April 1, 1947. R. L. ENGLE 2,418,252

AUTOMATIC BOAT BAILER

Filed Sept. 5, 1944

Fig. 5.

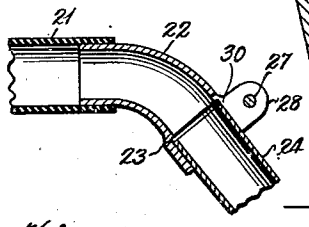



Fig. 1.

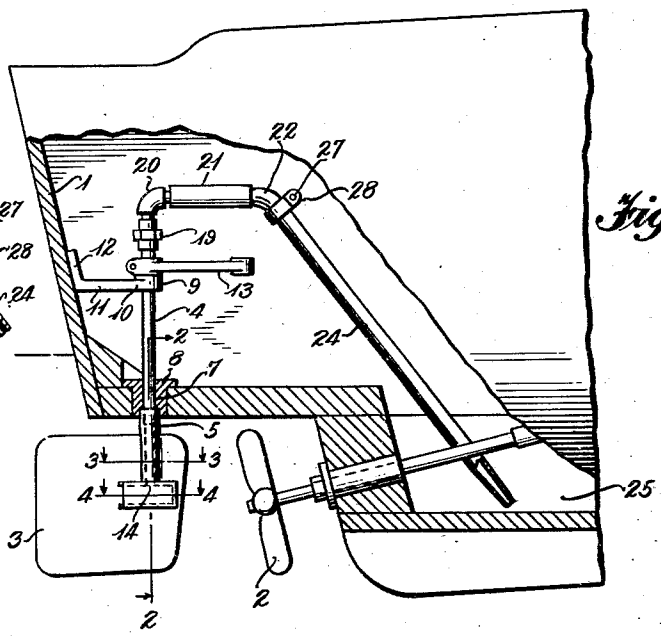



Fig. 6.

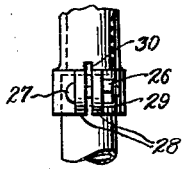



Fig. 2.

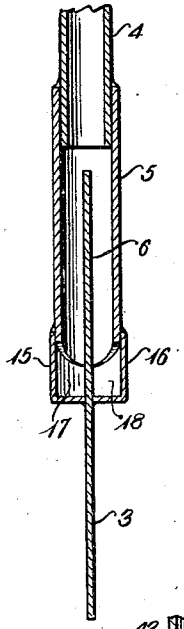



Fig. 3.

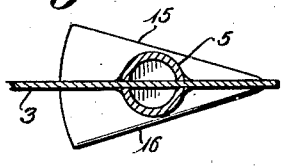



Fig. 4.

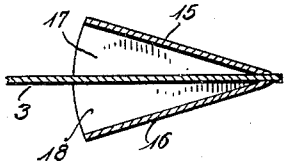



Fig. 7.

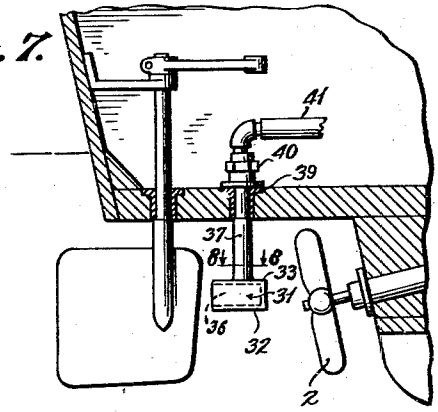



Fig. 8.

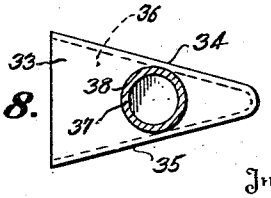



Fig. 9.

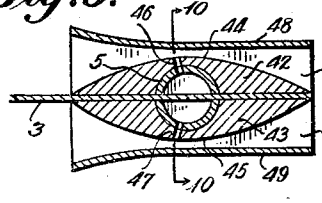
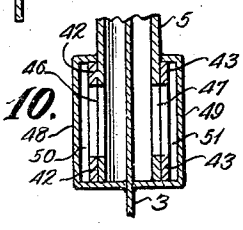



Fig. 10.




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## AUTOMATIC BOAT BAILER

Ralph Leo Engle, Oden, Mich.

Application September 5, 1944, Serial No. 552,755

10 Claims. (Cl. 114—185)

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The present invention relates to a self-bailing device and more particularly to such a bailer in which the bailing is accomplished by the effect produced by the rapid flow of water past a suction inducing member.

I am aware of the fact that this principle is not broadly new and that examples thereof appear in the patent literature. In this connection attention is directed to the patent to Garfield A. Wood, No. 1,578,621, of March 30, 1926, as exemplary of the prior art dealing with this type of construction. The bailer described therein is installed through the bottom of the boat with a small cup-like member facing backwards. The flow of water past this member, caused by the forward motion of the boat, creates a vacuum which causes the bilge water to be siphoned from the boat's hull.

It has been found, however, that the self-bailing devices of the type described above have the notable objection that they are operable only with a high speed type of boat, speeds of 20 miles per hour or more being required to initiate their operation. In contrast therewith, it has been possible to install a bailer constructed in accordance with the present invention on relatively slow moving craft and still obtain an efficient bailing action. This is accomplished by positioning the suction producing mechanism behind the boat's propeller so that the stream of water forced backward thereby aids in producing the necessary vacuum.

It is, therefore, apparent that one of the primary objects of the invention is to provide an automatic bailer which will function at low speeds or in fact when the boat is stationary if the propeller is turning.

Another object of the present invention is to provide a bailer with which it is possible to commence the bailing action when a higher initial lift of water is necessary than was the case with the previous bailers of this type.

Another object of the present invention is to provide a self-bailer which will operate even when the boat is stationary as when tied to a pier with the motor running and the propeller revolving.

Still another object of the present invention is to provide a combined rudder and self-bailer affording greater economy of construction and effecting substantial conservation of material.

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Still another object of the present invention is to produce an automatic bailer of simplified construction which may be easily installed upon practically any type of boat which is screw propelled.

Still another object of the invention is to provide a boat having automatic bailing means which is effective for removing bilge water from the hull of the boat when the boat is moving at a relatively slow speed, of say about 7 miles per hour, or when the boat is moored and the propeller is turning at a rate which would propel the boat at the aforementioned speed.

A still further object of the invention is to provide a boat bailing means adapted to be positively actuated to initiate the withdrawal of bilge water from the hull of a boat by the movement of the water forced rearwardly by the propeller.

Other and further objects of the invention will be readily apparent from the following description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view of the stern of a boat, partly in section, illustrating the manner in which a preferred form of combined rudder and self-bailer embodying the principles of the invention may be installed;

Figure 2 is an enlarged vertical sectional view taken along the line 2—2 of Figure 1;

Figure 3 is an enlarged sectional plan view taken along the line 3—3 of Figure 1;

Figure 4 is an enlarged sectional plan view taken along the line 4—4 of Figure 1;

Figure 5 is an enlarged sectional view of a portion of the conduit shown in Figure 1 and illustrates a means of preventing water from siphoning into the hull of the boat when the bailing action has ceased.

Figure 6 is a plan view of a portion of the conduit shown in Figure 5.

Figure 7 is a view illustrating a modified form of the invention in which the rudder and bailing device are formed separately, but with the bailing device positioned so as to be operated in accordance with the principles of the invention.

Figure 8 is an enlarged sectional plan view taken on the line 8—8 of Figure 7;

Figure 9 is a sectional plan view of a rudder and modified type of suction member, which can be utilized in the practice of the invention; and

Figure 10 is a vertical sectional view of the modification shown in Figure 9.

Now referring with greater particularity to the drawings it is seen that Figures 1 through 6 illustrate a construction in which the bailing device is associated with the boat's rudder and this forms the preferred embodiment of the invention. In the drawings the numeral 1 generally denotes the hull of the boat, 2 the propeller and 3 the blade of the rudder. A hollow shaft which may comprise sections 4 and 5 is positioned rearwardly of the propeller 2, and the lower shaft section 5 is provided with a slot 6 extending upwardly from its lower end in which the rudder blade 3 is mounted with the upper edge of the blade engaging the upper extremity of the slot. The shaft section 5 and the rudder blade 4 are secured together by soldering or welding along the edges of the slot so that the two are secured together in a water-tight manner.

The hollow shaft 4 may be conveniently mounted at the stern of the boat by any suitable means. However, for illustrative purposes the shaft 4 is shown projecting through an aperture 7 in a bearing member 8 set in the bottom of the hull of the boat, and through an aperture 9 in a second bearing member 10 which is positioned above the bearing member 8 and which has a laterally extending arm 11 provided with an upturned flange 12 secured in any convenient manner to the stern of the boat. A tiller 13 is secured to the shaft 4 and rests upon the upper face of the bearing 10 to prevent vertical displacement of shaft 4 in a downward direction. Vertical displacement of the shaft 4 in an upward direction is prevented by causing the upper face of the enlarged extension 5 to bear against the bearing 8.

To the sides of the rudder blade 3 and the lower end of the hollow shaft 4 is secured the suction inducing device indicated generally as 14. The suction inducing device 14 may be composed of two rearwardly flared portions 15 and 16 secured to opposite sides of the rudder blade 3 in a diametrically opposed position by brazing or other suitable means so as to define generally wedge-shaped rearwardly opening chambers 17 and 18. Portions 15 and 16 surround the lower end of the extension 5 and are secured thereto in a water-tight manner so that chambers 17 and 18 communicate with the hollow shaft 4.

The upper end of the hollow shaft 4 is provided with a suitable or conventional rotatable water-tight connection 19 to the upper end of which is secured the nipple 20. A short flexible pipe 21 of rubber or similar material may conveniently be used to connect the elbow 20 with a split angular elbow 22 inclining downwardly. In the split elbow 22 is a recessed portion 23 adapted to receive a tubular conduit 24 which projects downwardly into the bilge of the boat indicated as 25. The conduit 24 is mounted in any desired position in the recessed portion 23 by tightening a nut 26 on a bolt 27 which extends through two opposed arms 28 which project laterally from both sides of the slot 29 in the split union 22.

As is clearly shown in Figures 5 and 6 of the drawings, there is always present an opening 30 which serves to prevent water from being siphoned in the reverse direction and into the interior of the boat when the propeller has ceased rotating after a bailing operation. This is accomplished by the fact that the opening allows air to enter at this point and break the partial vacuum existing in the system. The opening



should, of course, not be large enough to interfere substantially with the operation of the bailing device and as set forth above the conduit 24 may be positioned in the recessed portion 23 so as to regulate the size of the opening 30.

Referring now to the modification of the invention illustrated by Figures 7 and 8, it is seen that the rudder and automatic bailing unit are maintained as separate entities. The bailer is, however, as before positioned directly behind the boat's propeller so that the backwardly flowing stream of water therefrom aids in producing the vacuum necessary for the operation of the bailer. In this construction the numeral 31 denotes the suction inducing device itself. This device may consist of a rearwardly flaring wedge shaped structure having a bottom portion 32, a top portion 33 and side members 34 and 35. This structure defines a chamber 36 which is open at its rearward end and closed at its forward end.

A hollow conduit 37 communicates with the interior of chamber 36 through an aperture 38 in the upper portion 33 of the suction inducing member 31 to which it is secured by welding, brazing or other suitable means so as to provide a water-tight seal. The conduit 37 projects through a bushing 39 in the bottom of the boat and to the upper end of the conduit 37 is secured a conventional rotatable connection 40 which may be conveniently seated upon the upper surface of the bushing 39. The connection 40 is preferably made rotatable so that a tube 41, connected thereto by any suitable means and shown only in part, which projects into the bilge of the boat in a manner similar to that illustrated in Figure 1, can be readily swung to different positions as desired.

As was the case with the embodiment of the invention illustrated by Figures 1 through 6 and described in connection therewith, some means must be provided for preventing the siphoning of water in a reverse direction when the propeller has ceased rotating and the bailing action discontinued. If the conduit communicating with the bilge rises to a point above the water line, the means may again consist of a small air opening at such a point, or in any case a conventional check valve could be interposed at some point in the conduit.

Figures 9 and 10 of the drawings illustrate a modified form of suction inducing member, which is adaptable to either of the embodiments of the present invention described above, although it is illustrated only in connection with the preferred form in which the suction member is associated with the rudder. In this modification the Venturi principle is utilized to provide an efficient form of suction inducing device.

In the drawings, the numerals 42 and 43 indicate members having convex surfaces 44 and 45 of similar configuration rigidly secured to both sides of the rudder blade 3 in diametrically opposed position. Extending between members 42 and 43 and fastened thereto is the enlarged lateral extension 5 of the hollow shaft 4 which is secured to the rudder blade 3 as described heretofore in connection with Figures 1 through 6 of the drawings. Slits 46 and 47 preferably inclined rearwardly at a slight angle are provided through the lateral extension 5 and the members 42 and 43 so as to communicate with the inner portion of the hollow shaft 4.

Surrounding the structure just described are rearwardly flaring channel shaped members 48 and 49 rigidly positioned with respect thereto so

as to define passageways 50 and 51 through which water is rapidly forced by the action of the boat's propeller. The channel members 48 and 49 seal off the bottom of the extension 5 in a water-tight manner as is clearly shown in Figure 10 of the drawings.

The remainder of the construction to be used with this modification of the invention may be the same as that shown and described in the embodiment of the invention embraced by Figures 1 through 6 of the drawings.

The operation of the invention is, of course, readily understood. In every case the water rushing past the suction inducing device creates a partial vacuum which causes the bilge water to be drawn through the conduit and ejected from the boat.

As an operable example of the preferred form of my invention there is furnished the following data obtained as the result of a test made therewith:

The bailer was installed on a boat having a top speed of approximately 27 miles per hour equipped with a 60 H. P. motor, developing a maximum of 3,000 R. P. M.'s and a three bladed propeller of 11 inch diameter and 12 inch pitch. The bailer began to operate when the motor had developed 1200 revolutions per minute which corresponds to a speed of about 7 or 8 miles per hour. It was found that even when the boat was held stationary, as by mooring, bailing commenced at 1200 revolutions per minute.

It was also discovered that by speeding the motor up to 1600 revolutions per minute bailing could be initiated by siphoning water up over a loop 26 inches high whereas the conventional type bailer has a lift of approximately 13 inches.

Having described my invention, I claim:

1. A self-bailing device for a boat having a bilge comprising in combination: a rudder having a blade and a hollow rudder shaft rigidly fastened to said blade; a suction inducing device carried by said rudder and communicating with said hollow shaft; and a conduit communicating with said hollow shaft and extending into the bilge of the boat.

2. A self-bailing device for a boat having a bilge, comprising: a rudder blade; a rearwardly flaring structure having a top, bottom and one side, the lateral inner edges of said top and bottom being rigidly secured to one side of said blade; a hollow shaft rigidly attached to said blade and communicating with the interior of said rearwardly flaring structure; means for turning said shaft; a rotatable, water-tight connection fitted on the upper end of said hollow shaft; and a conduit communicating at its one end with said rotatable connection and at its other end with the bilge of said boat.

3. A self-bailing device for a boat having a bilge, comprising: a rudder blade; two rearwardly flaring structures each having a top, bottom and one side, the lateral inner edges of the top and bottom of one of said structures being rigidly secured to one of the sides of said rudder blade, and the corresponding edges of the other of said members being secured to the other of said rudder blade in a diametrically opposed position; a hollow shaft, divided for a portion of its length, rigidly secured to both sides of said rudder blade throughout said divided portion, with one portion of said shaft communicating with the interior of one of said outwardly flaring structures and with the other portion of said shaft communicating with the interior of the other of said outwardly flaring structures; means for turning said shaft; a rotatable, water-tight connection fitted on the upper end of said hollow shaft; and a conduit communicating at its one end with said rotatable connection and at its other end with the bilge of said boat.



4. In a boat having a bilge, the combination of a propeller; a rudder including a blade; means defining a rearwardly opening chamber rigidly secured to at least one side of said blade; a hollow shaft rigidly attached to said blade and communicating with the interior of said chamber; and a conduit communicating with said hollow shaft and extending into the bilge of said boat; said rudder and said means defining a chamber attached thereto being positioned so as to be in the path of the stream of water forced backward by said propeller.

5. A self-bailing device for a boat having a bilge comprising a rudder blade; a hollow shaft rigidly attached to said blade; a suction inducing device including means for defining a rearwardly opening chamber carried by said rudder and communicating with said hollow shaft; means for turning said hollow shaft; and means for rotatably connecting said hollow shaft with a conduit which extends into the bilge of said boat.

6. A self-bailing device for a boat having a bilge comprising in combination: a rudder having a blade and a hollow shaft rigidly attached to said blade; a Venturi suction producing device carried by said rudder communicating with said hollow shaft; and a conduit communicating with said hollow shaft and extending into the bilge of said boat.

7. A self-bailing device for a boat having a screw propeller and a bilge, comprising in combination: a rudder; a suction inducing device carried by said rudder; and a conduit communicating with said suction inducing device and extending into the bilge of said boat, the arrangement being such that said suction inducing device is positioned in the water directly behind and adjacent to said propeller so as to be in the path of the stream of water forced backward thereby.

8. A self-bailing device for a boat having a screw propeller and a bilge, comprising in combination: a rudder; a Venturi suction inducing device carried by said rudder; and a conduit communicating with said Venturi suction inducing device and extending into the bilge of said boat, the arrangement being such that said Venturi suction inducing device is positioned in the water directly behind and adjacent to said propeller so as to be in the path of the stream of water forced backward thereby.

9. A self-bailing device for a boat having a screw propeller and a bilge, comprising in combination: a rudder having a blade portion; a suction inducing device carried by said blade portion; and a conduit communicating with said suction inducing device and extending into the bilge of said boat, the arrangement being such that said suction inducing device is positioned in the water directly behind and adjacent to said propeller so as to be in the path of the stream of water forced backward thereby.

10. A self-bailing device for a boat having a screw propeller and a bilge, comprising in combination: a rudder having a blade portion; a Venturi suction inducing device carried by said blade portion; and a conduit communicating with said Venturi suction inducing device and extending into the bilge of said boat, the arrangement being such that said Venturi suction inducing

device is positioned in the water directly behind and adjacent to said propeller so as to be in the path of the stream of water forced backward thereby.

RALPH LEO ENGLE.


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