July 12, 1966 H. A. DEVIS 3,259,927

MOORING BUOY

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Fig. 1

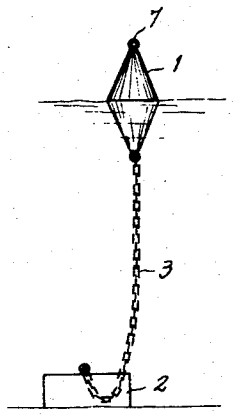


Fig. 2

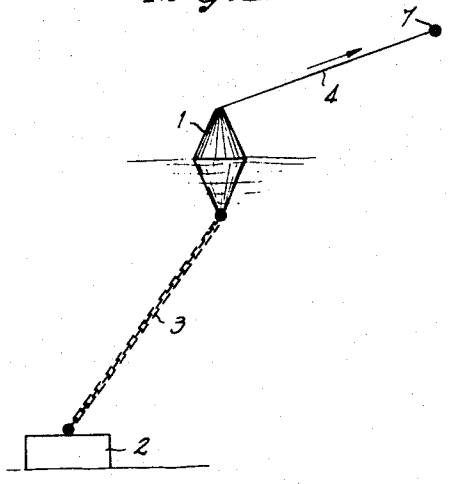
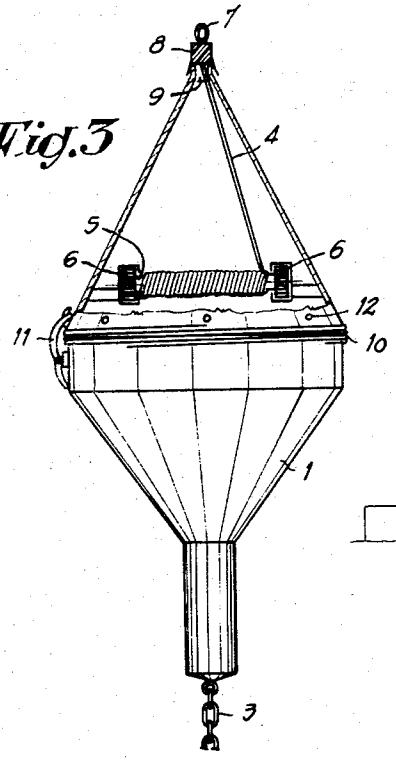


Fig. 3



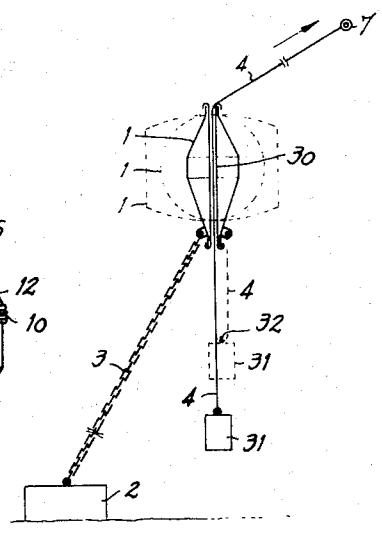


Fig. 8

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Fig. 4

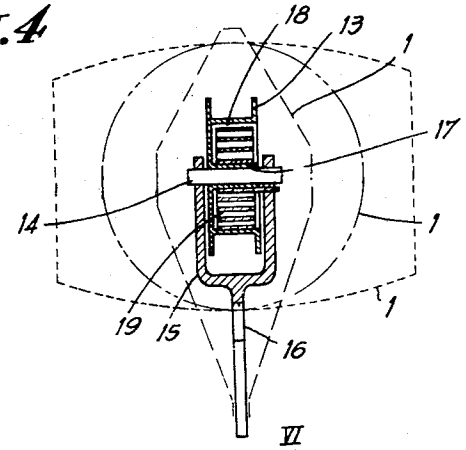


Fig. 5

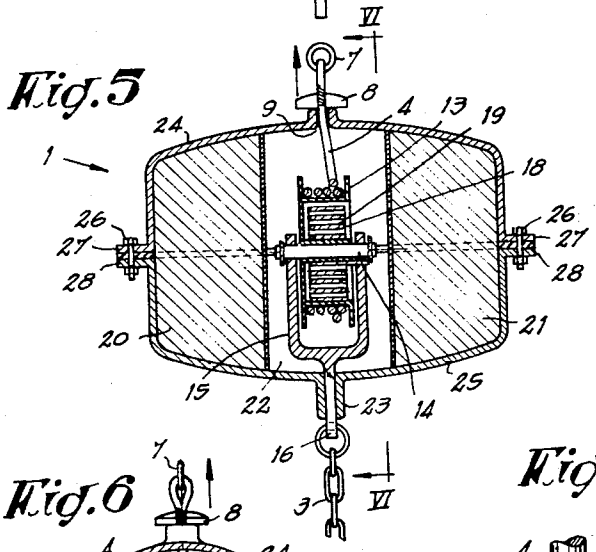


Fig. 6

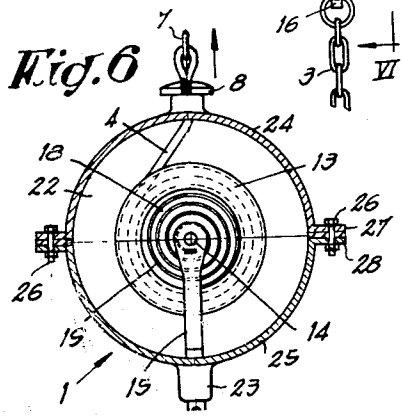
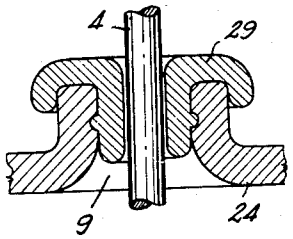


Fig. 7



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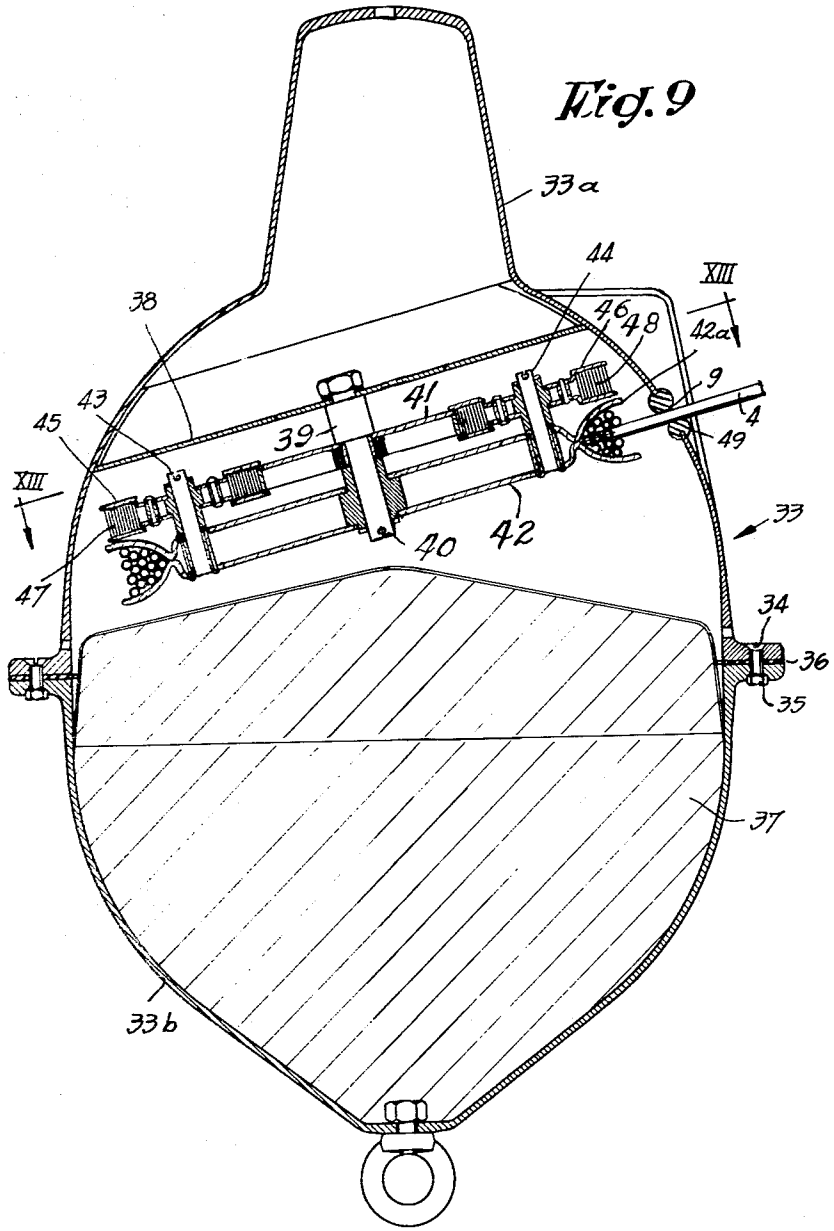
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Fig. 9



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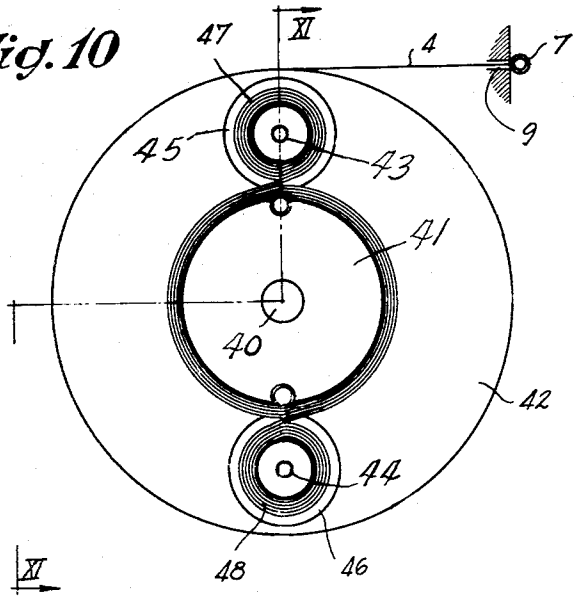
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Fig. 10



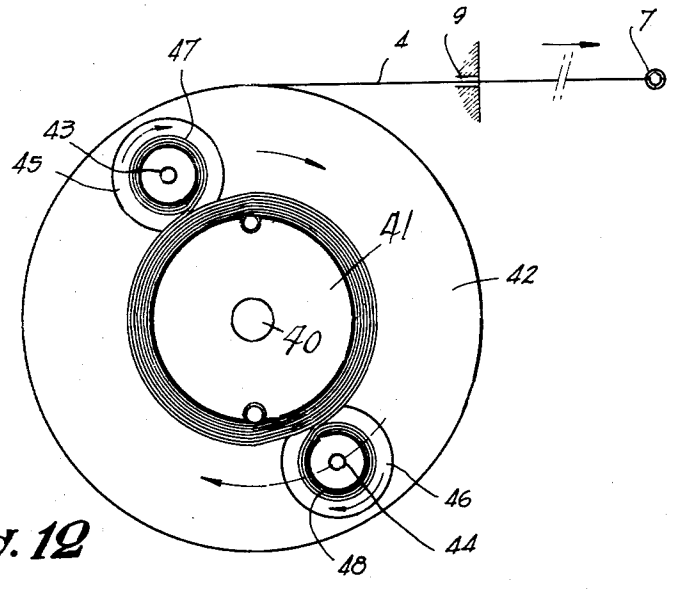


Fig. 12

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Fig. 11

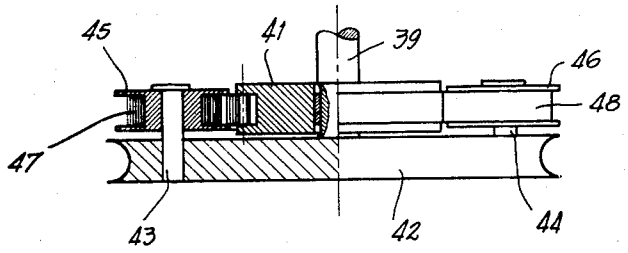
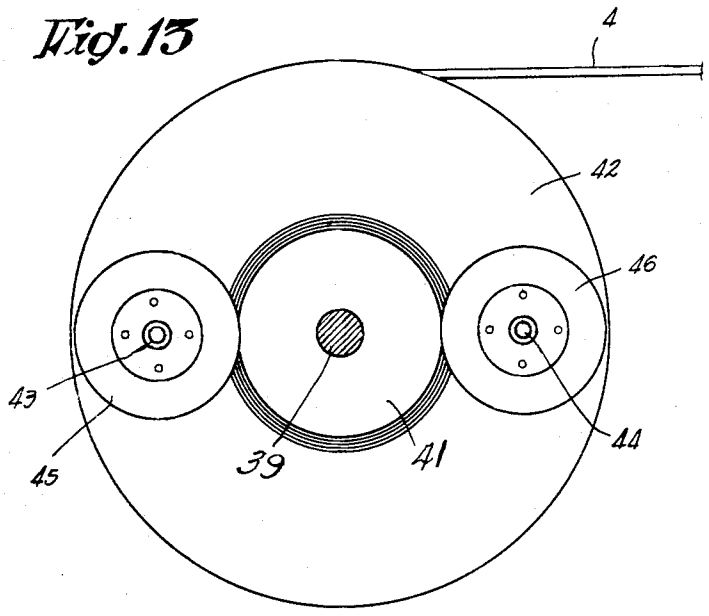


Fig. 13



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United States Patent Office 3,259,927 Patented July 12, 1966

3,259,927

MOORING BUOY

Henri Albert Devis, 91 Avenue Franklin Roosevelt, Brussels, Belgium

Filed May 12, 1964, Ser. No. 366,713
Claims priority, application Belgium, Sept. 10, 1963, 42,951, Patent 637,191; Apr. 6, 1964, 43,517, Patent 646,147
1 Claim. (Cl. 9—8)

Mooring buoys, whatever their shape and dimension, are substantially constituted by a floater, a fastening ring or a handle fixed to said floater, a sinker and, between the floater and the sinker, a supple high-resistance connection, generally a chain or cable.

Such mooring buoys, especially for small displacement vessels, such as yachts, are currently used where mooring quays or pontoons are not available.

If the traditional mooring buoys are theoretically able to fulfil their mission, it is well known from their users that, in practice, they present serious disadvantages.

The latter essentially result from the fact that it is necessary, to tie the painter of one's boat to said ring of the floater, to either take acrobatic positions over the freeboard of the boat or bring the floater aboard.

If these procedures already are uncomfortable in calm waters, they soon become intolerable in heavy seas or in tidal estuaries. This is further accentuated when sailing, where tying up becomes quite a feat.

These disadvantages are certainly not without danger for the passengers and the boat and, in this respect, the actual state of the art in mooring buoys poses the joint problem of security and comfort, especially for small displacement vessels.

The present invention gives a simple, rational and economical solution to this problem. This solution consists in solidarizing the tie-up ring to one extremity of a cable wound on a rotatable support provided inside of the buoy and permanently recalled in the direction of winding by at least one elastic element, in such a way that the buoy externally looks like a traditional mooring buoy. The mooring of boats, however, is profoundly modified in that it is sufficient to grab said ring either by hand or with a gaff and pull it aboard, what unwinds the cable whilst the buoy itself is left practically immobile.

Another object of the invention resides in the realisation of this new means in such a shape that, when the cable is completely unwound, the pull exerted by the boat on said cable is not exerted on the buoy or floater but directly on the sinker.

Still another object of the invention resides in the partitioning of the floater and in the filling of these compartments, except the one that contains the support around which the cable is wound, with a very light and non-absorbing material such as an expanded, close celled plastic, in such a manner that the floatability of the buoy is permanently assured even when water is accidentally let into it, for instance through the passage of the cable.

A further object of the invention resides in the realisation of the floater and its filling, both in suitable plastics, said floater being easily dismantable in at least two parts so that the cable winding device can easily be placed, respectively withdrawn, for assembly, checking, servicing, repairing and replacement purposes.

Still another object of the invention concerns the winding device in itself, considered as a new industrial product, substantially constituted by the combination of a relatively narrow spool of great diameter, presenting a hollow hub equally of great diameter and an axis, the length of which being substantially greater than the width of said spool, a U-shaped stirrup presenting, on the free

extremities of its branches, a seating for the corresponding extremities of the spool's axis; a cable or painter, one extremity of which being fixed to said axis whilst the other extremity is provided with a ring, and lastly, fixed to the central portion of said stirrup, an axis destined to extend through the lower part of the floater and to be connected to the extremity of the chain or cable fastening said floater to a sinker.

Another object of the invention is to provide such a winding device for said cable that the tension of the latter remains practically constant, whatever the length of cable that is unwound.

Such a winding device may indifferently be placed in floaters of any shape: biconical, cylindrical, barrel-shape, spherical, etc.

At last, another object of the invention resides in the provision, at the connection between cable and fastening ring, of a duly shaped element, generally in a relatively elastic material, conditioned to be firmly applied against the edge of the cable passage of the floater when said cable is completely wound.

Purely exemplary realisations of mooring buoys are hereafter described in detail, without any limitation and being understood that the present invention concerns any mechanical combination wherein the fastening or mooring ring is connected to the floater by way of a cable or equivalent, withdrawable through or within said floater.

In the included drawings:

FIGURES 1 and 2 schematically represent in inactive and mooring position respectively, a mooring buoy according to the invention;

FIGURE 3 is a front view with partial radial section of a first realisation of a buoy according to the invention;

FIGURE 4 is a cross section of a winding device particularly suited to equip buoys of any shape and dimensions;

FIGURE 5 represents a radial section of another realisation of a buoy according to the invention;

FIGURE 6 is a section taken alongst line VI—VI of FIGURE 5;

FIGURE 7 shows, in radial section, a particular cable passage in the floater;

FIGURE 8 is another execution of the disposition represented in FIGURE 7;

FIGURE 9 is a radial section of a floater equipped with a winding device according to the present invention;

FIGURE 10 schematically represents the recall device in waiting position;

FIGURE 11 is a section taken alongst line XI—XI of FIGURE 10;

FIGURE 12 is a view similar to that of FIGURE 10, the device being represented in mooring position;

FIGURE 13 is a section taken alongst line XIII—XIII of FIGURE 9.

As represented as schematically as possible, in FIGURES 1–3, a mooring buoy according to the invention substantially comprises a floater **1**, a sinker **2**, a connection **3**, a painter **4** and a device to permanently recall said painter inside floater **1**.

In the schematic example of FIGURE 3, this device is substantially constituted by an axis **5** permanently solicited by a spiral spring **6**. The painter **4** is provided, on its free extremity, for instance with a ring **7** and, under the latter, with a stop **8** equally serving as closing means for the mouthpiece **9** of the floater when the buoy is in inoperative position. In this embodiment, floater **1** is made up from two coaxially disposed hollow conical elements, mutually solidarized by a screw thread **10** and locking claws **11**. Small lateral openings **12**, located above the waterline, prevent the floater **1** to be filled with water. The penetration of water may nearly entirely be prevented

by filling the lower conical element, partially or totally with a very light and practically waterproof material, such as certain expanded plastics with closed cellular texture, whereby the provision of said openings **12** may be discarded.

The painter **4** is normally recalled by springs **6** and wound on axis **5** until the stop **8** covers the mouthpiece **9** of floater **1**. The ring **7** thus takes a traditional position and the mooring buoy has the appearance of a traditional buoy.

To moor a vessel, it is sufficient to grab ring **7** and pull so that the painter **4** unwinds from axis **5** against springs **6** and subsequently tie said ring **7** or painter **4** to the vessel by any known means.

The present invention is, of course, not limited to this embodiment and covers any conditioning of the floater **1** so that the painter **4** automatically enters in the latter when ring **7** is released. An embodiment of such a particular recall device is represented in detail in FIGURES 4, 5 and 6.

This device is substantially constituted by a relatively narrow spool **13** freely mounted on an axis **14** which rests on the two branches of fork **15**, the short handle **16** of which being destined to traverse the inferior part of floater **1**.

Spool **13** presents a hollow axis **17** and, between the latter and the rim, a relatively important annular space **18** in which is located a spiral spring **19**, one extremity of which being fixed to spool **13** and its other extremity to said fork **15–16**.

This recall device has the advantage of being relatively narrow and not cumbersome so that the floater **1** may easily be divided in three compartments, **20–21–22**, the two exterior compartments being for instance filled with a light and waterproof material, as previously described. The middle compartment **22** constitutes a receptacle for said recall device.

The top part of floater **1** presents a mouthpiece **9** through which runs the painter **4**, one end of the latter being fixed to said spool **13** and its other extremity ending in a ring **7** adjacent to a closing stop **8** of any desired shape. The lower part of floater **1** presents a nozzle **23**, the diameter of which being preferably slightly inferior to that of handle **16** of said fork so as to produce a strong tightening, the chain **3** being directly attached to the lower extremity of said handle **16**.

To facilitate construction, inspection, servicing and repair work, the floater **1** is preferably constituted by two shells **24–25** assembled by bolts **26** extending through the peripheral shoulders **27** and **28**, respectively.

To take care of the wear that could occur at the mouthpiece **9** because of the continuous friction of painter **4**, it can be advisable to provide an intermediate, replaceable mouthpiece **29**, as represented in FIGURE 7, made out of a suitable material chosen in function of said wear and of the nature of the external surface of painter **4**. For instance, if the latter is constituted by a stranded steel cable of ±¼ inch diameter covered with a plastic sheet, such as nylon, said intermediate mouthpiece **29** could be made in the same plastic or in any other material having a close structure and offering a high resistance to friction, respectively a low adherence. In case of wear, it is sufficient to simply replace said mouthpiece **29** and in this respect, it may be advisable to give it a cleft annular cross-section.

Of course, these embodiments are only given as examples without any limitation, the invention concerning as well any buoy of any shape and dimension as any painter retraction device, considered as new industrial product, suitable to be incorporated in such buoys, as previously described.

Thus, the painter **4** may be retracted in or through the buoy by any means other than an elastic recall or winding. In one characteristic embodiment of the invention, the withdrawal of the painter in, respectively through, the floater **1** is realized in an extremely simple and economic way, using a weight or balance-weight. Indeed, as schematically represented in FIGURE 8, the floater **1** is traversed by a tubular passage **30**. The painter **4** runs through said passage and is provided at one end with said ring **7** and, at the other end, with a balance-weight **31**. The painter **4** may also be connected, with its lower end, to said floater **1**, runs through a ring **32** of a counterweight **31** and, subsequently, through said passage **30**. This second solution is inconvenient in that it needs a heavier weight **31** but allows to nearly double the available length of the painter, this being interesting with deep waters.

Any other embodiment allowing the painter **4** to traverse floater **1** may of course be considered.

In the execution according to FIGURES 9–13, the buoy **33** is constituted by two half buoys **33*a*** and **33*b*** solidarized, for instance, with bolts **34** and nuts **35**, a sealing ring **36** being provided therebetween. The lower part **33*b*** can advantageously be filled with a light material such as an expanded, closed cellular plastic, so as to render said buoy perfectly unsinkable even if water accidentally enters in the latter. The recall device is conveniently located in the top part. This device may rest on a cross beam **38** solidarized to the corresponding part of the internal surface of the top part **33*a***. This cross beam **38** is inclined and may be fixed by any suitable means, such as gluing.

On this cross beam **38** is fixed one extremity of a shouldered axis **39–40** on which is fixed a drum **41** and, freely mounted, a spool **42**. The latter is so profiled that its rim **42*a*** may contain the wound painter **4** when the ring **7** occupies its rest position (FIGURE 10). Two axes **43** and **44**, equally spaced from axis **40**, rest on two diametrally opposed points of said spool **42**, pulleys **43** and **44** being respectively freely mounted on said axes. These two pulleys and the fixed drum **41** are disposed in a same plane parallel to that of spool **42**. On each of said pulleys **45** and **46** is wound an elastic strap, generally in spring steel, respectively **47** and **48**, one extremity of said straps resting freely on said pulleys **45** and **46** respectively, whilst the other extremity is fixed to said drum **41**. These windings are such that in one or the other of the extreme position of ring **7**, the elastic straps **47** and **48** are always wound with at least two turns either around said pulleys **45–46** or around said drum **41**. Preferably, said elastic straps will rest on their respective pulleys simply by being wound twice around the latter. This particular disposition gives a great flexibility to the device because said straps may eventually slide with respect to their winding axis.

In this instance, the outlet aperture **9** for painter **4** is located on the side of the said top part **33*a*** of the buoy. This aperture will preferably be provided with an elastic ring **49** so as to reduce to a minimum the water penetration into the buoy alongst said painter **4**.

As schematically represented in FIGURE 10, when ring **7** is in rest position, the elastic straps **47–48** are wound on their respective pulleys **45–46**, whilst both said straps encircle said drum **41** with two mutually superposed, respectively alternate turns.

When a traction is exerted on the ring **7** (FIGURE 12), the spool and axes **43–44** rotate and, subsequently, also pulleys **45–46**, around their respective axes and also around the central axis **40**. Said straps **47–48** wind whilst superposing on drum **41**, in such a way that when said ring **7** is in its outmost position, the said straps are essentially wound on said fixed drum **41** but whilst still encircling their respective pulleys **45–46**, for instance with at least two spires. It is thus apparent that the pulleys **45–46** are spring-loaded by the spring steel straps **47–48** which are wound around them. In the position shown in FIG. 12 they exert a counterclockwise torque on the mobile assembly.

This device is such that the painter **4** may be unwound on a distance, for instance of at least ten yards, with a practically constant traction. These various elements

will evidently be adapted to the dimensions of the buoy, respectively to the length of the painter. The relative position between this device and the buoy and also the position of the outlet aperture for the painter are essentially variable, the described embodiment being given only by way of example. Nevertheless, one of the characteristics of the invention also concerns the simple and economic embodiment of such a buoy and drum, namely by stamping or casting of simple blanks. These elements can thus be realized in synthetic material and more especially in reinforced or stratified resin with not only economical results but also with the effect that the finished product will be light and unaffected by water, more essentially by sea water.

Of course, any elements or equivalent dispositions can be substituted to the various above described elements.

At last, the insubmersibility of the buoy can be enhanced by the fact that its lower part is fitted as a watertight box, for instance by means of a closing plate or wall.

The buoy could equally be completed by any accessory either utilitarian or decorative. For instance, a part or the whole surface of the top part of the buoy could be rendered luminescent, fluorescent or reflective. The buoy could also be provided with a luminous device giving a continuous or intermittent light. To this respect, the top and narrow part of the buoy could be transparent, the luminous device being located within said transparent part.

The invention also concerns all accessory dispositions, as long as they are particularly conditioned or destined

to be applied in a mooring buoy according to the present invention.

What I claim is:

A mooring buoy, comprising a floater having an upper hollow upwardly converging conical portion and a lower hollow downwardly converging conical portion, locking claws interconnecting said two portions, a sinker, a chain connecting said sinker to the lower end of said lower portion, an axle mounted within said upper portion, a spring operatively connected with said axle, a ring located outside of said floater, a stop carried by the upper end of said upper portion, and a painter extending through said stop and having one end connected with said ring and another end connected with said axle, said spring being adapted to wind said painter upon said axle.

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