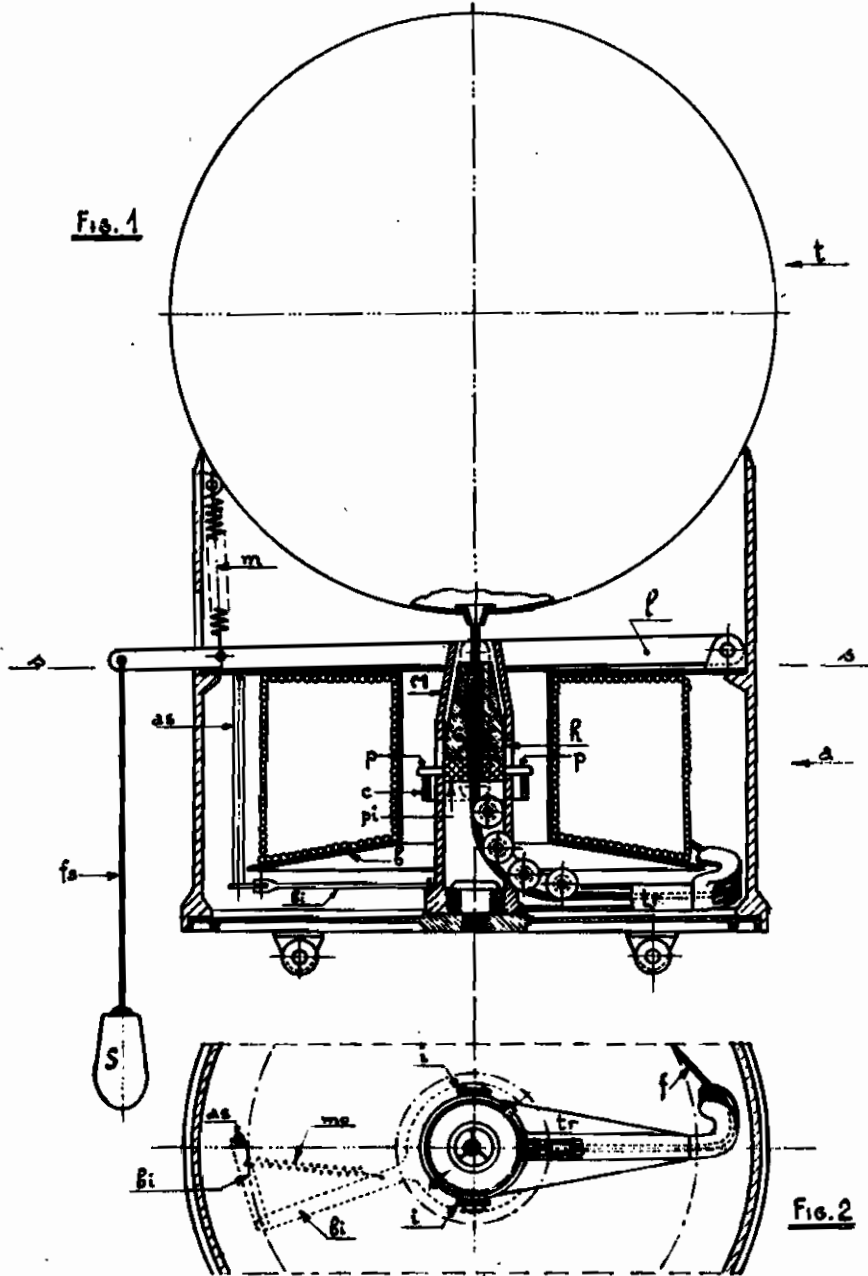


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MAY 4, 1943.
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E. OLMO
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MINES AND BUOYS
Filed Jan. 4, 1939

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249,225
3 Sheets-Sheet 1



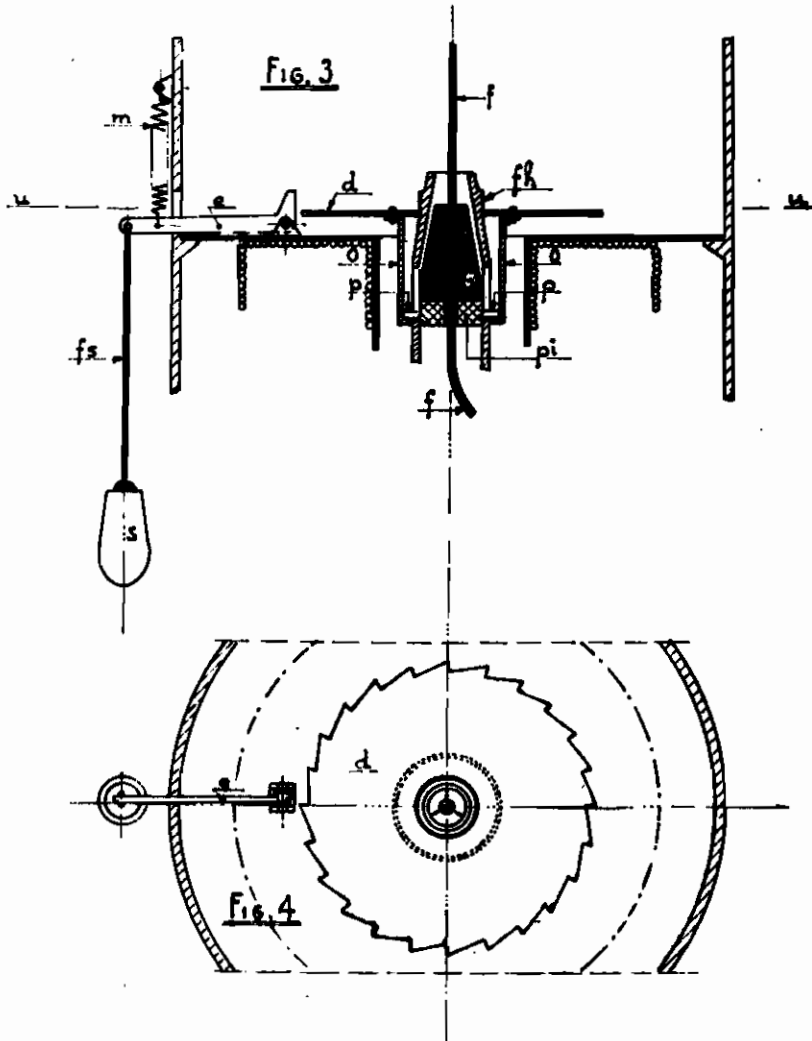
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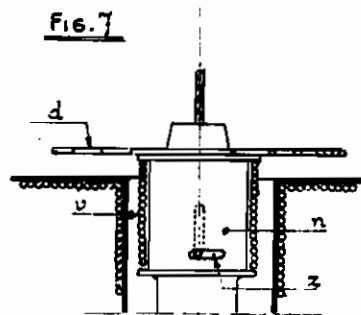
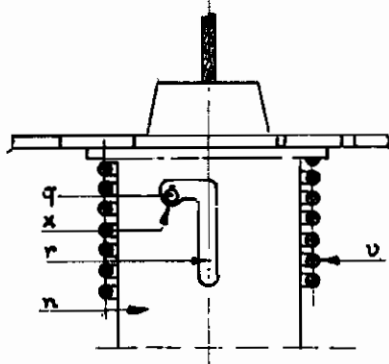
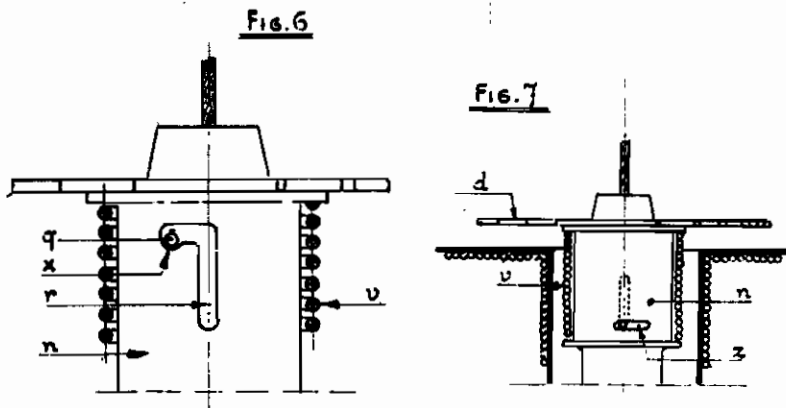
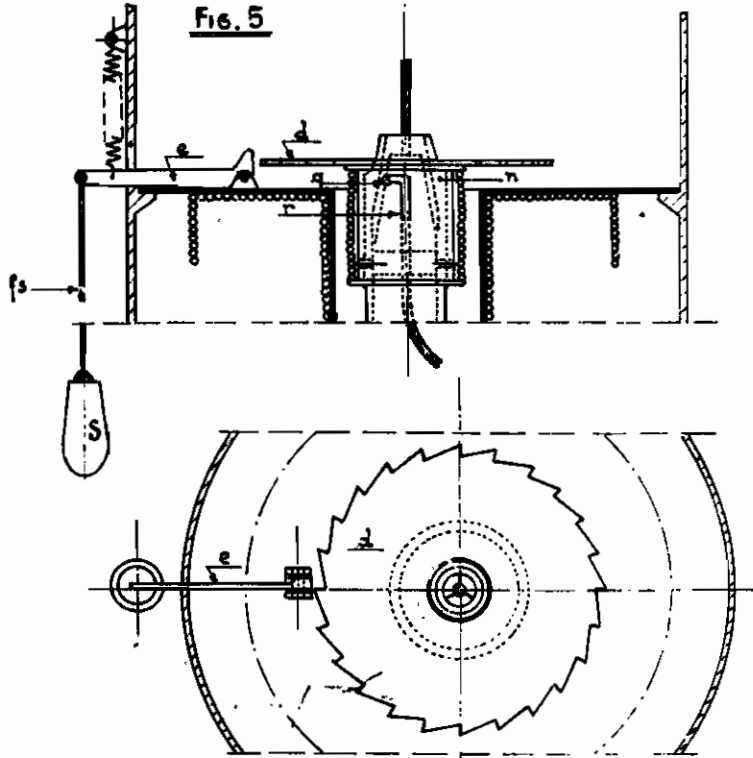


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ALIEN PROPERTY CUSTODIAN

DEVICES FOR THE SELF-MOORING OF MINES AND BUOYS

Enrico Olmo, Milan, Italy; vested in the Alien
Property Custodian

Application filed January 4, 1939

In the self-moorings of mines and buoys, generally, after their launching in water, the case of the mine or buoy remains floating, whilst a body of proper weight, called a "sinker" sinks towards the bottom. The connection between the case and the sinker is secured by a mooring rope or chain which unwinds from a mechanism, generally contained within the sinker, by a length corresponding to the increasing distance of the sinker from the case. Under the sinker, at a distance generally adjustable as desired, is suspended a sounding line. The operation of the latter is counteracted by a spring or other antagonistic force, whose action prevails only when the sounding line comes to bear against the bottom, so as to stop, eventually with a certain delay, any further unwinding of the cable. The mooring is thus obtained by the fact of the connection of the case with the sinker by means of a mooring length which now remains unvariable. As a particular case, otherwise very important, one can have also buoys and mines moored at any desired depth under the level of the water, when the sounding mechanism has been pre-arranged so that the unwound length of mooring cable will be less than the sounding by a length corresponding to the desired depth of immersion.

The mooring cable or chain, generally unwinds by rotation of the drum on which they are wound. Instead, according another known construction (U. S. Patent N. 1,910,988), said drum is fixed and is secured to the bottom of the sinker and over the drum is placed a rotatable arm pivoted on the axis of said drum. The cable coming from the drum is guided to the end of the arm, projecting outside the drum's flange, then the cable leaves the arm near the pivoting axis of the same, to connect its end to the case of the mine or buoy. When the drum sinks towards the bottom, said arm revolves, always keeping its extreme end outside the drum from which at every revolution it unwinds a turn of the cable. Now, instead of placing, as shown in above cited U. S. Patent N. 1,910,988, the drum at the bottom of the sinker and the arm over the drum, according to the present invention, said arm is pivoted at the bottom of the sinker and the drum is fixed to the sinker above the arm. The cable is always guided at the end of the arm and its end is brought into fixed relation with the buoys or mine's case, but after passing inside the drum. Thus it is possible to make use of the whole height of the drum to place the cable's stopping mechanism, without causing said cable to follow round-about circuits. Both these advantages are

very great, particularly due to the requirements of the utmost saving in space necessary in such apparatus. Further, according to the present invention, the action of the spring or of other antagonistic force on the sounding line, is used for obtaining the stoppage of the cable either directly or indirectly. In the latter case, said force or counteracting spring limits its action in the blocking of the cable, to the starting of the intervention of a more powerful energy, as for instance that of the rotating arm or that of the cable that unwinds or of other members set in motion by said cable, or else also the energy of a proper spring preceedingly wound. Moreover over this intervention of an auxiliary energy, according to the present invention, can be obtained by making use of the same rotating motion of the arm unwinding the cable. For instance, with said arm a disc might be set in rotation, but in such a way, that, while said arm goes on revolving, the disk may be stopped at any moment, due to an arresting member which may engage in notches or teeth or other devices, regularly distributed in a certain sequency and frequency on the disk itself.

Said stopping member enters into operation due to the antagonistic spring of the sinker, as soon as the latter strikes the bottom. But, though stopped, by being coupled to the arm by means of friction or any other detachable coupling, the arm can go on revolving and the relative motion of the arm with respect to the disk may be made use of in many different manners, to start the auxiliary energy which will block the mooring cable.

The attached drawings show, by way of example, a few practical embodiments of the present invention.

With reference to the drawing in upright section, Fig. 1 and to the plan view of the same, along section s—s, with drum removed, Fig. 2, we will name:

- t* the case of the mine or buoy;
- a* the automatic sinker of the mine or buoy;
- S* the sounding line;
- b* the drum on which is wound the mooring cable;
- f* the mooring cable;
- f_s* the sounding line cable;
- m* the antagonistic spring of the sounding line;
- tr* the rotating arm unwinding the cable;
- G* the jaws for gripping the mooring cable, with conical outer seat;
- M* the jaw-tightening member with inside conical seat;
- l* the sounding-line lever;

t the links connecting the sounding line lever to collar C;

C the collar;

p the pins projecting from the jaws-lifting plate;

h slots cut in member M allowing a vertical shift of pins *p*;

*p*₁ plate for lifting the cable-lifting jaws;

*a*_s rods to prevent the turns of cable from falling from the drum;

*b*₁ links carrying rods *a*_s and connecting them to the rotating arm *t*_r;

*m*₀ springs conferring yieldability to the rods *a*_s against the cable winding drum.

By leaving unaltered the meaning of the above symbols, as referring to members which do not undergo any change and with reference to the drawing in side view of fig. 3 as also to the plan of the same, along section *u—u* in fig. 4, we will name:

e the lever of the sounding line;

d the toothed disk;

*f*_h the thread by which the male piece M engages the female part of the disk;

o the box solid with *d* for lifting the pins *p*.

By leaving again unaltered the meaning of above symbols as referring to members which remain unaltered in the various alternatives and with reference to the drawing in upright section fig. 5 and to the plan view of the same, along section *u—u* in fig. 6, as also to the details in section figs. 7 and 8, we will name:

n the bush solid with disc *d*;

q the pins fixed to member M engaging in the slots *r* of bush *n*;

r the slots in the shape of a reversed L cut into bush *n* for pins *q*;

v an auxiliary spring for helping the arrangement of the mooring cable; turns on the drum;

z horizontal slots in bush *n* allowing the swinging of pins *q* with M;

x cut in the slots *r* for resting-in pins *q*.

When the apparatus shown in fig. 1 is launched in the water, the case *t* remains floating on the surface, the sinker *a* sinks towards the bottom; cable *f* is thus pulled and compels arm *t*_r to rotate unwinding from drum *b* the cable *f* in a length corresponding to the gradually increasing distance between case *t* and sinker *a*; meanwhile the sounding line S with its weight keeps lever *l* down, notwithstanding the action of the antagonistic spring *m*. As soon as the sounding line S strikes the bottom, spring *m* prevails and lifts the lever *l* and with it the links *i*, collar C, pins *p*; and plate *p*₁ which lifts the jaws G forcing them in the cone M. Due to the inside conical surface of member M and to the outside similar conical surface of jaws G, the latter grip cable *f*, sliding between said jaws, and block it, preventing any further sliding of the mooring cable.

From this moment case *t* will be compelled to follow down the sinker *a* in its motion of descent, until the latter strikes the bottom.

According to figs. 3 and 4, as soon as the sounding line strikes the bottom, spring *m* lifts lever *e* whose tail engages one of the teeth regularly distributed with a certain frequency on the rim of disk *d*. The disk thus ceases to turn, whilst the arm *t*_r goes on revolving, but, due to the thread *f*_h connecting member M to disc *d*, this member will

be lifted, dragging along box O and with it pins *p*, plate *p*₁ and the jaws which will block the cable as said above.

According to figs. 5, 6, 7 and 8, as soon as the sounding line S strikes the bottom, as stated above, the tail of lever *e* stops the disc *d*, forcing pins *q*, compressed by spring *v* in the slots *r*, to come out. Member M goes on revolving and with it, pins *q* fixed thereon. As soon as pins *q* reach the vertical part of slot *r*, spring *m* pushes upward bush *n* and with it pins *p*, plate *p*₁ and the jaws G which grip cable *f* as shown above. Eventually pins *p* can be fixed directly to the single jaws G; bush *n* will have also horizontal slots *z* allowing pins *p* to swing therein, whilst the bush is at rest. Member M on its turn will be provided with vertical slots *h* allowing pins *p* to be lifted for blocking the cable.

No particular difficulty prevents the achievement of many other embodiments of the present invention, and it would offer no difficulty, for instance, to obtain a gripping of the mooring cable with a spring as shown in figs. 5, 6, 7 and 8, making however bush *n* solid with member M, no more by means of pins *q* engaging in slots *r*, but with a thread *f*_h as shown in figs. 3 and 4. A bond of this kind might be convenient when the gripping of cable *f* is to be obtained after the rotating arm *t*_r has made with member M, a certain number of revolutions, as many as are required to disengage entirely the threads (which might be even somewhat long).

This arrangement is particularly convenient when the gripping of the cable is to be obtained when the sinker has laid on the bottom and a certain preestablished free run of cable is to be allowed for the mooring.

It should be borne in mind that according to the present invention, all the devices specified above, may be used in combination with special rods *a*_s, shown in figs. 1 and 2, secured to rotating arm *t*_r and which revolve with it, gliding against the flange of the cable drum *b*, to the object of preventing cable *f* from falling from the drum when slackening. Any of the rods *a*_s which can be in any desired number, may be carried by a link *b*₁ pinned to the arm *t*_r and may be connected to the said arm by a spring *m*₀ securing the yieldability of the bearing of rod *a*_s against the cable drum.

The invention shown above, can be used in combination with all and any other device which may be deemed most useful to the best performance of the buoys and mines. We will mention for instance those concerning the adjustment of the distance of the sounding line from the sinker, from zero to any desired value. We will mention the devices for temporarily blocking the mechanism for gripping the mooring cable, just for the first instants of the sinking of the sinker. Said block in the present case can be obtained in a particular easy manner by preventing the sounding line lever to move along its whole length necessary for obtaining the stoppage of the cable until the rotating arm *t*_r has not accomplished a certain number of revolutions, adjustable at will.

We will mention finally the application of a swivel or of a spherical joint to the attachment to case *t* of the mooring cable *f*.