When the screw is rotated in a direction to elevate the nut the weight of the load on the flexible elements will cause the latter to follow the nut, thus permitting the load to move downwardly. The structure comprises a comparatively small number of parts of simple construction which can be readily manufactured and assembled at a low cost. The assembled structure is of a very strong durable construction, capable of handling heavy loads, and the load is at all times under positive control of the operator because the nut is self-locking and can move lengthwise of the screw only when the latter is rotated by the hand wheel 26.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a structure of the character described, a load supporting element having plungers depending therefrom, a plurality of tubular members in which said plungers are slidably mounted, each tubular member having a laterally extending portion, a flexible element mounted in each tubular member and having one end connected with

the corresponding plunger, a controlling device having parts extending into and movable lengthwise of the respective laterally extending portions of said tubular members and connected with the adjacent ends of said flexible element, and means for imparting movement to said parts of said controlling device.

2. In a structure of the character described, a load supporting element having plungers depending therefrom, a plurality of tubular members in which said plungers are slidably mounted, each tubular member having a laterally extending portion, a series of balls mounted in each tubular member and held against relative movement lengthwise of said tubular member, the ball at one end of each series having supporting connection with the corresponding plunger, a controlling device having parts extending into and movable lengthwise of said tubular members and operatively connected with the balls at the other ends of the respective series of balls, and means for simultaneously actuating said parts of said controlling device.

3. In a structure of the character described, a load supporting element having plungers depending therefrom, a plurality of tubular members in which said plungers are slidably mounted, each tubular member having a laterally extending portion, a series of balls mounted in each tubular member and held against relative movement lengthwise of said tubular member, the ball at one end of each series having supporting connection with the corresponding plunger, a controlling device having parts extending into and movable lengthwise of said tubular members and operatively connected with the balls at the other ends of the respective series of balls, spacing members interposed between adjacent balls of each series of balls and having bearing recesses to receive said balls, and means for simultaneously actuating said parts of said controlling device.

4. In a structure of the character described, a load supporting element having plungers depending therefrom, a plurality of tubular members each having an outer upright portion in which one of said plungers is slidably mounted, an inner upright portion and a transverse portion, said inner portions being arranged adjacent one to the other, a controlling device having parts extending into and movable lengthwise of the respective inner portions of said tubular members, flexible elements mounted in said tubular members and having at one end supporting connection with the respective plungers and having at their other ends operative connection with the respective parts of said controlling device, and means for actuating said controlling device.

5. In a structure of the character described, a load supporting element having plungers depending therefrom, a plurality of tubular members each having an outer upright portion in which one of said plungers is slidably mounted, an inner upright portion and a transverse portion, said inner portions being arranged adjacent one to the other, a controlling device having parts extending into and movable lengthwise of the respective inner portions of said tubular members, a series of balls mounted in each tubular member and held against relative movement lengthwise thereof, the ball at one end of each series having supporting connection with the corresponding plunger and the ball at the other end of each series having operative connection with the corresponding part of said controlling

device, and means for actuating said controlling device.

6. In a structure of the character described, a base comprising a plurality of tubular members each having an outer upright portion, an inner upright portion and a transverse portion connecting the lower ends of said upright portions, said inner portions being arranged in spaced parallel relation, a load supporting element having depending plungers slidably mounted in the outer portions of the respective tubular members, a screw mounted adjacent to and parallel with said inner portions of said tubular members, a nut on said screw having parts extending into and movable lengthwise of the respective inner portions of said tubular member, flexible members mounted for longitudinal movement in said tubular members and connecting said nut with said plungers, and means for rotating said screw.

7. In a structure of the character described, a base comprising a plurality of tubular members each having an outer upright portion, an inner upright portion and a transverse portion connecting the lower ends of said upright portions, an upright screw rotatably mounted on said base and held against axial movement, the inner portions of said tubular members being arranged about said screw and each having a longitudinal slot, a nut on said screw having parts extending through said slots, a load supporting element having depending plungers slidably mounted in the outer portions of said tubular members, flexible elements mounted in the respective tubular members for longitudinal movement therein and connected at their respective ends with said plungers and said parts of said nut, and means for rotating said screw.

8. In a structure of the character described, a base comprising a plurality of tubular members each having an outer upright portion, an inner upright portion and a transverse portion connecting the lower ends of said upright portions, said inner portions being arranged in spaced parallel relation, a load supporting element having depending plungers slidably mounted in the outer portions of the respective tubular members, a screw mounted adjacent to and parallel with said inner portions of said tubular members, a nut on said screw having parts extending into and movable lengthwise of the respective inner portions of said tubular members, a series of balls mounted in each tubular member and held against relative movement lengthwise of said tubular member, the end balls of each series being connected respectively with the corresponding plunger and with the corresponding part of said nut, and means for rotating said screw.

9. In a structure of the character described, a base comprising a plurality of tubular members each having an outer upright portion, an inner upright portion and a transverse portion connecting the lower ends of said upright portions, said inner portions being arranged in spaced parallel relation, a load supporting element having depending plungers slidably mounted in the outer portions of the respective tubular members, a screw mounted adjacent to and parallel with said inner portions of said tubular members, a nut on said screw having parts extending into and movable lengthwise of the respective inner portions of said tubular members, a series of balls mounted in each tubular member and held against relative movement lengthwise of said tubular member, the end balls of each

series being connected respectively with the corresponding plunger and with the corresponding part of said nut, and spacing members interposed between adjacent balls of each series and having in their respective faces bearing recesses for said balls, and means for rotating said screw.

10. In a structure of the character described, a base comprising a plurality of tubular members each having an outer upright portion, an inner upright portion and a transverse portion connecting the lower ends of said upright portions, means for rigidly connecting the inner and outer portions of each tubular member one to the other and for rigidly connecting the several tubular members one to the other, flexible elements mounted for longitudinal movement in the respective tubular members, a controlling device having parts extending into the respective inner portions of said tubular members and connected with the adjacent ends of said flexible elements, a load supporting element having plungers extending into the respective outer portions of said tubular members and engaging the other ends of the respective flexible elements, and means for moving said controlling device lengthwise of said inner portions of said tubular members.

11. In a structure of the character described, a base comprising a plurality of tubular members each having an outer upright portion, an inner upright portion and a transverse portion connecting the lower ends of said upright portions, plates extending between and rigidly secured to the inner and outer portions of each tubular member, other plates extending between and rigidly secured to the plates which are connected with the respective tubular members, a bottom plate rigidly secured to the first mentioned plates, a screw rotatably supported on said bottom plate and extending lengthwise of the inner portions of said tubular members, a nut on said screw having parts extending into and movable lengthwise of the inner portions of said tubular members, flexible elements mounted in the respective tubular members for movement lengthwise thereof and each having one end in operative connection with said nut, a load supporting element having plungers extending into the respective outer portions of said tubular elements and having engagement with the other ends of said flexible elements, and means for rotating said screw.

12. In a structure of the character described, a base, a load supporting element having depending parts slidably mounted on said base, a controlling element mounted on said base for vertical movement with relation thereto, flexible elements connecting the respective parts of said load supporting element with said controlling device, means for guiding said flexible element in a fixed longitudinal path whereby the weight of the load on said load supporting element will be transmitted to said controlling device, and means for adjusting said controlling device.

13. In an adjustable load supporting structure, a tubular member having an upright portion and a laterally extending portion, a series of balls within said tubular member, a load engaging element having a part extending into said upright portion of said tubular member and supported by the balls therein, a controlling element having a part extending into the other end portion of said tubular member and having operative connection with the balls therein, bearing members arranged between adjacent balls and each having bearing recesses in the opposite faces

thereof, and means for actuating said controlling element.

14. In a structure of the character described, a tubular member curved about a transverse axis, a plunger slidably mounted in one end of said tubular member, a follower movably mounted in the other end of said tubular mem-

ber, a series of balls connecting said plunger with said follower, bearing members arranged between adjacent balls and each having a bearing recess in each face thereof, and means for actuating said follower.

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