

[54] **SAFETY RAIL APPARATUS**

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[51] Int. Cl. **A62b 1/14, E04g 3/14**

[58] Field of Search **182/8, 3, 4, 36, 38, 39, 182/82, 142; 52/710; 308/3.6**

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[57] **ABSTRACT**

An elongated tube formed of plastic material is embedded in a wall of a structure adjacent an outer face thereof, so that the enclosing wall confines the tube against transverse expanding deformation. Parallel ribs on the tube define a continuous entrance slot into an internal cavity, and a block member is movable longitudinally in the cavity. A terminal fitting for a safety line or other device is secured to the block and extends through the slot. The tube may extend either horizontally or vertically on a wall of the structure.

5 Claims, 4 Drawing Figures

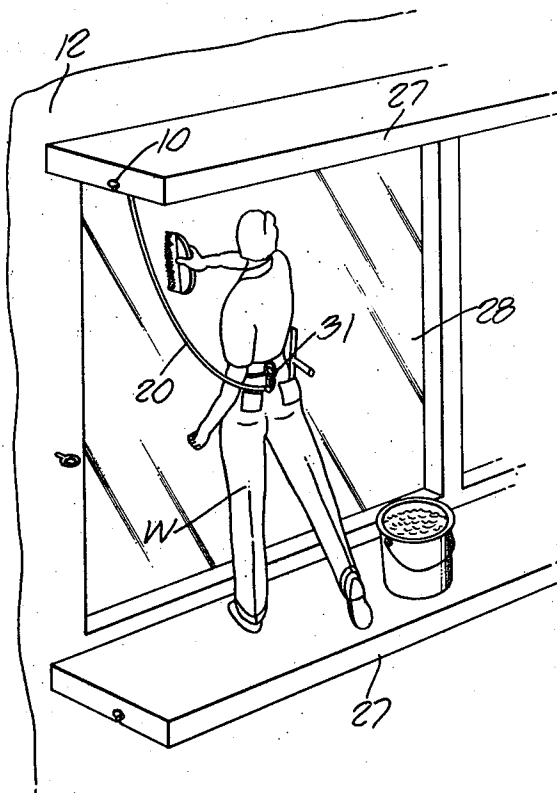


FIG. 1.

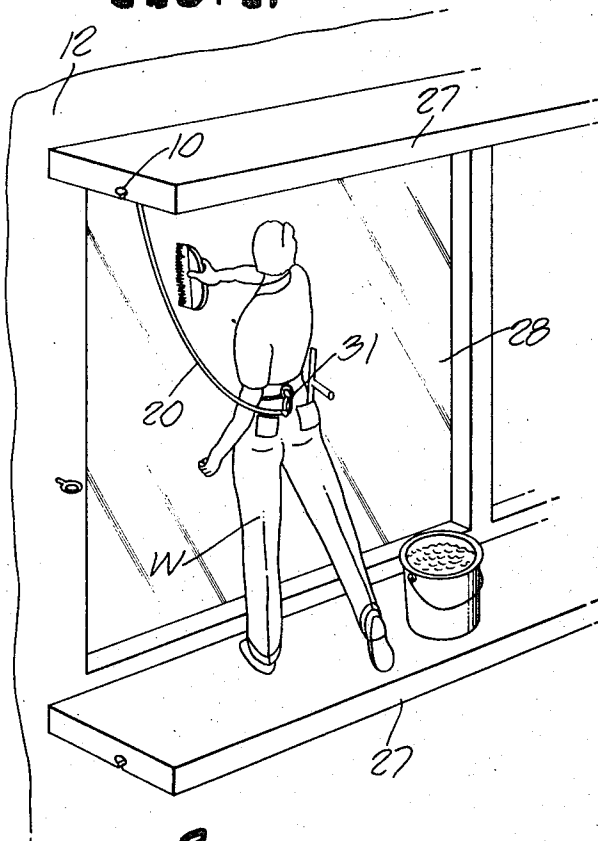


FIG. 4.

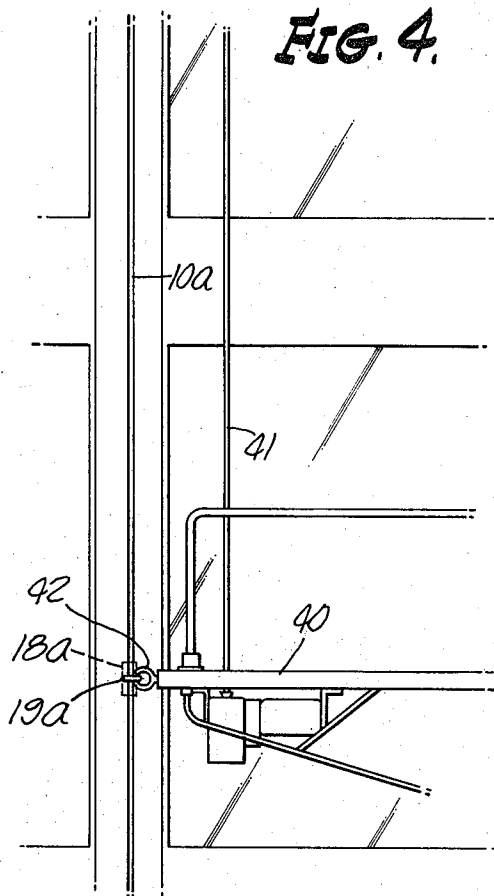
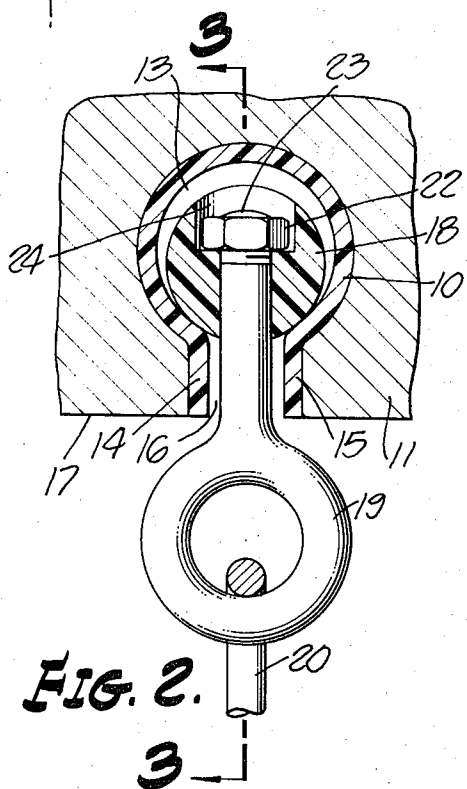


FIG. 2.

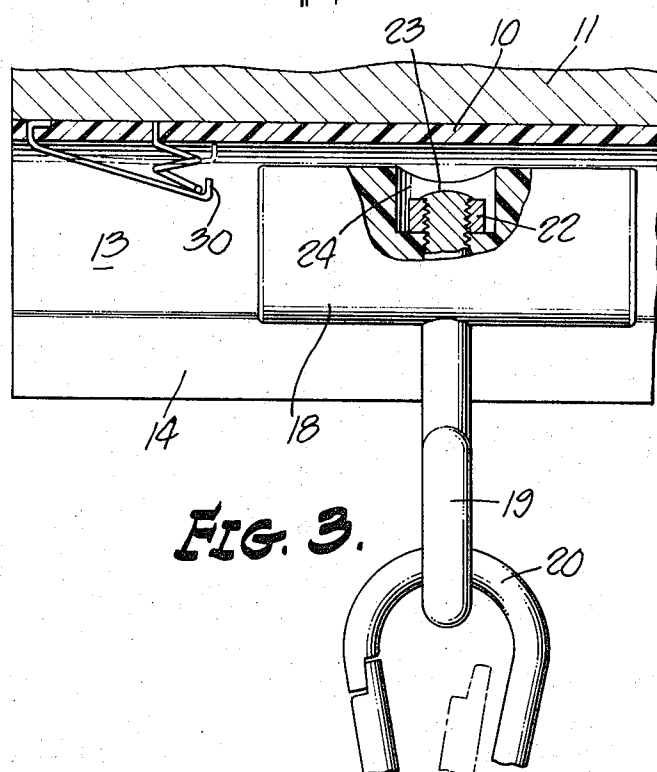


FIG. 3.

SAFETY RAIL APPARATUS

This invention relates to apparatus for use in connection with treatment of an exterior surface of a structure such as a building. For example, the apparatus is useful as a stationary track for a safety harness worn by a workman washing exterior windows of a building.

In the past, window cleaners' safety rail systems on office buildings have employed a metal rail and double roller assembly. However, the rail must often be made of bronze rather than aluminum or galvanized iron in order to resist erosion for an expected 50-year life of the building. The device of the present invention is less costly but it does not sacrifice strength or service life. Moreover, it results from recognition of the fact that no load is placed on the safety lanyard at the time it is shifted along the length of the rail, and therefore rollers are unnecessary.

In a typical commercial form of the invention, the safety device comprises an eye-bolt connected to a nylon block which slides within an extrusion formed of polyvinylchloride. The extrusion has an entrance slot along its full length. The extrusion is embedded within concrete at the time the building is constructed, and uses the backup strength of the concrete to prevent the nylon block from being pulled out through the narrow elongated slot.

Another use for the device of the present invention is to provide vertical guides on a building or other structure for use with a vertically moving platform suspended from the top of the building. The slotted extrusions with the internal slide blocks then act to prevent horizontal motion of the platform toward or away from the facade, or horizontal motion parallel to the external wall of the building. The platform may be used by workmen to clean windows or building surfaces or may be used to support automatic cleaning machinery. Moreover, the use of such a platform is not limited to cleaning; for example, such a platform might be used to erect a scaffold alongside a microwave tower.

An important feature of this invention is the fact that the slotted tube is not a structural member in its own right, but relies upon the compression strength of the enveloping concrete of the building wall against deformation by forces applied to the slide block.

Other objects and advantages will appear hereinafter in the drawings:

FIG. 1 is a perspective showing use of the invention by a workman cleaning the exterior windows on an office building.

FIG. 2 is a transverse sectional view showing a preferred embodiment of the invention.

FIG. 3 is a longitudinal sectional view taken substantially on the lines 3—3 as shown in FIG. 2.

FIG. 4 is a front elevation showing a modification.

Referring to the drawings, a tube 10 formed as an extrusion of plastic material such as, for example, polyvinylchloride, is embedded in the concrete 11 forming a part of an exterior wall surface of a structure such as an office building 12. The tube has walls defining a central cavity 13 and has outward extending parallel longitudinal ribs 14 and 15 defining a continuous entrance slot 16 between them. The ends of the ribs 14 and 15 preferably lie flush with the outer surface 17 of the building wall. The portions of the tube 10 which define the interior cavity 13 are generally circular.

A slide block 18 generally circular in cross section is positioned within the cavity 13 and is secured to a terminal fitting 19 for the safety line or lanyard 20. The terminal fitting 19 may take the form of an eye-bolt having a threaded nut 22 secured thereto. The extreme end surface 23 may be beveled over, staked or welded to prevent unthreading of the nut 22. A recess 24 in the slide block 18 receives the nut 22. The diameter of the slide block 18 is considerably greater than the width of the continuous entrance slot 16 to prevent escape of the slide block 18 from the cavity 13.

In the particular building construction shown in FIG. 1, horizontal ledges 27 above and below exterior windows 28 are formed as an integral part of the building walls. With this multiple-ledge type of construction, it is convenient to place the slotted tubes 10 horizontally along the undersurfaces of the ledges 27, and to embed them in place at the time of construction of the building. The concrete material which encloses the walls of the slotted tube 10 resists forces applied by the slide block 18 when the eye-bolts 19 are tensioned. The slotted plastic tubes 10 are not structural members in themselves, but rely for strength on the enclosing concrete of the wall. In ordinary use, the slide block 18 is manually moved along the slotted tube 10 only when no load is applied to the slide block.

Means are provided to prevent accidental movement of the slide block 18 out through either end of the slotted tube 10. As shown in FIG. 3, this means may comprise a spring abutment 30 which may be manually depressed when desired to permit removal of the slide block 18 through the open end of the slotted tube 10.

The slide block 18 and eye-bolt 19 are inexpensive, and one such assembly may be left in each guide tube 10, if desired, rather than transfer the slide block and eye-bolt from one guide tube to another. While the slotted tube 10 is shown as being substantially cylindrical in cross section, it will be understood that other shapes may be used, so long as the entrance slot is narrower than the cavity.

In operation, the workman W stands on a ledge 27 to wash exterior windows 28 on the building 12. His safety lanyard 20 is connected to the eye-bolt 19 and slide block 18. The slide block 18 is moved through the open end of the tube 10 embedded in the ledge 27 above the workman W. The slide block automatically passes the spring abutment 30 and may be moved lengthways along the tube 10 by the workman W as he moves horizontally along the ledge 27. The safety lanyard 20 remains fixed to the waist harness 31 worn by the workman W. If he should lose his footing on the ledge 27, his weight would be carried through the harness 31, safety lanyard 20 and eye-bolt 19 to the block 18. The strength of the concrete 11 prevents the block 18 from being torn from the slotted tube 10, and the fall of the workman W would thus be arrested.

In the modified form of the invention shown in FIG. 4, the slotted plastic tubes 10a are installed vertically on the face of a building, instead of horizontally. The slotted tubes 10a are otherwise substantially the same as the slotted tube 10 previously described. Also, the slide block 18a and the terminal fitting 19a are similar to the slide block 18 and terminal fitting 19 described above. A vertically movable platform 40 suspended by cables 41 travels vertically with respect to the face of the building, and is prevented from moving horizontally in any direction by an element 42 on the platform 40

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connected to the terminal fittings 19a. The movable platform 40 may be used by workmen for any purpose, such as to wash exterior windows or to clean or treat the outer surface of the building, or the platform may carry automatic washing machinery, not shown.

Having fully described my invention, it is to be understood that I am not to be limited to the details herein set forth but that my invention is of the full scope of the appended claims.

I claim:

1. In combination, a structure such as a building having concrete wall portions, an elongated non-metallic tube embedded in a concrete wall of the structure adjacent an outer face thereof to confine the tube against transverse expanding deformation, said tube having walls defining an internal cavity and having a continuous longitudinal entrance slot into said cavity and being of less transverse dimension than said cavity, a block member movable longitudinally in said cavity and of greater width than said slot to prevent escape of the block member through said entrance slot, the walls of said cavity converging toward said slot whereby forces on said block directed toward said slot tend to cause

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lateral expansion of said tube and a terminal fitting secured to said block member and extending slidably through said slot and having means for the releasable attachment thereto of movable means to be held adjacent said concrete wall, whereby tensioning of the terminal fitting by said movable means causes the block to exert the internal expanding force on the tube, resisted by the enclosing concrete wall.

2. The combination set forth in claim 1 in which said tube extends horizontally of said structure whereby said movable means may be a workman's safety harness.

3. The combination set forth in claim 1 in which said tube extends vertically of said structure whereby said movable means may be a movable platform.

4. The combination set forth in claim 1 in which the continuous entrance slot is defined between outward projecting longitudinal ribs on said tube.

5. The combination set forth in claim 1 in which said block and the portion of said tube defining said cavity are both generally circular in cross section.

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