Jan. 3, 1956 R. C. GSCHWIND 2,729,425

SAFETY DEVICE

Filed March 30, 1954 2 Sheets-Sheet 1

Fig. 1.

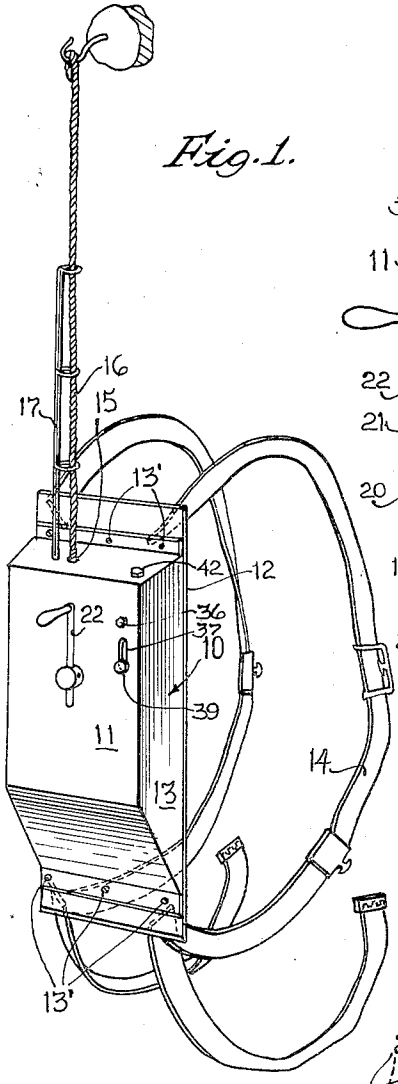


Fig. 2.

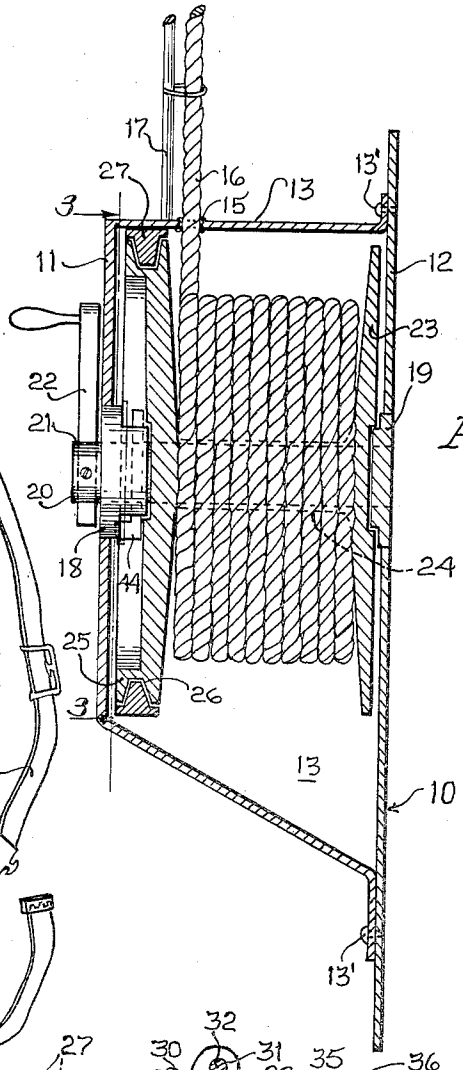
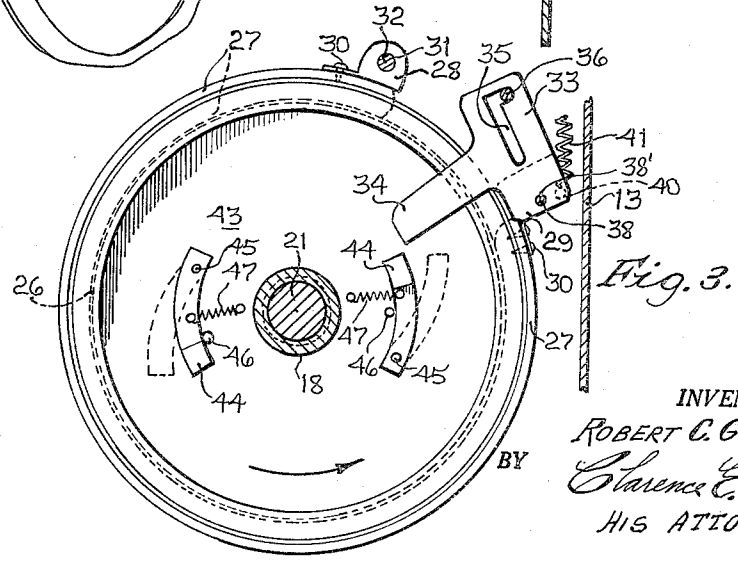


Fig. 3.



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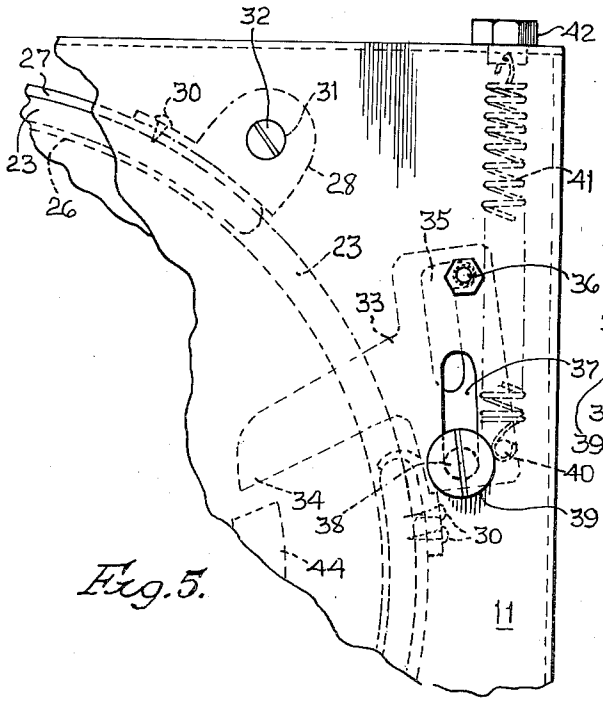


Fig. 5.

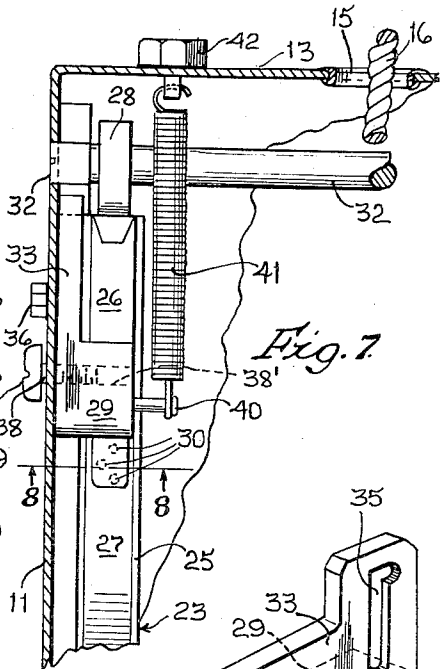


Fig. 7.

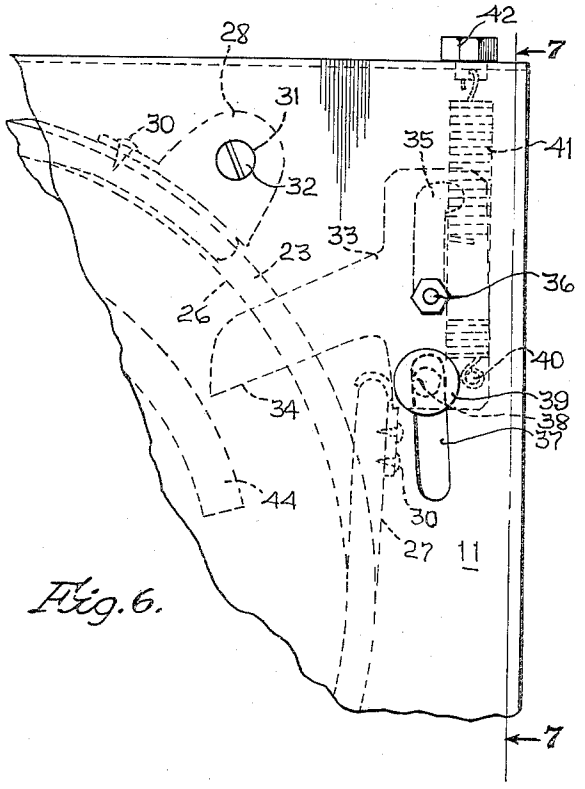


Fig. 6.

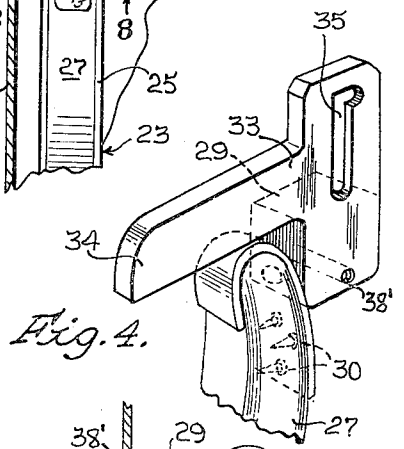


Fig. 4.

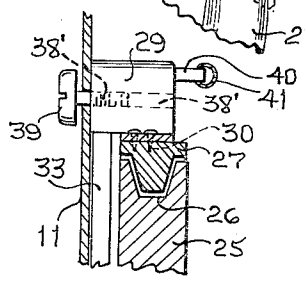


Fig. 8.

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2,729,425

SAFETY DEVICE

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Application March 30, 1954, Serial No. 419,881

7 Claims. (Cl. 254—157)

My invention relates to a new and useful improvement in a safety device in the nature of an apparatus for preventing falls into space.

A principal object of my invention is a provision in a device of this character of a small and light-weight compact unit, suitable for carrying upon the back of a user.

Another object of my invention is the provision in a device of this character of a simple braking mechanism whereby the withdrawal of the safety rope out of the device may gradually be arrested and finally prevented.

Another object of my invention is the provision in a device of this character of a simple arrangement of parts whereby the braking mechanism may be easily reset.

Still another and equally important object of my invention is the provision in a device of this character which permits withdrawal of a safety rope from the device, only if such withdrawal is accomplished through a slow and gradual movement such as the normal movement of a user while performing his normal work.

Another object of my invention is the provision in a device of this character of a simple arrangement of parts whereby the braking operation is steadily increased by the increased movement of the safety rope with respect to the device.

Another object of my invention is the provision in a device of this character of a simple arrangement of parts which are economical in cost and simple in manufacture.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

Fig. 1 is a perspective view of my invention;

Fig. 2 is a longitudinal sectional detail view of the invention showing the safety rope wound upon the pulley thereof;

Fig. 3 is a sectional detail view taken substantially on line 3—3 of Fig. 2;

Fig. 4 is a perspective view of the braking lever as employed in my invention;

Fig. 5 is a fragmentary detail view showing in dotted lines the position of the braking lever in an inoperative position;

Fig. 6 is a view similar to Fig. 5 but showing the braking lever in braking position;

Fig. 7 is a sectional detail view taken substantially on line 7—7 of Fig. 6; and

Fig. 8 is a fragmentary sectional detail view taken substantially on line 8—8 of Fig. 7.

It is becoming the accepted practice, and in a few States the statutory requirement, that a person whose employment requires him to work on the outside of a building and off the ground, use a safety device to prevent an accidental free fall into space. My invention is such a device. It is by design small in size, light in weight,

and as such is adapted to be conveniently worn on the back of the user.

The perspective view of my device as shown in Fig. 1 discloses a housing 10, made up of a front plate 11 and a back plate 12 joined together by nuts and bolts 13' along two opposite peripheral edges. The front plate 11 and the back plate 12 are joined together by side and end plates 13. The back plate 12 on its opposite side with respect to the housing 10 provides a method for attaching a safety harness 14. This harness 14 together with its method of attachment to the back plate 12 may be of any well known construction and arrangement. One of the end plates 13 is provided with an aperture 15 through which is adapted to pass the safety rope 16 as employed in my invention. Carried by this end plate adjacent the aperture 15, I provide a guide rod 17 for guiding the rope 16 as it passes from the housing 10.

Journalled through bearings 18 and 19 formed in the front plate 11 and back plate 12 respectively of the housing 10 is a rotatable shaft 20. This shaft 20 has one end 21 protruding beyond the housing 10 as shown in Figs. 1 and 2. Adapated to be frictionally secured to this end 21 of the shaft 20 is a handle 22, which is provided for normally rotating the shaft 20. The opposite end of the shaft terminates into the bearing 19 which is countersunk so as to prevent a flush surface even with the back plate 12 of the housing 10.

Mounted on the shaft 20 and rotatable therewith is a pulley member 23. This pulley provides a small hub 24 to which one end of the safety rope may be attached in any convenient manner. This pulley has one side 25 formed to provide a channel-shaped guide 26. Positioned within this guide 26 is a V-belt 27 of a smaller circumference than that of the channel-shaped guide. The ends of this V-belt 27 have fastened thereto mounting blocks 28 and 29. These blocks 28 and 29 are riveted to the V-belt 27 in any approved manner such as is shown at 30. Block 28 has formed therein a central opening 31 through which is journalled a fixed support rod 32. This rod 32 extends parallel to the long axis of the hub 24 and is fastened in any approved manner to the front plate 11 and back plate 12 of the housing 10. Block 29 has extending therefrom a braking lever 33. This lever 33 is provided with a laterally extending arm 34, which arm is of a sufficient width so as to be freely insertable between the side wall 25 of the pulley member 23 and the front plate 11. This arm 34 is constructed so as to extend in a direction substantially perpendicular to the long axis of the pulley member 23 as is viewed in Fig. 7.

The lever 33 is provided with a substantially L-shaped slot 35. The leg portion of the L-shaped slot 35 is constructed to extend in an opposite direction with respect to the arm 34 of the lever 33, as shown in Figs. 5 and 6.

Protruding into this slot 35 is a guide pin 36 carried by the front plate 11 of the housing 10. Also formed in the front plate 11 and in cross proximity positionwise to the slot 35 formed in the lever 33 is an elongated slot 37. Journalled through this slot 37 is a guide pin 38. This guide pin 38 is provided with an enlarged head 39 which is adapted to ride on the surfaces adjacent the slot 37. The opposite end of this guide pin 38 is adapted to be screwed into the block 29 as shown in Fig. 8, at 38'.

The block 29 is provided with a depending stud 40 to which is secured one end of an expansion spring 41. The other free end of the spring 41 is fastened by a bolt 42 to the end plate 13 of the housing 10.

The arrangement is such that when the block 29, together with the lever 33 is pulled by the tension of the spring 41 toward end plate 13, the pins 36 and 38 will ride in their respective slots 35 and 37 and be guided into

the position as shown in dotted lines in Fig. 6. In such a position the V-belt 27 will be drawn into the channel 26 of the side wall 25 of the pulley member 23. As the V-belt 27 is thus moved rotation of the pulley member 23 is prevented.

For releasing the V-belt 27 from the channel 26 of the side wall 25 of the pulley 23, the block 29 with the pin 38 is forced against the action of the spring 41 to the extreme end of the elongated slot 37, as shown in Fig. 5. At the same time, the pin 36 will ride through the L-shaped slot 35 and into the leg portion thereof, as shown in Fig. 5, where it will be temporarily latched. As the pin 38 of the block 29 is off center with respect thereto, the pull of the spring 41 is in such a direction that the pin 36 will be forced into the leg of the L-shaped slot 35 and held therein. In other words, under the specific arrangement and cooperation between the spring 41 and the pin 38, the block 29 together with the lever 33 has a tendency under the tension of the spring 41 to pivot in a clockwise direction about the pin 38. This pivotal movement will thus deposit the pin 36 into the leg portion of the L-shaped slot 35, as shown in Fig. 5.

The side wall 25 of the pulley member 23, adjacent the front plate 11 of the housing 10, is milled out to provide an open area 43. In this area 43 are positioned pivotal trip fingers 44. These trip fingers 44 are pivotally carried on studs 45 and are counterweighted at their free end, as shown in Fig. 3. These fingers 44 are held in engagement with positioning studs 46 by springs 47. In such a position the counterweighted ends of the trip fingers 44 will upon slow rotation of the pulley member 23 with the shaft 20 pass beneath the farthest extremity of the arm 34 of the braking lever 33, as shown in Fig. 3. However, if the speed of rotation of the pulley member 23 is increased to a preselected speed, the fingers 44 by centrifugal force will overcome the tension of the springs 47 and move into a position as shown in dotted lines in Fig. 3. In this position the fingers 44 will engage the arm 34 of the braking lever 33 and cause the pin 36 to ride out of the leg portion of the L-shaped slot 35. At this time, the mounting block 29, together with the braking lever 33, will be moved into a braking position by the tension of the spring 41. As the block 29 and the braking lever 33 are guided in their movement by the pin 38 and slot 37, the V-belt 27 will bind in the channel-shaped guide 26 and thereby prevent rotation of the pulley member 23. It is readily apparent that as the rope 16 is fastened to the hub 24 of the pulley member 23 that the braking and preventing of rotation of the pulley member 23 will also effect and prevent withdrawal of the rope 16 from the housing 10.

As the V-belt 27 is drawn into the channel shaped guide 26 by the action of the spring 41, the braking power of the V-belt 27 is greatly increased by reason of the rotation of the pulley member 23. The rotation of the pulley member 23 is in the identical direction as the movement of the V-belt 27 with respect to the channel shaped guide 26. Thus, when the braking lever 33 is tripped by the fingers 44, the V-belt 27 by the tension of the spring 41 and by its frictional engagement in the channel shaped guide 26 is moved in the same direction and therefore binds itself with greater pressure.

In operation my safety device, by the harness 14 is strapped to the back of the user. The free end of the safety rope 16 is attached to some point immediately above the area of work of the user. As the rope passes from the aperture 15 formed in the housing 10 and is guided by the rod 17, it is apparent that under normal circumstances that it will in no way interfere with the normal movements of a man working on a scaffold. As the shaft 20 and the pulley member 23 may be rotated by the withdrawal of the rope 16 during the normal movements of the user without the tripping of the braking lever 33, it is again apparent that my device affords the wearer a free range of activity. However, if the wearer should fall into space, the increased rotation of the pulley member 23 by the withdrawal of the rope 16 from the housing 10, would cause the trip fingers 44 by centrifugal force to engage the arm 34 and trip the braking lever 33 as aforedescribed.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

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

1. A safety device of the class described comprising a housing, a safety cable pulley member rotatably carried within said housing, a safety cable having one end connected to said pulley member, said housing having an aperture formed in one wall thereof and through which the opposite free end of said cable projects for connection to a point distant from said housing, braking means carried by said pulley member and movable into engagement with said member for preventing rotation of said member in one direction, means for normally holding said braking means from braking position with respect to said pulley member, and means carried by said pulley member for releasing said holding means to permit said braking means to move in the direction of rotation of said pulley member to prevent rotation of said pulley in said one direction when the rotation of said pulley member reaches a predetermined speed.

2. A safety device of the class described comprising a housing, a safety cable pulley member rotatably carried within said housing, a safety cable having one end connected to said pulley member, said housing having an aperture formed in one wall thereof and through which the opposite free end of said cable projects for connection to a point distant from said housing, braking means carried by said pulley member and movable into engagement with said member for preventing rotation of said member in one direction, means for normally holding said braking means from braking position with respect to said pulley member, and means carried by said pulley member for releasing said holding means to permit said braking means to move in the direction of rotation of said pulley member to prevent rotation of said pulley in said one direction when the rotation of said pulley member reaches a predetermined speed, said last-named means including trip fingers pivotally carried by said pulley member and engageable with said holding means when said pulley member rotates in said one direction at a predetermined speed, said trip fingers pivoted by centrifugal force into engaging position with said braking lever when said pulley member rotates in said one direction at a predetermined speed.

3. A safety device of the class described comprising a housing, a safety cable pulley member rotatably carried within said housing, a safety cable having one end connected to said pulley member, said housing having an aperture formed in one wall thereof and through which the opposite free end of said cable projects for connection to a point distant from said housing, radial braking means carried by said pulley member and movable into engagement with said member for preventing rotation of said member in one direction, means for normally holding said braking means from braking position with respect to said pulley member, and means carried by said pulley member for releasing said holding means to permit said braking means to move in the direction of rotation of said pulley member to prevent rotation of said pulley in said one direction when the rotation of said pulley member reaches a predetermined speed, said last-named means including trip fingers pivotally carried by said pulley member and engageable with said holding

means when said pulley member rotates in said one direction at a predetermined speed.

4. A safety device of the class described comprising a housing, a safety cable pulley member rotatably carried within said housing, a safety cable having one end connected to said pulley member, said housing having an aperture formed in one wall thereof and through which the opposite free end of said cable projects for connection to a point distant from said housing, radial braking means carried by said pulley member and movable into engagement with said member for preventing rotation of said member in one direction, said braking means including a V-belt frictionally engageable in a U-shaped guide formed in the peripheral edge of said pulley member, means for normally holding said braking means from braking position with respect to said pulley member, and means carried by said pulley member for releasing said holding means to permit said braking means to move in the direction of rotation of said pulley member to prevent rotation of said pulley in said one direction when the rotation of said pulley member reaches a predetermined speed, said last-named means including trip fingers pivotally carried by said pulley member and engageable with said holding means when said pulley member rotates in said one direction at a predetermined speed.

5. A safety device of the class described comprising a housing, a safety cable pulley member rotatably carried within said housing, a safety cable having one end connected to said pulley member, said housing having an aperture formed in one wall thereof and through which the opposite free end of said cable projects for connection to a point distant from said housing, braking means carried by said pulley member and movable into engagement with said member for preventing rotation of said member in one direction, a braking lever carried by said braking means and having operative connection to said housing for holding said braking means in an inoperative position with respect to said pulley member, and means carried by said pulley member for actuating said braking lever to release said braking means to permit said braking means to move in the direction of rotation of said pulley member to prevent rotation of said pulley member in said one direction when the rotation of said pulley member reaches a predetermined speed.

6. A safety device of the class described comprising a housing, a safety cable pulley member rotatably carried within said housing, a safety cable having one end connected to said pulley member, said housing having an aperture formed in one wall thereof and through which the opposite free end of said cable projects for connection

to a point distant from said housing, braking means carried by said pulley member for preventing rotation of said member in one direction, a braking lever carried by said braking means and having slidable connection to said housing, spring means for sliding said lever in one direction, holding means carried by said housing and operating in a slot formed in said lever for preventing said spring means from sliding said lever in said one direction, and means carried by said pulley and separately engaging said braking lever for releasing said holding means to permit said braking lever and said braking means to be moved in one direction by said spring means to permit said braking means to prevent rotation of said pulley in said one direction when the pulley reaches a predetermined speed.

7. A safety device of the class described comprising a housing, a safety cable pulley member rotatably carried within said housing, a safety cable having one end connected to said pulley member, said housing having an aperture formed in one wall thereof and through which the opposite free end of said cable projects for connection to a point distant from said housing, braking means carried by said pulley member for preventing rotation of said member in one direction, a braking lever carried by said braking means and having slidable connection to said housing, spring means for sliding said lever in one direction, holding means carried by said housing and operating in a slot formed in said lever for preventing said spring means from sliding said lever in said one direction, and means carried by said pulley and separately engaging said braking lever for releasing said holding means to permit said braking lever and said braking means to be moved in one direction by said spring means to permit said braking means to prevent rotation of said pulley in said one direction when the pulley reaches a predetermined speed, said last-named means including trip fingers pivotally carried by said pulley member and engageable with said holding means when said pulley member rotates in said one direction at a predetermined speed, said trip fingers pivoted by centrifugal force into engaging position with said braking lever when said pulley member rotates in said one direction at a predetermined speed.

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