No. 654,882. Patented July 31, 1900.

H. S. DURAND & R. K. McLELLAN.

STUFFING BOX.

(Application filed Oct. 13, 1899. Renewed May 19, 1900.)

(No Model.)

Fig. 3.

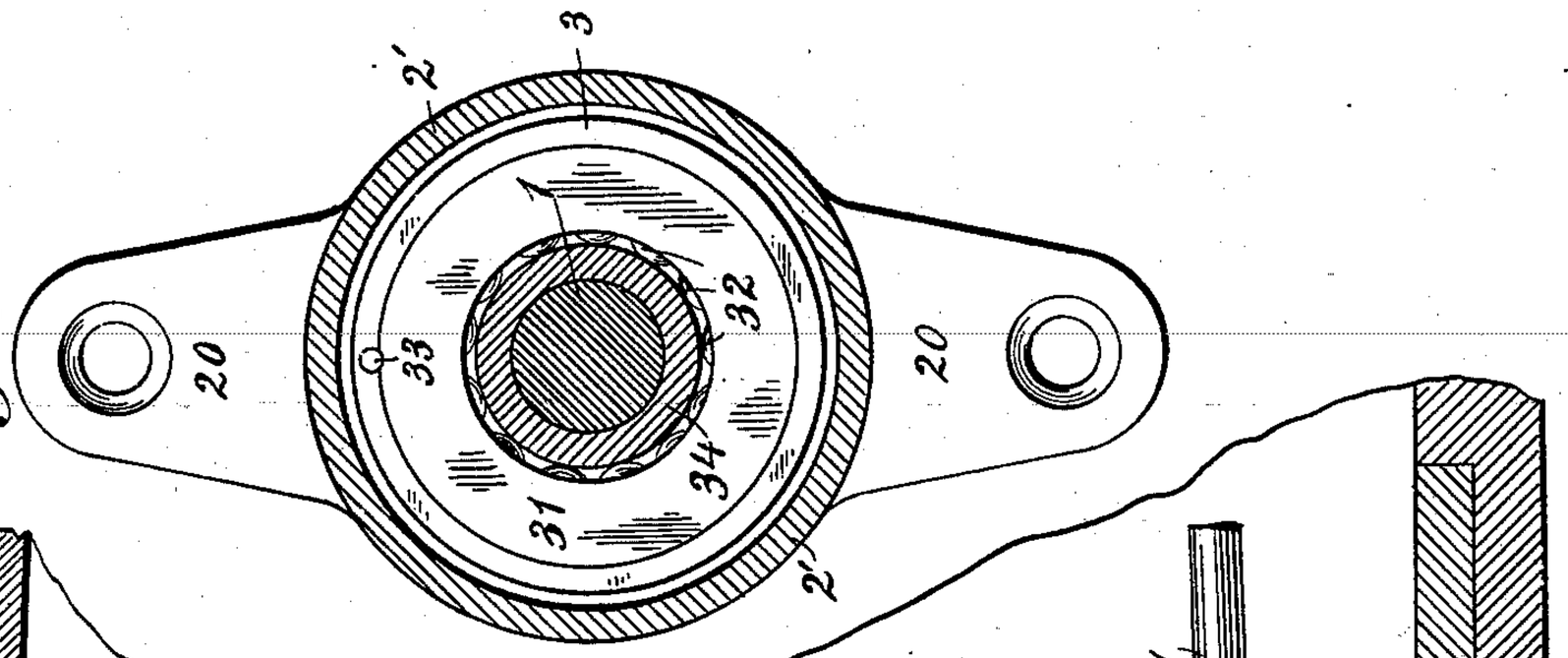


Fig. 1.

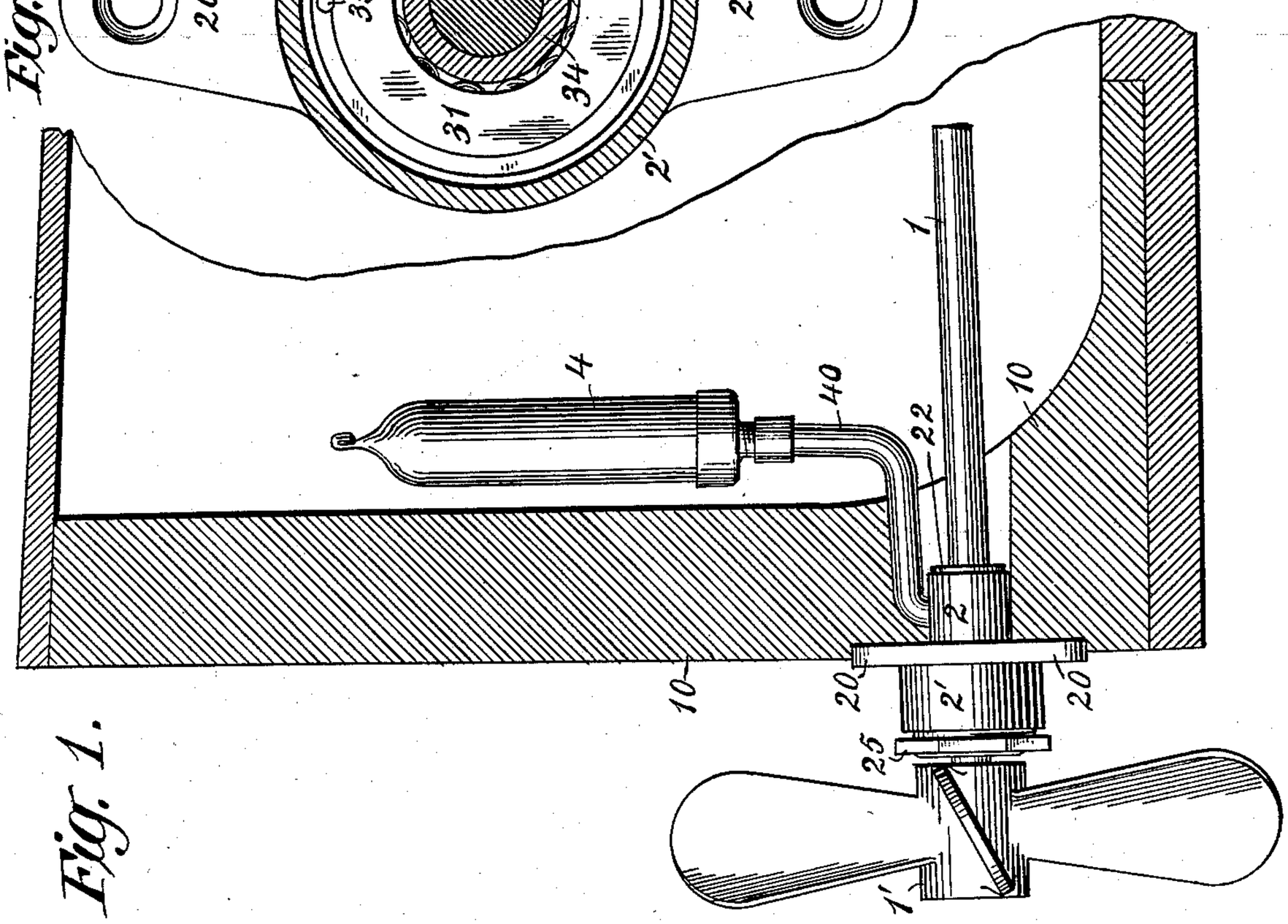
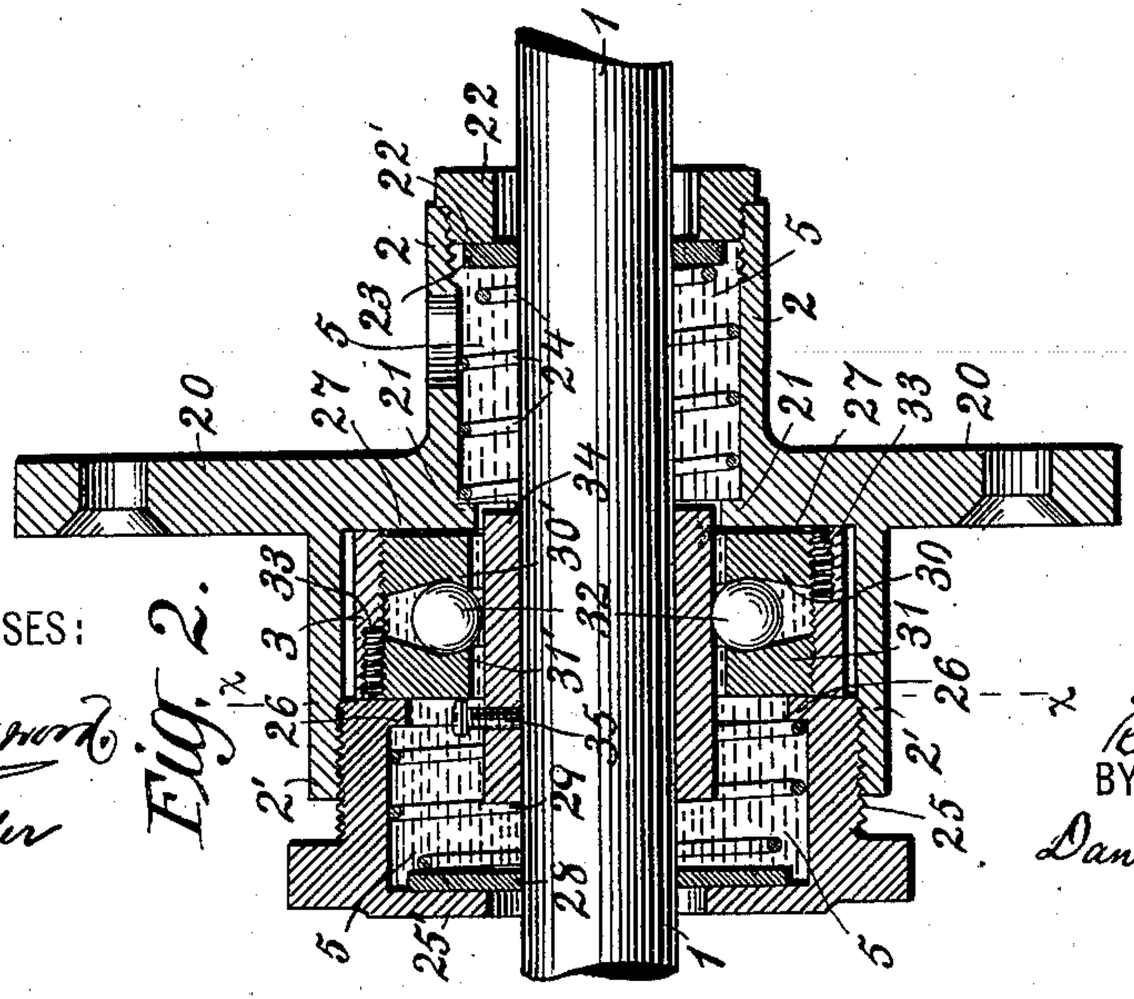


Fig. 2.



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STUFFING-BOX.

SPECIFICATION forming part of Letters Patent No. 654,882, dated July 31, 1900.

Application filed October 13, 1899. Renewed May 19, 1900. Serial No. 17,295. (No model.)

To all whom it may concern:

Be it known that we, HENRY S. DURAND, residing at Rochester, in the county of Monroe, and ROBERT K. MCLELLAN, residing at New York, borough of Manhattan, county of New York, State of New York, citizens of the United States, have invented a certain new and useful Improvement in Stuffing-Boxes, of which the following is a full, clear, and exact description, reference being made to the accompanying drawings, forming part of this specification.

This invention relates to improvements in stuffing-boxes which are used in connection with rotary shafts, such especially as the shafts of screw-propellers; and the invention consists of a stuffing-box proper provided with a shaft-bearing secured in the body thereof, the combined stuffing-box and bearing being constructed as herein described.

On the accompanying sheet of drawings, Figure 1 is a fragment of a longitudinal and vertical section of a boat to which the invention is applied; Fig. 2, a longitudinal section, on a larger scale, of the stuffing-box surrounding the propeller-shaft; and Fig. 3, a cross-section of the stuffing-box and shaft on the plane *x x*, Fig. 2.

Similar reference-numerals designate like parts in different views.

This invention is intended not only to perform all the useful functions of a common stuffing-box in coöperation with a propeller-shaft, but also to subject the shaft to but comparatively-little friction and to render it easy to relieve the shaft from any unnatural pressure imposed upon it by a slight displacement of the stuffing-box, such as is sometimes caused by a warping of the dead-wood or stern-post of a vessel, and to provide the shaft with an antifriction-bearing on the outside of the vessel close to the propeller, and consequently to render unnecessary the use of a shaft-bearing within the vessel near the stuffing-box.

The invention is shown and described in connection with the shaft of a screw-propeller of a small boat. This boat is propelled by foot-power acting on a motor which imparts motion to the shaft, the motor being that patented in Letters Patent of the United States No. 629,343. Especially in boats of which this is a type are stuffing-boxes embodying the invention manifestly superior to common stuffing-boxes; but they may be used with advantage also in larger vessels comprising propellers driven by engines, as well as in connection with other rotary shafts besides propeller-shafts.

The propeller-shaft 1, carrying the propeller 1′, is supported by two bearings, one being the bearing within the stuffing-box and the other being adjacent to the motor at the front end of the shaft.

The body of the stuffing-box comprises the parts 2 and 2′, and on it are ears 20, by which it is fastened to the dead-wood 10, the smaller part 2 of the body being in a hole in the dead-wood. The interior diameter of the part 2 is considerably greater than the diameter of the shaft, and at the rear end of the part 2 is an internal shoulder 21. At the front end of this part is a hollow screw-plug 22, which loosely surrounds the shaft and forms a shoulder 22′ within the part 2. Next to this shoulder is a ring 23, of Babbitt metal or similar material, closely fitting the shaft, but not being tight thereon and being smaller in diameter than the interior of the part 2. This ring is held against the inner end of the plug 22 or the shoulder 22′ by a coil-spring 24, which loosely surrounds the shaft, the rear coil of the spring resting against the shoulder 21. In place of the ring 23 there might be a group of rings composed of two or more rings 23 and a ring or rings of felt alternating therewith. A hollow screw-plug 25 fits in and engages with the part 2′ of the body. The perforated head 25′ of this screw-plug loosely surrounds the shaft, and the stem of the plug has an internal annular projection 26 formed on it next to its front end. The parts 2 and 2′ are united by an annular section, which forms an internal shoulder 27 at the front end of the part 2′. The screw-plug 25 contains a ring 28, of Babbitt metal or similar material, which fits the shaft closely, but is not tight thereon, and whose diameter is less than the interior diameter of the stem of the plug. This ring is kept in contact with the inner surface of the head 25′ of the plug by a coil-spring 29, loosely surrounding the shaft and making contact at

its front end with the projection 26. A group of rings composed of two or more rings 28 and a ring or rings of felt alternating therewith might be substituted for the ring 28.

The shaft-bearing is composed of a single ring of balls confined between two bearing-rings secured in a case. The diameter of the case 3 is somewhat less that the interior diameter of the part 2′ of the body of the stuffing-box. The bearing-rings 30 and 31 contain grooves which together form the ball-channel in which the balls 32 are confined behind and between the retaining-lips 30′ and 31′. Preferably both of these rings are screwed into the case 3 and locked therein by the means about to be described, so as to enable them both to be readily removed from the case; but one of them might be tightly pressed into the case or be otherwise permanently fastened therein. The means for locking one or both of the rings in the case consists of a screw 33, contained mainly in a threaded hole in the case 3, but engaging also with the thread of the bearing-ring, as appears by Fig. 2. The bearing-ring is locked in the case by driving the screw 33 tightly against the bottom of the threaded hole, that causing the thread of the screw to press firmly against the thread of the ring and keep the ring from turning. The bearing-ring is unlocked by loosening the screw 33, and it may be turned in either direction to adjust it without taking the screw out of the case. The bearing is confined in the stuffing-box at the front end of the part 2′, the case 3 of the bearing being clamped between the shoulder 27 and the front end of the screw-plug 25. The reaction of the case 3 on the screw-plug locks the plug in the body of the stuffing-box. On the shaft is a hardened-steel sleeve 34, which extends through and bears upon the ring of balls and which is detachably affixed to the shaft either by a set-screw 35 or a similar fastening.

The interior of the body of the stuffing-box is connected with a reservoir 4 by a pipe 40, the reservoir shown being a collapsible tube, for which, however, a reservoir of another form might be substituted. The filling of the stuffing-box is a semifluid waterproof grease 5, and it is forced into the stuffing-box from the reservoir through the pipe 40, as much filling as the box will hold being forced into it by compressing the collapsible tube. The rings 23 and 28 at the ends of the body prevent the filling from working out of the ends of the stuffing-box, except possibly to a slight extent, although it may be slowly driven out by continuing to compress the tube 4. By occasionally forcing fresh filling into the body until a small quantity issues from its ends the stuffing-box is kept properly supplied and deterioration of the filling is prevented. The filling not only excludes water from the stuffing-box, but it also lubricates the shaft-bearing. The friction to which the shaft is normally subjected by this stuffing-box is but little more than that which is generated in the antifriction-bearing alone, there being only a light pressure exerted on the shaft by the rings 23 and 28 and on the shaft and sleeve 34 by the semifluid filling. If the dead-wood warps and displaces the stuffing-box slightly, either the stuffing-box does not bind the shaft, or, if it does, usually the trouble thus caused may be easily and quickly remedied. The displacement of the stuffing-box does not destroy either the contact between the shoulder 22′ and the ring 23 or that between the head of the plug 25 and the ring 28; but each contact changes, the shoulder and head of the plug sliding a little on the rings and the rings tipping a little on the shaft, the mobile or displaceable filling not offering any appreciable resistance to this action. A displacement of the stuffing-box sometimes will not and sometimes will cause the bearing to bind the shaft. Inasmuch as the bearing comprises only a single ring of balls, the shaft will turn freely therein even if the axis of the shaft does not quite coincide with that of the bearing, provided the axes nearly coincide and intersect each other in the plane containing the centers of the balls. If then the bearing binds the shaft, probably the axes of the bearing and shaft neither coincide nor thus intersect each other, and the trouble can usually be remedied by loosening the screw-plug 25, whereupon the bearing assumes a natural position with respect to the body of the stuffing-box and shaft, the chamber in which the bearing is confined being larger than the bearing-case, and afterward clamping the bearing again in the body by tightening the screw-plug.

This stuffing-box and bearing might be used for a common shaft-bearing, and although the stuffing-box proper would not then perform the function of excluding water from the interior of a vessel, yet that use of the device is to be deemed a use of the invention.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A stuffing-box comprising: a hollow body; rings making a continuous changeable contact with surfaces at the ends of the body; and a shaft-bearing secured in the body between the rings; substantially as described.

2. A stuffing-box comprising: a hollow body; a shaft-bearing secured in the body; and a displaceable filling surrounding the shaft between the shaft-bearing and each end of the body; substantially as described.

3. A stuffing-box comprising: a hollow body; rings making a continuous changeable contact with surfaces at the ends of the body; a shaft-bearing secured in the body between the rings; and a displaceable filling confined between the rings and extending between the shaft-bearing and the rings; substantially as described.

4. A stuffing-box comprising: a hollow body; rings making a continuous changeable

contact with surfaces at the ends of the body; a semifluid filling confined in the body; and a shaft-bearing comprising a ring of balls immersed in the filling; substantially as described.

5. A stuffing-box comprising: a hollow body; rings making a continuous changeable contact at the ends of the body with internal annular surfaces, larger in diameter than the rings; and a shaft-bearing secured in the body between the rings; substantially as described.

6. A stuffing-box comprising: a hollow body; rings making a continuous changeable contact at the ends of the body with internal annular surfaces, larger in diameter than the rings; a shaft-bearing secured in the body between the rings; and a displaceable filling surrounding the shaft between the bearing and the rings; substantially as described.

7. A stuffing-box comprising: a hollow body; rings making a continuous changeable contact with surfaces at the ends of the body; a shaft-bearing in the body, movable in directions transverse to the axes of the body and bearing; and means for securing the bearing in different positions in the body; substantially as described.

8. A stuffing-box comprising: a hollow body; rings making a continuous changeable contact with surfaces at the ends of the body; and a shaft-bearing secured in the body between the rings, the bearing being a ball-bearing having only a single row of balls; substantially as described.

9. A stuffing-box comprising: a hollow body; rings making a continuous changeable contact with surfaces at the ends of the body; and a shaft-bearing secured in the body between the rings, the bearing being composed of a case, bearing-rings fixed in the case and forming a ball-channel, and a single ring of balls in the ball-channel; substantially as described.

10. A stuffing-box comprising: a hollow body; rings making a continuous changeable contact with surfaces at the ends of the body; a shaft-bearing in the body, movable in directions transverse to the axes of the body and bearing, and being composed of a case, bearing-rings fixed in the case and forming a ball-channel, and a single ring of balls in the ball-channel; and means for securing the bearing in different positions in the body; substantially as described.

11. A stuffing-box comprising: a hollow body having the parts 2 and 2′, and provided with an internal shoulder 27 at the inner end of the part 2′, and with a screw-plug 25 extending into the part 2′; rings making a continuous changeable contact with the head of the screw-plug 25 and a surface at the front end of the part 2; and a shaft-bearing which is inserted in the part 2′ and clamped therein against the shoulder 27 with the screw-plug 25; substantially as described.

12. A stuffing-box comprising: a hollow body having the parts 2 and 2′, and provided with an internal shoulder 27 at the inner end of the part 2′, and with a screw-plug 25 extending into the part 2′; rings making a continuous changeable contact with the head of the screw-plug 25 and a surface at the front end of the part 2; and a shaft-bearing which is inserted in the part 2′ and clamped therein against the shoulder 27 with the screw-plug 25, the bearing being movable in the body in directions transverse to the axes of the bearing and body, and fixable in different positions between the screw-plug and shoulder; substantially as described.

13. A stuffing-box comprising: a hollow body having the parts 2 and 2′, and provided with internal shoulders 21 and 27 at the inner ends of the parts 2 and 2′ respectively, and with screw-plugs 22 and 25 extending into the parts 2 and 2′ respectively, the plug 25 having an internal annular projection 26; a ring 23, smaller in diameter than the interior of the part 2, and a ring 28, smaller in diameter than the interior of the screw-plug 25, the ring 23 making contact with the end 22′ of the plug 22, and the ring 28 making contact with the inside of the head of the plug 25; a coil-spring bearing against the ring 23 and shoulder 21, and a coil-spring bearing against the ring 28 and projection 26; and a shaft-bearing which is inserted in the part 2′ of the body and clamped therein against the shoulder 27 with the screw-plug 25; substantially as described.

14. In a stuffing-box or other device comprising a ball-bearing, the combination of: a bearing-case; a screw 33 extending into a threaded hole in the case; bearing-rings in the case, one of the rings being threaded and engaging with a thread in the case and with that of the screw 33; and a ring of balls between the bearing-rings; substantially as described.

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In presence of—
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WM. J. HANDOVER.