United States Patent [19]

Byrd

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[54] **SAFETY LOWERING DEVICE**

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[52] **U.S. Cl.** **254/158**

[51] **Int. Cl.** **A62b 1/12**

[58] **Field of Search** ..... 193/35 A; 254/136, 158

[56] **References Cited**

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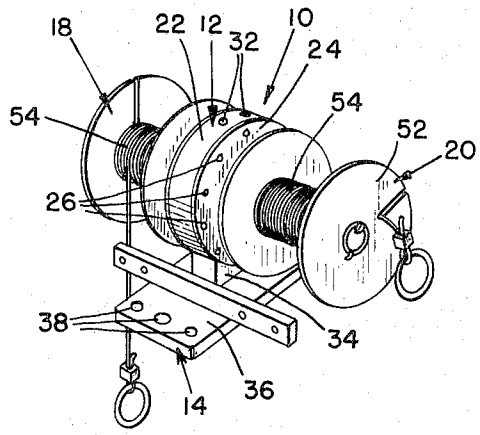
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Primary Examiner—Stanley H. Tollberg
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[57] **ABSTRACT**

A safety device utilizing a drum and cable arrangement for lowering a person or load at a substantially constant speed. A plurality of radially displaceable vanes or blades rotate with the drum and are positioned within a fluid-filled, sealed housing. A fixed plate is secured within the housing to depress the vanes upon movement past the plate to control rotation of the drum.

9 Claims, 4 Drawing Figures



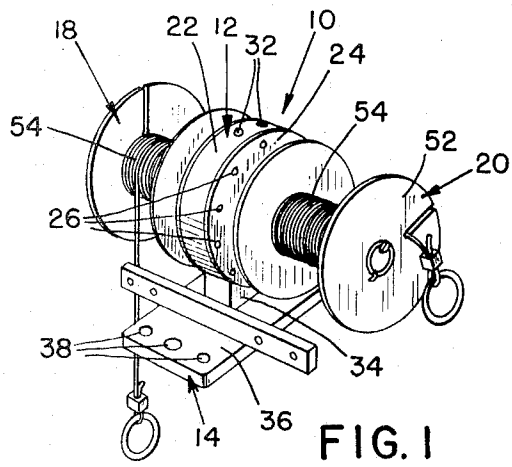


FIG. 1

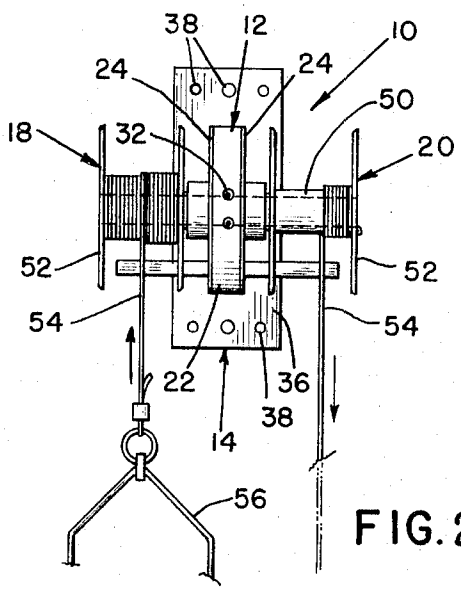


FIG. 2

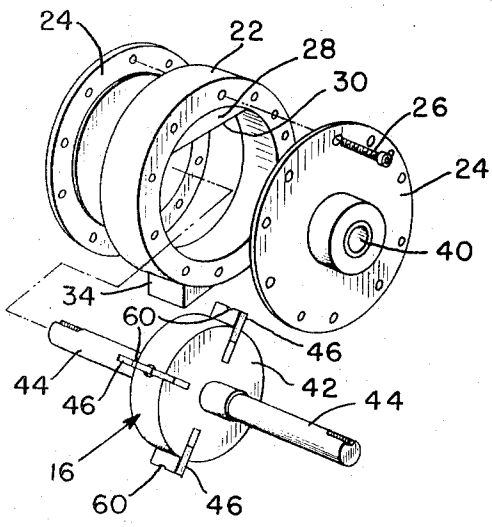


FIG. 4

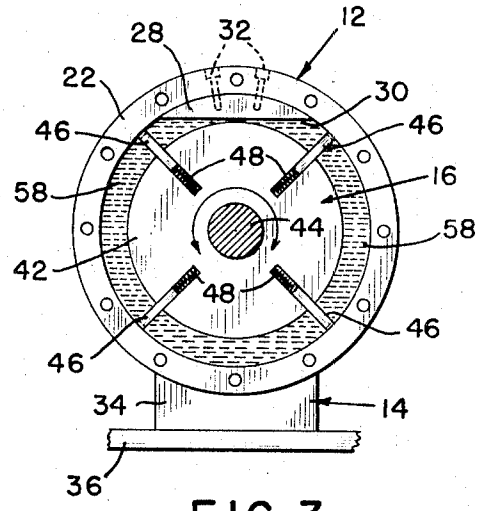


FIG. 3

SAFETY LOWERING DEVICE

BRIEF SUMMARY AND OBJECTS OF THE INVENTION

This invention relates to a safety device for use in lowering loads from an elevated location, and more particularly to a device for maintaining a generally constant, safe speed so that a load may be safely lowered.

The device may be used for the safe lowering of various bodies and objects. Particularly, the device may be secured to an upper story of a building or other structure for use as a fire escape for safely lowering persons to the ground from the upper stories of a building.

Briefly, the device includes a fluid type housing assembly which houses a plurality of rotatable vanes in a fluid. The vanes are connected for rotation with a rotor and displaceable relative thereto. The rotor is secured to a shaft which extends through the housing assembly and has a pair of drums fixed to the opposite ends of the shaft for rotation with a rotor. Each drum has a cable or line attached thereto, the cables being wound on the drums in opposite directions such that as one cable is unwound from a drum, the other cable is wound upon the other drum. Upon rotor rotation, the vanes are displaced inwardly by a plate from a position normally in engagement with the housing inner periphery. The speed of the drums is regulated by the liquid compressed upon vane rotation and by the small openings provided in the vanes.

One of the primary objects of the invention is the provision of a new and improved safety device for lowering persons or loads at a generally constant speed.

Another object of the invention is the provision of a safety lowering device employing two drums and two cables, the cables being oppositely wound on the drums whereby a person lowered by a first cable automatically raises the second cable to an operative position for a second operation.

Still another object of the invention is the provision of a device which is reliable, and of relatively small, simple construction.

Other objects and advantages of the invention will become apparent when considered in view of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a schematic, perspective view of the safety device of the present invention;

FIG. 2 is a front elevational view of the present invention illustrating one line being wound upon a drum as the other line is unwound from a drum;

FIG. 3 is a side elevational view, partly in section, of the safety apparatus illustrating the rotor, blades and stationary plate within the fluid-filled housing; and

FIG. 4 is an exploded, perspective view of the housing and rotor assembly.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing, and particularly to FIG. 1, the safety device **10** includes a stationary, sealed housing **12** fixed to a support bracket assembly **14**, a rotor assembly **16**, FIGS. **3** and **4**, and a pair of drums **18, 20**, one drum being located at each side of the sealed housing.

The sealed housing **12** comprises a sleeve-like annular member **22** having opposite ends closed and sealed

by circular plates **24**. The plates **24** may be secured by a plurality of suitable fasteners **26**. Secured on the inner periphery of the annular member **22** is a plate member **28**, FIGS. **3** and **4**. The plate member **28** is a segment of a circular plate having an arcuate face in engagement with the inner periphery of the annular member **22** and a flat face **30**. The plate member **22** is generally the same width as the annular member **22** and is fixedly secured thereto by fasteners **32**.

The annular member **22** of the housing **12** is mounted, as by welding or other suitable means, to a support block **34** which is, in turn, attached to a plate **36**. Openings **38** are provided in the plate **36** for facilitating mounting of the safety device **10** to a wall or other appropriate structure.

The rotor assembly **16** is rotatably mounted by bearings **40** located in the end plates **24, 24**. The assembly includes a rotor **42** secured to an elongated shaft **44**, and blades or vanes **46** displaceable radially of the rotor **42**. The shaft **44** extends axially through the annular member **22** and through openings in the end plates **24, 24** and is mounted for rotation relative to the housing **12** by means of the bearings **40**.

Each blade or vane **46** is generally rectangular having a width substantially corresponding to the width of the annular member **22** and is slidably mounted within a radial groove in the rotor **42**. Normally the blade **46** is biased by a spring **48**, or other means, radially outwardly into sliding engagement with the inner periphery of the annular member **22**. Upon rotation of rotor **42**, each blade **46** is depressed radially inwardly compressing the spring **48** as the blade moves over the face **30** of the vane engaging cam or plate member **28**. The vane engaging cam being a projecting segment of less than 10° in an angular rotation.

Each drum **18** and **20**, including a barrel portion **50** and spaced flanges **52**, is secured to the elongated shaft **44** by a key or other means. A cable **54** is wound upon each drum. One cable end is secured to the drum while the free end may be attached to a sling, strap or other means **56**, FIG. **2**, for supporting or attachment to a load or body.

In the operation of the device, the sealed housing **12** is filled with a suitable fluid **58** such as oil. The device **10** may be mounted upon a structure such that the cables **54** extending from the drums **18, 20** generally are in a vertical plane. It is to be noted that the cables **54** are wound upon the drums in opposite directions such that as one cable unwinds, the other cable is wound upon a drum.

The free end of the cable is attached to a person or other load for lowering. The lowering speed is retarded to a predetermined speed due to the rotation of the blades **46** within the fluid-filled housing **12** which functions as a fluid brake. The blades **46** also frictionally engage the inner periphery of the housing annular member **22** and the face **30** of the plate **28**. The face **30** is positioned such that it is spaced a very small distance from the outer periphery of the rotor **42**, as shown by FIG. **3**. As the blades **46** rotate in the fluid, the fluid immediately forwardly of the rotating blade is compressed as the blade approaches the stop member **28**. A small opening or groove **60** is provided in each blade **46** to permit fluid to flow from one side of the blade to the opposite side as the blade rotates. As the rotor and drums rotate to safety lower a person, a second cable is wound upon the other drum to permit a second per-

son to be immediately lowered by means of the second cable.

I claim:

1. Apparatus for controlling the rate of descent of a load comprising, a rotatable shaft, a drum mounted upon said shaft for rotation therewith to wind or pay out a line attached to the drum, support means, a fluid-filled, sealed housing assembly mounted upon said support means, said housing assembly rotatably supporting said shaft, rotor means, including a plurality of vanes, attached to said shaft for rotation therewith and vane engaging cam means projecting within a segment of less than 90° within said housing assembly for displacing said vanes relative to said rotor means upon rotation thereof whereby said vanes are projected radially substantially the same extent during rotation of said rotor means until engagement with said vane engaging cam means.

2. Apparatus as recited in claim 1, wherein said two drums, each having a line attached thereto, are secured to said shaft for rotation therewith, one line being unwound from one drum and a second line being wound upon the other drum upon rotation of the rotor means.

3. Apparatus as recited in claim 2, said rotor means including a rotor member mounted for rotation with said shaft, said member defining a plurality of radially directed slots, said vanes being slidably mounted within said slots.

4. Apparatus as recited in claim 3, and further including means biasing said vanes radially outwardly into engagement with said housing assembly.

5. Apparatus as recited in claim 4, said means within said housing assembly including a plate having a face for radially displacing inwardly said vanes as they rotate passed said plate.

6. Apparatus as recited in claim 5, wherein each vane defines an opening to permit fluid to flow from one side of the vane to the other side.

7. Apparatus as recited in claim 6, wherein the width of said vanes correspond substantially to the internal width of said housing assembly and said vanes normally extend from said rotor member outwardly into frictional, sliding engagement with said housing assembly.

8. Apparatus as recited in claim 1, said rotor means including a rotor member mounted for rotation with said shaft, said member defining a plurality of radially directed slots, said vanes being slidably mounted within said slots.

9. Apparatus as recited in claim 8, said means within said housing assembly including a plate having a face for radially displacing inwardly said vanes as they rotate passed said plate, each vane defining an opening to permit fluid to flow from one side of the vane to the other.

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