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SAFETY STOP FOR BALANCERS

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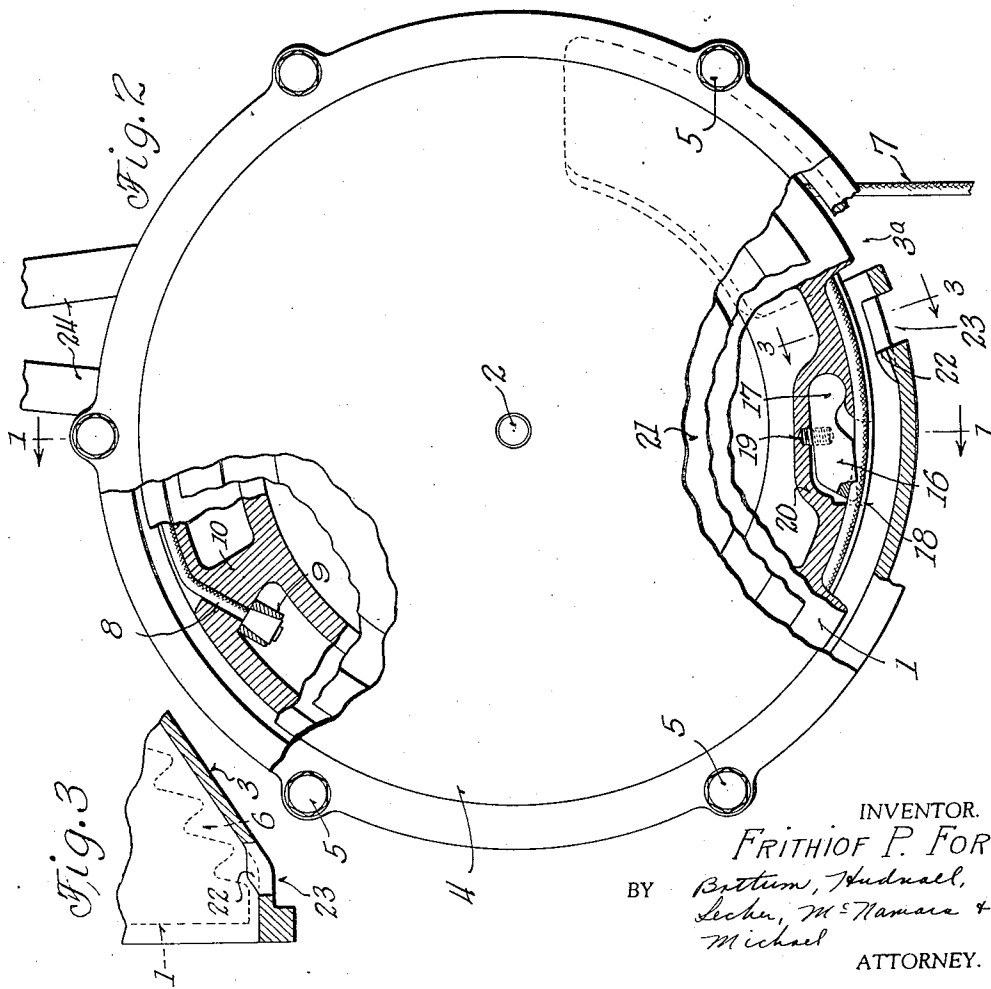
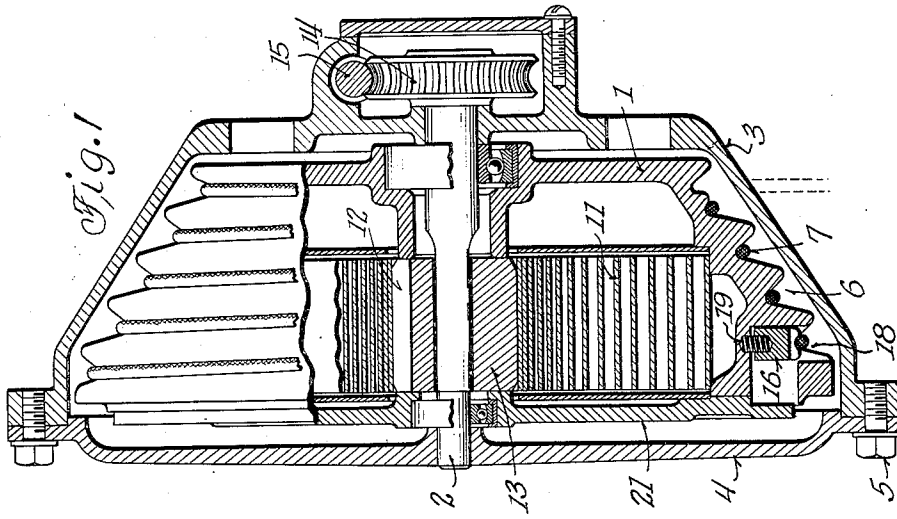
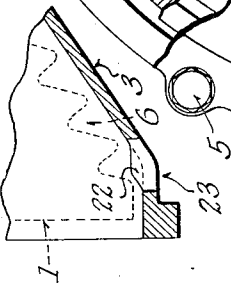


Fig. 3



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## SAFETY STOP FOR BALANCERS

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5 Claims. (Cl. 242-107)

This invention relates to balancers and more particularly to spring balancers for suspending portable power operated tools, such as electric drills, reamers, polishers, and the like, from overhead supports.

A balancer of the character referred to has a revoluble drum or reel on which winds a cable, the outer end of which is outside of the drum housing for connection with the tool or load to be raised and lowered by the drum. A spiral spring, preferably within the drum, turns the drum in a direction to raise the load on the cable. The spring is tensioned to counter-balance the weight of the tool attached to the cable so that the tool may be raised and lowered and be handled in a lowered position without requiring the operator to support the weight of the tool. The inner end of the cable is fixed to the drum so that the cable will wind on the drum and retain its connection with the drum when paid out to its fullest extent.

The object of my invention is to provide a safety lock to automatically stop the rotation of the drum before the inner end of the cable reaches the cable outlet opening in the balancer casing and thus avoid straining or injuring the connection between the cable and the drum when the cable is paid out to its fullest extent.

A further object of my invention is to control the operation of the safety lock by the cable, the lock being normally held inoperative by the cable when wound on the drum, but released for action when the cable is unwound from the drum to the extent above noted.

One embodiment of my invention is disclosed in the accompanying specification and drawing, in which:

Fig. 1 is a vertical sectional view with parts in elevation of a spring balancer embodying the safety lock of my invention, the section being taken on line 1-1 of Fig. 2;

Fig. 2 is an elevational view with parts broken away and in section, respectively, of the balancer showing the safety lock and the inner end of the cable attached to the drum; and

Fig. 3 is a sectional view taken on line 3-3 of Fig. 2 to show the abutment or shoulder for the pawl member of the safety lock.

In the drawing, 1 indicates the balancer drum or reel mounted for rotation on a shaft 2, the latter being journaled in anti-friction bearings in a casing which houses the drum. This casing is preferably comprised of a main or body section 3 and a removable cover section 4 which is attached to the section 3 by one or more cap screws 5 as shown.

The drum is preferably of the tapered type and is provided with a spiral groove 6 to receive a cable 7. The cable, as shown in Fig. 2, has its inner end 8 secured to the larger end of the drum as at 9. The connection is of the character de-

sired and anchors the cable end to a web 10 in the drum construction. The outer end of the cable is outside of the drum casing, the cable passing out of the casing through a cable outlet opening 3a provided in the lower portion of the section 3.

A spiral spring 11 turns the drum in a direction to wind the cable on the drum. This spring has its outer end secured to the drum in any preferred manner and its inner end 12 is secured to a sleeve 13 which is keyed to the shaft 2. The drum turns with respect to the shaft and the sleeve, the shaft being normally held against rotation by a worm gear assembly at one end of the shaft. This assembly comprises the worm gear 14 and a worm pinion 15, the latter being journaled in the casing section 3 with one end accessible for turning to wind up the spring to adjust its tension. The opposite ends of the shaft 2 are journaled in the casing sections 3 and 4, respectively, as shown.

The safety lock of my invention in the particular embodiment shown herein comprises a pawl 16 pivoted at 17 in the drum 1 and projectible through a slot 18 in the drum at a point in the circumference of the last convolution of the spiral groove 6. This convolution is located at the larger end of the drum and the pawl 16 is preferably disposed a little more than 180° from where the inner end of the cable is attached to the drum as shown in Fig. 2. The pawl is normally pressed outwardly from the drum by a coiled spring 19 having one end seated in the drum and the other end seated in the pawl as shown.

The pawl is mounted in a receiving chamber 20 provided in the drum. This chamber preferably opens through the side of the drum adjacent the cover plate 4 as shown in Fig. 2, whereby the pawl may be inserted in the drum and also whereby access may be had to the pawl whenever desired upon removal of the cover plate and the drum cover 21.

The cable when wound on the drum holds the pawl within the chamber 20, the portion of the pawl engaging the cable being grooved as shown to conform to the groove in the drum. As the cable is unwound from the drum, the cable releases its restraining hold on the pawl before the inner end of the cable reaches the cable outlet in the casing section 3. This occurs when the cable end is approximately 120° from this outlet. The spring 19 then projects the free end of the pawl out of the drum for contact with an abutment or shoulder 22 in the casing section 3 to stop the rotation of the drum and relieve the connection between the cable and the drum of strain or injury when the cable is paid out to its fullest extent. This is important for the weight of the load or tool attached to the cable plus the pull of the operator on the cable is sufficient to weaken the cable connection especially when repeated in the use

of the balancer device. With this strain taken off the cable end and applied to the drum and its casing, respectively, the cable connection is not weakened and the cable can be pulled out without  
5 fear of straining or weakening the cable connection.

It will be noted in Fig. 2 that the drum case 3 is provided with an opening 23 in advance of the shoulder 22 whereby the pawl may drop into the  
10 opening to engage the shoulder and also whereby the pawl is accessible from the exterior of the drum case for pressing it back into its chamber 20 to permit winding the cable on the drum after the safety lock has operated.

15 As noted in Fig. 1 the inner or larger end of the drum is closely adjacent the casing section 3. The shoulder 22 is preferably fashioned as illustrated in Fig. 3 so that the shoulder is free of the larger end of the drum and is disposed opposite the terminal convolution of the groove.

The drum casing has means, indicated generally at 24, whereby the balancer may be suspended from an overhead support. The outer end of the cable is equipped with a suitable hook or equivalent means whereby a tool may be readily applied  
25 to and be removed from the cable.

The details of construction and arrangement of parts shown and described may be variously changed and modified without departing from the spirit and scope of my invention, except as pointed out in the annexed claims.

I claim as my invention:

1. In a balancer of the character described, a housing, a drum rotatably mounted in said housing, a cable windable on the drum, means for  
35 turning the drum in a direction to wind the cable thereon, said housing having an outlet opening for the cable, means connecting the inner end of the cable to the drum, said drum having an outwardly opening recess in its portion on which  
40 the cable winds and unwinds, said recess being located in advance of the connection of the inner end of the cable with the drum in the direction of rotation of the drum to unwind the cable, an abutment on the housing, a pawl carried by the  
45 drum in said recess, said cable winding over the pawl and the recess for normally holding the pawl in the recess when the cable is wound on the drum, and means for projecting the pawl out of the recess when released by the cable for engaging  
50 the abutment to stop the rotation of the drum before the cable is completely unwound from the drum to relieve the cable connection with the drum of undue strain.

2. In a balancer of the character described, a housing, a drum rotatably mounted in said housing, a cable windable on the drum, said drum having a spiral groove to receive the cable, spring means for turning the drum in a direction to  
60 wind the cable thereon, said housing having an outlet opening for the cable, means connecting the inner end of the cable to the drum at the terminal convolution of said groove, said drum having a recess opening outwardly through said  
65 groove in advance of the connection of the inner end of the cable with the drum in the direction of rotation of the drum to unwind the cable, an abutment on the housing, a pawl carried by the drum in said recess, said cable winding over said  
70 pawl and said recess for normally holding the pawl in the recess when the cable is wound on the drum, said pawl having its outer end grooved to receive the cable when the cable winds over the pawl, and means for projecting the pawl out of the recess when released by the cable for engag-

ing the abutment to stop the rotation of the drum before the cable is completely unwound from the drum to relieve the cable connection with the drum to undue strain.

3. In a balancer of the character described, a housing, a tapered drum rotatably mounted in said housing, a cable windable on the tapered portion of the drum, said tapered portion having a spiral groove thereon to receive the cable, a spiral spring for turning the drum in a cable winding  
10 direction, means for adjusting the tension of the spring, said cable extending out of the housing through an opening therein, means connecting the inner end of the cable to the drum in the terminal convolution of the groove at the larger  
15 end of the drum, a pawl carried by the tapered portion of the drum at the terminal convolution of said groove and projectible out of said groove into locking engagement with the housing to stop  
20 the rotation of the drum in an unwinding direction when the cable releases the pawl, said cable winding over said pawl when wound on the drum for normally holding the pawl out of locking engagement with the housing, said pawl being located  
25 in advance of the cable connection with the drum in an unwinding direction so that the pawl will stop the rotation of the drum before the cable is completely unwound therefrom, and means for projecting the pawl out of the groove when released by the cable.

4. In a balancer of the character described, a housing, a drum rotatably mounted in said housing, a cable windable on the drum, spring means for turning the drum in a direction to wind the cable thereon, said housing having an outlet opening  
35 for the cable, means connecting the inner end of the cable to the drum, a locking element carried by the drum and projectible beyond the periphery of the drum into locking engagement with the housing to stop the rotation of the drum  
40 in an unwinding direction when the cable releases the locking element, said cable normally holding said element out of locking engagement with the housing when wound on the drum, said locking element being disposed to stop the rotation of the  
45 drum before the cable is completely unwound therefrom, and means for projecting the locking element into locking engagement with the housing when released by the cable.

5. In a balancer of the character described, a housing, a drum rotatably mounted in said housing, a cable windable on the drum, spring means for turning the drum in a direction to  
50 wind the cable thereon, said housing having an outlet opening for the cable, means connecting the inner end of the cable to the drum, a locking element carried by the cable receiving portion of the drum and projectible therefrom into locking engagement with the housing beyond the periph-  
55 ery of the drum to stop the rotation of the drum in an unwinding direction when the cable releases the locking element, said cable winding over said element when wound on the drum for normally holding the element out of locking engagement  
60 with the housing, said locking element being located in advance of the cable connection with the drum in an unwinding direction so that the element will stop the rotation of the drum before the  
65 cable is completely unwound therefrom, and means for projecting the locking element into locking engagement with the housing when released by the cable.

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