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STRUCTURAL POLE ASSEMBLIES

Filed April 23, 1965

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STRUCTURAL POLE ASSEMBLIES
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Filed Apr. 23, 1965, Ser. No. 450,387
2 Claims. (Cl. 287—58)

ABSTRACT OF THE DISCLOSURE
This invention relates to an improved elongated pole having two sections, one of which is movable relative to the other by spring biasing means to urge the movable and non-movable parts from one another to hold the pole between two surfaces and one or more easily removable spacer means which may be of different lengths and which are disposed in one or in the part to that the same pole may be mounted between different surfaces of different lengths or by addition of one or more spacers.

This invention relates to new and improved structural pole assemblies and is more particularly directed to such assemblies which are adjustable lengthwise through an appreciable range to accommodate use of the assembly between building surfaces, such as floors and ceilings, in different locations in the case where the distance between such surfaces at different locations varies.

The present invention relates broadly to improvements in the type of pole assemblies disclosed in Beale Patent No. 2,940,718. In use of the top connector assembly of the assembly disclosed in this patent, it is customary to employ selected springs of different lengths to permit mounting of the pole assembly between floor and ceiling at different locations if the distance between floor and ceiling at one location differs from the distance between floor and ceiling at another location. The use of different length springs imposes the requirement for stocking of a number of springs and such stocking is relatively expensive. For example, when variations in the spacing distance between floor and ceiling at different locations is substantial, in some cases on the order of up to four inches, a large number of different length springs may be required to be packaged with the assembly to accommodate such a wide variation in possible floor and ceiling surface spacings. In order to provide for mounting of a number of pole assemblies in a furniture system requiring the use of a number of such pole assemblies to carry furniture pieces, such as shelves, cabinets and the like, while providing for variations in the spacings between the floor and ceiling at different locations at which these assemblies are installed, the manufacturer of the prior art assemblies usually included in the assembly a number of springs of different lengths. These springs required additional handling, and, oftentimes, resulted in waste of these relatively expensive spring parts which are constructed, for example, of high tempered steel.

The present invention is directed to overcoming the above-mentioned, and other, disadvantages of prior art structural pole assemblies by providing a plurality of tubular spacers of different length which can be employed selectively with a single spring member to compensate for different heights or spacings between floors and ceilings while providing proper spring compression to maintain the pole assemblies in position between the floor and ceiling. In keeping with the objects of this invention, an installer of pole assemblies simply selects a predetermined number of inexpensive spacers of different lengths for use in the pole assembly, and, while using but a single spring, readily mounts the pole assembly between the floor and ceiling, and, accordingly, does not encounter wasting of excess springs in the course of making such an installation. In addition to this feature of the present invention, the spacers are each individually shaped diametrically with relationship to adjacent top connector adapter parts of the pole assembly, such as the spring, so as to center the spring on the adjacent spacer for preventing galling of spring parts upon other parts of the pole assembly which are relatively movable with respect to the spring.

Accordingly, it is a broad object of the present invention to provide new and improved structural pole assemblies.

A further object in keeping with this preceding object of the present invention is to provide a structural pole assembly including an adjustable top connector adapter having a spring centering spacer provided to reduce galling of parts of the assembly which may be rubbed by the spring.

A still further object of the present invention is to provide a structural pole assembly including interchangeable composite spacers of different lengths to attain different lengths of adjustment of the structural pole assembly between surfaces, such as floors and ceilings.

These and other objects, features and advantages of the present invention will become apparent from a careful consideration of the following detailed description, when read in conjunction with the accompanying drawing, which illustrates a preferred embodiment of the present invention and wherein:

FIGURE 1 is a vertically exploded view of a top connector constructed in accordance with the present invention;

FIGURE 2 is a view of the top connector of FIGURE 1 in assembled relationship with a structural pole member prior to compression of the spring of the pole assembly;

FIGURE 3 is a view in section taken along line 3—3 of FIGURE 2, and FIGURE 4 is a view in section taken along line 4—4 of FIGURE 2.

With reference first to FIGURES 1 and 2, a structural pole assembly of the present invention is shown including a structural pole member 10 having a flat top surface 11 (shown at the bottom of FIGURE 1) which is adapted to be abutted by a bottom spacer 48 of a top connector assembly 12, with parts of the top connector assembly 12 extending within shouldered vertical slots in the pole 10 in a manner to be described more fully hereinafter. The pole includes four longitudinally extending recesses 71 (FIGURE 4) each open to the periphery of the pole by a longitudinally extending slot 72.

The top connector assembly 12 of the present invention comprises a resilient, ceiling-engaging pad 14 which may be constructed, for example, of 60 durometer rubber and may be of any suitable shape. The pad 14 has a bottom extension 16 which is adapted to frictionally pass through a hole 18 in a turned-in top surface 19 of an outstanding tubular sleeve 20 of the top connector assembly 12. The sleeve 20 is preferably made of tubular aluminum stock and is gathered at the top surface 19 into the shape shown in FIG. 1. The hole 18 is sized with respect to the extension 16 so that a portion of the extension 16 will snap in place in the sleeve 20 and be retained frictionally therein. The top surface 19 of the sleeve 20 is arranged to bear against the bottom surface 22 of the pad 14 over a substantial area to distribute a biasing force to the upper surface of the pad 14 which transmits this force to the ceiling of a room 70 (FIG. 2) to assist in holding the pole assembly in a vertical position.

Internally, the surface 19 is tapered at its marginal edge 24 for centering of a single spring 32 of the top connector assembly 12. The spring 32 is disposed in the sleeve 20 in a manner to be described more fully hereinafter.

The sleeve 20 includes four spaced elongated depending legs 25 which terminate in tapered ends 26 to serve as...
bayonet-type longitudinally movable guide members and which define slots 28 therebetween. The slots 28 permit the legs 25 to fit over internal webs 30 of the pole 10, as best shown in FIGURE 4, which prevent the sleeve 20 from rotating relative to the pole 10.

As appears in FIG. 4, exterior surfaces of the legs 25 adjacent the slots 28 are spaced to vertically slideably engage internal surfaces of shoulders 31 which define vertical recesses in the pole 10, and which are guided thereby in part, vertically in movement relative to the pole 10.

The spring 32, when disposed in the sleeve 20, has an upper terminal convolution 34 in engagement with the tapered shoulder 34 of the sleeve 20 for axially centering the spring in alignment with the sleeve 20. The spring diameter is such to provide clearance space 37 (FIGURE 3) between the spring 32 and the inside wall of the sleeve 20, and the diameter of the spring and sleeve and the axial alignment of the spring and sleeve, in large part, reduce the possibility of galling of the sleeve 20 on the spring 32 and provide thereby a desirable freedom for movement of and compression of the spring 32. The bottom convolution 35 of the spring 32 is preferably flat wound and seats on the uppermost spacer, such as spacer 42 shown in FIG. 1.

To permit use of the pole assembly at different locations where the distance or spacing between floor and ceiling may vary, generally, while providing a wide range of adjustment of the length of the structural pole assembly and while using but a single spring 32, the top connector assembly 12 of the present invention includes a plurality of spacers which may be used singly or in different numbers to apply desired, predetermined tension on the compression spring 33, which tension is transmitted to the pad 14 whereby the structural pole assembly may be vertically mounted between a floor and a ceiling having a particular distance or spacing therebetween, within limits predetermined by the total number and total length of the number of spacers used in making the particular installation.

As shown in the drawings, the assembly 12 may include preferably an upper spacer 42, two intermediate spacers 44 and 46, and a lower spacer 48. It is noted that each of these spacers is of a different length or height. It has been found that the differences in spacing or distance between floor and ceiling at different locations varies generally within limits of one to four inches and, accordingly, the assembly 12 is packaged to include a spacer 42 which is substantially twice the length of the spacer 44, which, in turn, is substantially twice the length of the spacer 46, which, in turn, is substantially twice the length of the spacer 48. Thus, if the spring 32 is of a length of two inches, the spacer 44 will be of a length of one inch, the spacer 46, a length of one-half inch, and the spacer 48, a length of one-fourth inch, whereby to provide for adjustments in the length of the structural pole assembly at any suitable lengths up to four inches and in one-fourth inch minimum increments.

With a spring constant of known value in the spring 32, it is, accordingly, possible by a predetermined selection in the number and length or height of the spacers used to vary the amount of compression to be placed in the spring 32 to attain a desired tension, as well as to adapt the structural pole assembly for use in locations having different spacings between floor and ceiling.

It is preferable that at least one spacer be used in each installation for the following reasons. The mean diameter (inside diameter plus outside diameter divided by two) of the spring 32 is indicated at 50, and it is preferred that this mean diameter be less than the inside diameter 52 of the edge of the spacers 42, 44, 46 and 48, so that, regardless of how the spacers are arranged in the assembly 12, the mean diameter 50 of the spring 32 will always be less than the inside diameter 52 of each of the spacers used in order to center the spring in axial alignment with each of the spacers. Such arrangement of spacer and spring reduces the possibility of rubbing engagement and galling of the sides of the spring upon the inside surfaces of the depending legs 25 of the top connector adaptor during installation of the pole assembly.

Moreover, this sizing and arrangement of spring and spacers permits a smoother installation with legs aberration in spring tension which would otherwise occur as a result of the spring tending to gall different parts of the pole assembly, such as may occur when a spring is restricted against freedom of movement by other parts that are movable with respect thereto.

The uppermost inside diameter 52 of a spacer, such as spacer 42 as shown in FIGURE 1, is adapted to engage the bottom generally flat convolution 35 of the spring 32 in axial alignment to center the spring with the sleeve 20, and the spring, during assembly, is moved upwardly until the convolution 34 engages the tapered shoulder 24 within the sleeve 20.

To correctly mount the pole assembly in a vertical position between a floor and ceiling having a predetermined spring tension to maintain the assembly installed in such position, additional spacers 44, 46 and 48 as required to provide the necessary compression of the spring 32, are placed within the legs 25, and the entire structural assembly then mounted in the vertical position shown in FIGURE 2. To provide for a more solidly spaced therebetween and to obtain the proper spring tension to maintain the assembly installed in such position, additional spacers 44, 46 and 48 grouped as shown in FIGURE 2, the spring 32 is first inserted in the sleeve 20 and each of the spacers 44, 46, 48 then disposed in the sleeve 20. The spring that is bottomed at one end against the spacer 42 and at the other end against the tapered shoulder 24 of the sleeve 20. The bayonet ends 25 of the depending arms 25 of the sleeve 20 are thus disposed in the upper end of the pole 10 as appears in FIGURE 2 to complete assembly of the top connector assembly and pole assembly.

The spring 32 may then be compressed by movement of the sleeve 20 downwardly as viewed in FIGURE 2 and, while the spring 32 is under such compression, the pole assembly may be oriented vertically as shown in FIGURE 2. In FIGURE 2 the assembly 12 is shown in solid lines in the condition wherein the spring 32 is not under compression and in dotted lines wherein the spring is under compression with the pad 14' engaging a ceiling surface.

With the pad 14' in contact with the ceiling 70, the pole 10 may be raised vertically to overcompress the spring 32 so that a floor engaging pad 64 carried by the assembly may be moved into place to frictionally engage the floor 62 when such spring overcompression force is released or reduced. When the pole assembly is vertically aligned between the floor and ceiling, the spring overcompression force may be released and the ceiling engaging pad 14' and the floor engaging pad 64 are both now compressed by tension force exerted by the compressed spring 32 to frictionally retain the pole assembly 12 in place.

After one or two pole assemblies 12, each equipped with the adjustable top connector of the present invention, have been placed in vertical position between floor and ceiling, additional pole assemblies may likewise be installed accurately and readily in the same area by use of the same number of spacers 42, 44, 46 and 48 and the spring 32 along the floor and ceiling in the area of mounting of such pole assemblies is the same. It will be appreciated that more or less spacers, as required, may be employed in making those installations where variations exist between the distances between the floor and ceiling at different locations.

In the event that more spacers than are required to install a pole assembly happen to be placed within the sleeve 20, the pole assembly 12 may be readily removed...
from its installed position, the pole assembly is raised to overcompress the spring 32 and move the pole 10 from contact with the floor 62. The pole is then pivoted against the ceiling from the vertical installed position. The top connector assembly 12 is then tilted angularly downward, the sleeve 20 removed from the pole 10, and the lowermost spacers 48, 46, etc., then removed from the sleeve, as required. It is found that some workmen, skilled in the art, once having installed a number of pole assemblies 12, will obtain a "feel" of compression of the spring 32 when installing the assembly 12 which is useful as a guide for them for attaining a proper installation of the assembly 12 with the ceiling pad 14 and the floor pad 64 in engagement respectively with the ceiling and floor. It has also been found in making such installations on a "trial and error" basis that a faster installation is achieved by initially gauging on the "high side" the number of spacers to be used, i.e., use of one or more of the shorter length spacers in excess of the number of spacers "guessed" to that actually required to make the installation, and to remove one or more spacers if excessive spring compression forces are found to exist.

Accordingly, it is preferred that the spring constant (spring rate) of the spring 32 be a relatively low constant in keeping with the purpose of this invention, whereby a tolerable over-adjustment of one half inch to one inch is available for ordinary installations, such as, for example, shelf installations and a variation in spring constant of a quarter of an inch, approximately, be available for heavy duty or highly loaded partitions, and the like, where a more firm installation is required than in the case of installing shelves or decorative paneling and the like.

While I have shown and described in detail a preferred embodiment of the present invention and a method of installing and adjusting structural pole assemblies by means of a new and improved top connector of the present invention, obviously other uses and adaptations of the invention will occur to others skilled in the art. Accordingly, I wish not to be limited in my invention to the specific embodiment shown and described but only by the scope of the following claims.

I claim:

1. A connector assembly for an elongated pole and the like for securing the pole between spaced-apart fixed areas, said connector assembly including a friction surface for engaging one of said spaced-apart areas, an elongate tubular sleeve carrying said surface and having a body portion extending away from said surface generally at an angle normal thereto, guide surfaces on said body portion extending generally parallel with the longitudinal axis of said body portion, guide surfaces being slideably engageable with complementary surfaces of the pole for confining the relative movement between said body portion and pole to linear movement, the pole having an abutment shoulder, said body having an abutment shoulder, at least one helical compression spring disposed in said body adjacent said guide surfaces and having one end abutting said shoulder of said body portion, said spring being restrained to axial movement by said body portion, and a plurality of separate, removable tubular spacers at least some of which are of a different predetermined length disposed in said body portion adjacent said guide surfaces, said spring abutting one of said spacers with its other end and another of said spacers abutting the other of said abutment shoulders, said spacers being restrained to linear movement by an internal surface of said body portion, and said spacers being interchangeable both as to total length and number to provide for a variation in compression of said spring when said connector assembly and pole are mounted between said spaced apart fixed areas, and the mean diameter of the helix of said spring being slightly less than the inside diameter of the edge of each of the spacers so that regardless of how the spacers are arranged in the assembly the mean diameter of the spring will always be less than the inside diameter of each of the spacers.

2. A connector assembly as set forth in claim 1, wherein said spacers are readily removable from said connector assembly to relieve excess spring force over a predetermined maximum spring force.

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