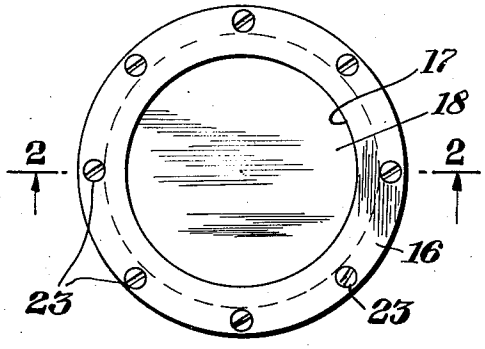
May 15, 1951 E. C. V. OLDOFREDI 2,553,269

SPRING BOX

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Fig. 1.



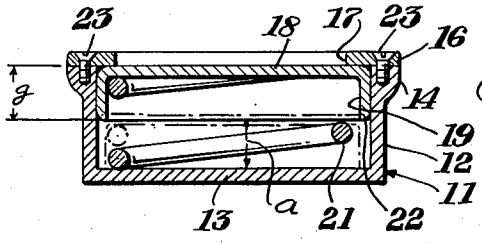
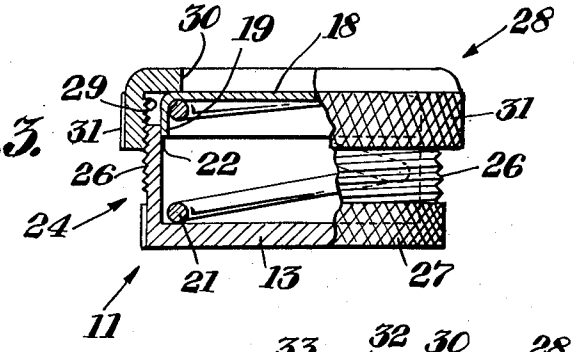


Fig. 2.

Fig. 3.



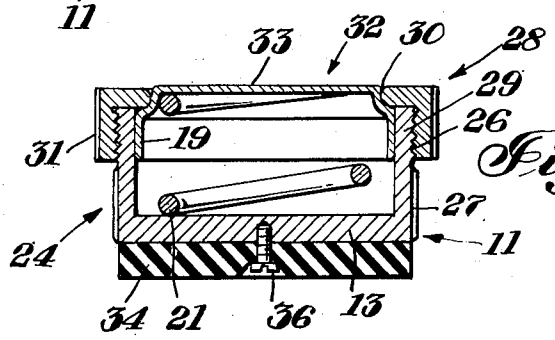


Fig. 4.

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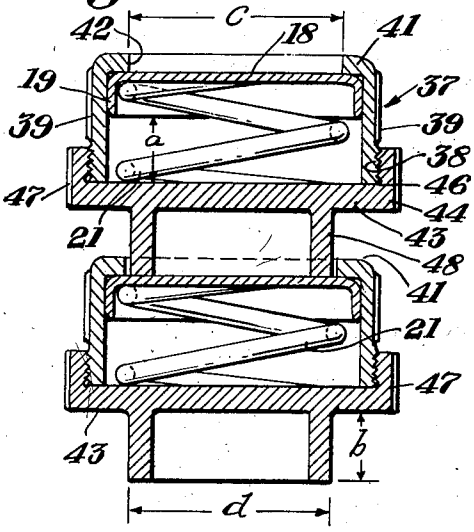
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Fig. 5.



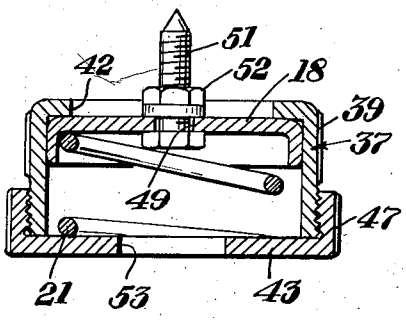
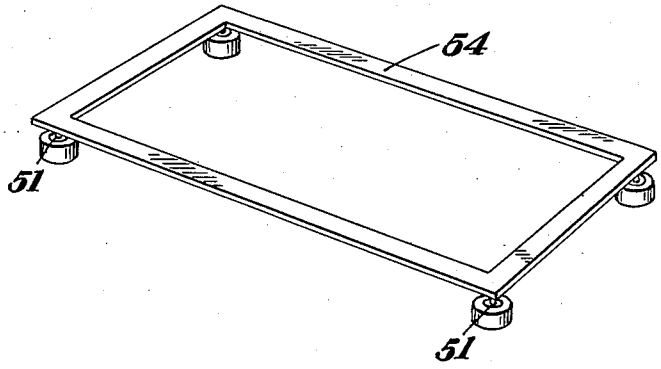


Fig. 6.

Fig. 7.



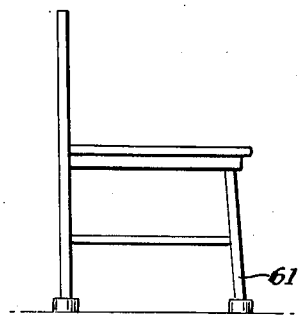


Fig. 8.

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SPRING BOX

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Fig. 9.

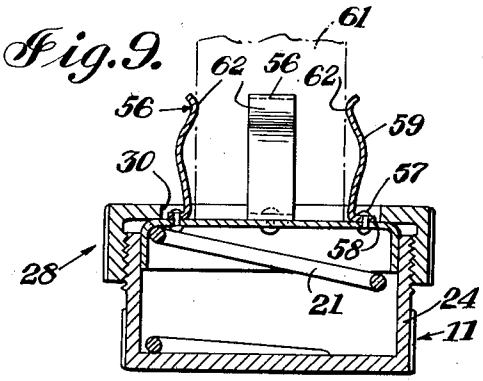


Fig. 10.

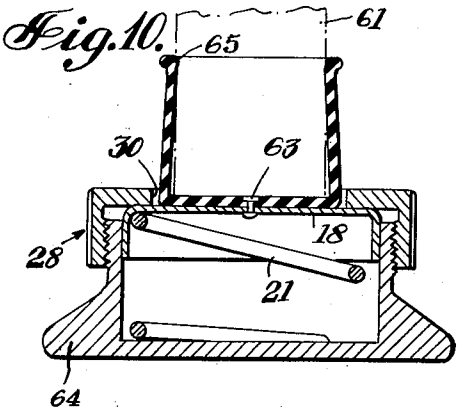


Fig. 11.

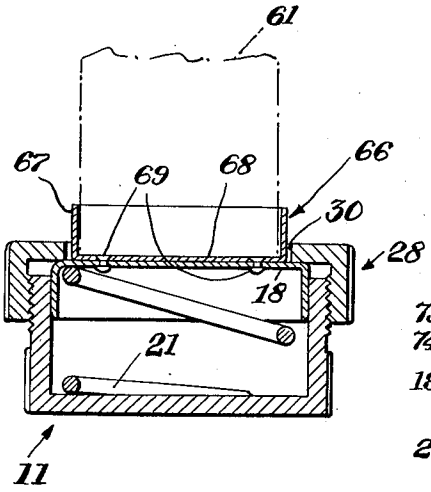
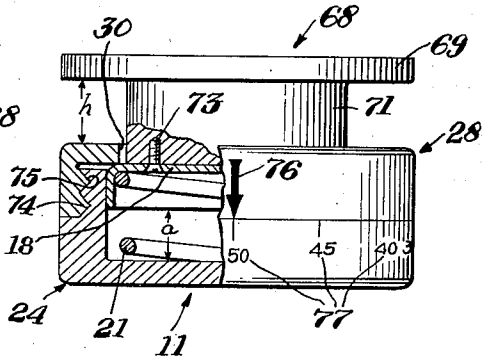


Fig. 12.



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UNITED STATES PATENT OFFICE

2,553,269

SPRING BOX

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Application November 5, 1945, Serial No. 626,651

7 Claims. (Cl. 267—1)

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The invention relates to spring boxes and relates more particularly to spring boxes in which one wall thereof is movable and may be depressed from the outside against the resilient force of a spring contained within the box.

One of the principal objects of my invention is to provide a spring box that may act as a resilient buffer for an article when placed adjacent thereto.

Another object is to provide a spring box that has adjusting means for accurately controlling the tension of its spring.

Another object is to provide such a device which may easily be fastened to any article.

A still further object is to provide a spring box adapted to fit interchangeably onto another spring box of the same design for creating a set of such boxes resulting in multiplied resiliency.

Further objects and advantages of the invention will be set forth in part in the following specification and, in part, will be obvious therefrom without being specifically referred to, the same being realized and attained as pointed out in the claims hereof.

Pressure springs, especially those of the helical type are utilized for a great variety of purposes: either for providing resiliency between two objects, or for acting as shock absorbers, or for other purposes; generally, a spring of that character is directly fastened onto the object to which it lends resiliency, and it is difficult to adjust the tension of that spring and cumbersome to replace the same if it is broken, damaged, or rendered useless as a consequence of fatigue.

In the present invention, however, an adjustable spring box has been designed housing a spring which bears against one movable wall that may be depressed from the outside against the force of that spring. Such a spring box may be inserted between two objects that require an intermediate buffer, or may be placed below an object and fastened thereto for providing a resilient support for the same; should the spring break or otherwise become useless, for instance through damage or fatigue, the entire box may easily be removed and replaced by a new one; or the spring box can easily be opened by removing a part thereof while the remainder is left fastened to an object, and the worn spring can be exchanged against a new one. Due to the adjustability of the spring tension, the degree of resiliency may be adapted to requirements without removing the box from its buffer location; and furthermore, a variety of boxes may be provided having identical or similar outside dimensions but different grades of tension springs, thus affording an excellent means for quickly testing and selecting a buffer of a high tension or a low tension, depending on the particular requirements.

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Such a spring box designed in accordance with my invention may advantageously be used for fastening the same to the underside of a heavy object, for instance, a piece of machinery or furniture where resiliency is required for shock absorbing or other purposes. For example, chairs may at once be converted into rocking chairs by attaching a spring box to each leg thereof. Preferably, boxes with one type resiliency may be attached to the front legs of a chair and boxes with another type of resiliency attached to the rear legs of the same chair, resulting in an excellent rocking chair.

In the accompanying drawings:

Fig. 1 is a plan view of a spring box;

Fig. 2 is a cross section thereof taken along line 2—2 of Fig. 1;

Fig. 3 is an elevational view partly in section showing a modification of the spring box of Fig. 2;

Fig. 4 is a cross section similar to Fig. 2 of a further embodiment;

Fig. 5 is a sectional view showing two spring boxes in telescopic engagement;

Fig. 6 is a sectional view of another modification showing a spring box and a fastening device attached thereon;

Fig. 7 is a perspective view of a frame and four spring boxes fastened to the underside thereof;

Fig. 8 is an elevational view of a conventional chair and spring boxes attached to the legs thereof;

Fig. 9 is a sectional view, similar to the sectional portion of Fig. 3, of a further modification showing a spring box which embodies resilient fastening means;

Fig. 10 is a sectional view of another modification which includes a wide base and resilient fastening means;

Fig. 11 is a sectional view of another modification showing a spring box and a hollow basin carried thereon; and

Fig. 12 is an elevational view, partly in section, of a still further modification showing a spring box supporting a plate.

In carrying the invention into effect in the embodiments which I have selected for illustration in the accompanying drawings and for de-

scription in this specification, and referring now particularly to Fig. 2, I provide a box 11 consisting of a tubular portion 12 and a base 13. Said tubular portion 12 may be of circular shape as indicated in Fig. 1 or may also be of square or hexagonal shape or any other of the commercially made tubular standard shapes. The upper part of said tubular portion 12 is widened into a rim 14 and carries a cover 16 thereon. Said cover 16 may be of annular shape as shown in Fig. 1, or may have a square or hexagonal shape corresponding to the tubular portion selected, and is provided with an opening 17 which in Figs. 1 and 2 is shown to be concentric with the outer contour of said cover. A movable member 18 is located within said box 11 and has an overturned edge 19 integral with said member 18. The outer contour of said member 18 may be circular or square or hexagonal, depending on the selection of the tubular portion 12. The member 18 is inserted in the box 11, with the overturned edge 19 projecting downward and in sliding engagement with the inside of said tubular portion 12. A helical spring 21 is located in said box 11 between the base 13 thereof and the underside of said member 18 and exerts pressure from said base against said member and pressing the latter against said cover 16.

The opening 17 of said cover 16 allows an object to contact from the outside said movable member 18 and to apply force thereon against the pressure of said spring 21, whereby said spring will be compressed and said movable member 18 will move for a distance, towards said base 13 of said box 11, the distance of movement depending on the exerted force.

The overturned edge 19 of said member 18 extends therefrom for a distance g which is slightly greater than the minimum axial length to which said spring 21 may be compressed. Thereby the movement of an object pressing said member 18 downward against the spring pressure will come to a stop before the windings of said spring 21 will lie man-on-man in the box (see dot-and-dash lines in Fig. 2 where that position is illustrated).

The spring 21 has only a few windings, preferably less than 2, which enables the member 18 to travel a maximum possible distance. The lowest point 22 of said overturned edge 19 is spaced for a distance a from the base when said member 18 is abutting against said cover 16 under the pressure of said spring 21 and represents the distance of the two extreme positions said member may occupy within said tubular portion 12 of said box 11, and an object which forces said member 18 against the pressure of said spring may move for said distance a.

The cover 16 is fastened to the rim 14 of the box 11 by means of screws 23, as shown in Figs. 1 and 2.

A modified spring box is shown in Fig. 3 which has several advantages over the box discussed before. A box 11 is shown consisting of a tubular portion 24 carrying a thread 26 on the outside near the upper end and a knurl 27 near the lower end thereof. A detachable cover 28 is shown thereon having a thread 29 on the inside which engages the thread 26 of the box 11 and is coacting therewith. An opening 30 in said cover is shown corresponding to the opening 17 of the cover 16 described hereinabove. A movable member 18 having an overturned edge 19 is located within the box 11 and in sliding engagement with the inside of said tubular portion 24, and

a spring 21, located between the base 13 of said box 11 and the underside of said member 18, presses the latter towards said cover 28. The cover 28 is provided with a knurl 31 on the outside. In this modification the detachable cover 28 may, with its threads 29, adjustably engage a greater or smaller amount of the threads 26 of the box 11 and thereby relatively lower or raise the position of the member 18 within the spring box assembly, whereby, in turn, the tension of said spring 21 will be increased or decreased respectively. The distance a of the lowest point 22 of the overturned edge 19 is variable in this modification. The upper winding of the spring 21 is located near the intersecting line of the member 18 and the integral overturned edge 19 thereof. The knurls 27 and 31 have been provided to facilitate the turning by hand of the cover 28 with relation to the box 11 for the purpose of adjustment.

In the modification shown in Fig. 4, I provide again a box 11 having a thread 26 and a knurling 27 and a detachable cover 28 carrying a thread 29 in engagement with said tubular portion 24 of said box 11, and the cover 28 has a knurl 31 on the outside and an opening 30 concentric with the contour of the box.

In addition, I provide on the movable member 32 an integral extension 33, which protrudes through said opening 30 of said cover 28 thereby furnishing a flush surface of the upper side of the spring box assembly. An overturned integral edge 19 of said movable member 32 is in sliding engagement with the inside of said tubular portion 24. A helical spring 21 is located between the base 13 of said box 11 and located with its upper winding on the underside of said extension 33 of said movable member 32. A shock absorber 34 is mounted to the underside of said base 13 and made of rubber or felt or the like and attached to the base by means of a screw 36. Said shock absorber 34 adds resiliency to the spring box assembly and, at the same time, provides a frictional surface thereon where the box is used as a supporting attachment to the underside of an object, such as a chair, shown in Fig. 8.

A different type of spring box is illustrated in Fig. 5. Mainly, the difference consists in the modified arrangement wherein here the cover, which retains the movable member within the box, is shown integral with the tubular portion and the base of the box is detachably connected to said tubular portion. In addition, two spring boxes in telescopic engagement are illustrated in this view and explanation therefor is given further below.

In describing the features of this modified type of spring box in detail, I provide a tubular portion 37 which carries on the outside near the lower end a thread 38 and near the upper end a knurl 39. A cover 41 is integral with said tubular portion 37 at said upper end and has an opening 42. A detachable base 43 is mounted on the tubular portion 37 near said lower end thereof and is provided with a cylindrical portion 44 carrying a thread 46 on the inside and a knurl 47 on the outside thereof and said thread 46 is in engagement with the thread 38 of said tubular portion 37. An annular protruding member 48, integral with the base 43, is shown extending therefrom on the outside.

A movable member 18 with an integral overturned edge 19 is shown in sliding engagement with the inside of said tubular portion 37, and a spring 21 exerts pressure between said detachable

base 43 and said movable member 18 for pressing the latter towards said cover 41 which is integral with said tubular portion 37.

One spring box of this type may be inserted into another similar one, as shown in Fig. 5; thereby a combination is provided which yields twice the resiliency of that of a single box and which doubles the distance *a* an object may travel while depressing the movable members 18 of that spring box set.

In this combination the protruding member 48 of one spring box protrudes through the opening 42 in the cover 41 of the other spring box; therefore the lateral dimension *d* of said protruding member 48 must be smaller than the lateral extension *c* of the opening 42, for permitting frictionless protrusion.

Furthermore, the length *b* for which said protruding member 48 extends from said base 43 must be at least equal to and preferably larger than the minimum distance *a* between the extreme positions of said movable member 18, representing the path of the same, within the tubular portion 37, for preventing the base 43 of the upper spring box to abut against the cover 41 of the lower spring box before the spring 21 of the upper box has been compressed to its allowable minimum axial height, when pressing against the lower box under outside force.

The base 43 is detachably mounted on the tubular portion 37 and through relative rotation of the base on the tubular portion 37 the spring tension may be adjustably varied.

A whole set or chain of spring boxes may be combined in that way for providing simple resilient means with ample resiliency corresponding to the number of spring boxes employed. Very effective buffers may thus be created that are interchangeable and simple to replace should failure occur in any one box. In addition, each movable member 18 of one spring box may be secured with relation to the base 43 of the adjacent spring box by means disclosed hereinbelow.

As an example, the frame of a heavy machine that should be protected from shocks may be blocked up by such a set of spring boxes with more boxes placed under the heavier parts of the frame, thereby compensating for the unequal weight distribution in the machine, or a loading platform may be supported by such boxes, with the number of boxes per set depending on and accordingly varying with the anticipated load estimate.

In Fig. 6, a spring box is shown, which is similar to the boxes shown in Fig. 5. In addition, the movable member 18 has an aperture 49 through which a screw 51 protrudes outwardly and is held thereon by a nut 52. The detachable base 43 is also provided with an aperture 53 which, however, is of a larger size than the aperture 49 of the member 18. Said aperture 53 is provided for permitting the passage of the screw 51 and of a tool for fastening said screw 51 to the member 18. For that reason, the aperture 53 should be larger than the aperture 49.

In Fig. 7, a rigid frame or base 54 is shown which has four corners, and a spring box is attached to each corner at the underside thereof. Screws 51 are shown providing the fastening means from said spring boxes to the frame 54.

Such a frame 54 can be utilized as a shock absorber for machinery or the like by placing the frame of a machine directly thereon and securing it thereto; or as a support for a loading platform to provide means for preventing

breakage in unloading breakable articles from higher vehicles, etc.; or, still further, for a spring foot rest or a base for temporarily placing a baby crib thereon, thus providing simple, portable rocking means.

My invention lends itself to entirely novel and yet very useful application. For instance, a chair may be converted into a rocking chair by securing one spring box to each leg thereof, as illustrated in Fig. 8. The attachment may be carried out by securing the screw 51 shown in Fig. 6 to the end of each leg and thereby providing the chair with rocking means; other modifications of fastening the spring boxes to the legs of a chair are described later on.

It is convenient to adjust the tension of the spring boxes which are fastened to the front legs so as to differ from those at the rear legs of the chair, because the weight of a person seated in a chair bears heavier upon the rear legs than those in front. Therefore, the spring boxes fastened to the rear legs should be provided with greater tension than those fastened to the front legs. Individual adjustment of each box will further enhance the comfort of a person using such a chair with rocking means. At the same time such a converted rocking chair is more stable than a rocking chair of the conventional type because it will not rock unless a person seated therein engages it in such movement. Further, it is safe for use by children or invalids because it cannot overturn in either direction; and because the rocking motion is mostly directed upwards and only slightly backwards, it can be used in dining places, theatres and other public places without annoyance.

As shown in Fig. 6 and explained hereinabove, fastening means may be secured to the movable member 18 and project therefrom towards the outside for securing the spring box assembly to an object. The particular fastening means referred to before is a screw 51 which may be a bolt or a wood screw and which is only representative of fastening means; and it will be understood that I do not limit myself to the embodiments shown and described herein for the purpose of illustration save as defined in the claims hereof. Other suitable fastening means may be substituted for the screw 51 and, for some purposes, it may be advantageous to employ fastening means that are more easily applied and allow a simple mode of fastening a spring box to an object and subsequently detaching it therefrom.

If it is desired, for instance, to convert a chair quickly into a rocking chair and again to reconvert it into an ordinary chair, it is practical to provide the spring box with frictional or other speedy fastening means, which at the same time will ensure sufficient adhesion to the object so that the spring box may not detach itself therefrom.

In carrying the above into effect, and referring now particularly to Fig. 9, I provide the member 18, moving within said tubular portion 24 of said box 11 and in sliding engagement with the inside thereof, with a plurality of resilient clamp members 56 made of spring steel or the like and protruding through the opening 38 of said cover 28. Said clamp members 56 are arranged along the periphery of a circle on said movable member 18 and each is secured from the outside thereto by means of a rivet 57 or by other suitable means. Each clamp member has a leg 58 at one end located adjacent said movable member 18 and secured thereto, and

a body 59 substantially perpendicular thereto and slightly curved first outwardly and thence inwardly with respect to the periphery of the circle along which each of said clamp members 56 is arranged, and is finally at its other end bent outwardly again for a small portion to facilitate the receiving of an object; a leg of a chair, constituting an illustration of such an object is shown in dash-and-dot lines in Fig. 9 and is designated 61. The spring box will be fastened to the leg 61 as the inwardly turned portion 62 of each clamp member 56 engages the surface of said leg 61. The circle along which said clamp members 56 are arranged on the movable member 18 has a smaller contour than the outline of the opening 30 of said cover 28 for permitting said clamp members to protrude therethrough and freely to pass through the same when said movable member 18 is moved by the weight of the outside object against the force of said spring 21.

Another modification embodying fastening means for detachably fastening the spring box to an object is shown in Fig. 10. Here the plurality of resilient clamp members 56 are replaced by a single hollow member 65 made of rubber or the like and fastened from the outside to said movable member 18 by means of a countersunk rivet 63 which is centrally located. Said hollow member 65 extends upwardly from said movable member 18 and has substantially straight sidewalls and protrudes through said opening 30 of said cover 28 and has throughout its length a smaller lateral dimension than said opening 30 for permitting it to pass therethrough. A leg 61 is shown, in dash-and-dot lines, frictionally engaged by said hollow member 65. The spring box can be quickly fastened to said leg 61 and, at will, be speedily detached therefrom.

In addition, the body of the box in this modification includes a broad base 64 to increase the stability of the spring box assembly.

Instead of a leg of a chair, the end of a cane or a crutch may be inserted into these resilient fastening means of the clamp member 56 type or the hollow member 65 type for speedily attaching a spring box thereto, thus providing greater comfort to the person forced to use such supporting means.

Where it is difficult or otherwise impractical to use a permanent fastening means or detachable fastening means, and where it is yet desirable to locate a leg of a chair or other object with relation to the spring box, it may be advantageous to employ a hollow basin 66 shown in Fig. 11 in which the leg 61 of the chair may rest. The sidewalls 67 of said basin 66 may either frictionally or otherwise engage the surface of said leg, or the leg may simply stand therein without being engaged by the sidewalls 67 of the basin 66, except that the sidewalls 67 prevent the leg from sliding off the spring box.

Said basin 66 having a sidewall 67 and a bottom 68, is secured with the latter to the outside of said movable member 18 by means of countersunk rivets 69; and the basin 66 protrudes through said opening 30 of said cover 28 and throughout its lateral dimension permits an easy passing through the same.

In addition to what has been said heretofore, a spring box may also be employed to lend resiliency to a great variety of objects. In order to facilitate supporting of heavy objects, such as loading platforms, it may not be important to fasten the spring boxes to the underside thereof as the weight of the object will make such attachment superfluous; at the same time, in order that the object may properly exert pressure against said movable member 18, in the absence of fastening means which extend therefrom, it will be necessary to provide connecting means between the object and the movable member, as in most cases the movable member 18 does not protrude beyond the outer contour of the spring box assembly. For that reason, either the object may carry protruding members on the base for contacting the movable member when placed on top of a spring box, or preferably each box may be provided with a connecting member permanently fastened to the movable member and protruding through the opening of the cover towards the outside of the spring box assembly.

A connecting member of that type fastened to the outside of said movable member 18 is shown in Fig. 12 and designated 68. Said connecting member 68 consists of a plate 69 provided with a spacer 71 thereon which is secured to the movable member 18 by means of two screws 73. Said spacer 71 protrudes through said opening 30 of said cover 28 and has a smaller contour than said opening, and said plate 69 is spaced from the outside of said cover 28 for a distance h. Said distance h is at least equal to but preferably larger than the dimension a representing the distance which said movable member 18 may travel within said box 11 while compressing the spring 21. Thereby the plate 69 will be prevented to come to a stop before the spring is entirely compressed when force is applied from the outside against said plate 69.

A platform or other object may be placed on top of said plate 69 and thus resiliently be supported by the same.

In Fig. 12 the tubular portion 24 is shown to be provided with a thread 74 of large pitch and the cover 28 has a corresponding thread 75. A single rotation of the cover 28 on the tubular portion 24 will thereby be sufficient to cover the entire range of adjustability of spring tension within this box.

Said cover 28 has on its outside a marker 76 which corresponds to a peripheral graduation 77 carried on the outside by said tubular portion 24 near the lower end thereof. The graduation is marked to designate force (pounds, or fractions thereof) and the marker 76 will at a given position of the cover 28 be adjacent a point of said graduation 77 corresponding to the momentary pressure of said spring 21, which pressure may thus directly be read at each position of the cover.

The provision of the scale or graduation 77 and its direct relation to the spring pressure in connection with the position of the marker 76 of said cover 28 enables this spring box to be used as a muscle exerciser. For instance, a person who wishes to exercise the muscles of one hand will turn the cover so as to compress the spring to a point where he is barely able to depress the plate 69 from the position it then holds. Beginning at this point and exercising each day he will subsequently find that he can soon start his exercise from a point of greater pressure, as his muscles develop. The exact pressure he is able to overcome at the start of each exercise may be directly read on the scale 77 by means of the marker 76.

Other muscles may also be trained by using the device as an exerciser. The device may be inserted between both hands and the exercise performed by endeavouring to press the plate 69 held by one hand in the direction of the base of the spring box which is held by the other hand. Again, the starting point may be adjustably varied and directly read on the scale.

Similarly, foot muscles may be exercised and many other muscle exercises be performed with that type spring box. The device lends itself particularly well for persons who wish to regain the original strength of their muscles after the latter have been temporarily kept inactive.

Certain of the advantages of the invention have already been herein referred to. It may be useful, however, particularly to mention the extremely simplified construction of these utility spring boxes devised for inexpensive mass production. Each part of the box except the spring may be made of any metal, plastics, wood, or composition material, and it can be finished plainly or elaborately according to the use to which it will be put.

I do not limit myself to the particular details of construction set forth in the foregoing specification and illustrated in the accompanying drawings, as the same refer to and set forth only certain embodiments of the invention and it is obvious that the same may be modified, within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to be secured by Letters Patent, is as follows:

1. A spring box, comprising in combination, a tubular portion having a base at one end thereof, a cover connected to the other end of said tubular portion, said cover having an opening therein and being adjustably spaced from said base, a compressible spring on said base within said tubular portion, and a movable member disposed within said tubular portion and supported upon said spring, and including a flat bottom and a continuous flange extending downwardly from said bottom for a distance slightly greater than the minimum distance to which said spring may be compressed, said flange being oppositely arranged with relation to said base and being, in all positions of said movable member, in sliding engagement with said tubular portion, for providing a stop for the movement of said member when moved by outside force against the pressure of said spring.

2. A spring box, as claimed in claim 1, together with, said cover and tubular portion each carrying a thread and being in threaded interengagement and bearing an indicating device including gradations on one of said thread carriers and a marker on the other, said cover adapted to be rotated on said tubular portion whereby the pressure of said spring will correspondingly be changed and and the marker will be brought adjacent subsequent points relative to said gradation, in accordance with the pressure exerted by said spring in the position to which said cover has been adjusted on said tubular portion.

3. A spring box, as claimed in claim 2, together with, a platform supported above said cover and disposed on the exterior of said tubular portion and cover and secured with relation to said movable member and spaced therefrom for a distance sufficient to permit unobstructed movement of said movable member within said tubular portion, for supporting an object.

4. A spring box, as claimed in claim 1, together with, said bottom having a portion, extending upwardly into said opening of said cover and being flush with the upper surface thereof in the uppermost position of said movable member.

5. A spring box, as claimed in claim 1, together with, an extension protruding downwardly on said base corresponding in shape to, but having a smaller contour than, said opening in said cover, whereby said spring box may be superposed onto another, in compound arrangement.

6. A spring box, as claimed in claim 1, in combination with, clamp means secured to said bottom and protruding through said opening upwardly to the exterior of said cover, for removably clamping to said movable member an object to be supported thereon.

7. A spring box, as claimed in claim 1, in combination with, a screw mounted on said bottom extending upwardly through said opening, said base having opposite said screw an aperture sufficiently wide for passage of tools to fasten said screw onto said cover.

EDGAR C. V. OLDOFREDI.

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