April 4, 1939. A. C. BARLTROP 2,152,946

WHEELED SUPPORTING MEANS, PARTICULARLY FOR FURNITURE

Filed Sept. 3, 1936 2 Sheets-Sheet 1

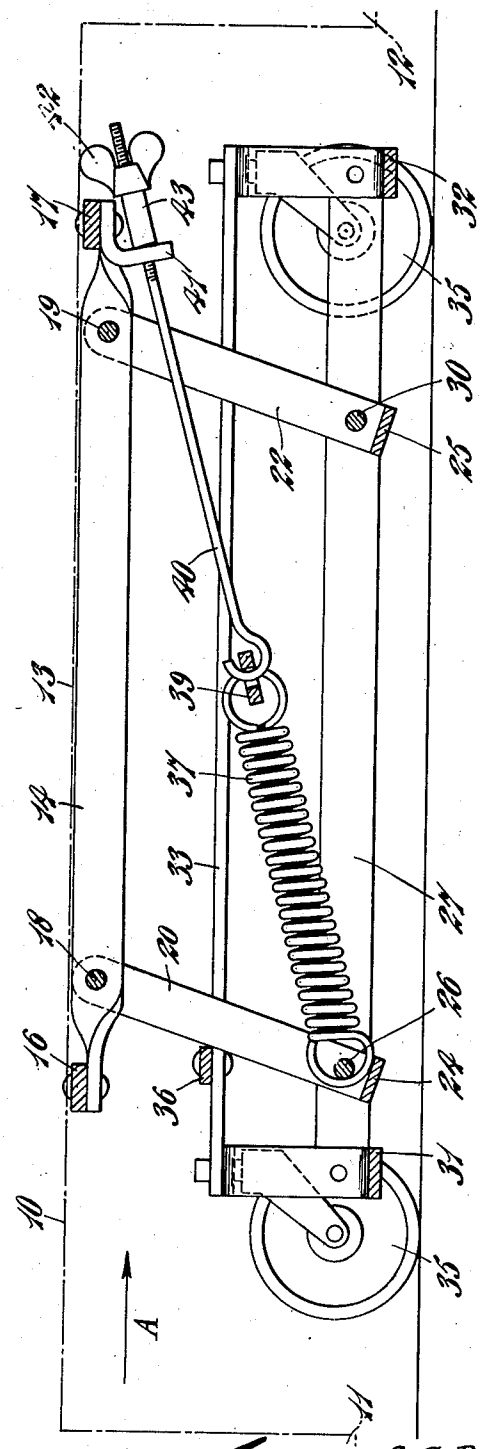

Fig. 1.

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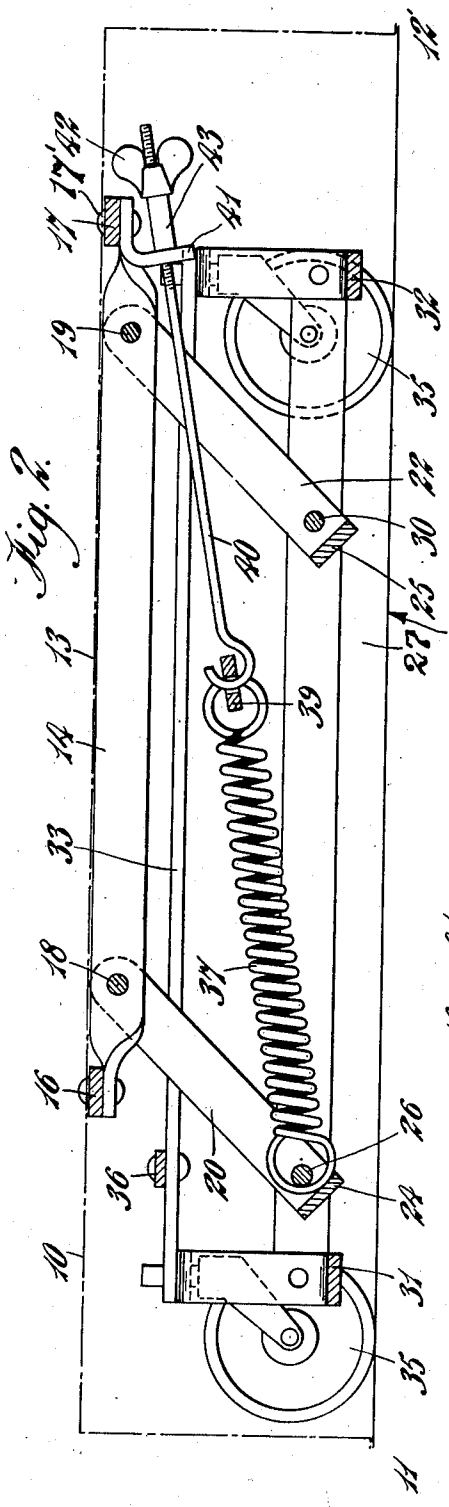

Fig. 2.

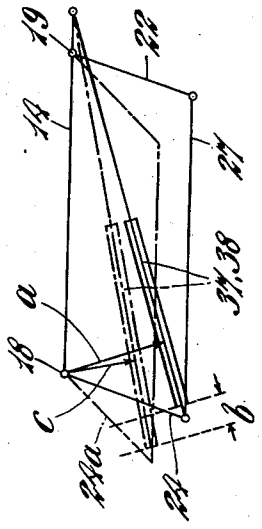

Fig. 4.

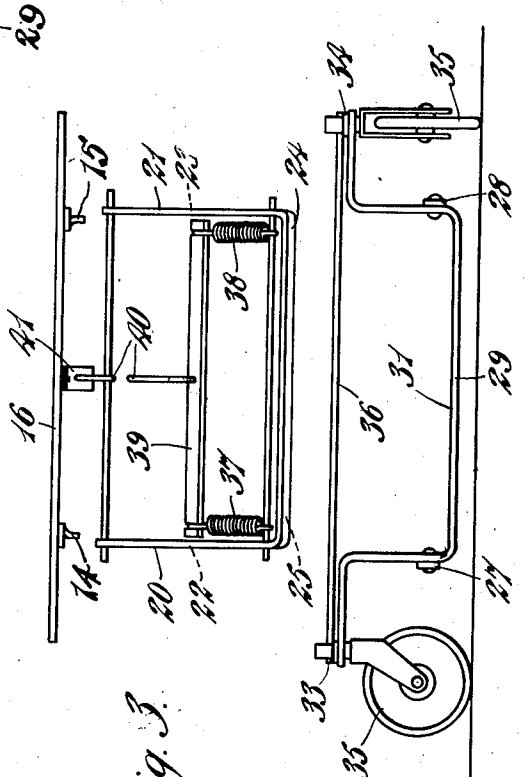

Fig. 3.

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UNITED STATES PATENT OFFICE

2,152,946

WHEELED SUPPORTING MEANS, PARTICULARLY FOR FURNITURE

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Application September 3, 1936, Serial No. 99,305
In Great Britain September 5, 1935

8 Claims. (Cl. 254—10)

This invention relates to wheeled supporting means particularly for furniture and the like, and it has for its primary object to provide an improved form and arrangement of fitting whereby wheels or castors associated with such articles of furniture or the like are only caused to bear the weight of said furniture or the like when they are operative. In this way advantages are obtained as will be hereinafter described.

The invention provides supporting means for furniture or the like, wherein a plurality of castors arranged to be raised and lowered relatively to the articles of furniture, are associated with spring means always tending to move the castors downwardly, but with a force which decreases as the castors are raised within their working range of movement. The invention consists in that the downward influence of the spring means, insufficient in the raised position of the castors to bear the weight of the article of furniture, is automatically increased by means of an associated pivoted linkage as the castors are lowered. In this specification movement of the castors is reckoned relative to the article of furniture and not to the floor, since in some examples of the invention the castors do not actually break contact with the floor.

The device may conveniently comprise a castor frame and a superimposed attachment frame, said frames being connected together for approaching and receding movement by means of parallel links defining a parallelogram in side elevation, the longer diagonal of said parallelogram being spanned by a tension spring which is extended when the castor frame is raised in relation to the attachment frame. In the preferred method of bringing the castors into operation, the supporting device is arranged so that upward force applied externally by the user neutralises a part of the weight of the article of furniture, and thus enables the castors to move downwardly relative to said article and so lift and maintain the latter out of contact with the floor. Alternatively, the castors may be arranged so as to be rendered operative by the actuation of a suitable lever or any other equivalent mechanical device whereby the castors are positively brought into and out of use.

One form of supporting means in accordance with the invention is illustrated in the accompanying drawings in which

Figure 1 is a sectional elevation showing the relative disposition of the working parts when the castors are operative;

Figure 2 is a view corresponding to Figure 1 with the castors out of use and the article of furniture resting rigidly upon the floor surface;

Figure 3 is an end elevation showing as an exploded view the attachment frame, connecting links and castor frame shown in Figure 1, looking in the direction indicated by the arrow A; and

Figure 4 is a diagram showing the action of the parallel linkage and the resilient means.

The embodiment illustrated in Figures 1, 2 and 3 is intended more particularly for use upon arm-chairs, easy-chairs and like articles of furniture of a fairly cumbersome and heavy nature, the lower part of said chair being indicated at 10 and being provided with legs or other rigid standing members, two of which are shown at 11 and 12. To the lower part of the chair 10 an attachment frame 13 is secured comprising a pair of longitudinal members 14 and 15 which are twisted at their ends and are joined by a pair of transverse bars 16 and 17 so as to constitute a frame. The side members 14 and 15 are drilled for the accommodation of a pair of pivot bars 18 and 19, each of which passes through holes formed in the free ends of limbs 20, 21, 22 and 23 of a pair of U-shaped link members 24 and 25, the shape of which will be seen more clearly in Figure 3. The link member 24 is pivotally mounted by means of a rod 26 which passes through holes in the lower parts of the limbs 20 and 21, the end portions of said rod 26 being accommodated in holes formed in the side members 27 and 28 of a castor frame indicated generally at 29, a corresponding rod 30 being fitted to the link member 25 so that in side elevation as shown in Figures 1 and 2 a parallelogram is constituted by the members 14, 20, 27 and 22.

The castor frame itself comprises also a pair of end transverse members 31 and 32 which are shaped as shown in Figure 3, and are connected at their extremities by a pair of longitudinal bars 33 and 34 so as to form a rigid structure for the support of four castors 35, one at each corner of the castor frame. These castors can conveniently be rather large in diameter so as to produce free running, and also to enable the article of furniture to be readily moved over the edges of carpets and other minor objects. The strength of the castors is not of particular importance, since they do not have to bear more load than the weight of the chair or equivalent. They are, moreover, only used when the furniture is being shifted, and it is, therefore, found in practice that comparatively inexpensive castors of large size, say three inches in diameter, give very good service.

The bars 33 and 34 are bridged by a stop bar 36 which serves to limit the downward movement of the castor frame 29 under the action of a pair of coiled tension springs 37 and 38, the lower ends of which are connected to the rod 26. At their upper ends the springs 37 and 38 are hooked over an equalizing bar 39, from the centre of which a tension member 40 extends obliquely upwards to the opposite corner of the parallelogram where it passes through a hole in a bracket 41 secured to the bar 17. The end of the tension member 40 is screw-threaded for engagement with a butterfly nut 42, which latter is rendered accessible by the provision of a spacing collar 43 so that the combined tension of the springs 37 and 38 can be adjusted in order that the turning moment imparted to the link member 24 about the axis of the rod 18 may be sufficient to overcome the weight of the article of furniture, thus maintaining the parts in the position shown in Figure 1. When the chair or equivalent has been wheeled to the position desired and a slight additional weight is imparted thereto, either by downward pressure of the hand or by the chair being occupied, the tension of the springs 37 and 38 is overcome and the chair 10, therefore, sinks to the ground until the whole weight of the chair is taken on the feet 11 and 12. The linkage then occupies the position shown in Figure 2 and as a result, although additional tension has been applied to the springs 37 and 38, the turning moment imparted thereby to the link member 24 is considerably less than it was previously. This will be seen by reference to Figure 4, in which the full lines indicate the position of the linkage members corresponding to Figure 1, while the broken lines indicate the corresponding parts in Figure 2. It will be observed that the turning moment initially applied to the link member 24 about its pivot 18 is represented by the product of the distance *a* multiplied by the tension of the springs 37 and 38, whereas when the link member 24 has been moved to the position indicated at 24*a*, the springs 37 and 38 have only been extended a distance *b*, while the measurement *a* has been reduced considerably to the distance indicated at *c*. This is due to the fact that the line of action of the tension springs 37, 38 progressively approaches a dead centre position as the frame 29 is raised, but, of course, never reaches such a position. As a consequence the pressure between the castors and the floor surface is never quite relieved, this resulting in immediate response when the chair or equivalent furniture is lifted, thus permitting the castors to move downwardly.

It will, of course, be realised that mechanical means may be included for raising and lowering the castors; and if desired such means may be arranged so that although the castors are brought into operation by the actuation of a lever, push rod or other mechanical contrivance, they are automatically released, thus lowering the article of furniture on to the floor surface when the normal weight on the castors is increased beyond a predetermined amount.

The improved device provides many advantages in practice, in addition to facilitating the movement of cumbersome pieces of furniture, one of these being the fact that said furniture can be formed with legs or other rigid bearing members having considerable area thus avoiding damage to the linoleum, carpets or other floor covering in addition to providing an exceptionally firm support for the article of furniture. As hereinbefore mentioned the device permits comparatively large wheels to be readily used, and in most cases these are quite invisible as they are positioned well underneath the chair or other piece of furniture. The use of large diameter castors also avoids the risk of seizure to a large extent, and as a consequence reduces the likelihood of damage to the floor covering through frictional abrasion, as for example often occurs when the small diameter rollers usually provided upon castors clog or seize and thus fail to function. The device, moreover, is particularly easy to attach and can be accommodated on the underneath of most easy chairs and settees as now manufactured, while it is, of course, adaptable for use with any other piece of furniture or other article which would normally be fitted with castors in order that it may be moved readily when required.

What I claim is:

1. In supporting means for furniture, an attachment frame adapted to be secured to an article to be supported, a castor frame, means swingingly connecting the frames, castors carried by the castor frame, and a spring connected with the frames and constantly urging the castor frame away from the attachment frame for engaging the castors with a supporting surface, said spring being swung toward a dead center position as the castor frame is moved toward the attachment frame whereby the downward urging action of the spring on the castor frame will be diminished.

2. In supporting means for furniture, an attachment frame adapted to be secured to an article to be supported, a castor frame, linkage swingingly connecting the frames, castors carried by the castor frame, and a spring connected with said frame and constantly urging the castor frame away from the attachment frame for engaging the castors with a supporting surface, downward movement of said article to be supported swinging the castor frame toward the attachment frame and the spring toward a dead center position whereby the downward urging action of the spring will be diminished.

3. In supporting means for furniture, an attachment frame secured to an article of furniture to be supported, a castor frame, U-shaped link members swingingly connecting the castor frame with the attachment frame, a spring connected with the frames and urging the castor frame away from the attachment frame, and castors carried by the castor frame and adapted for engagement with a supporting surface, downward movement of said article of furniture swinging the castor frame toward the attachment frame and the spring toward a dead center position whereby the downward urging action of the spring will be diminished.

4. In supporting means for furniture, a castor frame having longitudinal members, castors carried thereby, a superimposed attachment frame adapted to be secured to an article of furniture, parallel links swingingly connecting the frames for permitting raising and lowering movement of the castor frame with respect to the attachment frame, said parallel links having arms, rods extending through the arms of the links and through the longitudinal members of the castor frame for connecting the links to the castor frame, a bracket carried by the attachment frame, and a tension spring connected to one of the rods and to the bracket and urging the frame downwardly with respect to the attachment frame, downward movement of said article of

furniture swinging the castor frame toward the attachment frame and the spring toward a dead center position whereby the downward urging action of the spring will be diminished.

5. In supporting means for furniture, an attachment frame adapted to be secured to an article of furniture and having side members, a castor frame having longitudinal members, castors carried thereby, substantially U-shaped link members swingingly connecting the frames and having arms, rods extending through the arms and the side members and swingingly connecting the links with the castor frame, rods extending through the free end portion of the arms and the longitudinal members and connecting the castor frame and links with the attachment frame, a bracket carried by the attachment frame, a tension member connected with the bracket, an equalizing bar carried by the tension member at its free end, and a pair of tension springs normally urging the castor frame away from the attachment frame for engaging the castors with a supporting surface, downward movement of said article of furniture serving to swing the castor frame toward the attachment frame and the springs toward a dead center position whereby downward urging action of the springs on the castor frame will be diminished, said castor frame being moved by the springs without increasing the tension thereon upon lifting of the article of furniture.

6. Supporting means for furniture including a castor frame, castors carried thereby, a superimposed attachment frame, parallel links swingingly connecting the frames and permitting raising and lowering movement of the castor frame with respect to the attachment frame, the frames and links defining a parallelogram in side elevation, a tension spring connecting the frames and urging the castor frame downwardly with respect to the attachment frame, and means for varying the loading of the spring.

7. In supporting means for furniture, an attachment frame, a castor frame, means swingingly connecting the castor frame to the attachment frame, castors carried by the castor frame, a spring connected between the frames and normally urging the castor frame away from the attachment frame, said spring being mounted to act along a line approaching a dead center position upon rising movement of the castor frame whereby automatic reduction of the downward force applied to the castor frame will take place, and means carried by the castor frame for limiting downward movement thereof.

8. Supporting means for furniture including a frame adapted to be carried by an article of furniture having legs, a plurality of castors, a castor frame carrying the castors, means pivotally connecting the frames, means carried by the frames and normally urging the castor frame away from the first mentioned frame whereby the entire weight of the article of furniture will be supported by the castors below the legs, said castors being forced to inoperative position upon downward movement of the article of furniture for allowing said article of furniture to rest upon its legs.

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