Feb. 6, 1951 E. HOWARTH ET AL 2,540,525

SPRING SUPPORT

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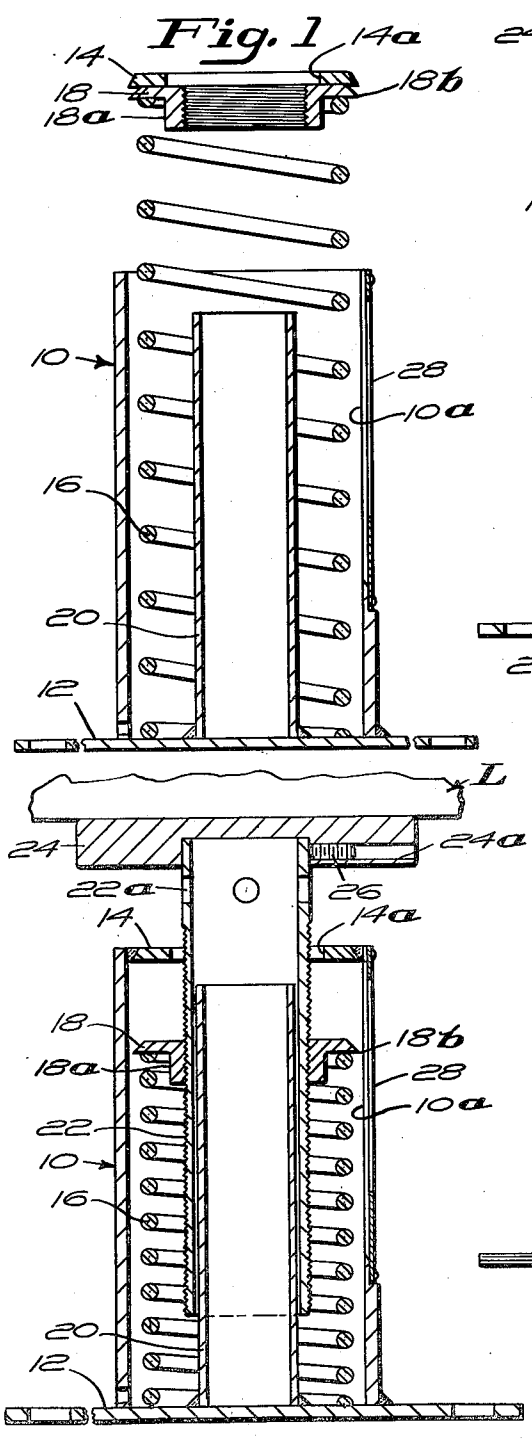
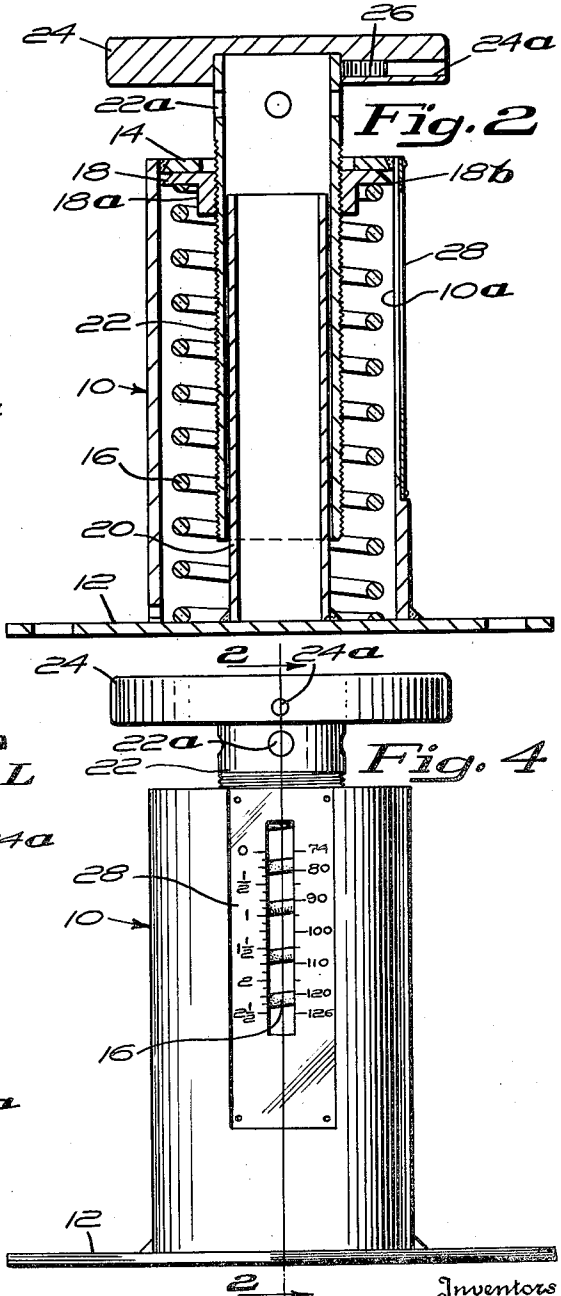


Fig. 3



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SPRING SUPPORT

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1 Claim. (Cl. 248—54)

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This invention relates to improvements in spring supports. More especially it has to do with a support embodying the principles of the hanger disclosed in the Donkersley et al. Patent No. 2,397,094, granted March 26, 1946, but intended for supporting overhead loads.

In the patent referred to the hanger disclosed comprises a casing having fixed top and bottom end plates and a movable plate within the casing engaging the upper end of a compression spring which extends between it and the bottom end plate. A hanger rod engaging the movable plate is connected to a load usually supported below the hanger. The spring in the hanger is precompressed during the assembly of the hanger to reduce the vertical extent of the hanger, to limit the load range, and to minimize the variation in supporting effect due to a vertical displacement of the load.

The principal object of the present invention is to provide a support having some of the characteristics of the aforesaid patented hanger but adapted particularly for supporting loads above it.

The best mode in which it has been contemplated to apply the present improvements is shown in the accompanying drawings but these are to be deemed illustrative for it is intended that the patent shall cover by suitable expression in the appended claim whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawings:

Fig. 1 is a medial sectional view of certain parts of a support embodying the present improvements, showing their relation prior to the assembly of the complete support;

Fig. 2 is a like view taken as on line 2—2 of Fig. 4, showing the support fully assembled;

Fig. 3 is another like sectional view showing a relation of the parts when supporting a load; and

Fig. 4 is a front elevational view of the improved support as shown in section in Fig. 2.

Referring to the drawing, the improved support comprises a casing having a cylindrical shell 10, a bottom plate or base 12 and a top end plate 14. The bottom or base plate 12 extends outward beyond the bottom edge of the shell 10 to which it is welded, or at least two or more portions of the bottom plate so extend, to provide for the attachment of the support to some fixed foundation or structural element. The top end plate 14 is also welded to the shell 10 and has a rather large central opening 14a.

Housed within the casing is a compression

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spring 16 which, when standing at its free length as seen in Fig. 1, is designedly longer than the shell 10. A movable plate 18, having a central depending flange 18a around a central opening in the plate, engages the upper end of the spring 16. An inner shell or tubular element 20 is attached to the base plate 12 and stands upward therefrom within the spring.

In the initial assembly of the support the top end plate 14 is welded to the shell 10 and the inner shell 20 is welded to the base plate 12. The spring is then placed on the base plate, the movable plate 18 is placed on the spring and then the shell 10 is placed around the spring and movable plate until the latter is engaged by the already welded-in top end plate 14. With all these parts arranged concentrically, the shell is depressed until its bottom edge makes contact with the base plate, where it is held thereto while the shell 10 and base plate 12 are welded together.

In this last described step in the assembly of the support the spring 16 is precompressed. The amount of this precompression or preloading of the spring is arbitrary. For a line of supports capable of carrying loads from around 74 pounds to say 4800 pounds it has been found quite satisfactory to provide fourteen different sizes of the support. By a suitable selection of springs, each one of the fourteen sizes can be precompressed about 3 inches. This amount of precompression will keep the variation in supporting force exerted by each spring within 15% of any load placed upon a support within its working range. In this respect the improved support embodies and follows the principles disclosed in the aforesaid Donkersley et al. patent.

Prior to assembly the depending flange 18a of the movable plate is internally threaded and after the spring has been precompressed as described, or in any other suitable manner, an externally threaded hollow plunger 22 is screwed into the flange 18 with its inner wall slightly separated from the outer wall of the inner shell 20. The upper portion of the plunger 22 is not threaded but has openings 22a around it through which a rod may be inserted for final adjustment of the support. On the top of the plunger 22 is a load plate 24 having a central recession to receive the top end of the plunger. A hole 24a may be bored and threaded in the load plate to receive a stud 26 for clamping the load plate and plunger together when the desired adjustment of the support has been made.

When installing the support, the load L to be

carried thereby is held in position by some temporary means, such as a chain-hoist or other removable apparatus. The support is then placed under the load L and its base plate 12 is firmly secured. The plunger 22 is then screwed upward until the load plate 24 engages the load to be supported. The weight of this load is known and after the load plate has made contact with it, the plunger 22 is further turned in the same direction as before. This further turning of the plunger immediately imposes on the load the precompressed force of the spring because after contact between the load plate and the load, the further turning of the plunger 22 causes the movable plate to move downward away from the fixed top plate 14. The frictional resistance between the spring and the movable plate being greater than that between its threads and those of the plunger, rotation of the latter does not cause rotation of the movable plate but only causes it to move longitudinally and further compress the spring.

On one side of the shell 10 is an opening 10*a* and attached to the shell is a flat scale plate 28 having a vertically disposed slot therein through which the sharp tapered edge 18*b* of the movable plate is visible. On one side of the vertical slot the scale plate has graduations laid off one-eighth inch apart and on the other side of said slot are graduations indicating the supporting force being exerted by the spring. For example, and as shown in Fig. 4, for a size 1 support these graduations would extend from 74 pounds to 126 pounds. This is the designed working range of the size 1 support. If the load to be supported weighs, say 100 pounds, the plunger 22 is turned as heretofore explained until the sharp edge of the movable plate is opposite the graduation labeled 100 pounds.

The support is then supporting the known load and the chain-hoist or other temporary device for holding the load in position can readily be removed.

If the load moves upward or downward from the position it occupied when the support was adjusted as just described, it will still be supported by the spring. If the load moves upward or downward a half inch, the change in supporting effort will not exceed 15%.

For example, with the size No. 1 support the spring used has a spring constant of 21 pounds per inch of deflection. If it is precompressed 3 inches the spring will be exerting a static force of 63 pounds on the end plates of the casing. When depressed by a load of 74 pounds (the minimum load for which the size 1 support is designed) the spring will be exerting a supporting force of that same amount. If this load moves upward a half inch the spring will be exerting a supporting effect of 63.5 pounds or 10.5 pounds less than the load of 74 pounds. But 10.5 pounds is only slightly over 14% of the load, and thus the variation in supporting effort is less than 15%.

If a load of 126 pounds (the maximum load for which the size 1 support is designed) is being supported by a size 1 hanger, then if it moves upward or downward ½ inch the change in spring force will still be 10.5 pounds. But this is only slightly over 8% of the load and hence it follows that throughout the designed load range of the support (for loads from 74 to 126 pounds) the variation in supporting effort for a ½ inch displacement of the load will not produce a variation in supporting effort of over 15% of the load. This is within the limits of variation considered safe in sound engineering practice.

One important use for the improved support disclosed herein is in connection with a piping system which conducts a fluid whose temperature may vary and cause elongation or contraction, and hence movement of the pipes in the line. Where a pipe or a base elbow of such a system must be supported from below the improved hanger can be readily installed and easily adjusted.

We claim:

A spring support for supporting a known load subject to a predetermined displacement, comprising a shell with a fixed base; a top plate provided with a central opening; a movable plate within said shell having a central threaded opening; a spring in said shell precompressed between the movable plate and the said base whereby when no load is being supported the movable plate is held against said top plate; a hollow plunger projecting upward outside said shell and extending downward within said shell through the opening in said top plate having external threads engaging the threaded opening of said movable plate; a load plate having a central recess to receive the projecting end of said plunger; and means for locking said load plate and said plunger together; the said plunger being initially rotated with respect to said movable plate to bring said load plate into contact with said load and being further rotated with respect to said movable plate and said load plate when said load plate engages the load to thereby effect movement of said movable plate axially within said shell to adjust the compression of the spring so that when the load has thereafter moved through its predetermined displacement the force then being exerted by the spring will substantially equal the weight of the load; the said load plate and said plunger being secured together by said locking means upon completion of the aforesaid adjustment of the spring compression to prevent further rotation of the plunger.

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