

June 16, 1964

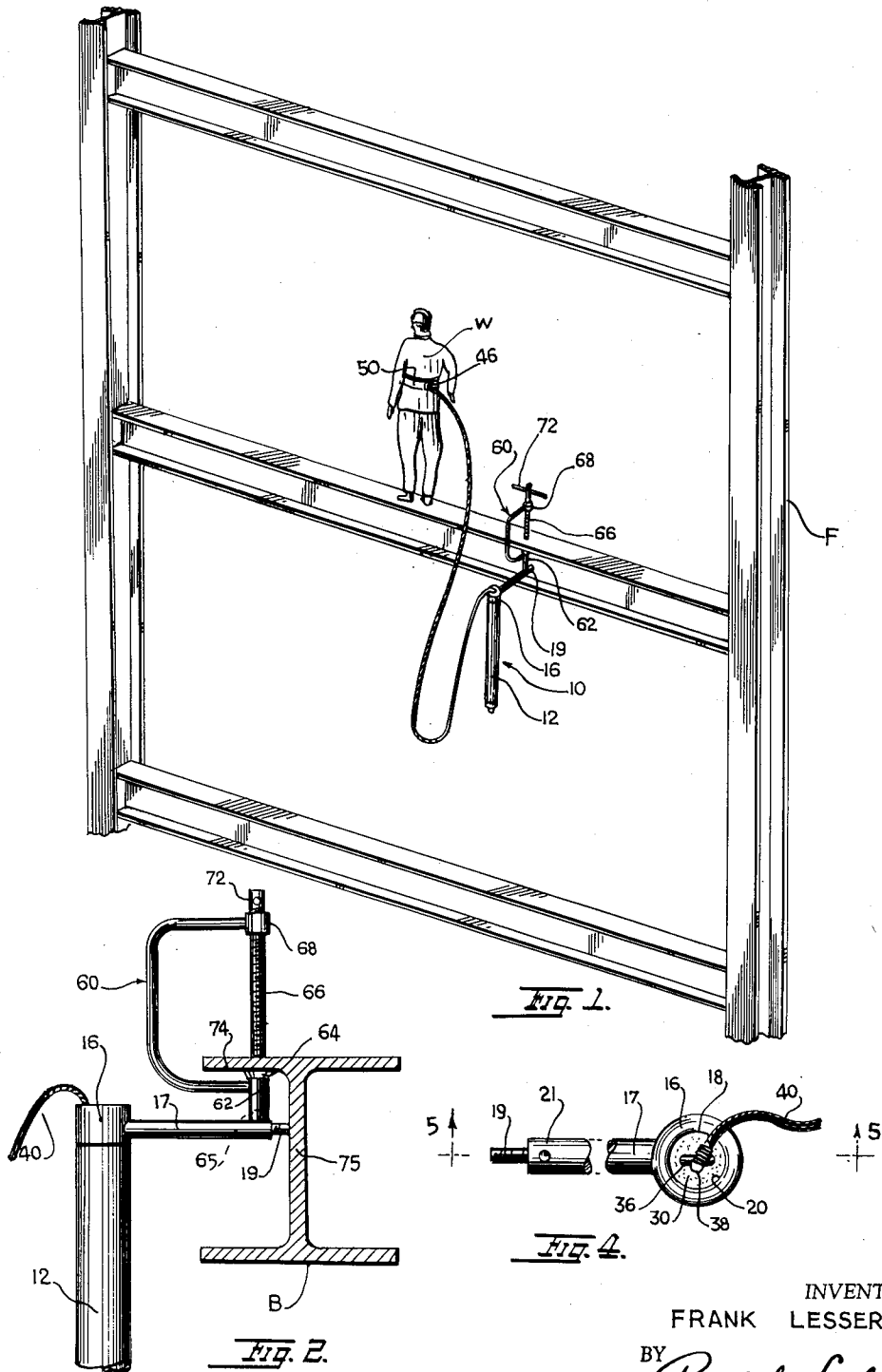
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3,137,487

SAFETY BELT FOR SCAFFOLDS

Filed Sept. 18, 1963

3 Sheets-Sheet 1



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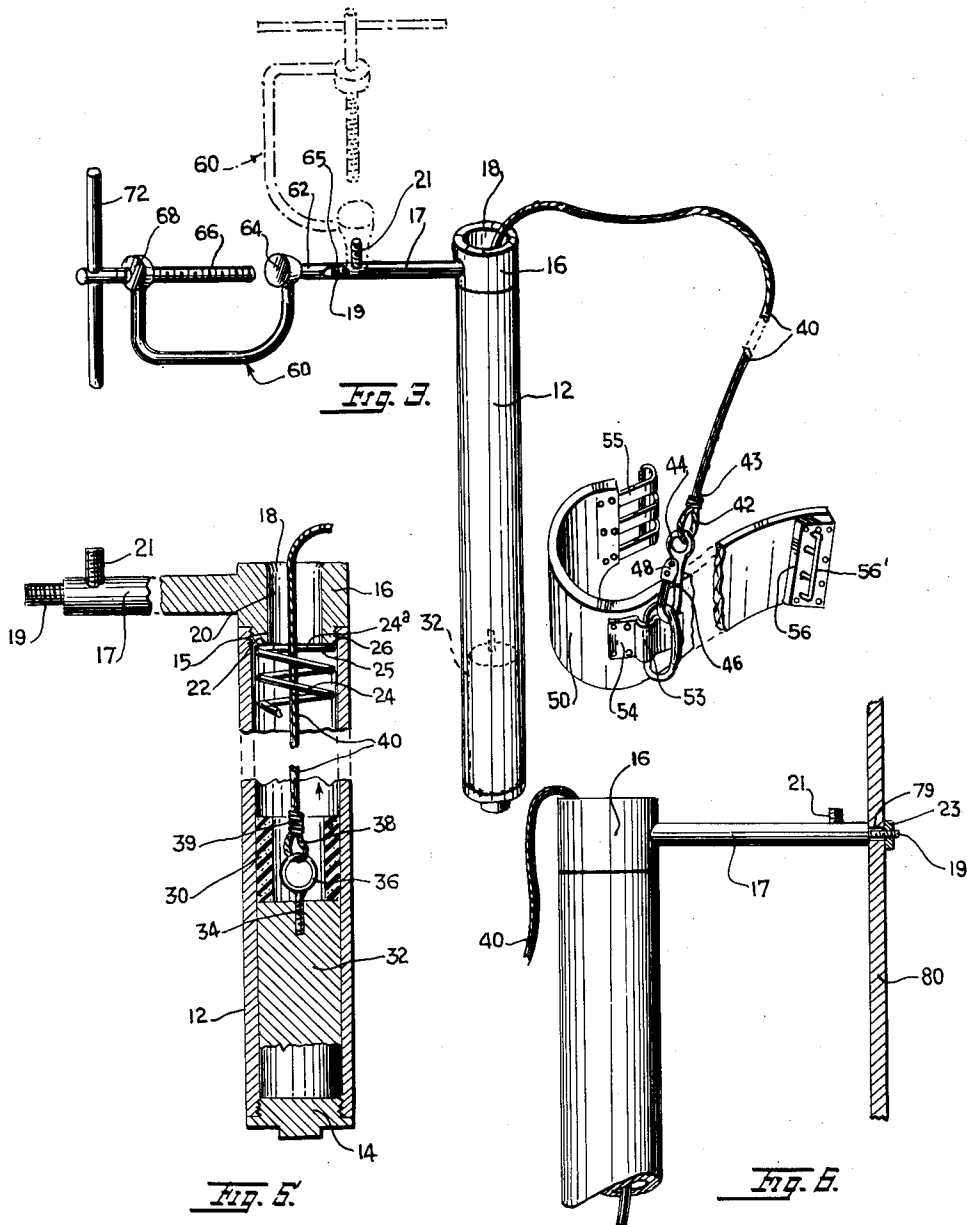
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3 Sheets-Sheet 2



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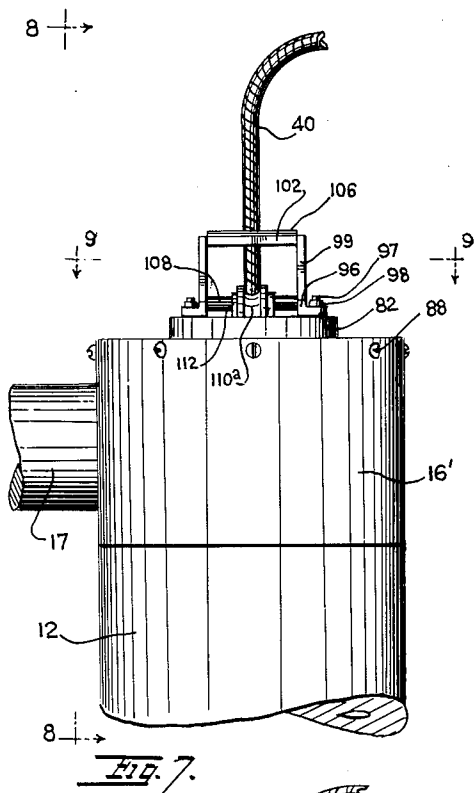
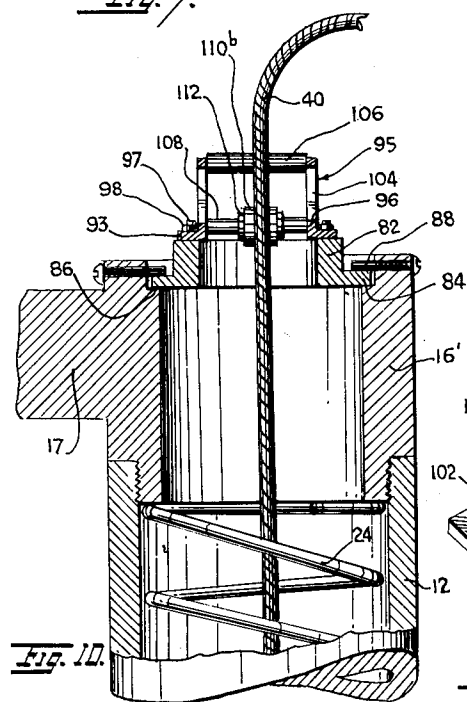
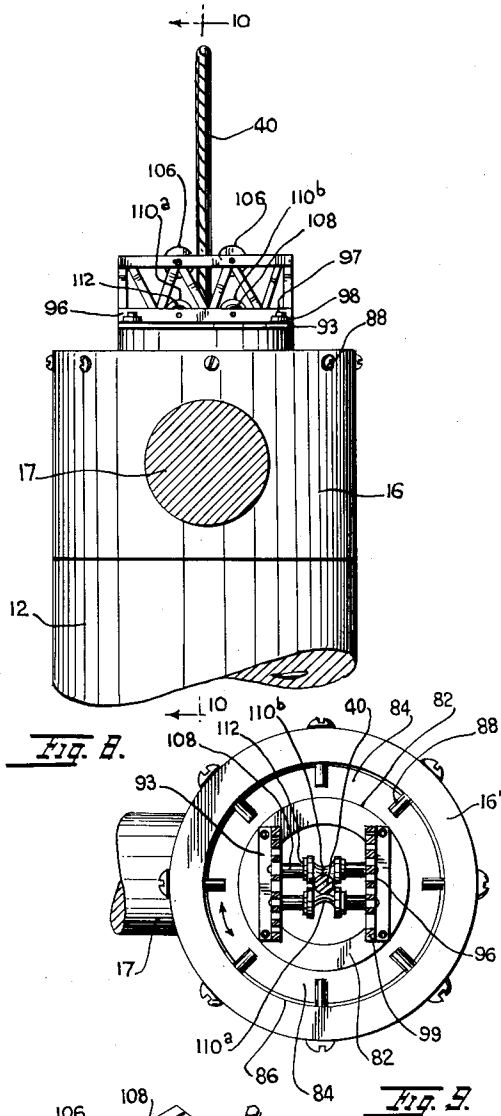
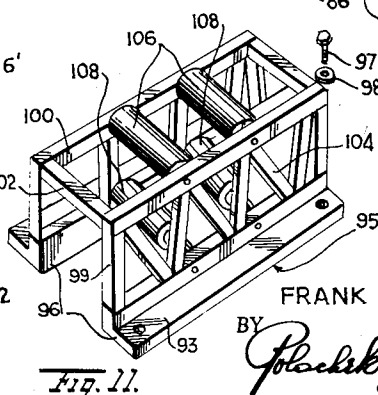
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3 Sheets-Sheet 3



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3,137,487

SAFETY BELT FOR SCAFFOLDS

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2 Claims. (Cl. 267—1)

This invention concerns a safety device for construction workers and more particularly concerns a safety belt, line and shock absorbing tethering device to break the fall of a workman from a scaffold or other elevated position.

According to the invention there is provided a safety belt which is worn around the waist of a workman. A flexible cable is removably attached to the belt. The cable terminates in a tube in which is a slidable weight attached to the end of the cable in the tube. A resilient rubber sleeve block is frictionally fitted in the tube and slidable therein. The cable passes out of a constricted upper end of the tube. A coil spring is located in the tube at the constricted upper end. Integral with the upper end of the tube is a radially extended arm having a threaded stud or bolt at its end. A C-clamp or a nut can be engaged on this stud for mounting the tube on a girder of a building frame. The tube may have two threaded studs extending in different directions 90° apart so that the tube can be mounted on either horizontal or vertical supports and will always be positioned vertically. The spring, rubber block and counterweight all cooperate to cushion the shock and break the fall of a workman should he slip from an elevated working position. The device is portable so that it can readily be relocated at different working positions. The cable permits the worker to move around freely and the device is located out of the way so as not to interfere with his work, but the device is always ready to serve for the intended emergency lifesaving purposes.

It is therefore a principal object of the invention to provide a lifesaving or safety device for a workman including a counterweight movable in a tube and cooperating shock absorbing components in the tube.

A further object is to provide a device as described with a flexible line or cable attached to the counterweight and with a safety belt to which the cable is removably attached.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a perspective view of part of a framework of a building with a workman shown in an elevated working position protected by a device embodying the invention shown mounted on the framework.

FIG. 2 is a sectional view on an enlarged scale taken on line 2—2 of FIG. 1 showing parts of the device.

FIG. 3 is a perspective view of the device per se, parts being broken away, and with a C-clamp shown in dotted lines in an alternate position.

FIG. 4 is a top plan view of part of the device of FIG. 3, the C-clamp being removed.

FIG. 5 is a sectional view on an enlarged scale taken on line 5—5 of FIG. 4, parts being shown in side elevation.

FIG. 6 is a sectional view similar to FIG. 2 showing an alternative way of mounting the device on a building wall.

FIG. 7 is a side elevational view on an enlarged scale similar to a portion of FIG. 2, showing a modification of the device.

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FIG. 8 is a side elevational view, partially in section, taken on line 8—8 of FIG. 7.

FIG. 9 is a horizontal sectional view taken on line 9—9 of FIG. 7.

FIG. 10 is a vertical sectional view taken on line 10—10 of FIG. 8.

FIG. 11 is a perspective view of a pulley and guide frame employed in the modification of FIGS. 7—10.

Referring to FIGS. 1—5, there is shown the safety device 10 including a cylindrical tube 12 closed at its bottom threaded end by a removable threaded plug or cap 14. The upper end of the tube is open and internally threaded at 26. A threaded nipple 15 of a fitting 16 is secured into the end of the tube. The fitting has a rounded, flared opening 18 at the upper end of its central axial passage 20. The internal diameter of passage 20 is less than that of tube 12 to provide an annular seat 22 at the bottom end of the nipple inside the tube. A coil spring 24 is axially disposed in the tube and its upper turn 24^a is seated in groove 25 formed in the tube just below the internal threads 26. The turn 24^a is held in place by the nipple 15. The lower turns of the spring are axially compressible upwards toward the fitting 16.

Slidably fitted inside the tube is a resilient rubber friction sleeve 30. This sleeve can be moved axially upward in the tube against the frictional gripping force on the sleeve by the surrounding inner wall of the tube. Below the sleeve 30 is a massive cylindrical counterweight 32. The counterweight has a threaded bore 33 in which is removably engaged threaded shank 34 of an eyebolt 36. Secured to the eyebolt is the lower loop 38 of a flexible rope or cable 40. The loop is whipped at 39. The cable extends axially upward out of the tube and fitting. The cable 40 terminates in another loop 42 whipped at 43 and engaged on eye 44 of a snap hook 46. The hook has a leaf spring 48 which engages behind the free end of the hook. The hook is shown in FIGS. 1 and 2 detachably secured to a safety belt 50.

The snap hook engages on a stainless steel ring 52 secured in a loop 53 of a strap 54 riveted to the belt. The belt is a thick leather strap having a plurality of hooks 55 secured at one end and a buckle 56 secured to the other end. The buckle has a catch 56' providing three loops in which the hooks 55 can respectively engage.

Radially extending from fitting 16 is an arm 17. A first threaded stud 19 extends axially outward of the free end of the arm and a second threaded stud 21 extends radially outward of the arm near its free end. Thus, studs 19 and 21 are axially perpendicular to each other.

A C-clamp 60 can be attached to the device in either of two positions. This C-clamp has a stem 62 extending from its anvil 64. This stem has an internally threaded bore 65 which receives either stud 19 or stud 21 in threaded engagement. In FIGS. 1 and 2 the C-clamp is shown engaged on stud 21 so that the threaded shank 66 of the C-clamp is axially parallel to the axis of tube 12 and axially perpendicular to arm 17. The C-clamp is shown in the same position in dotted lines in FIG. 3. In FIG. 3 the C-clamp is shown engaged on stud 19 with shank 66 axially perpendicular to the axis of tube 12 and axially parallel to arm 17.

The C-clamp has a threaded eye 68 opposite anvil 64 in which shank 66 is threaded. The shank terminates in a diametral opening 70 in which is fitted a turning bar 72.

The device is shown in use in FIGS. 1 and 2. The belt 50 is secured around the waist of the worker W who is working on an elevated I-beam B forming part of a building framework F. The C-clamp is secured to upper horizontal flange plate 74 of beam B with stem 62 secured to stud 21. Stud 19 abuts beam plate 75. Anvil 64 abuts the bottom of plate 74. Thus, stem 62

is axially perpendicular to arm 17 and axially parallel to tube 12 which is axially vertical. The cable 40 extends out of the top of fitting 16 on tube 12 and terminates at the belt 50. The worker is unrestricted in his movements to walk back and forth across the beam B. If the worker accidentally falls off the beam his weight will initially be applied to counterweight 32 which will push against sleeve 30. Sleeve 30 will yield resiliently until the force of friction holding it in place in the tube will be overcome whereupon the sleeve will slide upward with the counterweight until spring 24 is encountered. Then the spring will be compressed by the sleeve 30 while the sleeve in turn is compressed by the counterweight until the cable 40 is finally held taut. It will be noted that the shock absorbing or resisting components are applied successively to break the fall of the workman so that finally he is safely supported by the taut cable and safety belt.

FIG. 6 shows how the device can be used without the C-clamp. The threaded stud 19 is passed through a hole 79 formed in a vertical plate or wall 80 and is secured by a nut 23. The arm 17 is horizontal and the tube 12 is axially vertical as required for proper operation of the device.

If it is desired to secure the C-clamp to a vertical wall or other support then the clamp will be engaged on stud 19 as shown in solid lines in FIG. 3 and the clamp can then be attached to the vertical support in the same manner as illustrated in FIGS. 1 and 2. The tube 12 in such an arrangement will be axially vertical as illustrated in FIG. 3.

In fitting 16, the upper flared opening provides a smooth bearing surface for the cable 40 as it passes in and out of the tube 12. FIGS. 7-11 illustrate a modification of the invention in which a substantially frictionless bearing and guide arrangement is provided at the top of tube 12.

A rotatable bearing ring 82 is provided with an annular radial flange 84. This flange rests rotatably on an annular shoulder 86 formed inside of fitting 16; see FIG. 10. A plurality of pins 88 extend radially inward of the fitting near its upper end to hold the ring 82 rotatably in the fitting.

Secured to the upper annular surface of ring 82 is a framework 95. This framework includes two parallel angle bars 96 extending chordally across the ring 82 and having horizontal flanges 93 secured by bolts 97 and washers 98 to the ring 82. Vertical end bars 99 are welded to opposite ends of the angle bars. Horizontal bars 100 are secured to upper ends of bars 99. Cross bars 102 are welded to ends of bars 100 at opposite ends of the framework. Diagonal brace bars 104 are welded between the angle bars 96 and bars 100. A pair of parallel spaced guide bars 106 are secured to bars 100 across the framework. Bars 106 serve to guide the cable 40. Located below bars 106 is a pair of horizontal spaced shafts 108 which carry rotatable pulleys 110^a, 110^b. The cable 40 passes between the aligned flanges of the two pulleys. Bars 106 are parallel and coplanar with shafts 108. A pair of flanges 112 on opposite sides of each pulley holds the pulley centered on its supporting shaft. Other corresponding parts to those of FIGS. 1-6 are identically numbered.

The arrangement described insures that cable 40 is held axially centered in tube 12 as it passes in and out of the tube. The bars 106 guide the cable out of and into the framework and guide the cable into the framework and between the pulleys and guide the cable out of the framework. The pulleys and guide bars minimize rubbing friction on the cable as it passes in and out of the tube 12.

The arrangement of FIGS. 7-11 is applicable to both

forms of the device shown used with and without the C-clamp in FIGS. 1-5 and FIG. 6, respectively.

The invention makes it possible to provide a building construction worker with a lifesaving or safety appliance which he can reposition at will in any location where he must work. The device is out of the way at the worker's back and does not interfere with his walking or working movements in any way. It is always ready and in position to operate if an emergency or accident should cause the worker to fall.

The several metal parts of the device may be made of steel, bronze, or other tough metals. All parts of the device will have sufficient size and strength to support the weight of a worker under the most rigorous conditions of use, such as would be encountered in a free fall for the full length of the cable 40, and then subsequent suspension of the worker by the belt at the end of cable 40 for a period of time until help arrives and the worker is restored to his original position.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. A safety device comprising a cylindrical tube, a cylindrical counterweight slidably disposed in the tube, a shock absorbing resilient sleeve axially aligned with the counterweight in the tube, a flexible cable secured to the counterweight and passing axially through the sleeve out of the tube, a tubular fitting mounted on the upper end of the tube, a coil spring engaged under the fitting at the upper end of the tube, an arm extending radially outward of the fitting, means on the arm for engaging a support to mount the tube axially vertical with respect to said support, said fitting having a shoulder formed in its upper end, a ring rotatably mounted on said shoulder, a framework secured to said ring, a pair of pulleys rotatably carried by said framework and having flanges disposed in alignment, said pulleys defining a passage therebetween with said cable passing through said passage, and a pair of spaced guide bars carried by said framework above said pulleys for guiding the cable into and out of the framework and between the pulleys.

2. As an article of manufacture, a safety device comprising a cylindrical tube having internally threaded opposite ends, a threaded plug engaged in one end of the tube, a tubular fitting having a threaded nipple engaged on the other end of the tube, an arm extending radially outward of the fitting, a resilient rubber sleeve slidably disposed in the tube between the counterweight and nipple, a coil spring secured at the upper end of the tube by said nipple, and a C-clamp on the outer end of the arm for attachment to a support and for mounting said tube axially vertical with respect to said support, said fitting having a shoulder formed in its upper end, a ring rotatably mounted on said shoulder, a framework secured to said ring, a pair of pulleys rotatably carried by said framework and having flanges disposed in alignment, said pulleys defining a passage therebetween for passing a cable through the passage, and a pair of spaced guide bars carried by said framework above said pulleys for guiding the cable into and out of the framework and between the pulleys.

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