July 4, 1950 R. ALDERSON 2,513,440

WHEELED LIFTING MECHANISM FOR HEAVY FURNITURE

Filed Oct. 6, 1948 2 Sheets-Sheet 1

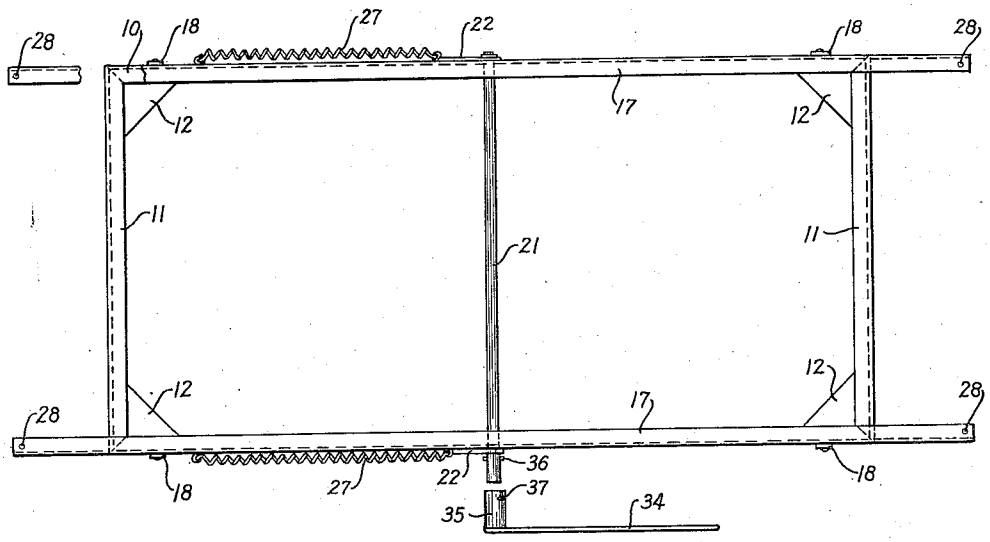

FIG.— 1

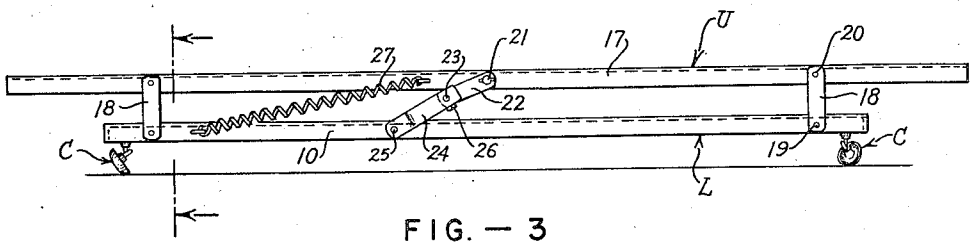

FIG. — 3

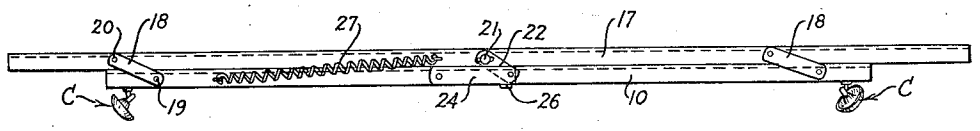

FIG.— 2

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WHEELED LIFTING MECHANISM FOR HEAVY FURNITURE

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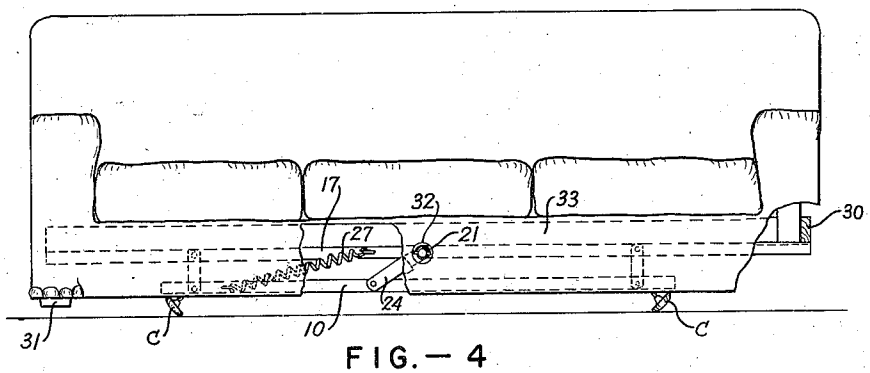

FIG.— 4

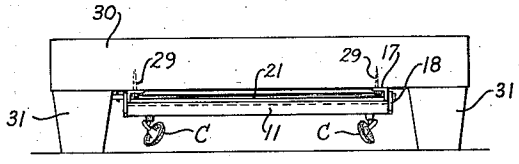

FIG.— 5

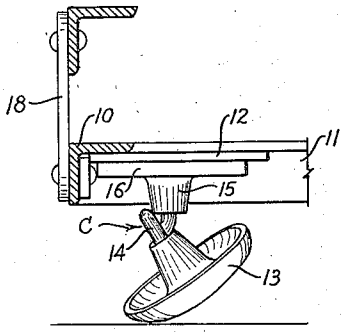

FIG. — 6

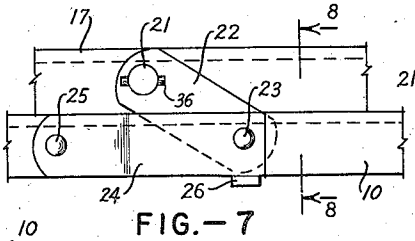

FIG.— 7

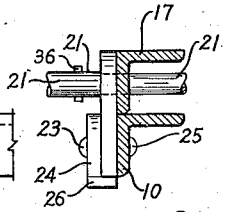

FIG.— 8

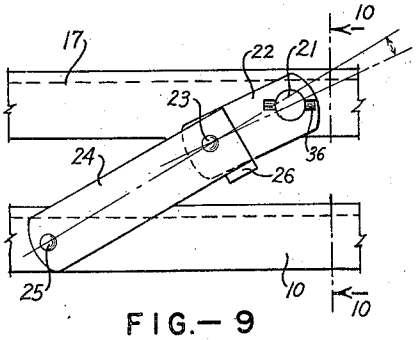

FIG.— 9

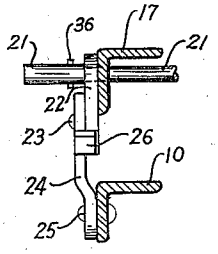

FIG.— 10

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WHEELED LIFTING MECHANISM FOR HEAVY FURNITURE

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Application October 6, 1948, Serial No. 53,050

10 Claims. (Cl. 214—65)

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This invention relates to lifting mechanism and more particularly to such a mechanism which is adapted to be associated with a heavy object so as to permit such object to be lifted and supported on wheels in order that it can be readily moved about by pushing or pulling.

One of the objects of my invention is to produce an improved wheeled lifting mechanism for permanent association with a heavy object which is normally not portable, except by lifting and carrying, which will be so operable at will that the object can be raised and supported on the wheels for easy movement.

Another object is to provide a wheeled lifting mechanism of the kind referred to which is simple in construction, easy to operate and readily associated to form a permanent part of an object to be lifted and made movable on wheels.

A further and more specific object is to provide means for permanent association with a heavy article of furniture having no casters on its legs, such as davenports, settees and chairs, which will enable a person at will to easily lift the article of furniture off the floor and support it on wheels so that it can be readily moved, as desired, by small pushing or pulling forces.

Another object is to so associate in a permanent manner with an article of furniture, lifting mechanism of the kind described which will be concealed beneath the article of furniture, yet easily operable in a convenient manner.

Other objects of the invention will become apparent from the following description taken in connection with the accompanying drawings in which:

Figure 1 is a top view of a lifting mechanism embodying my invention, said mechanism being shown, for clarity, disassociated from the objects to be lifted;

Figure 2 is a side view of the lifting mechanism shown in Figure 1, the parts thereof being in inoperative positions;

Figure 3 is another side view of the lifting mechanism, but showing the parts moved to lifting positions;

Figure 4 is a front view of a davenport showing the lifting mechanism associated therewith and in operative condition whereby the davenport is raised and supported thereon for ready and easy movement on the wheels by pushing or pulling;

Figure 5 is an end view of the davenport and lifting mechanism showing the manner of attachment of the upper frame structure to the davenport, said mechanism being in inoperative condition;

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Figure 6 is a sectional view showing details of construction, said view being taken on the line 6—6 of Figure 3;

Figure 7 is an enlarged view showing the front toggle employed in lifting, said toggle being in its inoperative condition;

Figure 8 is a sectional view taken on the line 8—8 of Figure 7;

Figure 9 is another enlarged view of the front toggle, but showing the parts in position assumed when the lifting mechanism is operated to support the davenport thereon; and

Figure 10 is a sectional view taken on the line 10—10 of Figure 9.

My improved lifting mechanism is shown, by way of example, as being particularly designed for use with a heavy article of furniture such as a davenport, but it is to be understood that it can be associated with other heavy articles of furniture which are troublesome to move, or any heavy articles other than furniture, particularly those which are to be moved only periodically. It is well known that heavy articles of furniture, such as davenports and overstuffed chairs, are very difficult for housewives to move when it is desired to clean where these articles normally set. Because of this difficulty, many a heavy object which should be moved and the floor cleaned where it sets each time the room is cleaned, is not moved at all, or only on very rare occasions.

Referring in detail, first to Figures 1, 2, 3, 6, 7, 8, 9 and 10, the lifting mechanism structure per se will be first described without reference to its manner of association with the davenport with which it is intended to be attached and be a permanent part thereof. The lifting mechanism comprises a lower frame structure, generally indicated by the letter L, and an upper frame structure, generally indicated by the letter U. The lower frame structure is rectangular, having side members 10 connected together at their ends by end members 11. As shown, the frame is made from angle irons welded together, but these members could be of other material if desired. At the corners of the lower frame member there is secured, as by welding, brace structures in the form of triangular plates 12. With these corner braces the lower frame is made very rigid. The braces, in addition to making the lower frame more rigid, provide a member to which wheels in the form of casters C can be attached, said casters comprising a wheel 13, an axle 14 carried by a bearing 15 secured to an attaching plate 16, all as best shown in Figure 6.

The upper frame structure U is made from two longitudinally extending side members 17,

shown as angle irons but may be other material. These side members are of such length as to project beyond the ends of the lower frame structure. Each member 17 is arranged to be superposed above a side member 10 of the lower frame structure and to be connected therewith. The connection employed between a longitudinal member 17 of the upper frame structure and a side frame member 10 of the lower frame structure comprises two links 18. The links 18 are of like length, with the lower end being pivotally connected to the side member 10 of the lower frame structure by means of a pivot pin 19 and the upper end being connected to the longitudinally extending member 17 by a pivot pin 20. Each two connecting links 18, together with the members 10 and 17 with which they are connected, form a parallelogram pivotable at its corners and thus permitting the members 10 and 17 to be either in close juxtaposition or to be in spaced relation with both members always being maintained in parallel relation, the spacing being limited by the length of links 18.

The upper frame structure comprising the two longitudinally extending members 17 is arranged to be connected by means of a rotatable shaft 21 which has bearing in the two members at its ends, said shaft being at right angles to the longitudinal axis of the said members. Each end of the shaft 21 has secured thereto, so as to be rotatable therewith, a short arm 22. Each of these arms is carried by the shaft on the outside of the member 17. Each arm, at its end away from the shaft, is pivotally connected by means of a pivot pin 23 with one end of a link 24 which is slightly longer than the arm 22. The other end of this link 24 is pivotally connected by a pivot pin 25 with the side member 10 of the lower frame structure L. The arm 22 and the link 24, together, form a toggle connection between the frame structures and function in a manner to cause the upper and lower frame structures to move relatively away from or toward each other, depending on the direction of rotation of shaft 21. The arms 22 and the links 24 are arranged to have only a limited range of relative pivoted movement with respect to each other when the frame structure is moved apart, and this is accomplished by providing a laterally extending abutment flange 26 on the end of the link which is pivoted to the arm 22. This flange 26 is so arranged that the arm 22 can be swung relative to the link only to a position where its longitudinal axis is at a slight angle to the longitudinal axis of the link 24. In other words, the arm 22 and link 24 can have relative pivotal movement with respect to each other until the pivot pin 23 connecting the arm and link assumes a so-called over-center position with respect to a line drawn between the axis of the shaft 21 and the pivot 25 of the link. Such over-center position is clearly disclosed in Figure 9. When the arm 22 and the link 24 assume the over-center position, the upper frame structure will be so spaced away from the lower frame structure that the connecting links 18 will be in a substantially vertical position, all as shown in Figure 3. The arms 22 and the links 24 forming a toggle on each side of the upper and lower frame structures can thus maintain these frame structures in their spaced apart position so that the links 18 can support the upper frame structure on the lower frame structure. The toggles will prevent the upper frame structure from swinging on over because of the connection provided by the link and arm between the upper and lower frame structure, and the over-center conditioning will prevent the frame structure from moving back.

To further insure that the over-center relationship of each arm and link will be maintained, corresponding sides of the upper and lower frame structures have connected therebetween relatively strong coil springs 27. It will be noted that the springs are so connected between the frame structures that they will tend to resist the movement of the upper frame structure relative to the lower frame structure when the toggles are so operated by the shaft 21 as to move the upper frame structure away from the lower frame structure and into the position shown in Figures 3, 4 and 9. With this arrangement of the springs, then when the upper frame structure reaches its fully raised position and the toggles assume over-center condition, as shown in Figure 9, the springs will be effective to maintain this over-center condition of the toggle levers since their pull will be such that the arms 22 will be yieldably held against the flanges 26 on the end of the links 24 which are pivotally connected to the arms.

Referring to Figures 4 and 5, the manner of associating the lifting mechanism with a heavy article of furniture such as the disclosed davenport will be described. The length of the longitudinally extending members 17 of the upper frame structure is arranged to be such as to correspond substantially with the length of the davenport. The ends of these members are provided with holes 28 whereby they can be secured by means of lag screws 29, or other securing means such as bolts, to the end cross frame members 30 of the davenport, which members 30, as will be noted in Figure 5, have attached thereto the legs 31 whereby the body of the davenport is spaced above the floor upon which the davenport sets.

It will be noted from Figures 4 and 5 that the lower frame structure L, when the upper frame structure is attached as described, will be positioned beneath the central part of the davenport and inwardly from the front and back sides thereof. The cross shaft 21 which is employed to move the two frame structures either toward or away from each other will then be approximately at the center of the davenport. The end of the shaft 21 which is to be operated will be adjacent the front side of the davenport and in order that this shaft may be operated at will, a hole 32 can be provided in the front panel 33 of the davenport, all as shown in Figure 4.

To operate the shaft 21, there is provided a crank lever 34, as shown in Figure 1, such lever having a cylindrical attaching hub 35 for receiving the end of the shaft 21 which is arranged to project beyond the lower frame structure at its front side. To provide a detachable connection between the hub 35 of the lever and the shaft, the shaft is provided with a cross pin 36 and the hub is provided with bayonet slots 37 to receive the ends of the pin when the hub is slipped onto the end of the shaft. It will thus be seen that the lever 34 is attachable and detachable at will from the shaft 21, and when the lever is desired to be attached to the shaft to operate the shaft, the lever can be slipped into the hole 32 in the front panel of the davenport and engaged with the shaft. If it should be desired to close the hole 32 in the front panel for appearance sake, any suitable detachable

cover or plug (not shown) can be employed.

From the foregoing description it is believed to be obvious as to the manner of operation of my improved lifting mechanism. With the upper frame structure attached to the davenport, as disclosed, the davenport can be supported on the floor by its legs in the usual manner whenever the lower and upper frames are conditioned to be in their inoperative position, as shown in Figures 2 and 5 for example. These positions of the frame structures will be maintained by the action of the springs 27. Under such conditions the lower frame structure will be raised off the floor so that the casters are not engaging the floor, all as shown in Figure 5. This position will result from the design of the lifting mechanism in relation to the particular design of the davenport. When the lifting mechanism is in this condition, the casters and lower frame structure will be sufficiently hidden beneath the davenport so as not to be noticeable.

If, at any time, it should be desired to raise the davenport and condition it so that it will rest upon the casters of the frame structure, the lever 34 is attached to the shaft 21 and then rotated in a clockwise direction as would be viewed in Figure 4. This movement of the lever will cause, by operation of the toggle, a movement of the lower frame structure downwardly with respect to the upper frame structure until the casters are brought into engagement with the floor. When this occurs, then the upper frame structure will begin to move away from the lower frame structure until the toggle assumes the over-center condition as shown in Figures 3, 4 and 9. As the upper frame structure moves upwardly away from the lower frame structure after the casters of said lower frame structure engage the floor, the entire davenport will be raised off from the floor to the position shown in Figure 4. The davenport will then be supported on the lifting mechanism and since the lower frame structure is provided with casters, the davenport will be supported on the casters and it is then easily movable to any desired position by pushing or pulling. Thus, it is possible for the davenport to be easily moved in order that a thorough cleaning of the floor can be made where the davenport normally sets. After the cleaning, the davenport can be moved back to its position and then lowered so that its legs will support it directly on the floor. The lowering is accomplished by merely swinging the lever 34 in a counterclockwise direction so as to bring the toggle back from the over-center position, after which the springs 27 and the weight of the davenport will be effective to bring the two frame structures together as shown in Figure 2. When the davenport again rests on its legs, the lower frame structure will be pulled up against the lower frame structure by the action of the springs 27.

Being aware of the possibility of modification in the particular lifting mechanism shown as embodying the invention, it is not intended that the scope of the invention be limited in any manner except in accordance with the appended claims.

What is claimed is:

1. In a lifting mechanism for permanent association with a heavy article of furniture permitting said article to be raised from the floor and supported on wheels for easy movement, an upper frame structure attached to the bottom of the article of furniture, a lower frame structure provided with wheels, means so connecting the frame structures as to hold the lower frame structure suspended above the floor, and means for moving the lower frame structure downwardly with respect to the upper frame structure to thereby place the wheels on the floor and for then moving the upper frame structure upwardly with respect to the lower frame structure to thereby raise the article of furniture off the floor and support it on the wheels, said last named means comprising a shaft journaled in one of the frame structures and extending laterally across the structure intermediate the ends thereof, means operable by shaft rotation and acting on opposite sides of the frame structures intermediate their ends for moving the frame structures relatively away from each other, and a lever detachable from the shaft for rotating said shaft.

2. In a lifting mechanism for placing beneath a heavy object to thereby raise said object off a floor and support it on wheels for easy movement, an upper frame structure for engaging the bottom portion of the object, a lower frame structure provided with wheels, pairs of links pivotally connecting like sides of the structures with each pair arranged in parallel relation, means for moving the frame structures relatively to each other as permitted by the links and to positions where the links are substantially vertical to the planes of the frame structures so that the links will provide compression members supporting the object on the wheels, and means for maintaining the frame structures in object supporting relationship including an over-center toggle mechanism between the frame structures on each side thereof and intermediate their ends.

3. In a lifting mechanism for placing beneath a heavy object to thereby raise said object off a floor and support it on wheels for easy movement, an upper frame structure for engaging the bottom portion of the object, a lower frame structure provided with wheels, pairs of links pivotally connecting like sides of the structures with each pair arranged in parallel relation, and means comprising toggles at the central part of the frames and means operating the toggles including a rotatable shaft journaled in one frame structure and extending laterally across it for moving the frame structures relatively to each other as permitted by the links, said structures when moved relatively so that the links are substantially vertical to the planes of the structures causing the object to be lifted from the floor and supported on the wheels.

4. In a lifting mechanism for placing beneath a heavy object to thereby raise said object off a floor and support it on wheels for ready movement, an upper frame structure for engagement with the object, a lower frame structure provided with wheels, and means for moving the frame structure relatively away from each other and maintaining such relationship to thereby raise the object from the floor and support it on the wheels, said last named means comprising a rotatable shaft journaled in one of the frame structures, and toggle connections between the frame structures and intermediate their ends with each having an arm links secured to the shaft for rotation with the shaft and its other link pivoted to the other frame structure, means for so connecting the frame structures that rotation of the shaft will so operate the toggle connections as to cause the frame structures to

move relatively away from each other, and cooperating means on the links of the toggle connection for locking the links of the toggle connections in over-center positions to hold the frame structures in spaced relation.

5. In a lifting mechanism for placing beneath a heavy object to thereby raise said object off a floor and support it on wheels for easy movement, an upper frame structure for engaging the bottom portion of the object, a lower frame structure provided with wheels, pairs of links pivotally connecting like sides of the frame structures with each pair arranged in parallel relation, spring means connecting the frame structures for yieldably maintaining the frame structures in close relationship as permitted by the links, a toggle connection between the frame structures, means for operating the toggle connection to thereby cause the structures to move relatively away from each other against the action of the spring means and as permitted by the links, means for limiting the relative movement of the links of the toggle connection to over-center positions when the frame structures assume such spaced apart relationship that the parallel links are substantially vertical to the planes of the structure.

6. In combination with a heavy article which is adapted to normally rest on a floor by means of legs or like structure, of a lifting mechanism therefor for raising the article and supporting it on wheels and comprising a lower frame structure, wheels on said frame structure, an upper frame structure, links pivotally connected to like sides of the frame structure to thus establish a parallelogram arrangement between the frame structures permitting the said structures to move relatively toward and away from each other, means securing the upper frame structure to the bottom part of the article in such manner that the lower structure can assume a position where the wheels are raised above the floor, and means for moving the frame structures relatively away from each other from the position assumed when the wheels are raised above the floor to thereby cause the wheels to engage the floor and the article to be raised off the floor and supported on the wheels, said last named means comprising a leverage connection between the frame structures, and means for operating the leverage connection to thereby apply forces acting on the structures to move them away from each other.

7. In combination with a heavy article which is adapted to normally rest on a floor by means of legs or like structure, of a lifting mechanism therefor for raising the article and supporting it on wheels and comprising a lower frame structure, wheels on said frame structure, an upper frame structure, links pivotally connected to like sides of the frame structure to thus establish a parallelogram arrangement between the frame structures permitting the said structures to move relatively toward and away from each other, means securing the upper frame structure to the bottom part of the article in such manner that the lower structure can assume a position where the wheels are raised above the floor, toggle connections between the frame structure including links having ends pivoted together and other ends pivoted to the frame structures, a shaft extending laterally across the frame structures for operating the toggle connections with the shaft being secured to a link of each toggle and providing its pivotal connection with a frame structure, and means for rotating the shaft to thereby operate the toggle connections and move the structures relatively away from each other so that the wheels will engage the floor and the article will be lifted from the floor.

8. In a lifting mechanism for permanent association with a heavy object provided with a base portion having flat non-rotatable surfaces normally engageable with a floor or like surface and having a space between the main body of the object and the floor and within the outlines of the floor engaging surfaces, said mechanism being positioned in said space and comprising an upper frame structure, means for attaching the frame to the object, a lower frame structure positioned beneath the upper frame structure, wheels on said lower frame structure, and connecting mechanism between the frame structures operable to cause said frame structures to move relatively away from each other to positions where the heavy object will be lifted from the floor or like surface and supported on the wheels of the lower frame structure or to cause said frame structures to move relatively toward each other and allow the object to again rest directly on the floor or like surface, said connecting structure comprising links pivoted at their ends to the frame structures, and means for swinging the upper frame structure as permitted by the links relatively to the lower frame structure.

9. In a lifting mechanism for permanent association with a heavy object provided with a base portion having flat non-rotatable surfaces normally engageable with a floor or like surface and having a space between the main body of the object and the floor and within the outlines of the floor engaging surfaces, said mechanism being positioned in said space and comprising an upper frame structure, means for attaching the frame to the object, a lower frame structure positioned beneath the upper frame structure, wheels on said lower frame structure, and connecting mechanism between the frame structures operable to cause said frame structures to move relatively away from each other to positions where the heavy object will be lifted from the floor or like surface and supported on the wheels of the lower frame structure or to cause said frame structures to move relatively toward each other and allow the object to again rest directly on the floor or like surface, said connecting structure comprising links pivoted at their ends to the frame structures, and means for swinging the upper frame structure as permitted by the links relatively to the lower frame structure, and means for maintaining the upper frame structure and the lower frame structure in such spaced relation that the object will be supported on the wheels.

10. In combination with a heavy article of furniture, of a lifting mechanism forming a permanent part thereof for permitting the article to be raised and supported on wheels for easy movement, said mechanism comprising an upper frame structure secured to the frame of the article of furniture, a lower frame structure provided with wheels thereon, said lower frame structure being of an area size less than the area of the bottom portion of the article of furniture and said frame structures being so related to each other and the furniture that the lower frame structure can assume a position retracted from the floor when the article is setting normally on the floor, and means connecting

said frame structures and operable to move the lower frame structure away from the upper frame structure to thereby raise the article of furniture off the floor and support it on the wheels, said last named means comprising lever mechanism connected between the frame structures, a rotatable shaft carried by one frame structure for operating the lever mechanism and having an end positioned adjacent a side of the article of furniture, and means for rotating the shaft including a member positioned for access at a side of the article.

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