Oct. 8, 1968 J. J. BYRNE 3,405,388

DRIFT ALARM SYSTEM FOR BOATS

Filed July 26, 1965 2 Sheets-Sheet 1

FIG. 3

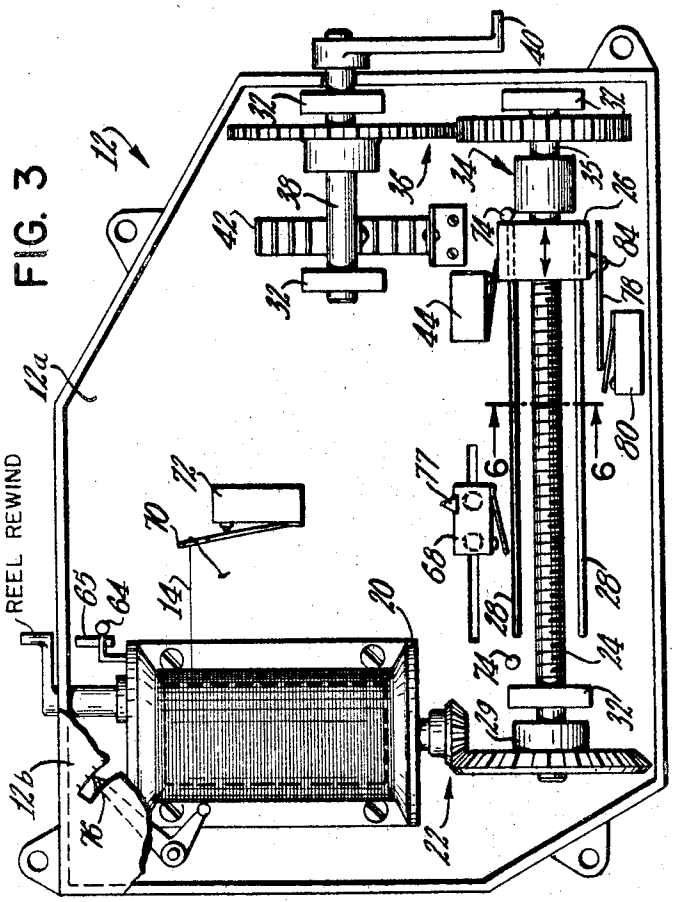


FIG. 6

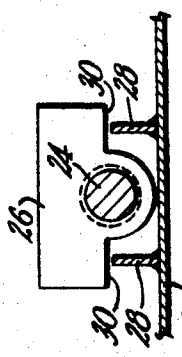


FIG. 1

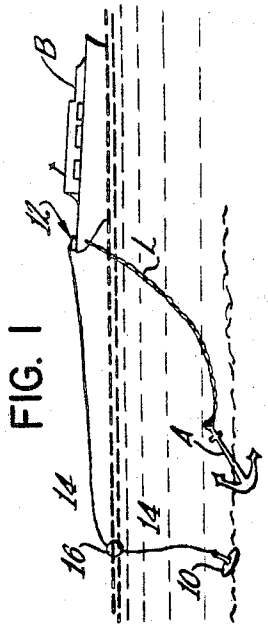


FIG. 2

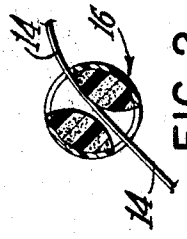
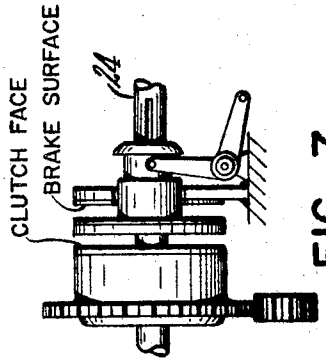


FIG. 7



INVENTOR.
JOHN JOSEPH BYRNE

BY

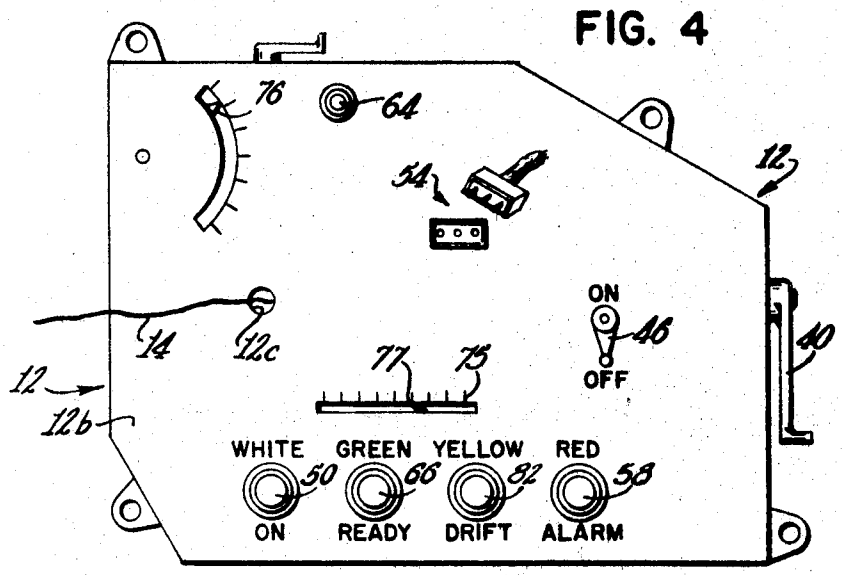
Leonard H. King
ATTORNEY

Oct. 8, 1968 J. J. BYRNE 3,405,388

DRIFT ALARM SYSTEM FOR BOATS

Filed July 26, 1965 2 Sheets-Sheet 2

FIG. 4



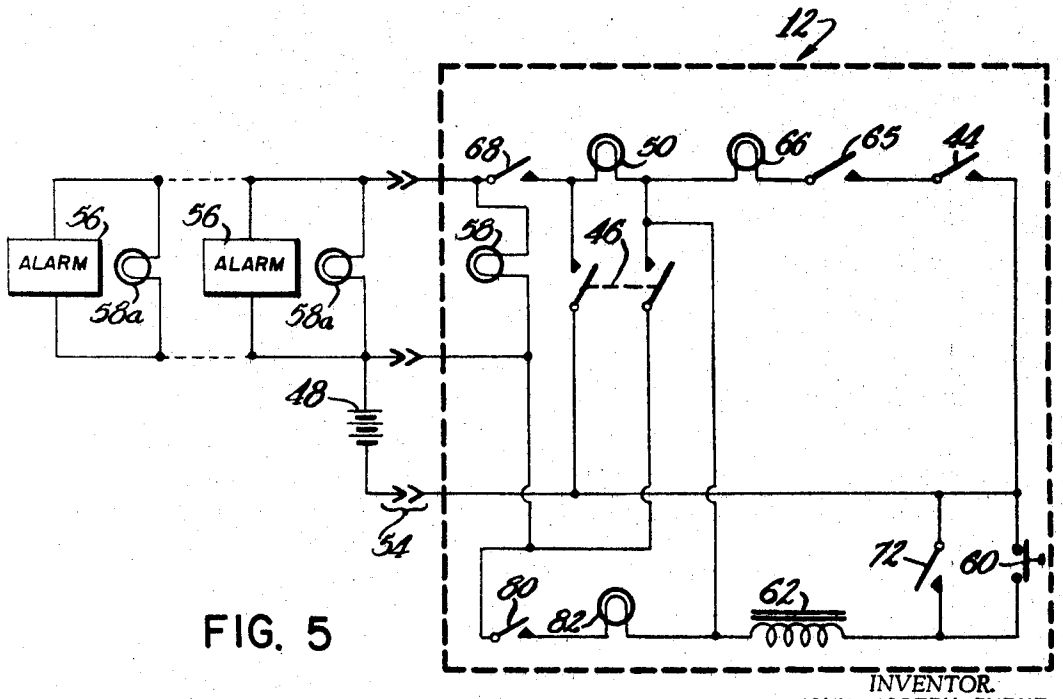


FIG. 5

INVENTOR.
JOHN JOSEPH BYRNE

BY

Leonard W. King

ATTORNEY

United States Patent Office 3,405,388
Patented Oct. 8, 1968

3,405,388

DRIFT ALARM SYSTEM FOR BOATS

John Joseph Byrne, New York, N.Y.
(9 Benedict Place, Greenwich, Conn. 06830)

Continuation-in-part of application Ser. No. 324,089, Nov. 15, 1963. This application July 26, 1965, Ser. No. 474,919
3 Claims. (Cl. 340—29)

ABSTRACT OF THE DISCLOSURE

An apparatus for detecting the dragging of an anchor by a ship. A dual alarm system is employed. Warning means indicate drift within a preset range and alarm means indicate drift beyond a critical range. A drift distance indicator is provided.

This application is a continuation-in-part of my co-pending application for Anchoring of Ships, filed Nov. 15, 1963, Ser. No. 324,089, now abandoned.

This invention relates generally to the apparatus for anchoring ships and more particularly to alarm means associated therewith to indicate movement of an anchored ship beyond a prescribed distance.

It is acknowledged in the shipping industry as well as by individual boatsmen that a dragging anchor or a severed anchor line represents a major safety hazard. If the anchor drags, the boat may drift onto a reef, sand bar, against another boat or other hazard. The present state of the art provides no completely satisfactory system that automatically monitors the condition of the anchor line and signals when and how far the boat has drifted.

By using simple, low cost and readily available components, the present invention offers a solution to the above-mentioned problems. A light line extends between an auxiliary anchor and the monitoring apparatus aboard the craft. The auxiliary anchor is positioned below the water level proximate the holding anchor. The line affixed to the auxiliary anchor passes through a surface buoy and terminates in a clutched reel located in a housing on board the boat. Means are provided for signalling when the boat is starting to drift. Visual and/or audible signal means indicate that the boat has drifted beyond a predetermined safe distance. Adjustment means are included for varying the distance of safe, permissible drift which is a function of localized conditions.

Accordingly, it is an object of the present invention to provide improved, automatic means for signalling the drift of a boat beyond a predetermined distance from its anchorage.

Another object is to provide automatic signal means for indicating when an anchored boat begins to drift.

A further object is to include means for adjusting the signal means to be responsive to greater or lesser drifting.

An additional object is to provide either visual or audible signal means or both for indicating drifting of the boat or breaking of the main anchor line.

Still another object is to include counter means for indicating the distance the boat has drifted.

A feature of the present invention is that the foregoing objectives are achieved by means of relatively inexpensive and readily available commercial components.

These and other features, objects and advantages of the invention will, in part, be pointed out with particularity and will, in part, become obvious from the following more detailed description of the invention, taken in conjunction with the accompanying drawing, which forms an integral part thereof.

In the various figures of the drawing like reference characters designate like parts.

In the drawings:

FIG. 1 is a pictorial view of the present invention and an anchored boat;

FIG. 2 is an enlarged sectional view of a surface marker used with the present invention;

FIG. 3 is a sectional view of the housing with the cover removed to illustrate the mechanism comprising the present invention;

FIG. 4 is an elevation view of the control housing;

FIG. 5 is a schematic diagram of the circuitry used with the present invention;

FIG. 6 is a sectional elevational view taken along line 6—6 of FIG. 3; and

FIG. 7 is an elevational view of an alternative clutch brake mechanism used with the present invention.

Referring now to the drawings, it will be seen that anchor A is holding boat B by means of anchorline L. An auxiliary anchor **10** is also secured to a control housing **12** on the boat by means of a line **14** which passes through surface buoy **16**. As shown in FIG. 2, buoy **16** has a curved transverse aperture **18** which serves the dual purpose of permitting line **14** free movement therethrough and also assisting in the positioning of the marker almost directly above anchor A under normal conditions, so as to minimize the danger of fouling of the line **14** in the anchor line. To withstand the corrosive effects of sea water and to provide sufficient buoyancy, it is currently preferred to make the surface marker **16** from a material such as a polypropylene shell filled with foamed polystyrene.

FIGS. 3, 4 and 5 illustrate the apparatus for indicating and signalling the drift of a boat as well as the housing **12** therefor. A reel **20**, which may be a standard, deep sea fishing reel modified for this application, is mounted on base plate **12***a* to which housing cover **12***b* is attached.

Among the modifications required, if a standard fishing reel is employed, is the increasing of the drum diameter from the typical ⅜-inch diameter to about 2-inch or greater diameter. This change assures substantial linearity in the various indicator dials employed in the apparatus. A shaft extending from the reel would also be provided. Employing a 2-inch diameter reel and a 1 to 4 reduction ratio for the beveled gears and a lead screw pitch of 10 threads per inch will provide approximately 2½ inches of travel for a drift of 50 feet. Obviously the gear and pitch ratios may be varied to achieve other travel lengths for the nut corresponding to a desired sensitivity.

A reduction gear train **22**, herein illustrated as two right angle bevel gears, is coupled to the reel shaft. Lead screw **24** is secured to the output of the right angle drive and supports an axially movable but non-rotatable traveling nut **26**. It is to be understood that the specific gearing arrangement is shown only by way of example and may be varied without departing from the invention. For example, other right angle drive means may be used or a direct drive system may be employed. Typical of the arrangements that may be used to provide nonrotation while the nut is axially moved is the fixed ribs **28** against which ledges **30** of the nut ride (FIG. 6).

The opposite end of lead screw shaft **24**, which is suitably journalled in bearings mounted in hangers **32** fixed to the base, is coupled by means of a direct acting clutch brake **34** to the input shaft **35** of a second gear train **36**. The two shafts are coupled when the solenoid coil is energized. A convenient form of clutch-brake is the direct acting electrically energized solenoid type. In the de-energized condition an armature member is forced by a spring biasing means against a brake member. The armature member is coupled to shaft **35**, thus locking it against rotation while the shaft **24** is left free to rotate. On the other hand, when the solenoid is energized, the armature is drawn against the clutch face attached to shaft **24** to

couple it to shaft **35**. Other clutch brakes may be used as for example the mechanically actuated type shown in FIG. 7.

Output shaft **38** supports an external handle **40** and a coiled biasing member **42**, such as a clock spring. As the handle is turned in the proper direction, with the clutch brake temporarily energized, spring **42** is wound up and nut **26** moves to the right (FIG. 4) to close switch **44** for reasons explained hereinafter.

Operation

The main power switch **46** is closed to energize the equipment from power source **48**. Pilot light **50** will go on to show that power is on. The power supply may be a battery disposed within the housing **12** or remotely located. The apparatus may also be energized from the vessel's electrical system. Preferably, the power supply is remote to provide a check as to whether the three conductor cable connecting jack **54**, remote alarm **56** and remote signal lamp **58***a* and power supply **48** is intact.

Push button **60** is temporarily depressed to energize the solenoid **62** of the clutch brake **34**. The reel is disengaged from the gear train and the traveling nut **26** by action of clutch lever **64**. The operation of shaft handle **40**, driving gear train **36** and lead screw **24**, causes nut **26** to travel to the extreme right position to close switch **44**. This handle cranking action also winds clock spring **42**.

As the line is payed out, the reel clutch is maintained in a disengaged position. The reel is manually engaged by throwing the clutch handle **64** when the auxiliary anchor reaches bottom. This action closes switch **65**, completing the circuit to "ready light" **66** and indicates that the mechanism is in readiness for actuation. If the boat begins to drag its main anchor the auxiliary anchor will not be dragged by the light tension thereon, but since the reel clutch is engaged, the line **14** will be payed out, causing nut **26** to move to the left (FIG. 3) to close switch **68** to energize lamp **58** and remote alarm **56**.

Line **14** passes through an aperture **12C** in the housing cover and is passed through a ring **70** formed on the actuator of normally closed switch **72** before it is wound on the reel hub. The tension provided by an intact line holds the switch contacts open. Should line **14** break, the switch contacts close to energize the solenoid of clutch brake **34**, whereby the coil spring **42** is coupled to lead screw **24**. The coil spring, which is initially wound up by moving the nut to the right, will therefore drive the nut towards switch **68** to sound the alarm in the manner previously described. Suitable stops **74** are included to limit the linear travel of the nut in either direction. Gear train **22** is coupled to shaft **24** through a slip clutch **29** to prevent damage when the nut reaches a stop **74**.

Switch **68** is slidably secured to housing **12** to permit variable location with respect to nut **26**. The length of permissible drag may therefore be easily set by reference to the scale **75** and pointer **77**. Furthermore, an indicator **76** is also provided to visually display the number of feet payed out by the reel after the clutch is engaged. The indicator could be a conventional sliding pointer coupled to the reel.

Nut **26** is also provided with an adjustable length extension arm **78** arranged to engage a switch **80**. When the boat starts to drift, some of the line **14** is payed out and the nut travels to the left. When arm **78** closes the contacts of switch **80**, a yellow warning light **82** is turned on to indicate that the line is being drawn out but not necessarily that the anchor has dragged. The effective length of arm **78** may be varied by loosening screw **84** and sliding the arm left or right to the desired position. If the boat moves beyond the preset distance, switch **68**, which is spaced from switch **80** in the direction of the travel of the nut, will be closed to sound the alarm.

It will be evident from the foregoing description that the components employed are all conventional and readily available at a reasonable cost. It will also be apparent that the apparatus provides effective alarm means for indicating a variety of undesirable conditions. The alarm is very easily set for different permissible drifting distances and is positive when either the drifting distance is exceeded or when the alarm line breaks. A preliminary alarm is also included to indicate drifting within the permissible range.

There has been disclosed heretofore the best embodiment of the invention presently contemplated and it is to be understood that various changes and modifications may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. An alarm system for indicating the drift of an anchored boat comprising:

(a) an auxiliary anchor positioned below the water level proximate the main anchor;

(b) a line extending between said auxiliary anchor and the boat;

(c) a rotatable reel positioned on the boat, said reel having a length of said line wound thereon, said reel being arranged to pay out said line upon movement of the boat from its anchored position;

(d) a driven member coupled to said reel, said driven member being movable proportionately to the paying out of said line by said reel;

(e) first switch means actuated by the movement of said driven member;

(f) alarm means responsive to the actuating of said first switch means;

(g) means to position said driven member at a starting point; and

(h) spring means normally urging said driven member away from the starting position thereof and toward said first switch means upon the breaking of said line whereby said alarm is activated.

2. The apparatus in accordance with claim **1** including means to selectively clutch and brake said spring means with respect to said driven member.

3. An alarm system for indicating the drift of an anchored boat comprising:

(a) an auxiliary anchor positioned below the water level proximate the main anchor;

(b) a line extending between said auxiliary anchor and the boat;

(c) a rotatable reel positioned on the boat, said reel having a length of said line wound thereon, said reel being arranged to pay out said line upon movement of the boat from its anchored position;

(d) a driven member coupled to said reel, said driven member being movable proportionately to the paying out of said line by said reel;

(e) first switch means actuated by the movement of said driven member;

(f) alarm means responsive to the actuating of said first switch means;

(g) engageable clutch means coupled to said reel;

(h) second switch means actuated by said clutch means; and

(i) means responsive to the actuation of said second switch means to indicate that said clutch is engaged when said auxiliary anchor is properly positioned and said apparatus is ready to operate.

References Cited

UNITED STATES PATENTS

3,217,291 11/1965 King ..... 340—29

JOHN W. CALDWELL, *Primary Examiner.*

ALVIN H. WARING, *Assistant Examiner.*