Nov. 15, 1966 W. L. BLACKBURN 3,285,572

DECK BUTTON

Filed June 28, 1965

Fig. 1

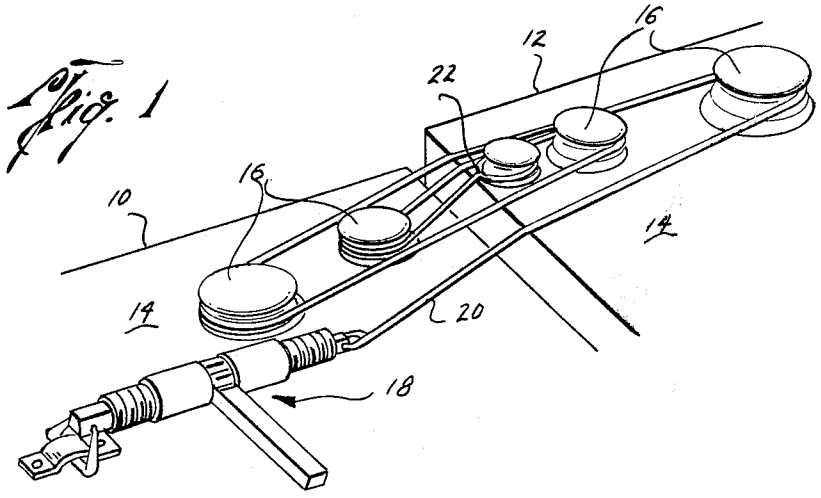


Fig. 2

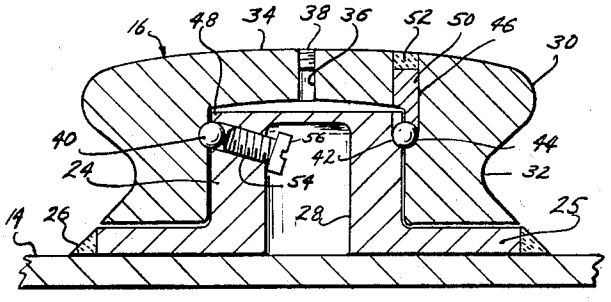
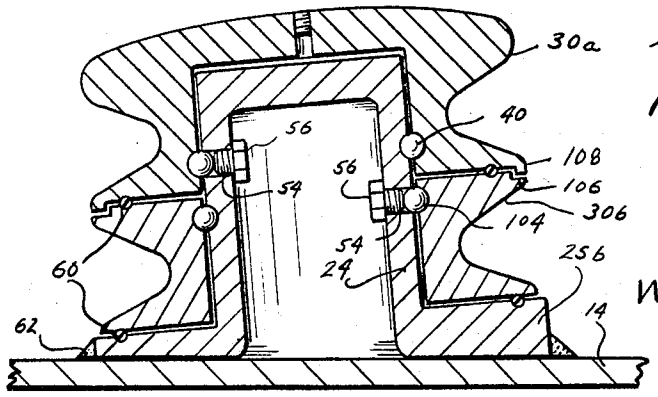


Fig. 3



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DECK BUTTON

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This invention constitutes a continuation-in-part of my co-pending application entitled Anti-Friction Rotatable Button, Serial No. 259,922, filed February 20, 1963, which is in turn a continuation-in-part of my application entitled Rotatable Button for Barges and the Like, Serial No. 123,206, filed July 11, 1961, both now abandoned.

The present invention relates to an improved button which is rotatable and includes retainer and thrust bearings, and is particularly suited for attachment to the deck of a barge or the like, as a deck fitting for rigging barges and two boats together, and a method of locking such a button.

Prior devices of this general nature, which are variously called chocks, cheek blocks, bitts, bollards, mooring posts, or spools, have been suggested which utilize spindles and pulleys about which wire rope or cable is passed when rigging together and guiding the movement of barges or other vessels. These prior devices have generally consisted of a rod-like spindle which is bolted to the deck and about which is rotatably mounted a pulley or grooved wheel. Due to their manner of construction, these prior devices have not been utilized when tying trains of barges together, for they have all been inherently incapable of withstanding the tremendous strain placed thereon when navigating the barges throughout the various inland waterways. The rolling chock, however, has been so utilized, and is capable of handling the strain involved because not only is the bottom of the spindle attached to the deck, but also the top of the spindle by an appropriate overlying arm. The very presence of this arm limits the potential of the rolling chock, for to utilize the cable in all directions, it is necessary to manually feed the cable between the arm and the pulley. This, of course, considerably increases the time required to make an appropriate connection.

Further, all of the prior devices have suffered the distinct disadvantage of not being watertight, consequently when a wave passes over the chock, water penetrates to the spindle, causing rust which in turn freezes the rotating pulley and renders the chock no more effective than a simple post welded to the deck.

In view of these factors, present vessels utilize a non-rotatable button which is welded or bolted to the deck, since this button can be made quite strong and is usable in any direction. Further, having no moving parts, there is nothing to freeze. To utilize these buttons, cables are wrapped thereabout and tightened by an appropriate winch or steamboat ratchet. After slack is removed from the cable, considerable friction develops between the button and cable. Therefore, time and energy are wasted in attempting to tighten the cable and induce it to slip freely on the buttons.

The button of the present invention overcomes these objections by providing a hollow tubular spindle of a substantially greater diameter than that heretofore utilized. Further, the spindle is so constructed that it is externally welded to the deck of a vessel, thus assuring that the wire rope or cable will part before the button of the present invention will tear loose from the deck. Rotatably mounted on the tubular spindle, in a manner to be hereinafter described, is at least one pulley suitably

grooved to engage rigging cable. Further, the pulley is so constructed as to eliminate the introduction of trash or debris between the pulley, spindle, and deck. Further, provision is made for positive lubrication of the journal bearing which is included between the spindle and pulley. Additionally, all snagging projections are eliminated by the present invention, and since no arm is used, the button of the present invention is capable of use from all horizontal directions.

Still further, the button of the present invention includes retainer bearings which may be either ball or roller, and so constructed that the pulley will rotate freely on the spindle, and further so constructed that if tying or shock force is applied to the pulley, the retainer bearings will not be damaged. Additionally, provision is made in the present invention to prevent the entrance of water into the bearing area, even when the button is totally submerged, as is often the case in rough weather. Still further, the present invention comprises a button which is tamper free, and thus eliminates one of the more vexing problems facing barge owners whose unsupervised equipment includes valuable accessories. In order to secure these advantages, the present invention is so made that it must be welded to the deck, and may not be removed therefrom without a great deal of effort, typically such as by cutting free with an appropriate cutting torch.

It is, therefore, among the general objects of the present invention to provide a button having each of the enumerated advantages mentioned above and none of the disadvantages associated with prior art structures.

It is a particular object of the present invention to provide a rotatable button capable of standing the tremendous strain encountered when connecting and navigating barges or the like together upon the inland and ocean waterways, and which button includes no snagging projections, a feature of particular benefit during rigging.

Often in rigging trains of barges together it is found that the decks of adjacent barges are at different elevations. Consequently, the rigging cables must lie at an angle with the horizontal. If the upward angle is too great the cable will slip over the usual chock. On the other hand, if the rotatable deck button of the present invention is used, there is considerable strain imposed on the retainer means. To solve this problem, the present invention also provides an optional tapered base so that the forward end of the button is raised upwardly to reduce strain on the retainer.

Yet another object of the present invention is to provide a rotatable button having the foregoing advantages, which may also include two independent pulleys thereon.

A still further object of the present invention is to provide a method for introducing the retainer bearing elements between the pulley and spindle, thereby providing a product heretofore uncontemplated in the barge rigging art.

Other and further objects, features, and advantages will be apparent from the following description of the presently preferred embodiments of the present invention, given for the purpose of disclosure, and taken in conjunction with the accompanying drawings, wherein like character references designate like parts throughout the several views and where:

FIGURE 1 is a partial perspective view showing the button of the present invention when utilized to draw together two barges during rigging.

FIGURE 2 is a sectional side view of an embodiment of the present invention wherein one race of ball bearings is utilized as a retainer, and

FIGURE 3 is a sectional side view of a modified embodiment of the present invention wherein two distinct rotatable pulleys are shown and illustrating the tapered base.

Generally, the present invention comprises a heavy tubular spindle which is welded to the deck plating, and upon which is mounted, by means of retainer bearings, a rotatable pulley in a watertight manner, including several modifications or additions, as well as a method for locking a rotatable deck button to the deck of a barge, or the like.

Referring now to FIGURE 1 wherein a partial perspective view shows the use of the buttons of the present invention, the reference numeral **10** generally designates a first vessel or barge, while the numeral **12** generally represents a second vessel or barge. Mounted on the deck **14** of each barge is the button **16** of the present invention. Suitably attached to the deck **14** of the barge **10** is a cable tightening means, here shown as a steamboat ratchet **18** to which is attached a wire rope or cable **20** which is wound about the buttons **16**, finally terminating in a loop **22**. Thus, it is readily seen that to draw the barges **10** and **12** tightly together, in order to make up a train of barges, it is only necessary to actuate the conventional steamboat ratchet **18**, thus tightening the cable **20**. In this connection, however, it is well to note that if non-rotatable prior art buttons were utilized the friction imposed on the cable **20** in attempting to pull it toward the steamboat ratchet **18** would be considerable, and in some manner must be overcome. This is, of course, one of the objects of the present invention.

FIGURE 1 also illustrates a typical situation wherein barge **10** is loaded and sits lower in the water than barge **12**, which is light. The tendency for the cable **20** to slip over the buttons **16** may be solved, in accordance with the present invention, by tilting the button **16**. This modification is described further hereinafter.

Referring now to FIGURE 2, it is seen that the button **16** generally comprises right cylindrical or tubular spindle **24** having a base **25** with welding flange whose perimeter is solidly welded to the deck **14** as shown by the weld bead **26**. In order to give some idea of the size of the parts involved, the outside diameter of the spindle **24** flange is generally **12** inches or greater. It is to be noted that the spindle **24** includes a hollow core **28** adjacent to the deck **14**, which does not extend through the top of the spindle **24**.

Placed over and sliding upon the spindle **24**, and in rotatable journal bearing relationship therewith, is the pulley **30**. The pulley **30** includes a cable groove **32** which is designed to accommodate the cable **20**, and it is further to be noted that the pulley **30** includes an obstruction-free top **34** whose major diameter is substantially equal to that of the weld bead **26**. Mounted centrally in the top **34** of the pulley **30** is a grease hole **36** into which may be screwed a standard pipe plug **38**, or other conventional grease plugging means.

Placed between the pulley **30** and the spindle **24** is a retainer means such as the series of ball bearings **40**, which fit into a generally semi-circular groove **42** about the upper periphery of the spindle **24** and a similar mating groove **44** within the pulley **30**, thus defining a bearing race. It is to be noted that the row of balls **40** is adjacent to the upper extremity of the spindle **24**, and not in the center or below the bearing area between the pulley **30** and spindle **24**. The reason for this is to prevent the inclusion of rust and debris should the deck with button be submerged.

When a cable **20** is wrapped around the pulley **30** in the groove **32** and the cable is tightened by the steamboat ratchet **18**, or in any other conventional manner, the pulley **30** will rotate about the spindle **24** because of their

fit as a journal bearing. Because of the large size of the journal bearing, the button is able to easily withstand a considerable static and rolling load, as well as a sudden shock lead. The clearance between the grooves **42** and **44** on the spindle **24** and pulley **30** is somewhat larger than the diameter of the ball bearings **40**, so as to insure that no load is transmitted from the pulley **32** through the ball bearings **40** to the spindle **24**. Instead, all horizontal loading is through the sliding journal bearing, thereby preventing deformation of the ball bearings **40**.

Of course, the ball bearings **40** do serve as a retaining means to hold the pulley **30** on the spindle **24** and also as thrust bearings when an upward load is impressed on the pulley. The provision of a rotatable button considerably reduces cable friction, and by actual test has increased make up efficiency by a factor of four. The present invention, therefore, advantageously reduces the friction necessary to draw two vessels together and at the same time provides for severe shock loading.

The ball bearings **40** are inserted into the grooves **42** and **44** between the spindle **24** and pulley **30** from the top **34** of the pulley **30**. This is accomplished by drilling a hole **46** from the top **34** of the pulley **30** to the mating grooves **42** and **44**. It will be noted that this hole **46** must also cut away a portion of the lip **48** which extends about the top of the spindle **24** above its groove **42**. Thereupon, the ball bearings **40** are dropped into the hole **46** and thus fall into the mating grooves **42** and **44** defining the retainer race. Thereupon, the ball bearings **40** are moved out of the way, in a conventional manner, as by rotating the pulley **30** on the spindle **24**, and additional ball bearings **40** are inserted until the retainer race or mating grooves **42** and **44** are substantially filled with ball bearings **40**. Thereupon, to prevent the entrance of debris, and to maintain watertightness, a plug **50** is inserted into the hole **46**. It is preferred that the fit between the plug **50** and hole **46** be an interference fit, although conventional screw threads might be utilized. Placed over the top of the plug **50** and flush with the top **34** of the pulley **30** is a filler **52**.

Yet another method of inserting the ball bearings **40** into the race defined by the grooves **42** and **44** is to drill a horizontal or downwardly inclined hole **54** from the groove **42** in the upper part of the spindle **24** through to the core **28** within the spindle **24**. Whereupon, the individual ball bearings **40** may be pushed from inside the core **28** through the hole **54** into the retainer race defined by the grooves **42** and **44** in a manner similar to that previously described with reference to hole **46**. After the retainer race is substantially filled with ball bearings **40**, the hole **54** is plugged in a conventional manner, as by using the screw **56**.

After the ball bearings **40** have been placed in the race, the rotatable deck button of the present invention is made ready for use simply by welding the bead **26** between the deck plate **14** and the spindle **24**. In this condition, it will be noted that the ball bearings once in place may not be removed, without cutting the button **16** from the deck **14**. Therefore, this manner of construction advantageously results in a tamper-proof rotatable button **16** which may not be removed without considerable difficulty.

The ball bearings **40**, in addition to providing vertical thrust bearings for the rotatable button **16** also provide a method of permanently locking the pulley **30** to the spindle **24**. In other words, it is impossible to remove the pulley **30** from the spindle **24** without shearing the numerous balls **40** in the ball bearing race due to the lip **48**. Furthermore, no snagging projections or obstructions extend from the present invention, and the entire device is mounted above deck.

After the rotatable button has been welded to the deck **14**, the pipe plug **38** is removed from the hole **36** and a conventional grease gun fitted so that the bearing

surface between the pulley **30** and the spindle **24** are filled with grease. Whereupon, the pipe plug **38** is replaced in the top of the pulley **30**. In this condition it will be noted that if the deck **14** is submerged, water cannot enter into the bearing area between the inside of the pulley **30** and the spindle **24**, for in order for the water to enter, any air or grease within the bearing area must be displaced. As the pulley **30** is watertight, there is no exit for the air or grease entrapped therein. Consequently, rotatable deck button in the present invention is watertight. Further, being watertight, there is no method of introducing trash or debris between the pulley **30** and the spindle **24**. Likewise, it is apparent that there are no projections extending from the pulley **30**, and consequently there is no likelihood of snagging the workman or a cable.

Finally, the heavy walled construction of the spindle **24** provides an extremely sturdy button **16** which may not be dismantled nor accidentally removed from the deck **14**, and which will withstand extreme shock loading.

Referring now to FIGURE 3, another embodiment of the present invention is shown with various modifications. In the embodiment of FIGURE 3 it will be noted that there is an upper pulley **30***a* as well as a lower pulley **30***b*. Each of the pulleys is mounted on the spindle **24** in a manner virtually identical to that previously described with reference to FIGURE 2. For example, pulley **30***b* may have the ball bearings **104** inserted in appropriate retainer grooves in a manner identical to that described in FIGURE 1 with reference to the hole **54**.

Around the upper rim of the lower pulley **30***b* is a recess **16**. Mating with this recess **106** on the lower portion of the upper pulley **30***a* is a shoulder **108**. The purpose of this shoulder and recess is to provide further protection against the inadvertent entrance of trash and debris into the journal bearing area between the pulleys **30***a* and **30***b* and the spindle **24**. Of course, a grease seal **60** may be likewise included both between the lower pulley **30***b* and the base **25**, as well as between the two pulleys. After the lower pulley **30***b* has been appropriately placed on the spindle **24**, the upper pulley **30***a* may be placed in a manner similar to that previously shown with reference to FIGURE 1, hole **54**.

Again, it will be noted that the retainer race in each of the pulleys **30***a* and *b* has clearance so that if a shock load is encountered, the pulley **30***a* or *b* will bear directly against the spindle **24** without crushing or deforming the ball bearings.

Comparing FIGURES 1 and 3, it will be noted that the buttons are set at an angle with respect to the deck, and tilt upwardly toward the next barge. The purpose of this tilt is to prevent the cable **20** from slipping off the pulley when one barge is above another. The tilt is provided by using a tapered base **25***b* as a part of spindle **24**, as seen in FIGURE 3. The presently preferred tilt is 5–10°. Of course, this angle is not sufficient to cause any trouble when the two barges **10** and **12** are exactly level, and because the buttons are set back from the edge, the maximum displacement of the cable downwardly, as for instance on barge **12**, is 5–10°.

Of course, the tapered base **25***b* may be substituted for the base **25** in FIGURE 2 and the grease seals **60** similarly used in either modification.

The method of the present invention is felt to be apparent from the foregoing description of the various embodiments. Briefly the method is concerned with the steps involved in locking a pulley on a spindle and the resulting product, a rotatable deck button with retainer bearings. The steps generally include forming a retainer groove or race in both the spindle and pulley, drilling or boring an access hole, inserting bearings through the access hole into the race, plugging the hole, and welding the fitting to the deck, thereby providing a tamper-free rotatable button.

Thus, advantageously, it is seen that the deck button of the present invention has provided an exremely strong structure which may be externally welded to the deck of a vessel, which includes retainer bearings, which is rotatably mounted and usable in all directions, which is water-tight, which includes provisions for lubrication, which eliminates all snagging projections, and which is tamper-free.

Further, the present invention provides a novel method for locking rotatable elements into a deck button for use in rigging barges or the like.

The present invention, therefore, is well adapted to carry out the objects and attain the ends and advantages mentioned, as well as others inherent therein. While presently preferred embodiments of the invention are given for the purpose of disclosure, numerous changes in the details of construction and the combination, shape, size and arrangement of parts and steps may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A rotatable button-type deck fitting including:
- a spindle comprising a right cylindrical upstanding journal bearing with a base extending radially from the bottom thereof,
- said spindle having a core extending from the base to within the journal bearing,
- a retainer recess on the spindle extending about the periphery of the journal bearing,
- a pulley having a smooth top whose diameter is substantially that of the spindle base,
- said pulley including an inset journal bearing providing a sliding fit with the upstanding journal bearing of the spindle,
- a retainer recess in the pulley journal bearing mating with the spindle retainer recess when the pulley is mounted on the spindle, the mating retainer recesses forming a retainer race,
- said pulley including a wire rope groove about its periphery and adjacent the journal bearing,
- either said pulley or spindle having an access hole extending to the retainer race,
- rotatable retainer means insertable through said access hole and rollable in said retainer race,
- a plug insertable in said access hole,
- a second pulley mounted beneath said first mentioned pulley,
- said second pulley having a diameter substantially that of the spindle base,
- said second pulley including a journal bearing providing a sliding fit with the upstanding journal bearing of the spindle,
- a second retainer recess on the spindle journal bearing,
- a second retainer recess in the second pulley journal bearing mating with the second spindle retainer recess when the second pulley is mounted on the spindle, the mating second retainer recesses forming a second retainer race,
- said second pulley including a wire rope groove about its periphery and adjacent the journal bearing,
- said second pulley having an access hole extending from the core to the second retainer race,
- second rotatable retainer means insertable through said second access hole and rollable in said second retainer race, and
- a second plug insertable in said second access hole,
- thereby providing a double deck button with rotatable pulleys.

2. The invention of claim **1** wherein the bottom of the base is tapered with respect to the journal bearing.

3. The invention of claim **1** including:
- a recess extending about the upper outer diameter of the second pulley, and

a shoulder extending below the lower outer diameter of the first mentioned pulley and mating with the recess extending about the upper outer diameter of the second pulley.

4. The invention of claim 3 including grease seals mounted between the two pulleys and between the second pulley and the base.

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