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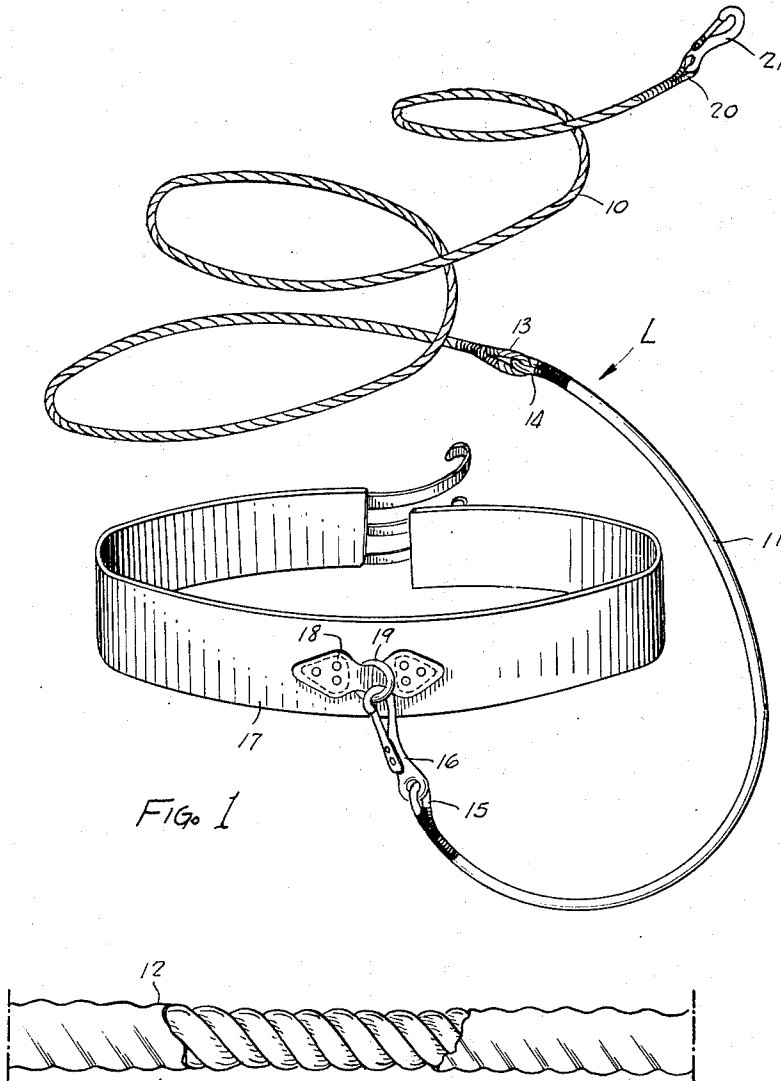
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2,459,545

LIFE LINE

Filed April 5, 1946

3 Sheets-Sheet 1



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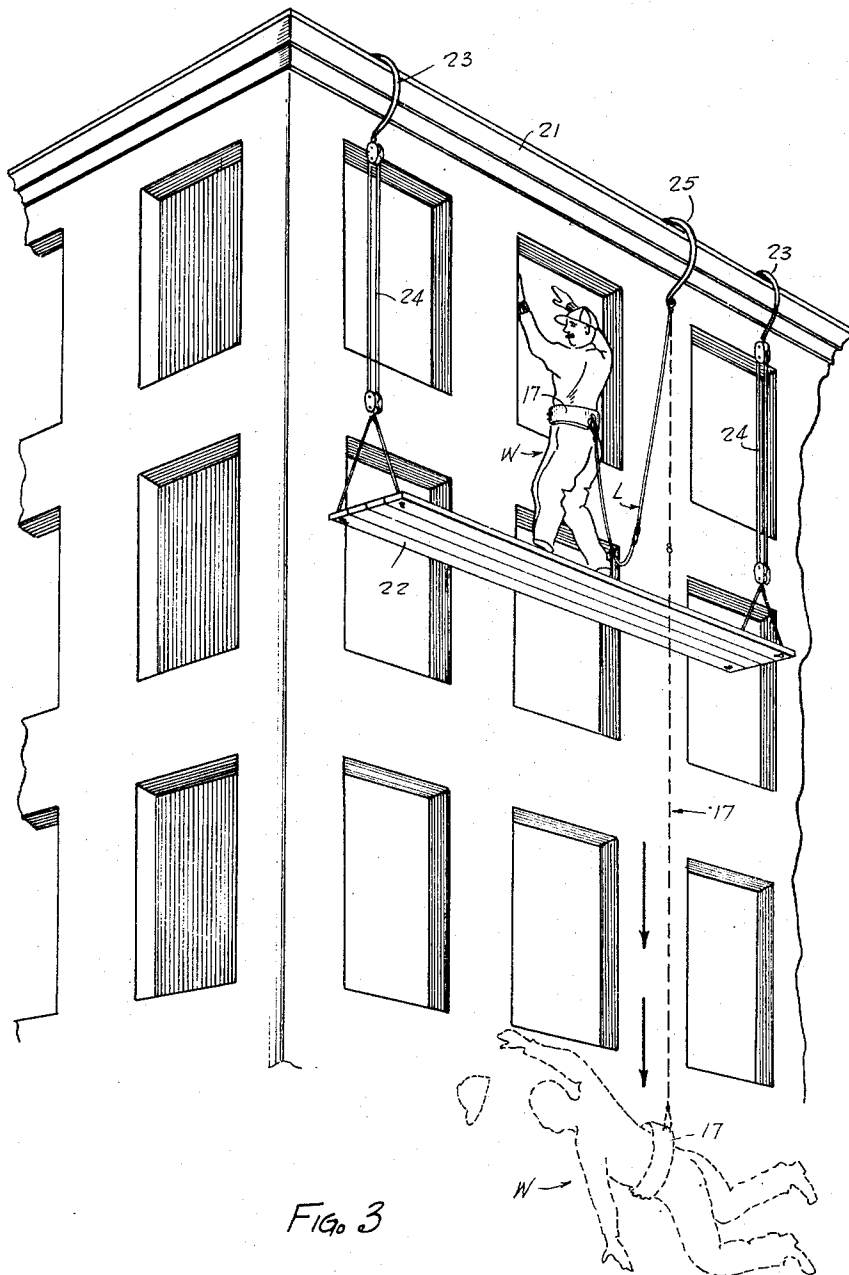
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3 Sheets-Sheet 2



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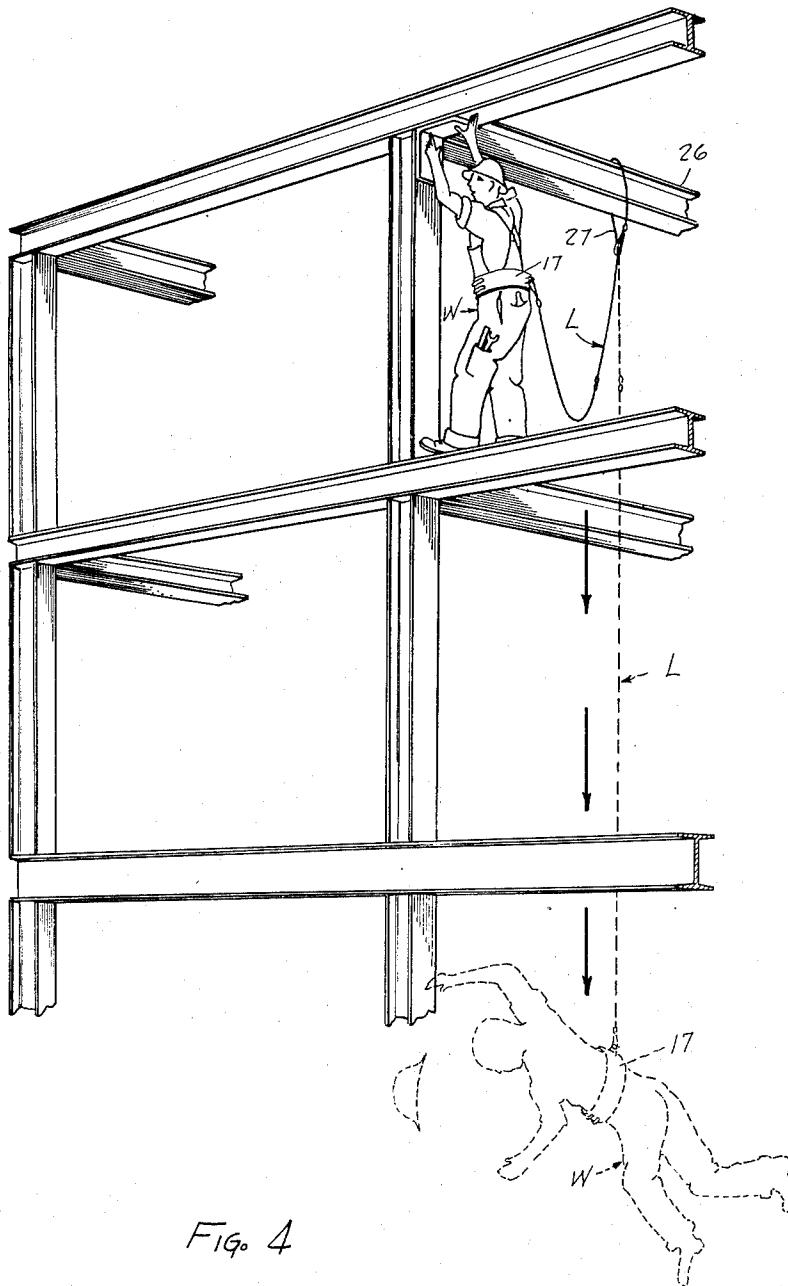
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UNITED STATES PATENT OFFICE

2,459,545

LIFE LINE

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Application April 5, 1946, Serial No. 659,779

2 Claims. (Cl. 227-49)

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The present invention relates to life lines such as are commonly employed by construction workers, window washers, shipyard workers, and others engaged in hazardous occupations where the danger of a fall is imminent.

At the present time, it is common practice for those engaged in dangerous occupations of the type above set forth to employ so called "life lines" which are intended to save the worker's life in the event of a fall. Ordinarily a life line is secured at one end to a convenient anchorage on the particular job. The other end is secured to the person of the worker as by being affixed to a belt which encircles the worker. Due to the fact that it is necessary for the worker to move about, there must be an appreciable amount of slack in the life line. Thus, when a scaffold gives way, the harness breaks, or the worker slips from the support on which he is working he falls an appreciable distance because of this slack in the line. Due to gravity action, the worker's body is accelerated to a rate of speed so noticeable that when the life line becomes taut he is brought to a stop with a severe jerk which often results in serious injury to the worker.

With the foregoing conditions in mind, this invention has in view as its foremost objective the provision of a life line including means for gradually absorbing the shock of a fall and decelerating the worker's body in a gradual manner. In carrying out this idea in a practical embodiment it is important to avoid the use of any shock absorbing mechanism which will react or recoil and thereby increase the likelihood of injury to the worker. Following this theory, such devices as metallic springs, rubber shock cord, and similar mechanisms which react with a sling-shot action are ruled out.

At the present time, there is known and available to the public certain synthetic plastic fibers which in their undrawn state are susceptible of being drawn and while so drawing absorb energy. Moreover, this drawing is permanent and is not accompanied by any reaction, recoil, or rebound. Among such synthetic plastic fibers might be noted undrawn nylon, polyethylene, Vinyon, and Vynlite.

Accordingly a further object of the invention is the provision of a life line of the character aforesaid which includes a length or section of undrawn synthetic plastic fiber which is susceptible of being drawn and while drawing absorb energy. With such a life line properly secured at one end to an anchorage on the building structure and the other end affixed to the worker with

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the usual amount of slack, the worker may fall. However, rather than being brought to a stop with a sudden jerk, as the line becomes taut the undrawn synthetic plastic fibers elongate and gradually decelerate the worker's body until it is brought to a stop. Thus, likelihood of personal injury to the worker is greatly minimized if not completely obviated.

Various other more detailed objects and advantages of the invention such as arise in connection with carrying out the above noted ideas in a practical embodiment will in part become apparent and in part be hereinafter stated as the description of the invention proceeds.

The invention therefore comprises, a life line including a length or section made from undrawn synthetic plastic fibers which have the ability to draw and while drawing absorb energy.

For a full and more complete understanding of the invention reference may be had to the following description and accompanying drawings wherein:

Figure 1 is a perspective view of a life line made in accordance with the precepts of this invention and shown as attached to a body strap or belt.

Figure 2 is an enlarged detailed view showing a portion of a section made from undrawn synthetic plastic fibers with parts broken away.

Figure 3 is a perspective view of a building with a scaffold supported therefrom and showing one mode of usage of the life line, and

Figure 4 is another perspective view illustrating the mode of usage by a structural steel worker.

Referring now to the drawings wherein like reference characters denote corresponding parts and first more particularly to Figure 1, a life line which is made following the teachings of this invention is therein depicted and referred to in its entirety by the reference character L. The life line L comprises a main body section 10 which may be made from any non-elastic material having the required tensile strength. Among the materials from which the body section 10 may be made are noted: steel cable, cotton cable, hemp or flax rope, or any other materials commonly employed to make rope and cables or any combination thereof.

The life line L also includes a second section 11 which is identified as being the drawable section. Drawable section 11 may be made from any synthetic plastic fiber which in its undrawn condition is susceptible of being drawn and while drawing absorb energy. Among such materials are noted: undrawn nylon, polyethylene, Vinyon and Vynlite. For the purposes of this specification, un-

drawn nylon may be taken as the preferred material to be used in making section 11. It is now well established that undrawn nylon is capable of elongating to the extent of at least two-hundred percent and while so elongating absorb an appreciable amount of energy.

In order to preserve the undrawn synthetic plastic fiber in its drawable condition so as to provide the best safety factor possible, the synthetic plastic fibers should be treated with a proper solution to maintain this condition. Treatments which will serve this purpose are fully set forth in the applications of Herbert E. Rose, Serial Numbers 589,708, filed April 21, 1945, now abandoned, and 633,551, filed December 7, 1945, now Patent No. 2,441,209, May 11, 1948, respectively.

In order to make sure that the treatment remains in the fibers it is believed to be the better practice to enclose the section 11 in an encasing sheath as shown at 12 in Figure 2. This sheath 12 precludes the possibility of the treatment drying out from the fibers.

The sections 10 and 11 may be connected in any suitable manner. As illustrated in Figure 1, section 10 is formed with a terminal loop 13 which interlocks with a terminal loop 14 on the section 11. The latter section is formed at its other end with another terminal loop 15 which serves as a means of connection to a snap fastener shown at 16. The snap fastener 16 is susceptible of being attached to just about any type of body harness. One example of such a body harness is shown in the form of the abdominal belt 17 illustrated in Figure 1. Belts such as this are now commonly employed by construction workers and others engaged in similar hazardous occupations and are used with the heretofore known life lines. The present invention contemplates the use of the new life line with any of the abdominal belts or harnesses now employed.

As illustrated in Figure 1 the belt 17 includes a bracket 18 which carries a ring 19. This ring 19 is adapted to have the snap fastener 16 engage therewith in a well-known and obvious manner as illustrated.

The free end of the section 10 is also formed with a terminal loop 20 to which is secured another snap fastener 21.

Referring now more particularly to Figure 3, one mode of usage for the life line hereinbefore described will now be outlined. A building is represented at B and is shown as having the usual parapet 21. A scaffold 22 is supported from the parapet 21 by grapples 23 and lines 24. A worker shown at W wears the abdominal belt 17 to which the life line L is attached in the manner described. In order to provide an anchorage for the other end of the life line L a grapple 25 may be employed and the snap fastener 21 is suitably secured to this grapple. It will be noted that there is sufficient slack in the line L for the worker W to move about in performing his assigned tasks. Should the scaffold or any of its supports fail for any reason or should the worker W fall off the scaffold, he will descend under gravity action until such time as the line L become taut. However, rather than being brought abruptly to a stop with a jerk which might prove injurious, the

drawable section 11 elongates and while so doing gradually absorbs the shock of the fall. Moreover, this drawing is a permanent one not accompanied by any rebound which might cause injury to the worker. The dotted line image of Figure 3 illustrates the position of the worker after the fall.

Figure 4 illustrates a slightly different mode of usage wherein the structure on which the worker is engaged presents a suitable anchorage which is susceptible of being encircled by the section 10. The steel structure illustrated includes numerous horizontal beams 26 any one of which is adapted to have the section 10 pass thereabout and the snap fastener 21 secured to the line itself so as to form an anchoring loop designated 27. The mode of operation is otherwise the same as that above described. Should the worker fall from his normal position, the life line L first becomes taut, whereupon the section 11 begins to draw and gradually brings him to a stop without injury.

While preferred specific embodiments of the invention are hereinbefore set forth, it is to be clearly understood that the invention is not to be limited to the exact construction illustrated and described because various modifications of these details may be provided in putting the invention into practice within the purview of the appended claims.

What is claimed is:

1. In a life line of the character described, a relatively non-elastic, non-stretchable section, fastening means carried at the free end of said section, a section made from undrawn synthetic plastic fibers joined to said first section, fastening means at the free end of said section of undrawn synthetic plastic fibers and means adapted to be worn by a person coupled with said last-named fastening means, whereby when said first-named fastening means is secured to a support and the weight of said person is applied to the line, said undrawn fibers elongate permanently and while so elongating absorb energy and serve as a shock absorber.

2. In a life line of the character described, a section of treated undrawn synthetic plastic fibers in rope-like form, and a sheath enclosing said section to preserve the efficiency and durability of the drawing properties of said treated fibers.

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(5th addition patent to 553,653)