No. 654,881. Patented July 31, 1900.

H. S. DURAND.

STUFFING BOX.

(Application filed Aug. 17, 1899.)

(No Model.)

Fig. 3.

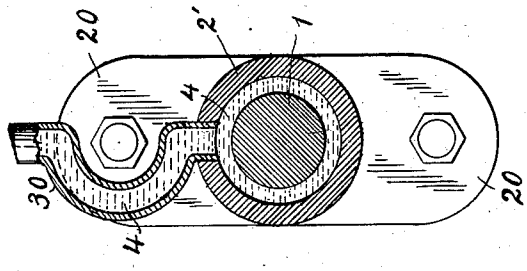


Fig. 1.

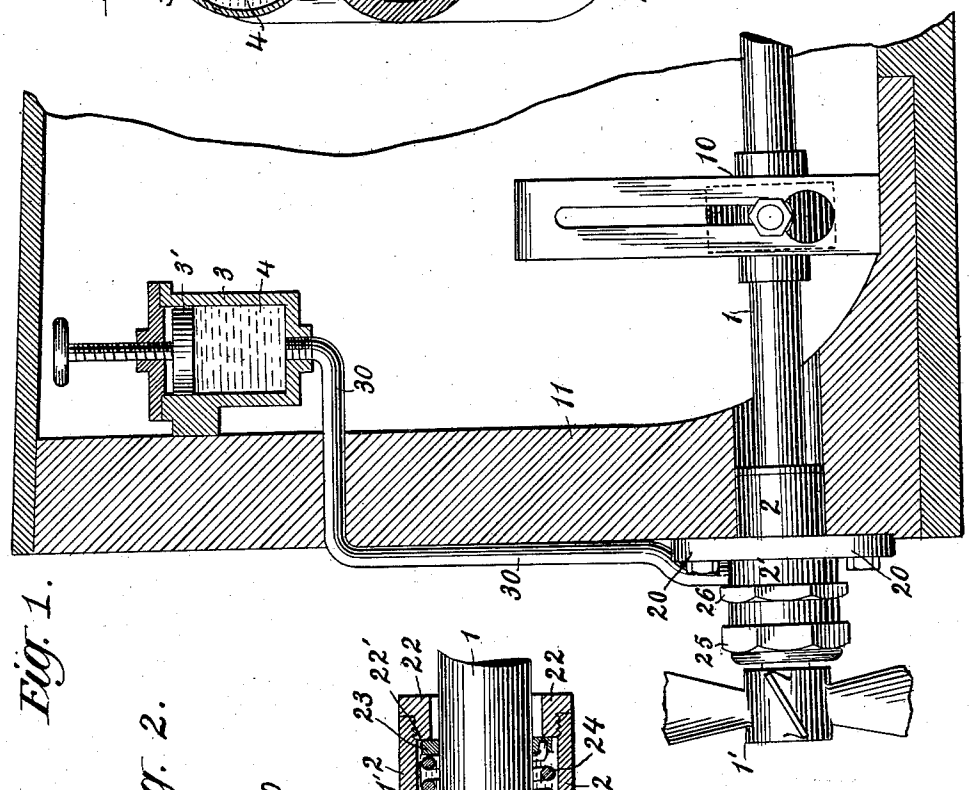
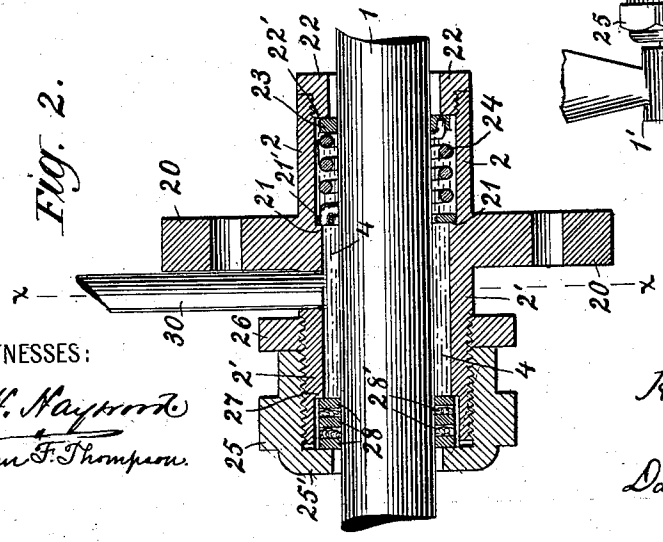


Fig. 2.



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HENRY S. DURAND, OF ROCHESTER, NEW YORK.

STUFFING-BOX.

SPECIFICATION forming part of Letters Patent No. 654,881, dated July 31, 1900.

Application filed August 17, 1899. Serial No. 727,563. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. DURAND, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, 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 the construction of stuffing-boxes and in the character of the packing or filling used therein; and the invention consists of the stuffing-box which is herein described and particularly defined in the claims.

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; and Fig. 3, a cross-section thereof in the plane x x, Fig. 2.

Similar reference-numerals designate like parts in the different views.

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 a common stuffing-box even under the best conditions subjects the shaft to friction which is excessive with respect to the power, and it often binds the shaft hard in consequence of the displacement of the stuffing-box by the warping of the dead-wood, and only with much trouble can be restored to its proper relation to the shaft. For these reasons the use of a common stuffing-box in such boats is unsatisfactory.

The main object of this invention is to provide such boats with an appropriate stuffing-box capable of allowing the shaft to turn therein with but comparatively little friction, and comprising means for relieving the shaft from any unnatural pressure imposed upon it by a slight displacement of the stuffing-box; but stuffing-boxes embodying the invention may be used with advantage also in larger vessels comprising propellers driven by engines as well as in connection with other shafts besides propeller-shafts.

The propeller-shaft 1, carrying the screw-propeller 1′, is supported by two bearings within the boat, one of these being a bearing near the dead-wood 11 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, the part 2 of the body being in a hole in the dead-wood. The interior diameter of the part 2 is greater than that of the part 2′ and both are considerably greater than the diameter of the shaft, and at the rear end of the part 2 is an internal shoulder 21, next to which is a ring 21′, which loosely surrounds the shaft, but fits tightly in the part 2. At the front end of this part is a hollow screw-plug 22, which loosely surrounds this shaft and forms a shoulder 22′ within the part 2. Next to this shoulder is a collar 23, of Babbitt metal or similar material, closely fitting the shaft, but not being tight on the shaft, and being smaller in diameter than the interior of the part 2. This loose-fitting shaft-collar is held against the inner end of the plug 22 or the shoulder 22′ by a coil-spring 24, the rear coil of the spring resting against the ring 21′. The coil-spring loosely surrounds the shaft and the wire of the spring is bent near each end, and the ends of the wire extend into holes in the ring and collar, so that the spring tends to keep the collar from turning with the shaft, the ring 21′ being, as above stated, tight in the part 2. The main office of the ring 21′ is to afford a broad surface next to the rear end of the spring, but the spring might rest against the shoulder 21 or a similar but somewhat broader shoulder, instead of against the ring 21′.

On the rear end of the part 2′ is a screw-cap 25, and next to this on the part 2′ is a check-nut 26. The perforated head 25′ of the screw-cap loosely surrounds the shaft. Within the screw-cap is a shoulder 27, formed in the part 2′, although it might be the rear end of that part, and between this shoulder and the head of the cap are collars 28, of Babbitt metal or similar material, and rings 28′, of felt, each of the felt rings being between two of the collars. These collars and rings

fit the shaft closely, but are not tight thereon, and their diameter is less than that of the recess in which they are confined. They are preferably clamped together tightly enough between the head of the screw-cap and the shoulder 27 to so compress the felt rings as to render their inner edges firm and secure their continuous contact with the shaft.

In place of the collar 23 above mentioned there might be a group of collars and felt rings such as the collars and rings 28 and 28′.

The interior of the body of the stuffing-box is connected with a reservoir 3 by a pipe 30, the reservoir being in the boat and the pipe extending from the reservoir through the dead-wood to the outer part 2′ of the stuffing-box. This reservoir is essentially a cylinder containing a screw-piston 3′. The filling is a viscous waterproof grease 4, and it is forced into the stuffing-box from the reservoir through the pipe 30. It fills all the space within the body of the stuffing-box between the collar 23 and those at the other end of the body except that occupied by the shaft, the ring 21, and the spring 24, its viscosity being such that the collar 23 and group of collars and felt rings 28 and 28′ prevent it from working out of the ends of the stuffing-box, except possibly to a very slight extent, although it may be slowly forced out around the shaft by depressing the piston 3′. 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; but instead of the reservoir shown a collapsible tube or some other means for holding the grease and forcing it into the stuffing-box might be adopted.

The friction to which the shaft is normally subjected by this stuffing-box, it being merely that due to the light pressure exerted on the shaft by the felt rings and the semifluid filling, consumes but a very small percentage of the power, and if the dead-wood warps and displaces the stuffing-box slightly either the stuffing-box does not bind the shaft or if it does the trouble thus caused may be easily and quickly remedied. The displacement of the stuffing-box changes but does not destroy the contact between the shoulder 22′ and the collar 23, the shoulder sliding a little on the collar and the collar tipping a little on the shaft by turning on an axis transverse to that of the shaft, the displaceable viscous filling not offering any appreciable resistance to this action, and if the collars and rings 28 and 28′ are not tightly clamped between the head of the screw-cap and the shoulder 27 then the displacement of the stuffing-box effects a similar change in the contact of the head 25 with the collar next to it, the head sliding on the collar and the collars and rings of the group sliding on each other and tipping on the shaft, but remaining with their faces in close contact with one another. If the collars and rings 28 and 28′ are clamped between the head of the screw-cap and the shoulder, then the displacement of the stuffing-box is apt to make the collars bind the shaft; but by loosening the screw-cap they will be allowed to assume natural positions with respect to the body of the stuffing-box and the shaft, whereupon they will cease to bind the shaft and then may be again clamped in the body. Clamping the collars in the body, as described, helps to render the shaft steady by providing it with a guide or supplemental bearing close to the propeller.

The collars and rings 28 and 28′ are preferred to a single collar, which might be substituted for them, because the felt rings help materially to render the joint tight, while they exert but little pressure on the shaft. This group of collars and rings might be held in contact with the head of the cap 25 by a spring similar to the spring 24, and the collar 23 might be confined between a shoulder within the body, near the hollow screw-plug and the inner end of the plug, without the aid of a spring.

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

1. A stuffing-box comprising: a hollow body; shaft-collars making a continuous changeable contact with surfaces at both ends of the body, each of the collars being movable on the shaft on an axis transverse to that of the shaft; and a displaceable filling confined in the body between the collars; substantially as described.

2. A stuffing-box comprising: a hollow body; shaft-collars making a continuous changeable contact with surfaces at both ends of the body, each of the collars being movable on the shaft on an axis transverse to that of the shaft; means for keeping said collars in contact with said surfaces; and a displaceable filling confined in the body between the collars; substantially as described.

3. A stuffing-box comprising: a hollow body having internal annular surfaces at its ends; and two or more shaft-collars, each being movable on the shaft on an axis transverse to that of the shaft, and two of said collars making a continuous changeable contact with said internal annular surfaces at the ends of the body; substantially as described.

4. A stuffing-box comprising: a hollow body having internal annular surfaces at right angles to its axis; a group of two or more shaft-collars interposed between said surfaces, each of said collars being movable on the shaft on an axis transverse to that of the shaft; and means for clamping the group of collars between said surfaces; substantially as described.

5. A stuffing-box comprising: a hollow body having a single internal annular surface at one end and a pair of internal annular surfaces near the other end; a shaft-collar making contact with said single annular surface, and a group of shaft-collars interposed within said pair of annular surfaces, each of said

collars being movable on the shaft on an axis transverse to that of the shaft; and means for clamping the group of collars within said pair of surfaces; substantially as described.

6. A stuffing-box comprising: a hollow body including the screw-plug 22 and screw-cap 25 and the internal annular shoulder 27; a shaft-collar 23 smallar in diameter than the interior of the body adjacent to the screw-plug 22, said collar making contact with said screw-plug; and a group of shaft-collars and felt rings 28 and 28′, smaller in diameter than the interior of the body adjacent to the head of the screw-cap 25, said group of collars and rings being interposed between the head 25′ of the screw-cap and the shoulder 27; substantially as described.

7. A stuffing-box comprising: a hollow body including the screw-plug 22 and screw-cap 25 and internal annular shoulders 21 and 27; a shaft-collar 23 smaller in diameter than the interior of the body adjacent to the screw-plug 22, said collar making contact with said screw-plug; a spring 24 between said collar and the shoulder 21; and a group of shaft-collars and felt rings 28 and 28′, smaller in diameter than the interior of the body adjacent to the head of the screw-cap 25, said group of collars and rings being interposed between the head 25′ of the screw-cap and the shoulder 27; substantially as described.

8. A stuffing-box comprising: a hollow body, containing surfaces that loosely surround the shaft; and a filling consisting of a viscous fluid interposed between said surfaces and extending around the shaft in contact with the shaft, its viscosity being great enough to prevent its escape from between said surfaces; substantially as described.

9. A stuffing-box comprising: a hollow body; loose-fitting shaft-collars at the ends of the body; and a filling, consisting of a viscous fluid, confined in the body between the collars; substantially as described.

10. A stuffing-box comprising: a hollow body; loose-fitting shaft-collars making a continuous changeable contact with surfaces at the ends of the body; and a filling consisting of a viscous fluid, confined in the body between the collars; substantially as described.

11. A stuffing-box comprising: a hollow body having internal annular surfaces at its ends; loose-fitting shaft-collars making contact with said annular surfaces; and a filling, consisting of a viscous fluid, confined in the body between the collars; substantially as described.

12. A stuffing-box comprising: a hollow body having internal annular surfaces at its ends; loose-fitting shaft-collars making contact with said annular surfaces; means for keeping the collars in contact with said surfaces; and a filling, consisting of a viscous fluid, confined in the body between the collars; substantially as described.

13. A stuffing-box comprising: a hollow body; shaft-collars making a continuous changeable contact with surfaces at the ends of the body, each of the collars being movable on the shaft on an axis transverse to that of the shaft; and a filling, consisting of a viscous fluid, confined in the body between the collars; substantially as described.

14. A stuffing-box comprising: a hollow body including the screw-plug 22 and screw-cap 25 and the internal annular shoulder 27; a shaft-collar 23 smaller in diameter than the interior of the body adjacent to the screw-plug 22, said collar making contact with said screw-plug; means for keeping said collar in contact with said plug; a group of shaft-collars and felt rings 28 and 28′, smaller in diameter than the interior of the body adjacent to the head of the screw-cap 25, said group of collars and rings being interposed between the head 25′ of the screw-cap and the shoulder 27; and a filling, consisting of a viscous fluid, confined in the body between the collar 23 and the group of collars and rings 28 and 28′; substantially as described.

HENRY S. DURAND.

In presence of—
EDW. L. WATERBURY,
ROBERT K. MCLELLAN.