

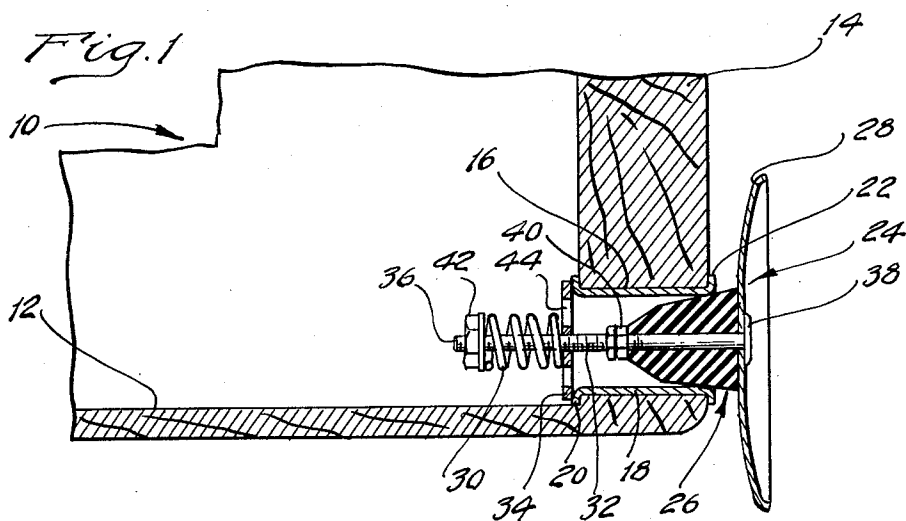
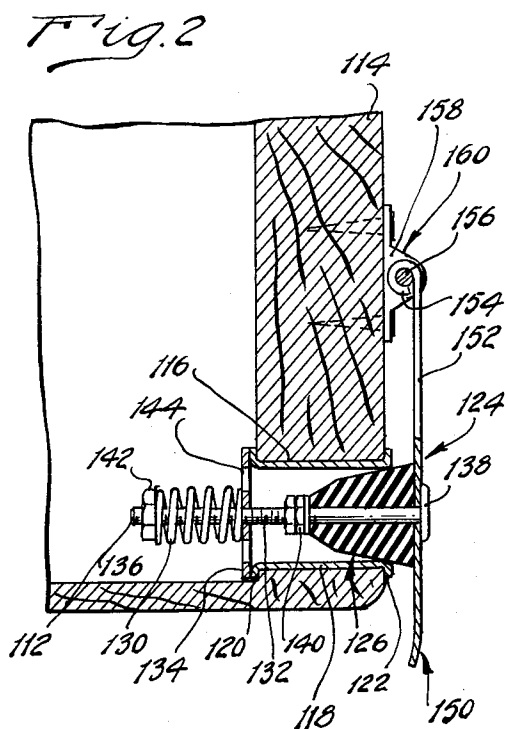
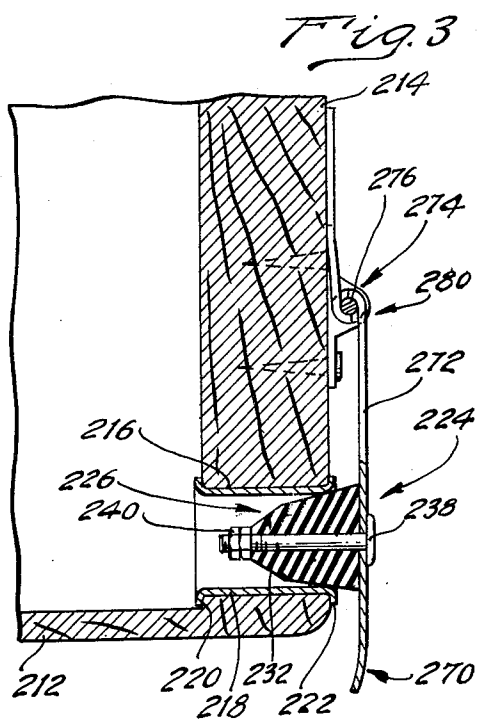
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AUTOMATIC BILGE WATER DRAINING DEVICES

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1

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AUTOMATIC BILGE WATER DRAINING DEVICES

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This invention relates to valves and, in particular, to automatic bilge water drain valves for boats.

One object of this invention is to provide an automatic drain valve for a boat which will open in response to the motion of the boat to drain the bilge water from the inside of the boat, and which will close when the boat slows or stops whereby to prevent backflow of water into the bilge.

Another object is to provide an automatic drain valve for a boat as described above which will free the attention of the operator of the boat from the manual performance of this task while the boat is under way, so that he may give his attention to navigation and other more important concerns.

Another object is to provide an automatic drain valve of the foregoing character which may be adapted to an existing boat having a conventional drain hole located in its transom.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawing, wherein:

FIGURE 1 is a fragmentary longitudinal vertical section through the transom and keel of a boat showing the automatic drain valve installed, according to one form of the invention;

FIGURE 2 is a similar view of an installation of one modified form of the automatic drain valve; and

FIGURE 3 is a similar view of an installation of a second modified form of the automatic drain valve.

Referring to the drawings in detail, FIGURE 1 shows a stern portion of a boat, generally designated 10, of conventional construction, having an approximately horizontal keel portion 12 intersecting with an approximately vertical transom portion 14. The bottom of the transom 14 is fitted with a drain hole 16 located upon the hull center line or at any other suitable and convenient position upon the transom 14. The hole 16 is provided with a cylindrical lining sleeve 18 of metal or other durable material having annular end flanges 20 and 22. While a circular hole has been chosen to illustrate the present form of the invention described below, the drain hole and consequently the plug fitting into it may be of any suitable and convenient shape.

The automatic drain valve, generally designated 24, consists generally of a plug 26, retarding disc or plate 28, compression spring 30, threaded supporting rod 32 and perforated spring abutment 34. The threaded supporting rod 32 is disposed upon the center line axis of the drain hole 16 and passes through bores in the plug 26, retarding disc 28 and spring abutment 34, all of which are coaxial with the drain hole 16. The supporting rod 32 has a threaded end portion 36 directed toward the inside of the boat, the threading extending along the rod to the location of the plug 26. The supporting rod 32 terminates in an enlarged end portion 38 at its opposite end directed toward the outside of the boat. The plug 26 is secured by nut means 40 upon the threaded supporting rod 32 and against the retarding plate 28, which is in turn accordingly secured against the enlarged end portion 38 of the supporting rod 32. The plug 26 approximates the shape of a pair of connected truncated cones, having its greatest diameter adjacent the retarder 28 where the diameter is slightly greater than the inside diameter of the lining sleeve 18. The smallest diameter of the plug 26 is at the end adjacent the nut 40 where the diameter

2

is substantially less than the inside diameter of the lining sleeve 18. The compression spring 30 is coiled around the threaded end portion 36 of the supporting rod 32 with one end of the spring 30 resting against the perforated abutment 34 intermediate the ends of the supporting rod 32 and the other end against a nut 42 at the extremity of the threaded end 36 of the supporting rod 32. The spring abutment 34 is disposed against the annular end flange 20 of the lining sleeve 18 and slidably supports the supporting rod 32. Perforations 44 are provided around the periphery of the spring abutment 34 for the passage of water.

In the manufacture of the automatic drain valve 24, the plug 26 and retarder 28 are fastened to the supporting rod 32 by the nut 40. The resulting assembly is installed in the drain hole 16 against the outside edge of the lining sleeve 18. The spring abutment 34 is then slipped onto the supporting rod 32 and against the inside flange 20 of the lining sleeve 18. The compression spring 30 is placed around the threaded end 36 of the supporting rod 32 which protrudes beyond the spring abutment 34, and the spring is locked in place by the nut 42 on the extremity of the threaded end 36.

In the operation of the automatic drain valve 24, the force of the compression spring 30 acts against the stationary spring abutment 34 which is stationary with respect to the transom, and against the nut 42. In consequence, the supporting rod 32, by means of the nut 42 mounted thereon, tends to be shifted to the left (FIGURE 1) toward the inside of the boat by the action of the compression spring 30. This movement is halted when the plug 26, shifting along with the rod 32, pushes against the outside edge of the sleeve 18 to close the hole 16. This closing of the automatic drain valve 24 occurs when the boat 10 is not in motion or is moving slowly.

When the boat 10 is in motion, its bow tends to be lifted up in the water and consequently its stern tends to drop, putting the keel 12 at an inclined angle from the horizontal. Accordingly, any water that has collected in the bilge or inside bottom of the boat tends to move toward the stern and consequently toward the drain hole 16, particularly if the hull is of approximately V-shaped cross-section and the drain hole is located at the bottom of the transom 14 upon the longitudinal center line of the hull, as shown in the drawing. During the motion of the vessel, the water passing under the keel 12 acts upon the retarder 28. In response to this action, the retarder 28 tends to move rearwardly to the right as shown in FIGURE 1, in a direction away from the stern of the boat. In so doing, it draws with it the supporting rod 32 and the plug 26, and nuts 40 and 42 mounted thereon, thereby compressing the compression spring 30. The motion of the plug 26 to the right (FIGURE 1) withdraws the plug 26 from annular contact with the drain hole sleeve lining 18. This action permits water gathered at the stern of the boat as described above to pass through the perforations 44 in the spring abutment 34, through the drain hole 16, past the withdrawn plug 26 and out into the race of water moving astern of the boat. The movement of the water under the keel and astern of the boat also creates a suction upon the opened drain hole 16 which assists the flow of bilge water drained from inside the boat.

When the boat 10 comes to rest or to move at slow speeds, the retarder 28 is no longer capable of counteracting the force of the compression spring 30. Accordingly, the compression spring 30 expands longitudinally to resume its original shape, thereby forcing the nut 42, the supporting rod 32, and the nut 40, plug 26 and re-

3

tarder 28 all mounted thereon back toward the inside of the boat, closing the hole 16 again with the plug 26.

In the modification of the automatic drain valve shown in FIGURE 2, the reference numerals designating parts which are substantially similar to those described in FIGURE 1 have been retained and increased by 100. The modified automatic drain valve, generally designated 124, differs from the automatic drain valve 24 largely in the form of its retarder, generally designated 150. The retarder 150 has an arm portion or portions 152 extending upwardly therefrom and terminating in a hinge connection 154 embracing a pin 156 mounted upon a hinge bracket 158 of a hinge, generally designated 160, bolted or otherwise secured to the transom 114. Accordingly, the plug 126 travels in an arcuate path around the hinge 160. Since the distance the plug 126 travels is related to the difference of length of the compressed and expanded states of the compression spring 130, the arcuate path of the plug 126 approximates a straight line. This is particularly true when the distance between the hinge 160 and supporting rod 132 is increased in relation to the length of the supporting rod 132. The principal modification of the operation of the modified valve 124 is that the action of the hinge 160 stabilizes the path of the plug 126 so that the plug 126 will not be easily deflected and bent in an undesirable manner.

In the modification of the automatic drain valve shown in FIGURE 3, the reference numerals designating parts which are substantially similar to those described in FIGURE 1 have been retained and increased by 200. The modified automatic drain valve, generally designated 224, has a retarder 270 connected to the lower arm 272 of a torsion spring 274 coiled around a hinge pin 276 mounted upon a hinge bracket 278 of a hinge, generally designated 280. The upper arm 282 of the torsion spring 274 is anchored to and engages the hinge bracket 278 as a spring abutment. The torsion spring 274 replaces the compression spring 30 of the valve 24, and accordingly, the nut 42 and spring abutment 34 are omitted in the valve 224 and the supporting rod 232 is consequently shortened.

In the operation of the automatic drain valve 224, the torsion spring 274 acts to press the retarder 270 toward the transom 214 and accordingly to hold the plug 226 in place in the hole 216. The action of the water as described above, in pushing the retarder 270 away from the transom 214 overcomes the force of the torsion spring 274, and allows the plug 226 to be released from the hole 216 until the action of the water ceases.

What I claim is:

1. An automatic bilge water draining device for insertion in a hole in the lower rear portion of a boat hull, said device comprising an annular drain valve seat member adapted to be inserted in alignment with the hole in the boat hull; a drain valve member mounted adjacent the rearward end of said valve seat member and movable into and out of closing relationship therewith, a retarder element disposed rearwardly of said valve member and operatively connected thereto, said retarder element having a portion thereof adapted to project beyond the boat hull into the path of the water passing thereby, means for supporting said valve member for motion into

4

and out of closing relationship with said valve seat member, and a resilient element operatively connected to said valve member and normally urging said valve member into closing relationship with said valve seat member, said supporting means including a guide member disposed adjacent said valve seat member and a guided member connected to said valve member and slidably engaging said guide member for guided motion relatively thereto.

2. An automatic bilge water draining device, according to claim 1, wherein the guide member is mounted inwardly of said valve seat member and wherein said guided member comprises an elongated rod slidably engaging said guide member and yieldingly engaged by said resilient element.

3. An automatic bilge water draining device, according to claim 2, wherein the guide member has a water passageway therethrough and also has a guide bore, and wherein said elongated rod slidably engages said guide bore.

4. An automatic bilge water draining device, according to claim 3, wherein said resilient element comprises a spring having one end abuttingly engaging said guide member and having its other end yieldingly engaging said guided member.

5. An automatic bilge water draining device, according to claim 1, wherein said supporting means includes a bracket adapted to be fastened to the boat hull adjacent the hole therein and a valve member carrier pivotally mounted on said bracket for swinging motion toward and away from the outer end of said valve seat member, said valve member being mounted on said carrier and swinging therewith into and out of closing engagement with said valve seat member.

6. An automatic bilge water draining device, according to claim 5, wherein said retarder is connected to the lower end of said valve member carrier below said valve member.

7. An automatic bilge water draining device for insertion in a hole in the lower rear portion of a boat hull, said device comprising an annular drain valve seat member adapted to be inserted in alignment with the hole in the boat hull; a drain valve member mounted adjacent the rearward end of said valve seat member and movable into and out of closing relationship therewith, a retarder element disposed rearwardly of said valve member and operatively connected thereto, said retarder element having a portion thereof adapted to project beyond the boat hull into the path of the water passing thereby, means for supporting said valve member for motion into and out of closing relationship with said valve seat member, and a resilient element operatively connected to said valve member and normally urging said valve member into closing relationship with said valve seat member, said retarder element being approximately plate-shaped and having a portion thereof projecting below said valve seat and adapted to project beyond the boat hull into the path of the water passing thereby.

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