United States Patent

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[54] **PROTECTIVE SHROUD ASSEMBLY FOR INSTALLATION ABOUT STRESSED COIL SPRINGS**
5 Claims, 5 Drawing Figs.

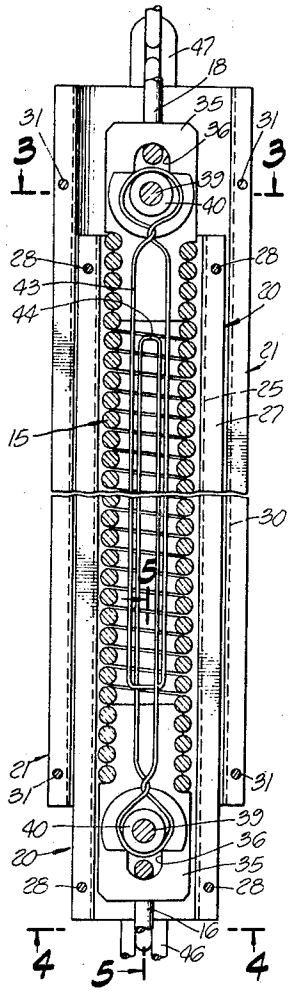
[52] **U.S. Cl.** **267/74,** 267/171
[51] **Int. Cl.** **F16f 1/12**
[50] **Field of Search** 267/166, 180, 178, 74, 171

[56] **References Cited**
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ABSTRACT: A protective assembly for coil springs to protect life and property should the springs fail while stressed. The protective shroud is installable about the spring while under stress without need for unloading the spring or using any except simple tools.



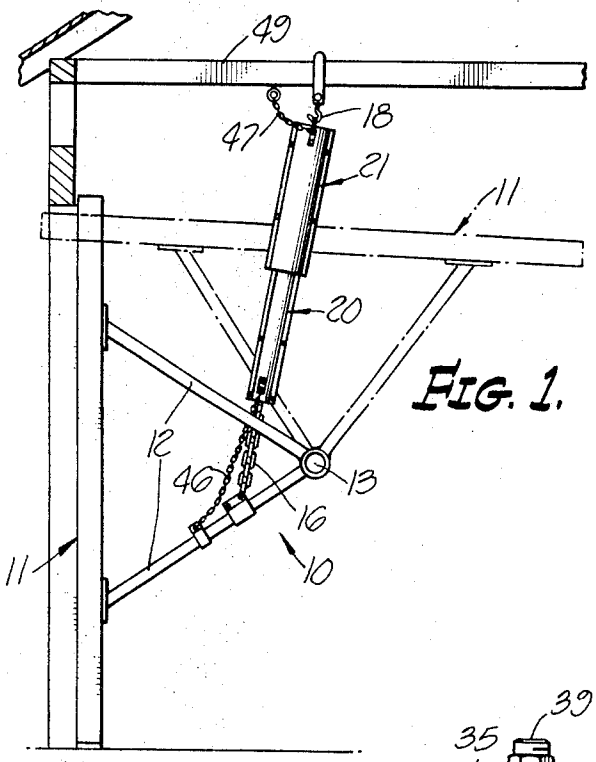


FIG. 1.

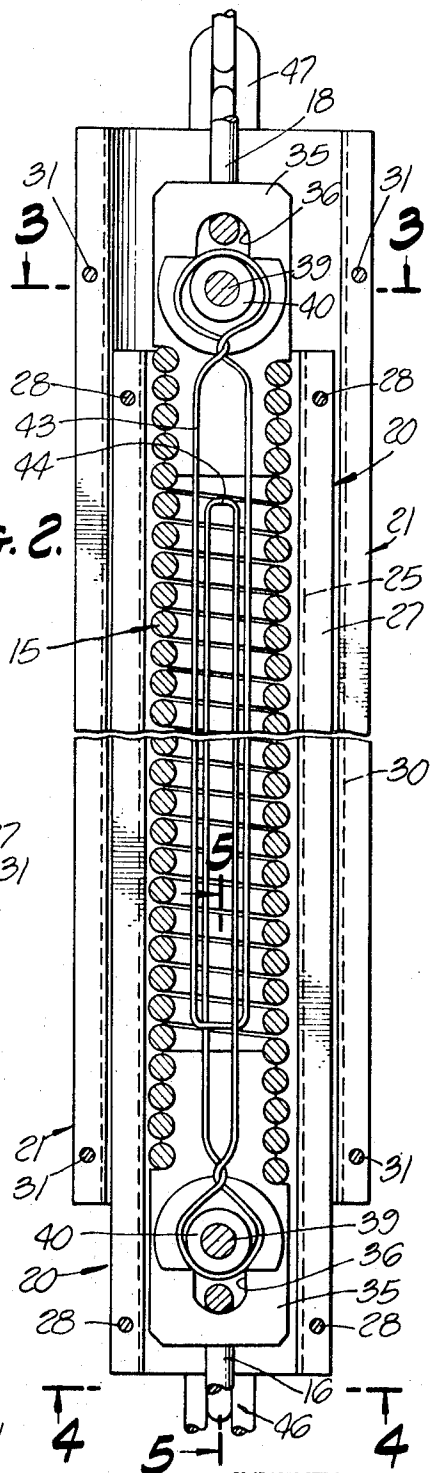


FIG. 2.

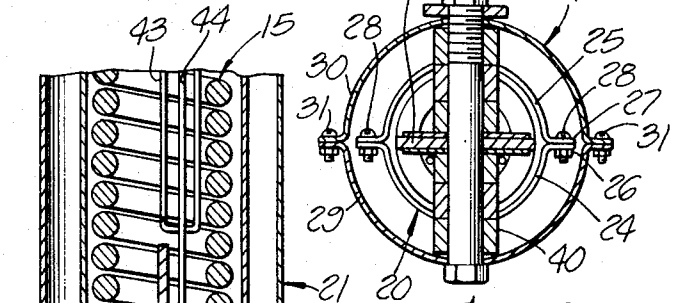


FIG. 3.

FIG. 5.

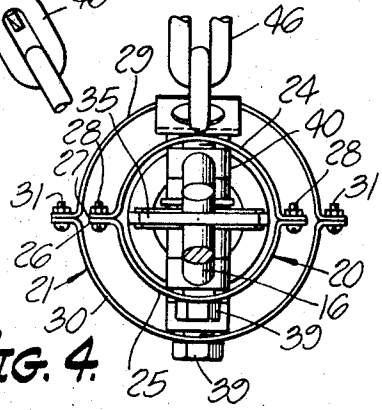


FIG. 4.

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PROTECTIVE SHROUD ASSEMBLY FOR INSTALLATION ABOUT STRESSED COIL SPRINGS

It is common experience for highly stressed coil springs, as for example, those commonly used to operate counterbalanced overhead doors to fail and release the highly stressed fragments at high velocity hazardous to life and property in the vicinity. Various expedients have been proposed heretofore to safeguard against these hazards, but these have been subject to numerous disadvantages and shortcomings sought to be obviated by the present invention. For example, it has been proposed to use different modes of encasing the springs in a manner to prevent the parts escaping. However, the installation of such devices necessitate disassembly of the spring and associated parts of the counterbalance linkage which, in itself, is hazardous, particularly to inexperienced personnel lacking proper jigs and safeguards. Furthermore, this is a time consuming and a costly operation requiring skill and special tools to effect the disassembly and reassembly safely.

To avoid these and other shortcomings of prior expedients there is provided by this invention a simple set of components readily assembled about an installed spring already under stress. Neither special tools nor experience is required and it is unnecessary for the operator to disassembly any part of the unit. The invention protective assembly consists of two pairs of semicylindrical members of different diameters readily telescopable one within the other and fully enclosing the spring, even when fully extended. Assembly pins serve to connect the remote ends of the assembled tubes to the adjacent ends of the spring. Additional protection is afforded by flexible tie means connecting the individual shroud tubes to a fixed anchorage and, desirably, by a pair of telescoping interlooped links extending through the center of the spring to anchor points with the adjacent spring ends and the shroud tubes. Irrespective of the mode or the number of parts resulting from spring failure, all are held positively captive by these several and independently acting safeguards.

Accordingly, it is a primary object of this invention to provide a new and improved protective assembly for installation about a previously installed and stressed spring without need for disconnecting or unloading the spring.

Another object of the invention is the provision of simple, inexpensive, rugged components easily assembled by the novice with simple tools about an already installed spring of a door counterbalance mechanism.

More specifically it is an object of this invention to provide pairs of semicylindrical shroud parts readily secured together about a loaded coil spring together with means for securing the assembled shroud parts to a fixed anchorage.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which preferred embodiments of the invention are illustrated.

FIG. 1 is a fragmentary elevational view of an overhead door with a typical counterbalance mechanism having the invention protective assembly enclosing the operating spring thereof;

FIG. 2 is a longitudinal cross-sectional view on an enlarged scale through the spring in FIG. 1;

FIGS. 3 and 4 are cross-sectional views taken along lines 3–3 and 4–4 on FIG. 2; and

FIG. 5 is a fragmentary cross-sectional view taken along line 5–5 on FIG. 2.

Referring initially to FIG. 1 there is shown an illustrative counterbalance mechanism, designated generally **10**, installed on an overhead door **11** and effective to assist its movement between closed and opened positions, the latter being indicated by dot-and-dash lines. The counterbalance includes a pair of triangularly disposed brackets secured to the door with outer ends journaled on a pin **13** suitably fixed to an adjacent portion of the building wall. The lower end of a

powerful tension coil spring **15** is secured to bracket **12** by a chain **16** and its upper end is secured to a fixed part of the building, as by an anchor hook **18**. The spring is highly stressed when door **11** is in closed position and, acting in concert with a companion counterbalance and spring mechanism not shown but located at the other end of door **11**, is effective to support by far the major weight of door **11** while closed. Accordingly, relatively slight upward force is required to initiate clockwise pivotal movement of the door about pivot pin **13**.

Owing to the highly stressed condition of spring **15** in the closed position of the door it not infrequently happens that the spring fails suddenly and without warning. This may occur at any time while the door is closed or while approaching closed position. Persons present in the vicinity can suffer serious injury or loss of life from flying parts of the spring. Other serious injury results to the property in the area or to the building itself.

Such occurrences are safeguarded against by this invention comprising two pairs of semicylindrical sleeves **20, 21** of differing diameters so as to telescope readily and without interference one within the other. As best appears from FIGS. **3** to **5**, smaller sleeve **20** comprises semicylindrical halves **24, 25** each provided with radial flanges **26, 27** and rigidly clamped together by bolts **28**. Likewise the larger diameter sleeve **21** comprises semicylindrical halves **29, 30** with similar radial flanges held together by bolts **31**. As herein shown, counterbalance springs **15** are provided with steel mounting straps **35** appropriately notched along their lateral edges for rotation into mating relation with the end convolutions of the spring. The outer ends of straps are formed with elongated notches **36** to accommodate a chain **16** or a hook **18**, or other means for holding the spring assembled to the counterbalance mechanism. Accordingly, there is ample excess space at the inner ends of slots **36** to receive a pin or bolt **39** extending through aligned openings at the outer ends of the tubular shrouds **20, 21** in the manner best illustrated in FIG. **5**. This bolt is preferably provided with spacer sleeves **40** to assure that the shroud tubes are spaced concentrically of one another and of spring **15**.

It is possible that spring **15** may fragment into various parts simultaneously. To avoid any possibility of these fragments escaping, there is preferably provided a pair of innerlooped links **43, 44** (FIG. **2**). These endless links are located centrally of the spring and arranged to telescope while interlocked lengthwise of one another. The opposite ends of the links or loops are preferably twisted to provide a mounting loop through which pins **39** extend. Loops **43, 44** are sufficiently long as to permit the spring to be extended to its maximum without placing a load on safety loops **43, 44**. Accordingly, these loops perform no function normally but, like shroud tubes **20, 21**, remain in readiness to retain broken convolutions of the spring captive should the spring fail.

Additionally it is preferred that each end of the protective shroud tubes **20, 21** be anchored to some permanent structure. For this purpose each shroud tube is provided with a flexible tie such as chains **46, 47** having one end anchored to pins **39** and the other to support bracket **12** or to member **49** of the building structure.

From the foregoing it is readily apparent that the described protective assembly is easily installed about a spring **15**. Smaller diameter tube **20** is first assembled against the opposite sides of the lower half of spring **15** and locked in place by assembly bolts **28**. A pin or bolt at **39** is also inserted across the lower end of the shroud tube and anchored to the support strap **35** of the spring by passing the bolt through opening **36**. As the bolt is inserted through opening **36** it is also passed through spaces **40** and through the loop at the lower end of safety link **44**.

Thereafter the upper and larger shroud tube **21** is assembled in the same manner to the upper portion of spring **15**. Before tightening the nut on bolt **39**, the safety chains **46, 47** are inserted over the end of the bolt. Finally, the free ends of the

safety chains **46, 47** are secured to an adjacent permanent part of the assembly thereby completing the installation of the safety protective unit.

While the particular protective shroud assembly for installation about stressed coil springs herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. In a counterbalanced overhead door assembly of the type utilizing tension coil spring to power a counterbalanced door-operating linkage assembly, that improvement which comprises a protective assembly designed for assembly about said tension coil spring while in place under load without need for detaching or unloading the spring, said protective assembly including pairs of semicylindrical members of different diameters sized to embrace said spring loosely, means for holding each pair of said members securely together with their adjacent ends loosely telescoped together, pin means extending diametrically through the remote ends of said pair of members and through means connecting said springs to an adjacent part of said counterbalance assembly.

2. The combination defined in claim **1** characterized in the provision of flexible high-strength tie means extending axially of said spring and of sufficient length as not to interfere with the extension and contraction of said spring during opening and closing of the door but effective to hold said pairs of cylindrical members and the parts of the spring captive should the spring fail.

3. That method of enshrouding the tension coil spring of previously installed overhead door counterbalance assemblies without need for disconnecting the installed stressed spring and irrespective of the stressed condition of the spring which method comprises: embracing the opposite end halves of an installed spring with pairs of semicylindrical members of sufficiently different diameters to telescope over one another while allowing the spring to expand and contract, securing said pairs of members together, and securing an end of each pair of members to the adjacent end of the spring.

4. That method defined in claim **3** characterized in the step of connecting one end of a high-strength flexible tie member to each pair of cylindrical members and the other end of said tie members to a high-strength anchorage.

5. That method defined in claim **3** characterized in the step of installing a pair of interlooped elongated loops axially of said spring, and connecting the remote ends of said pair of loops to an adjacent respective end of said spring thereby to tie the remote ends of said spring and of said pair of semicylindrical members together and prevent the escape of convolutions of said spring upon multiple failure of said spring.