March 5, 1929. E. W. ARMS 1,704,237

PLUMB BOB

Filed April 13, 1928

Fig. 1.

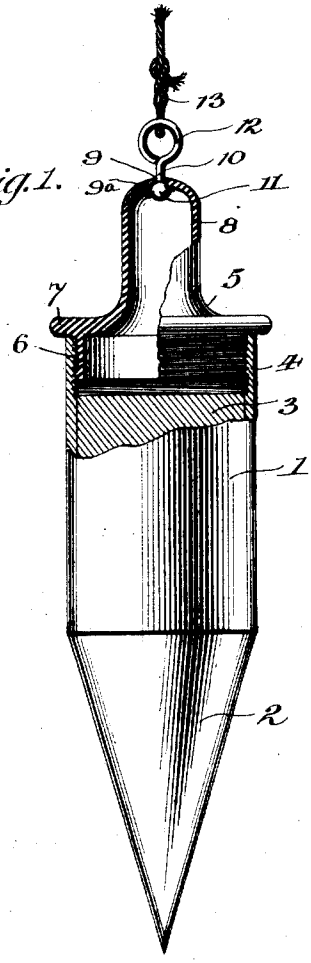
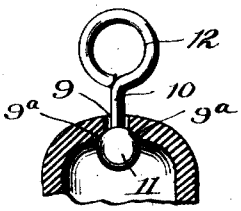


Fig. 2.



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PLUMB BOB.

Application filed April 13, 1928. Serial No. 269,814.

My invention relates to plumb bobs and particularly to plumb bobs designed for use in accurate surveying work.

Such bobs are commonly of substantially conical shape with a downwardly projecting point, and are provided with a hollow detachable cap having an opening in the top thereof through which the suspension cord is threaded. In setting up a surveying instrument, it is important to have the bob, which is suspended below the instrument, appear to remain stationary even though rotating on its vertical axis. It is also important to have the bob cease vibrating as soon as possible when it is supported by hand as it is during chaining. The factors involved in accomplishing these results are: a low center of gravity, perfect symmetry and a close fit between the cord and the hole in the top of the bob.

A low center of gravity is obtained by providing the cap with a long hollow neck through which the cord is threaded. With such a structure, when the cord is being supported by hand, only a slight touch of the point to the ground is necessary to stop the bob from vibrating. However, the cord wears out rapidly because of fraying of the strands against the edges of the guide hole in the cap, and sometimes may have to be replaced as often as once a day. This necessitates frequent rethreading, and the rethreading operation through the long neck is difficult especially as the cord is practically as large as the hole. Replacing the cord is also especially difficult during cold weather. Cord replacement may be facilitated by enlarging the opening in the cap but with this construction the cord has a tendency to shift to one side of the hole so that the bob does not hang true.

With the constructions of the prior art only one size of cord can be used if extremely accurate work is to be done and the variation should only be slight in any case. For different types of work various sizes of cord are desirable. If, for example, accurate instrument work is to be done, or a strong wind is blowing, it is desirable to use a small cord. For less accurate work or for extremely long sights a large cord would be preferable. Since these cords are subject to frequent breakage it is often necessary to replace them at the nearest local store and for this reason the hole in the cap must be as large as practicable.

I avoid all of the difficulties enumerated above, and by the use of my invention plumb bobs may be designed with no reference whatever to the size of the cord. A cord of any desired size may be used, and the cord may be tied to the bob with practically any kind of knot and yet the bob will hang true.

In the accompanying drawing,—

Fig. 1 is a side view of one form of plumb bob embodying my invention, with parts broken away to show the construction; and

Fig. 2 is an enlarged detail view of the plumb bob suspension means.

Referring to Figure 1, the body of the bob is designated by the reference character 1. The body 1 is of substantially cylindrical shape and has a downwardly extending tapered point 2 which defines the lower end of the vertical axis of the bob. This body is composed of heavy material so as to have considerable mass. As here shown the body 1 is composed of an outer sheet metal shell filled with lead, indicated at 3. This shell has an upwardly projecting internally threaded rim 4.

For suspension purposes the bob is provided with a hollow cap 5 having a downwardly projecting externally threaded flange 6. This cap has a bead 7 and is adapted to be screwed into the rim 4 of the body 1 until the bead 7 engages the top of the rim 4. The cap 5 also has above the bead a long hollow symmetrical neck 8, with an opening 9 in the top thereof, such opening being centered in the vertical axis of the bob. The inner end of opening 9 is preferably countersunk to form a socket portion 9^a. Freely fitted in the opening 9 is a swivel pin 10 having an enlarged head 11, spherical or approximately so, on its upper face to prevent withdrawal of the pin through opening 9. At the upper end of pin 10 is a ring 12 to permit ready attachment of a cord 13. The head 11 cooperates with socket 9^a to form a universal joint, thereby allowing the suspended bob to adjust itself until the center of hole 9 and the point 2 are in a vertical line with the point of suspension of the cord, in spite of variations in the position of pin 10.

It will be manifest that with a universal connection permitting relative rotary and

angular motion between the suspension member and the bob, and the center of universal motion being in the vertical axis of the bob, the bob will hang true regardless of the size of the suspension cord or the type of knot employed in securing it to the swivel ring. Furthermore, cords of various sizes may be interchanged without difficulty, and without affecting the accuracy of the device.

Although I have herein shown and described only one form of apparatus embodying my invention, it is obvious that various changes may be made in the details without departing from the spirit and scope of my invention as set forth in the appended claims.

What is claimed is:

1. A plumb bob comprising in combination a body having a point in its vertical axis; and a suspending member having means for the ready attachment of a cord, said member having a universal pivotal connection with said body in the vertical axis thereof.

2. A plumb bob comprising in combination an elongated body made up of a lower portion of substantial mass terminating in a point at the lower end of the vertical axis of the body, and an upper portion of relatively small mass having an aperture centered in the upper end of the vertical axis of the body; a pin mounted in said aperture for at least limited universal pivotal motion, said pin being centered by said aperture; and means carried by said pin for the attachment of a cord.

3. A plumb bob comprising in combination an elongated body made up of a lower portion of substantial mass terminating in a point at the lower end of the vertical axis of the body, and an upwardly elongated hollow neck portion, having an aperture centered in the vertical axis of the body, and a pin mounted in said aperture and having a substantially spherical head, said pin being centered by said aperture and capable of limited universal pivotal motion with respect thereto; and means carried by said pin for the attachment of a cord.

4. A plumb bob comprising in combination an elongated body having a downwardly projecting point in its vertical axis, and a hollow elongated neck portion, said neck portion having an aperture in the top thereof and centered in the vertical axis of said body; a socket in said neck portion in symmetrical alinement with the vertical axis of said aperture; a pin mounted in said aperture and having a substantially spherical head portion cooperating with said socket; and means on said pin for the attachment of a cord.

In testimony whereof I have signed my name to this specification.

EDWARD W. ARMS.