Sept. 13, 1960 J. J. HAMMOND ET AL 2,952,485

MUSIC STAND

Filed June 21, 1956 2 Sheets-Sheet 1

Fig. 1.

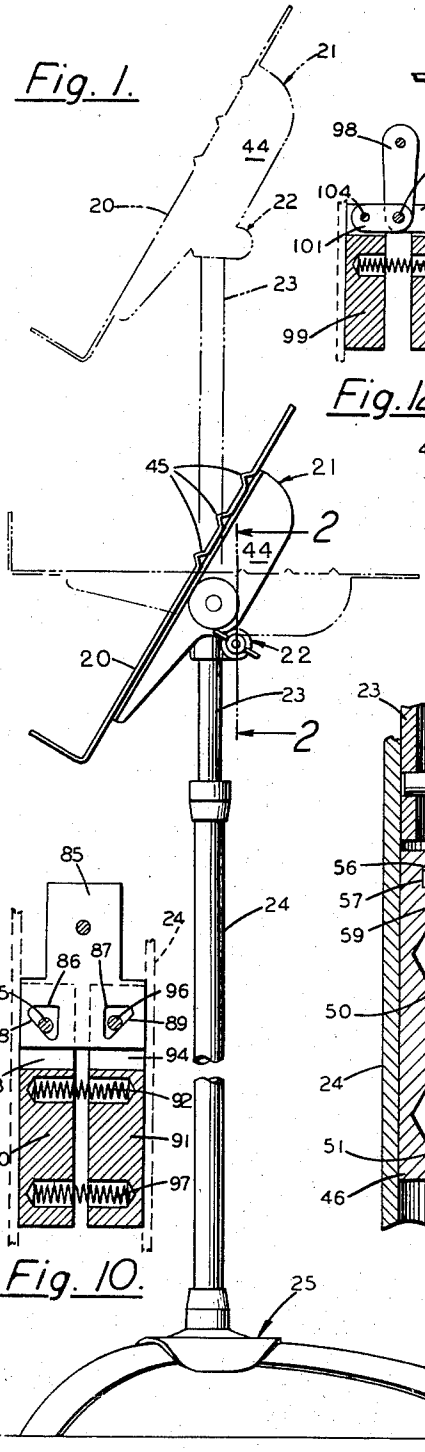


Fig. 10.

Fig. 2.

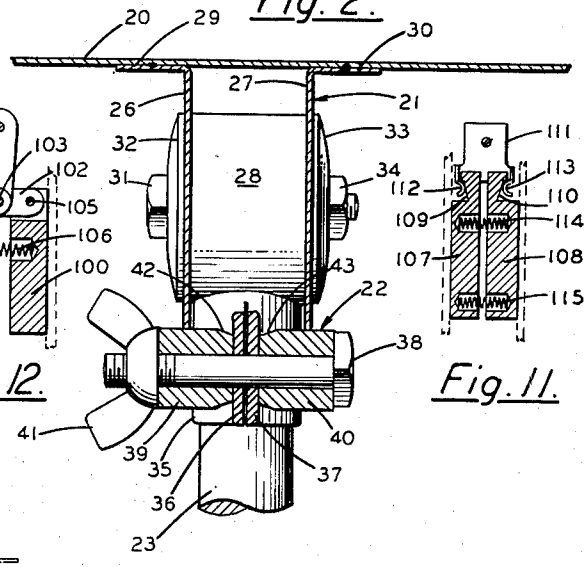


Fig. 12.

Fig. 11.

Fig. 3.

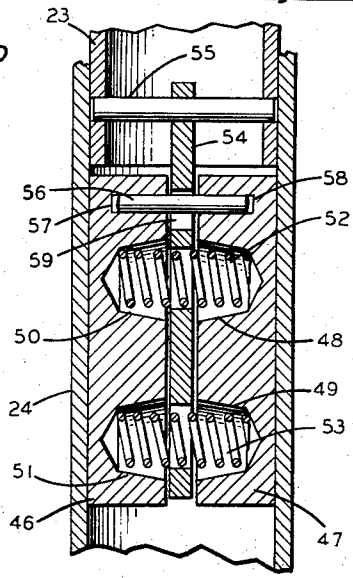
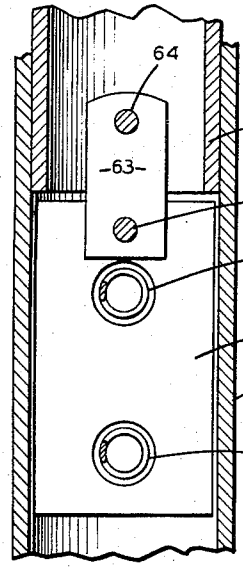


Fig. 4.



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Fig. 5.

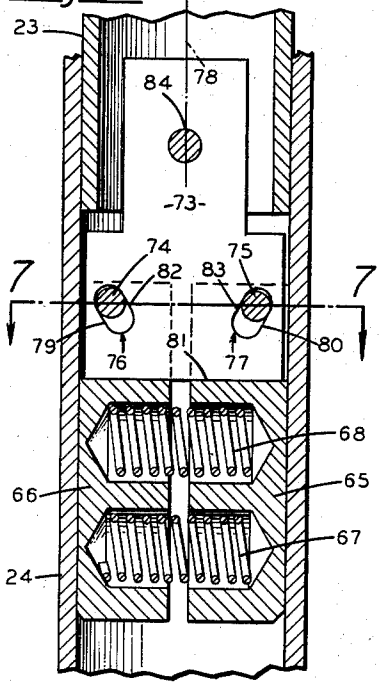


Fig. 8.

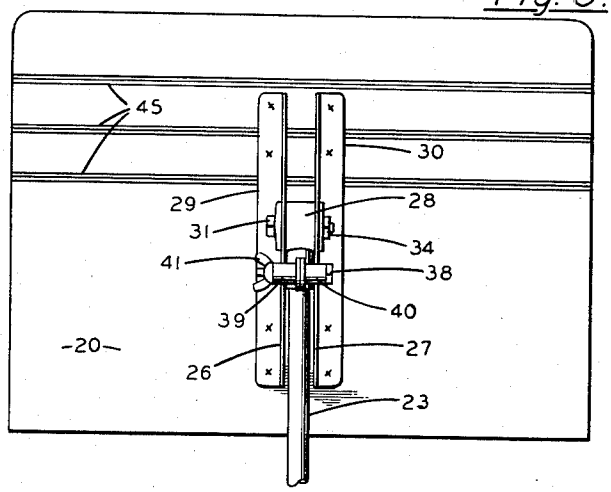


Fig. 9.

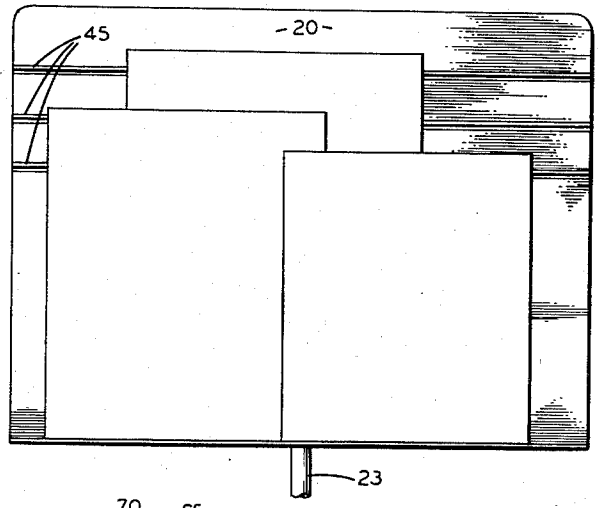
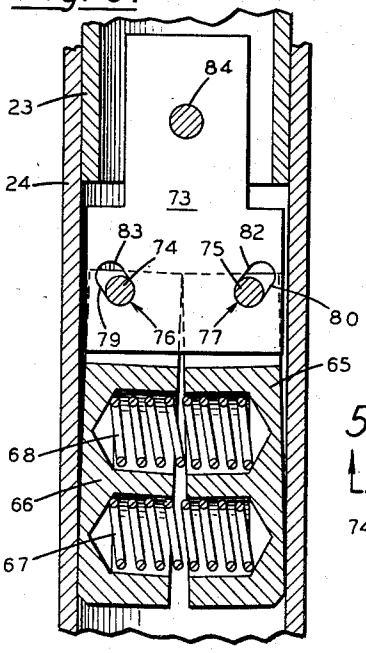


Fig. 6.



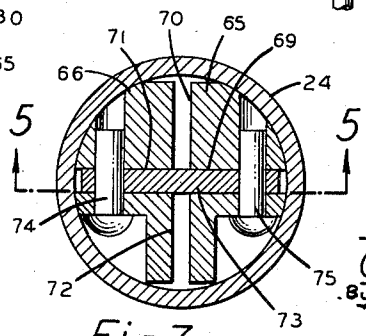


Fig. 7.

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MUSIC STAND

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4 Claims. (Cl. 287—58)

This invention has been developed as a result of the problems encountered in the design of a so-called "concert" type music stand. These devices differ from other music stands primarily in that they are adapted for heavy duty, and are constructed to withstand considerable abuse. They are also ordinarily somewhat larger than those ordinarily provided for home use.

One of the features that is most desirable in the concert-type music stands is its ready adjustability to a desired height. In an orchestra of fifty to a hundred persons of assorted sizes, each will have his own individual requirements as to the proper elevation at which the pages of the music are best positioned to accommodate his particular physical height, and also the peculiarities of his vision. It is obvious that a height adjustment should certainly not require the use of a set of tools, or the entrance of the orchestra onto the stage would shortly be followed by a scene similar to a large garage. Manually-adjustable clamping mechanisms have the distinct disadvantage that they tend to become either too loose or overly tight. In the latter case, any person having less strength of the hand than the previous user of the clamp would encounter considerable difficulty in establishing his required adjustment. Stops and mechanical dogs tending to establish a plurality of predetermined height positions also have the shortcoming of practically never providing the exact position desired, and also of tending to create objectionable sounds.

Frequently, a musician will decide that his stand is improperly placed during the progess of the performance, and no mechanism should be involved in the music stand which would introduce undesirable sounds into the orchestral mixture.

Ideally, it should merely be necessary for the musician to grasp the music stand and directly pull it to the desired height, with no further action on his part being required to maintain that position. Friction-type arrangements for maintaining the adjusted position of a telescoping supporting leg sytem are well known. Applicant has provided a friction system for this purpose which has the advantage of a high degree of reliability coupled with a non-chattering movement. In addition, the detailed design features of the components of the device are such that the assembly of the unit in the first instance at the factory is a procedure of ultimate simplicity.

In the preferred form of the invention, a differential actuating force is established between the force required to elevate the device and that necessary to depress it. One of the troubles encountered in the use of a friction device is the fact that a tremendous amount of force is required to increase the height in comparison with the amount of load which is supported on the top of the stand. For example, if the friction device should be adjusted to accommodate a weight of ten pounds on the stand, the elevation of the device (with the load in position) must overcome not only the ten pounds of friction but also the ten pounds of load. This, of course, results

in a force of at least double the weight which is supported. Usually, the case is even worse than this. A suporting load of ten pounds will usually require a safety factor so that the frictional force would be something in the order of at least fifteen pounds. When the designed load requirement reaches twenty pounds, the force necessary to increase the height of the stand becomes such that a considerable feat of strength is required unless one is careful to brace his feet and lift in the fashion of a skilled piano mover. This invention provides an arrangement in which a frictional system capable of supporting twenty pounds can be constructed to require between five and ten pounds (plus the load) to move it in a direction to increase the height. Carefully controlled production and design can even increase this differential. Several different arrangements for providing the differential are described herein in connection with modified forms of the invention.

This invention also provides the fitting for mounting the usual supporting panel constituting the top of the stand on the leg structure. The clamping device used to secure the connection to the leg mechanism is modified in such a manner that it also operates as a stop which establishes a horizontal attitude of the supporting panel so that the device can conveniently be used as a conductor's stand. The presence of the stop permits the conductor to place items of considerable weight near the edge of the device, which would tend to cause the top panel to rotate into more solid engagement with the stop.

The several features of the invention will be discussed in detail through an analysis of the particular embodiments illustrated in the accompanying drawings. In the drawings,

Figure 1 presents a side elevation of a music stand embodying this invention, showing an increased height adjustment in dotted lines, and also showing the adjustment of the attitude of the supporting panel in dotted lines.

Figure 2 is a section taken on an enlarged scale on the plane 2—2 of Figure 1.

Figure 3 shows a section on an enlarged scale of the frictional system provided by one form of the invention for maintaining the adjustment of the telescoping leg system.

Figure 4 illustrates a modified form of the frictional system from that indicated in Figure 3.

Figure 5 presents a further modified form of the frictional holding system.

Figure 6 illustrates the position taken by the components of the Figure 5 mechanism when the device is being elevated.

Figure 7 presents a section taken on the plane 7—7 of Figure 5.

Figure 8 is a rear view of the upper end of the music stand, showing the mounting bracket.

Figure 9 is a front view of the upper end of the music stand.

Figures 10, 11, and 12 (refer to Sheet 1) each show modified forms of the invention with regard to the construction of the frictional adjustment-maintaining system.

Referring to Figure 1, the illustrated music stand includes a music-supporting panel 20 provided with the bracket 21 secured to its rear surface, the bracket 21 serving as a coupling to the pivot fitting generally indicated at 22. This fitting is secured to the upper end of the inner tube 23 of the telescoping leg assembly, which also includes the outer tube 24. A base of any convenient description, as shown at 25, is fixed with respect to the bottom of the outer tube 24, and provides a firm foundation for the entire device.

Referring particularly to Figure 2, the bracket 21 is

formed by spaced angle members which provide parallel flanges 26 and 27, which embrace the bearing member 28. The angle members providing the flanges 26 and 27 are preferably secured to the supporting panel 20 through the spot-welding of the laterally-extending flanges 29 and 30, respectively. A pin or bolt 31 traverses suitable holes in the flanges 26 and 27, and also a hole through the axis of the bearing member 28. Washers 32 and 33 are preferably crowned somewhat so that the tightening of the nut 34 will apply a resilient force to the flanges 26 and 27 against the axially-opposite faces of the bearing member 28 to create a yieldable clamping action for maintaining the attitude of the supporting panel 20.

A split collar 35 is fixed with respect to the bearing member 28, and is provided wtih substantially radially-extending members 36 and 37 on opposite sides of the "split." A bolt 38 traverses the holes in the members 36 and 37, and also the spacing sleeves 39 and 40. A wing nut 41 is provided to facilitate the tightening of the bolt 38 manually. The spacing collars 39 and 40 are preferably provided with an annular bevel as indicated at 42 and 43, respectively, which permits the axis of the bolt 38 to be placed nearer to the axis of the tube 23 without interference with the intersection of the members 36 and 37 and the annular portion of the split collar 35. When the supporting panel 20 is rotated into the horizontal position shown in dotted lines in Figure 2, the portions 44 of the flanges 26 and 27 come into abutting relationship with the side of the spacing sleeves 39 and 40 to limit further rotation of the supporting panel in a clockwise direction, as is shown in Figure 1. The supporting panel 20 is also provided with spaced ridges 45 for the purpose of elevating the edges of the papers positioned on the stand from the planar surface of the supporting panel 20 to facilitate gripping the music with the fingers. Such elevation should preferably take place near the top of the page, and the three ridges are provided to properly support musical scores of varying sizes.

Referring to Figure 3, a mechanism is illustrated which frictionally maintains the height adjustment of the telescoping leg system. A pair of bearing shoes 46 and 47 is similarly formed, and preferably machined or cast from a permeable material capable of retaining lubricant. One type of such material is commonly identified by the trademark "Oilite," and is a porous bronze material. A pair of frusto-conical holes is formed in each of the bearing shoes, as shown at 48—49 (in the shoe 47) and 50—51 (in the shoe 46). The spring 52 has its opposite ends received in the holes 48 and 50, respectively, and it is preferred that the diameter of the spring should be roughly equal to the minor diameter of the frusto-conical portion so that the opposite ends of the spring be relatively fixed with respect to the bearing shoes. Similarly, the spring 53 is positioned with its opposite ends in the frusto-conical holes 49 and 51.

A link 54 is positioned between the bearing shoes 46 and 47, and is provided with holes which fit fairly closely with the outside diameter of the springs 52 and 53. The link 54 is coupled to the inner tube 23 by the cross pin 55, which is maintained in its position by the confinement within the outer tube 24. A lifting force applied to the inner tube 23 tending to increase the height of the stand will result in an upward pull on the link 54, which will be transferred to the bearing shoes 46 and 47 through the engagement of the link with the springs 52 and 53. This action will deflect the spring so that the axes thereof tend to bow upwardly within the limits provided by the frusto-conical holes 48—50, and will thereby lessen the degree of biasing action which the springs exert on the bearing shoes to maintain a frictional resistance to motion along the inside of the tube 24. The use of cylindrical holes engaged by hour-glass-shaped springs would be functionally equivalent to the cylindrical springs and frusto-conical holes illustrated. Since it is desirable to maintain the action of the springs at the maximum during the application of down loading, the transverse pin 56 is positioned within opposite holes 57 and 58, and this pin also traverses the slot 59 in the link 54. The vertical length of this opening is such as will permit the lateral deflection of the springs on the application of upward force to the link 54, but will limit the downward movement of the link with respect to the bearing shoes to a position in which the axes of the springs 52 and 53 are substantially horizontal and disposed in a straight line.

Referring to Figure 4, a modified form of the invention is illustrated in which no differential force is provided. The outer tube 24 accommodates bearing shoes 60 similar in form to those shown in Figure 3. The springs 61 and 62 are also similar to those of Figure 3, but may be received in either cylindrical or frusto-conical holes. The link 63, however, is merely connected directly to the cross pin 64, and no freedom of axial movement of the link 63 with respect to the bearing shoes 60 is provided. The link 63 is coupled to the inner tube 23 by the cross pin 64 through the same system as is shown in Figure 3.

Referring to Figures 5, 6, and 7, a modified form of the invention is illustrated in which a high degree of differentiation can be provided between the upward and downward forces required to move the bearing shoes 65 and 66 along the inside of the tube 24. Springs 67 and 68 are received within opposite holes in the shoes 65 and 66 in the same fashion as is shown in Figure 4.

A slot 69 is machined in the upper end of the bearing shoe 65 (refer to Figure 7) in a direction perpendicular to the inner face 70, and a similar slot 71 is provided in the upper end of the shoe 66 generally perpendicular to its inner face 72. A link 73 is received within the slots 69 and 71. Pins 74 and 75 intersect the slots 71 and 69, respectively, and connect the link 73 with the bearing shoes 65 and 66.

The slots 76 and 77, through which the pins 74 and 75 engage the link 73, are disposed at a slant with respect to the axis 78 of the tubes 23 and 24. These slots provide the surfaces 79 and 80 through which lifting forces applied to the link 73 are transferred to the pins 74 and 75. The attitude of these slots is such that these lifting forces tend not only to move the bearing shoes upwardly, but also inwardly, and thereby decrease the intensity of the frictional engagement between the shoes and the inner walls of the tube 24. On the application of down load, the lower edge 81 of the link 73 will come into abutting relationship with the bottom of the slots 69 and 71 prior to the time at which the upper surfaces 82 and 83 of the slots will tend to apply an additional outward force which might create a jamming action. As a result of this structure, the down load supported by the frictional system will be opposed by the friction created solely by the springs 67 and 68. Upward force tending to increase the height will encounter less resistance because of the tendency of the mechanism to decrease the effectiveness of the springs on that direction of movement. As in the other cases, the upper end of the link 73 is coupled to the inner tube 23 by a cross pin indicated at 84 in Figures 5 and 6. Figure 6 indicates the condition of the system as upward force is being applied. Close examination of Figure 6 will verify the fact that the upper ends of the shoes 65 and 66 have been drawn together, and that the lower ends are still bearing against the inner walls of the outer tube. The drag created at this point is sufficient to maintain the contracting effect of the engagement of the pins 74 and 75 with the respective inclined slots 76 and 77.

Referring to Figure 10, a device is shown which operates in similar fashion to that illustrated in Figures 5 and 6. The outer tube 24 is shown in dotted lines for reference. A link 85 is provided with the generally triangular shaped openings 86 and 87, having slanted lower

surfaces 88 and 89, respectively. Upward force applied to the link 85 has the same tendency to draw the upper ends of the shoes 90 and 91 together against the action of the spring 92 as in the case of the Figure 5 mechanism. On the application of download, however, sufficient clearance is provided in the slots 93 (in the bearing shoe 90) and 94 (in the bearing shoe 91) for the upper ends of the slots 86 and 87 to come into direct engagement with the pins 95 and 96. The upper ends of the slots 86 and 87 are substantially horizontal, and have the same effect as the engagement of the bottom of the link 73 in the arrangement shown in Figure 5. If desired, the surfaces provided by the upper edges of the slots 88 and 89 may be inclined slightly so as to just about offset the effects of friction of the pins 95 and 96 against the material of the link 85, thereby eliminating any tendency for such friction to interfere with the full release of the action of the spring 92. Such an angular relationship of the upper edges of the slots 86 and 87 would result in disposing each of them along a line which would intersect the axis of the tubes at a lower point than the same line would intersect the wall of a tube on the opposite side of the slot. The lower spring 97, as a result of its position in each of the aforementioned devices, would have its effect maintained substantially unimpaired as far as its biasing effect is concerned. For maximum differentiation, the lower springs may be formed to give a relatively small proportion of the total biasing effect.

Referring to Figure 12, a further arrangement is shown for creating a differential action, and which involves the connection of the link 98 to the shoes 99 and 100 through the normally horizontal links 101 and 102. These links are pivotally connected to the lifting link 98 adjacent the axis of the device on the pin indicated at 103, and are also pivotally connected to the respective bearing shoes at points radially outward from the center as indicated at 104 and 105. The action of the links 101 and 102, together with the lifting link 98, is substantially the same as a conventional toggle. Upward force tending to cause a sliding of the blocks 99 and 100 will first tend to bring them more closely together against the action of the spring 106. Preferably, the spring should be placed near the upper end of the device, with just enough remaining biasing effect being applied at the lower end of the shoes to sustain the toggle action without a chattering as the height of the device is increased. Enough lost motion must be provided in the toggle connections to render it impossible for the toggle to shove the blocks against the tube walls. This function should be left to the spring 106.

Referring to Figure 11, a further modification is illustrated in which the inclined surfaces responsible for the contraction of the bearing shoes are provided on the shoes themselves. The shoes 107 and 108 are each machined at the upper ends thereof to provide the slanted surfaces 109 and 110. The material of the lifting link 111 is formed to create the rounded sections 112 and 113 for engagement with the surfaces 109 and 110. A lifting action will be transferred to the bearing blocks through these inclined surfaces, and will, therefore, have a tendency to contract the shoes against the action of the spring 114, and in some degree that of the spring 115.

The particular embodiments of the present invention which have been illustrated and discussed herein are for illustrative purposes only and are not to be considered as a limitation upon the scope of the appended claims. In these claims, it is our intent to claim the entire invention disclosed herein, except as we are limited by the prior art.

We claim:

1. Adjustable telescoping supporting leg means comprising: inner and outer tubes slideably engaging each other; first and second opposite bearing shoes slideably received within said outer tube, said bearing shoes each having a plurality of respectively opposite transverse holes on the inner faces of said bearing shoes and a slot at one end disposed transversely to and intersecting certain of said holes; compression spring means having the opposite ends thereof received within said holes; stop means limiting the penetration of said spring means into said holes whereby said bearing shoes are urged outwardly against the inside of said outer tube; laterally-spaced pins intersected by said bearing shoe slots, respectively; link means engaging said bearing shoe slots and having holes providing first surfaces, said first surfaces being disposed at an angle to the axis of said tubes for receiving said pins whereby force applied to said link means tending to pull said bearing shoes along said outer tube will also tend to bring said bearing shoes together against the action of said spring means, said spring means normally exerting a greater biasing effect adjacent said link means than at the opposite end of said bearing shoes, said link means also having second surfaces, said second surfaces being at the end of said link means and substantially perpendicular to the axis of said tubes, and disposed to abut the end of said bearing shoe slots on reversal of said force; and coupling means connecting said link means to said inner tube means.

2. Adjustable telescoping supporting leg means comprising: inner and outer tubes slideably engaging each other; first and second opposite bearing shoes slideably received within said outer tube, said bearing shoes each having a plurality of respectively opposite transverse holes on the inner faces of said bearing shoes and a slot at one end disposed transversely to and intersecting certain of said holes; compression spring means having the opposite ends thereof received within said holes; stop means limiting the penetration of said spring means into said holes whereby said bearing shoes are urged outwardly against the inside of said outer tube; laterally-spaced pins intersecting said bearing shoe slots, respectively; link means engaging said bearing shoe slots and having holes providing first surfaces, said first surfaces being disposed at an angle to the axis of said tubes for receiving said pins whereby force applied to said link means tending to pull said bearing shoes along said outer tube will also tend to bring said bearing shoes together against the action of said spring means, said link means also having second surfaces, said second surfaces being substantially perpendicular to the axis of said tubes, and disposed to abut surfaces fixed with respect to said bearing shoes on reversal of said force; and coupling means connecting said link means to said inner tube means.

3. Adjustable telescoping supporting leg means comprising: inner and outer tubes slideably engaging each other; first and second opposite bearing shoes slideably received within said outer tube, said bearing shoes each having a plurality of respectively opposite transverse holes on the inner faces of said bearing shoes and a slot at one end disposed transversely to and intersecting certain of said holes; compression spring means having the opposite ends thereof received within said holes; stop means limiting the penetration of said spring means into said holes whereby said bearing shoes are urged outwardly against the inside of said outer tube means; link means engaging said bearing shoe slots; means forming a coupling between said link means and said bearing shoes including first interengaging surfaces disposed at an angle to the axis of said tubes, said bearing shoe-link means coupling also having second surfaces, said second surfaces being substantially perpendicular to the axis of said tubes, and disposed to abut surfaces fixed with respect to said bearing shoes on reversal of said force; and coupling means connecting said link means to said inner tube.

4. Adjustable telescoping supporting leg means comprising: inner and outer tubes slideably engaging each other; first and second opposite bearing shoes slideably received within said outer tube, said bearing shoe means

each having a plurality of respectively opposite transverse holes on the inner faces of said bearing shoes; compression spring means having the opposite ends thereof received within said holes; stop means limiting the penetration of said spring means into said holes whereby said bearing shoes are urged outwardly against the inside of said outer tube; link means, said link means and bearing shoes having first interengaging surfaces, said first interengaging surfaces being disposed at an angle to the axis of said tubes whereby force applied to said link means tending to pull said bearing shoes along said tube means will also tend to bring said bearing shoes together against the action of said spring means, said link means and bearing shoes also having second interengaging surfaces, said second interengaging surfaces being substantially perpendicular to the axis of said tubes, and disposed to abut on reversal of said force; and coupling means connecting said link means to said inner tube.

References Cited in the file of this patent

UNITED STATES PATENTS

398,408	Koehn	Feb. 26, 1889
1,357,714	Lane	Nov. 2, 1920
1,474,981	Ozlek	Nov. 20, 1923
1,558,998	Nichols	Oct. 27, 1925
1,776,776	Blackmarr	Sept. 30, 1930
1,852,785	Moehler	Apr. 5, 1932
1,966,566	Spica	July 17, 1934
2,261,505	Schlesinger	Nov. 4, 1941
2,278,250	Diesbach	Mar. 31, 1942
2,459,676	Axtell	Jan. 18, 1949
2,491,682	Muhlbach	Dec. 20, 1949
2,658,777	Rauglas	Nov. 10, 1953

FOREIGN PATENTS

668,952	France	Nov. 8, 1929