Nov. 8, 1938. E. S. BUSH 2,136,072

AUTOMATIC PLUMB BOB

Filed July 13, 1936

FIG. 1

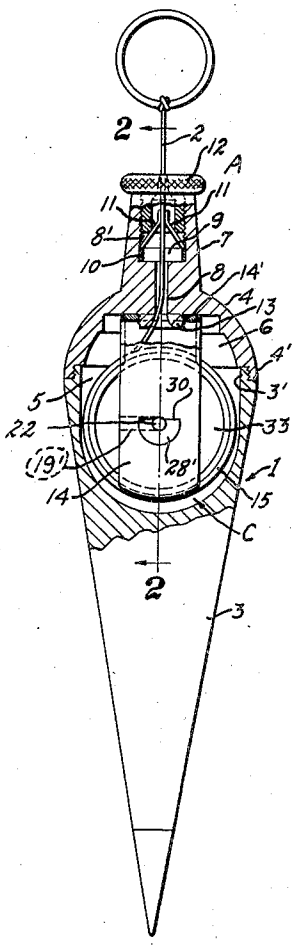


FIG. 2

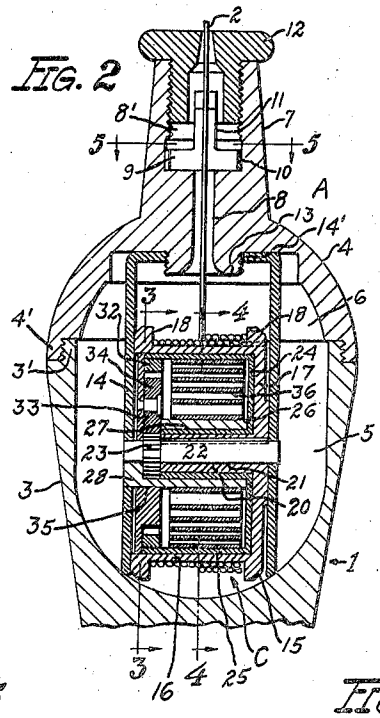


FIG. 5

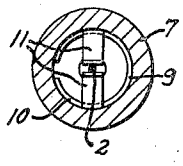


FIG. 6

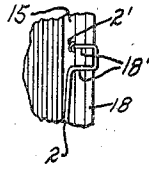


FIG. 3

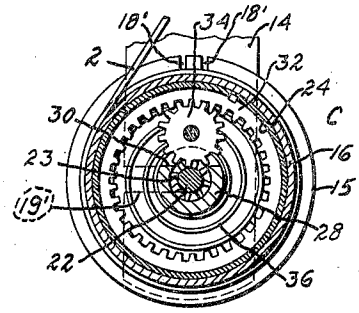


FIG. 4

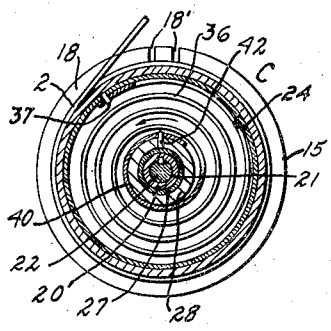
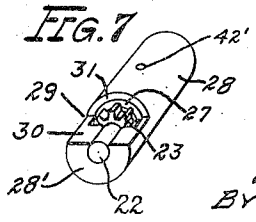


FIG. 7



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AUTOMATIC PLUMB BOB

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Application July 13, 1936, Serial No. 90,376

1 Claim. (Cl. 242—108)

This invention relates generally to plumb bobs, and more specifically to a plumb bob the supporting cord of which is connected to the weight in such manner that when not in use the cord will be automatically wound up within the bob, and wherein any length of cord may be withdrawn from the bob and the bob clamped to the cord to restrain the operation of the cord-winding means until it is desired to release same, the predominant object of the invention being to provide an extremely simple device of this type, which is an improvement on the automatic plumb bob covered by United States Letters Patent 1,357,270, granted to me on November 2, 1920.

Fig. 1 is a view of the improved plumb bob illustrating same partly in elevation and partly in vertical section.

Fig. 2 is an enlarged vertical section on line 2—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 2.

Fig. 4 is a section on line 4—4 of Fig. 2.

Fig. 5 is a section on line 5—5 of Fig. 2.

Fig. 6 is a fragmentary detail showing the manner in which an end of the cord is attached to the reel of the plumb bob.

Fig. 7 is a perspective of a part of the cord-winding mechanism of the improved plumb bob.

In the drawing, wherein is shown for the purpose of illustration, merely, one embodiment of the invention, A designates the improved plumb bob generally, said plumb bob including a bob of weight 1 and a supporting cord 2. The bob 1 is of the usual shape and comprises a lower section 3 and an upper section or cap 4, said upper section preferably being detachably connected to the lower section by cooperating screw-threaded portions 3' and 4' formed on said lower and upper sections. At its upper end the lower section 3 is provided with a chamber 5 formed therein, and the upper section 4 is provided with a chamber 6 which, when the upper section or cap 4 is in place on the lower section 3, cooperates with the chamber 5 to provide a single chamber.

The upper portion 4 of the bob 1 is provided with an upwardly extended portion 7 through which an opening 8 is formed longitudinally thereof, said opening being of enlarged diameter at its upper end as indicated at 8', and this enlarged portion being screw-threaded as seen in Figs. 1 and 2. The supporting cord 2 of the plumb bob is extended through the opening 8—8', and 9 designates a clamping element which is located within the portion 8' of said opening. The clamping element 9 is formed of spring metal and comprises an expansible split ring 10 with which a pair of oppositely disposed, upwardly extended arms 11 are associated. The arms 11 at their upper ends are provided with substantially parallel portions, and the lower portions of said arms are inclined as shown in Fig. 1, said arms being formed integral with the split ring 10 at its upper edge. 12 designates a screw-threaded plug which is screwed into the screw-threaded portion 8' of the opening 8, the lower edge of said plug being adapted to contact with the inclined portions of the arms 11 when the plug 12 has been screwed inwardly into the portion 8' of the opening 8 a sufficient distance.

The supporting cord 2 passes between the upper, parallel end portions of the arms 11, and when it is desired to clamp said supporting cord so as to prevent movement thereof with respect to the bob 1, the plug 12 is screwed downwardly into the opening 8'. This will draw the upper ends of the arms 11 toward each other in a manner to tightly grip the supporting cord, whereby movement of said supporting cord relative to the bob is prevented. The arms 11 are possessed of sufficient resiliency to cause said arms to move away from each other when the lower portion of the plug 12 is moved upwardly, thus permitting free movement of the supporting cord between said arms.

At the upper wall of the chamber 6 within the upper section or cap 4 is a screw-threaded projection 13 through which the opening 8 passes, and 14 designates an inverted U-shaped frame which is provided with a screw-threaded opening 14' in its upper wall, which receives the screw-threaded extension referred to so as to support the U-shaped frame in the chambers 5—6 within the bob 1. The U-shaped frame 14 is possessed of sufficient spring or resiliency so that the downwardly extended legs of said frame may be moved outwardly from their normal positions, as illustrated in Fig. 2, and these downwardly extended legs support the cord-winding mechanism C of my improved plumb bob.

The cord-winding mechanism C of the improved plumb bob includes a reel 15, which is in the form of an element having an annular wall 16 and a rear wall 17, said annular wall being provided with annular outstanding flanges 18 between which the supporting cord is wound on the outer face of the annular wall. The reel 15, when considered apart from the mechanism associated therewith, is open at the side opposite to the side thereof at which the wall 17 is situated, and said reel is provided with a centrally located extension 20 which is formed integral

with the wall 17 and extends therefrom toward the opposite, open side of the reel. The extension 20 terminates short of the outer face of the reel at the side thereof opposite to the side at which the wall 17 is located, as shown in Fig. 2, and this extension is provided with an elongated opening 21 formed longitudinally thereof in which the inner portion of a short shaft 22 is disposed. The short shaft 22 has gear teeth formed thereon providing a pinion 23, portions of the shaft 22 being formed at opposite sides of said pinion, and the inner portion of said shaft is driven into the opening 21 to provide a drive fit, whereby said shaft moves with the reel 15.

Located within the reel 15 is a spring barrel 24 which comprises an outer annular wall 25 arranged in contact with the inner face of the annular wall 16 of the reel 15, and a rear wall 26 arranged in contact with the inner face of the end wall 17 of said reel. The spring barrel includes also an integral sleeve portion 27 which is located centrally of the spring barrel and extends inwardly from the wall 26 thereof. The sleeve portion 27 is arranged to embrace the extension 20 of the reel as shown clearly in Fig. 2, said sleeve portion 27 and said extension 20 terminating in coincidence with each other.

28 designates a spring arbor which is in the form of a cylinder which embraces the sleeve portion 27 and extension 20 of the spring barrel and reel, respectively. At its outer end the cylindrical spring arbor 28 is partially closed, as indicated at 28' in Figs. 1 and 7, and said outer end of the arbor is partially cut away as indicated at 29 in Fig. 7, so as to provide the arbor with an outer end which is substantially semicircular in shape and of reduced diameter in one direction. The flat top face 30 of the outer end portion of the arbor 28 is provided by cutting the outer end portion of the arbor parallel with its axis, and this flat face 30 is joined by a flat face 31 which is extended at a substantial right angle to the face 30. The opening in the arbor which results from cutting same as indicated exposes the interior of the arbor, and the upper portion of the pinion 23 already referred to herein is presented at said opening. The outer portion of the short shaft 22 is journaled in an aperture formed in the outer end of the spring arbor 28, and said substantially semicircular end portion of the arbor is extended into a correspondingly shaped aperture in the adjacent leg of the frame 14, whereby said arbor is prevented from rotating.

Arranged within the spring barrel of the cord-winding mechanism immediately adjacent to the outer, open end thereof is an internal gear 32 (Figs. 2 and 3), said internal gear being fixed to and rotatable with the spring barrel 24. The outer end of the spring barrel is closed by a plate 33 which rotatably supports an intermediate pinion 34. The intermediate pinion 34 meshes with the internal gear 32 and with the pinion 23, whereby motion is transmitted from one of the gears 32—23 to the other thereof. The plate 33 is of varying thicknesses, said plate being relatively thin at its upper portion where the intermediate gear 34 is located and being thicker at its lower portion, the thickness of said plate at its lower portion being approximately the same as the combined thicknesses of the upper plate portion and the intermediate gear. The plate 33 is of the approximate diameter of the interior of the reel 15, as shown in Fig. 2, and this plate is provided with an aperture 35 of the shape and substantial dimensions of the end portion of the spring arbor 28. When the plate 33 is in place in the structure of the cord-winding mechanism C, the end portion of the arbor is extended through the correspondingly shaped aperture 35 in the plate, and the result of this arrangement is that said plate is held stationary.

Arranged within the spring barrel of the cord-winding device C is a helical spring 36, one end of which is secured to the spring barrel by a pin 37 (Fig. 4) which is carried by said spring barrel and extends through an aperture in the end portion of the spring 36. The opposite end of the helical spring 36 is fastened to the spring arbor 28 and engages said spring arbor in the manner shown clearly in Fig. 4. The helical spring is shaped to provide an inner circle 40. A rivet or other fastening device 42 is extended through a portion of the spring comprising the inner circle and into an opening 42' in the spring arbor 28, whereby said spring portions are held in their proper positions. When the spring is being wound up, as when the supporting cord is pulled out the tendency is for the end portion of the spring to move in the direction suggested by the arrow in Fig. 4.

In the use of my improved plumb bob, outward movement of the supporting cord results, through the operation of the cooperating gears, in the spring barrel being rotated in the opposite direction to the direction of rotation of the reel, whereby the helical spring is wound up, and when the cord is released the spring will rotate the reel to rewind said cord. If it should be desired to clamp the cord to prevent movement thereof with respect to the bob, this may be accomplished by screwing the plug 12 downwardly, as already explained, to draw the clamping arms 11 together to the cord-clamping position.

An important feature of the invention resides in the fact that the entire cord-winding mechanism of my improved plumb bob is in the form of a unit which is conveniently detachable from the bob, it being necessary to merely unscrew the upper section or cap 4 from the lower section of the bob, whereupon the cord-winding mechanism may be unscrewed from the screw-threaded extension 13 of said upper section or cap. The cord-winding unit may then be taken apart by springing the legs of the U-shaped frame apart to free the spring arbor 28 from the apertures in said legs in which it is normally disposed. The various parts of the cord-winding mechanism may then be lifted out of place, as no fastening devices are employed to secure said parts together. To remove the helical spring it is only necessary to disengage the outer end of said spring from the pin 37, when said spring may be lifted out. When the cord-winding mechanism is assembled, as shown in Fig. 2, the lower ends of the legs of the U-shaped frame 14 contact with the curved bottom wall of the chamber 5, whereby said legs are prevented from spreading.

The cord 2 is attached at its inner end to the reel in the manner illustrated in Fig. 6; that is to say, one of the annular flanges 18 is provided with a pair of slots 18' through which the cord is passed in the manner illustrated. By so attaching the cord to the reel the knot 2' is located at the inside of the reel, where it will not interfere with free rotation of the reel.

I claim:

In a spring winding reel, a hollow winding element, a coil spring and spring case therein, a

hollow spring arbor secured to the inner end of the spring, the outer end of the spring being connected to the case, a rotatable member extending internally of the arbor, a winding pinion carried by said rotatable member, said member and pinion being co-axial with and rotatively secured to the hollow winding element, and a gear train operable by said winding pinion responsive to rotation of the winding element for rotation of the spring case.

EUGENE S. BUSH.