

FIG. 1.

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FIG. 2.

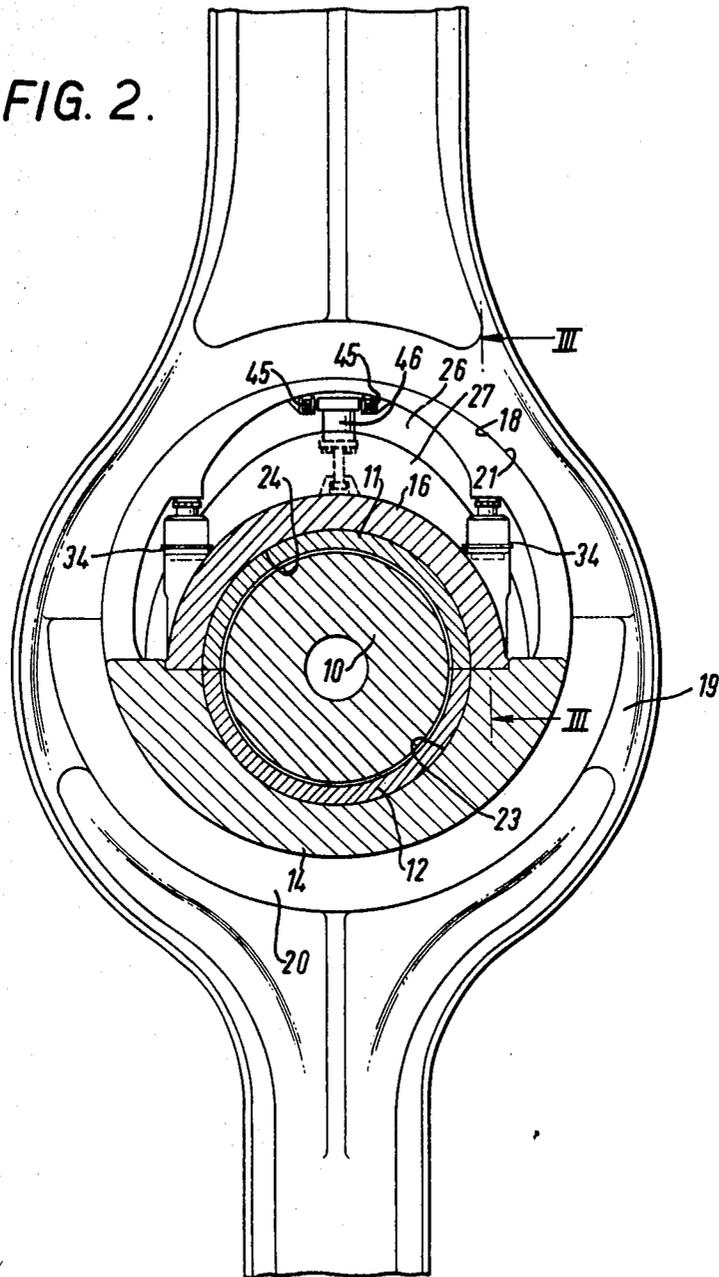


FIG. 3.

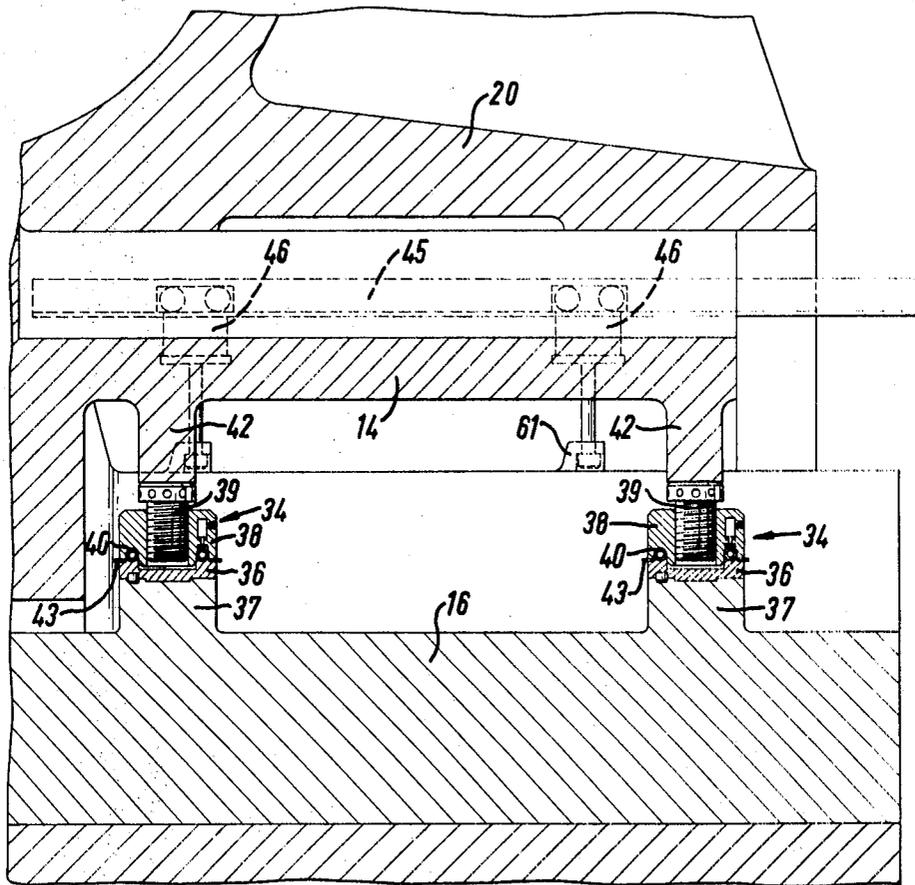


FIG. 4.

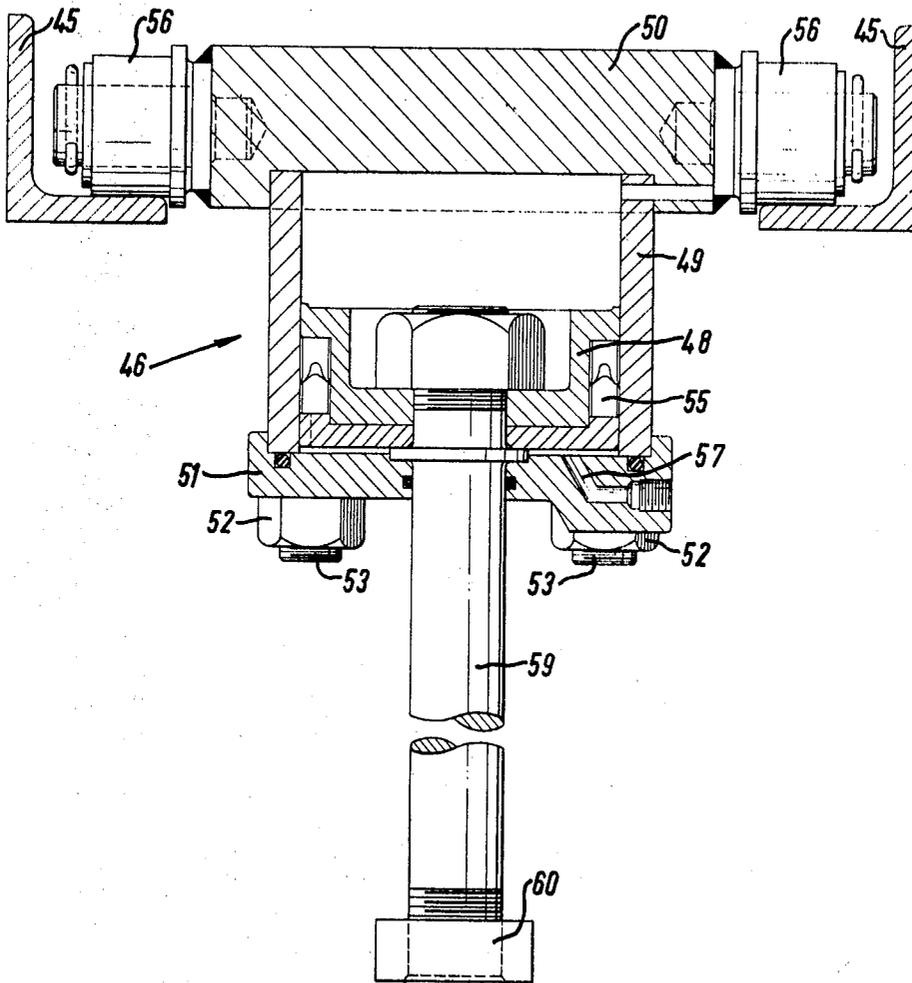
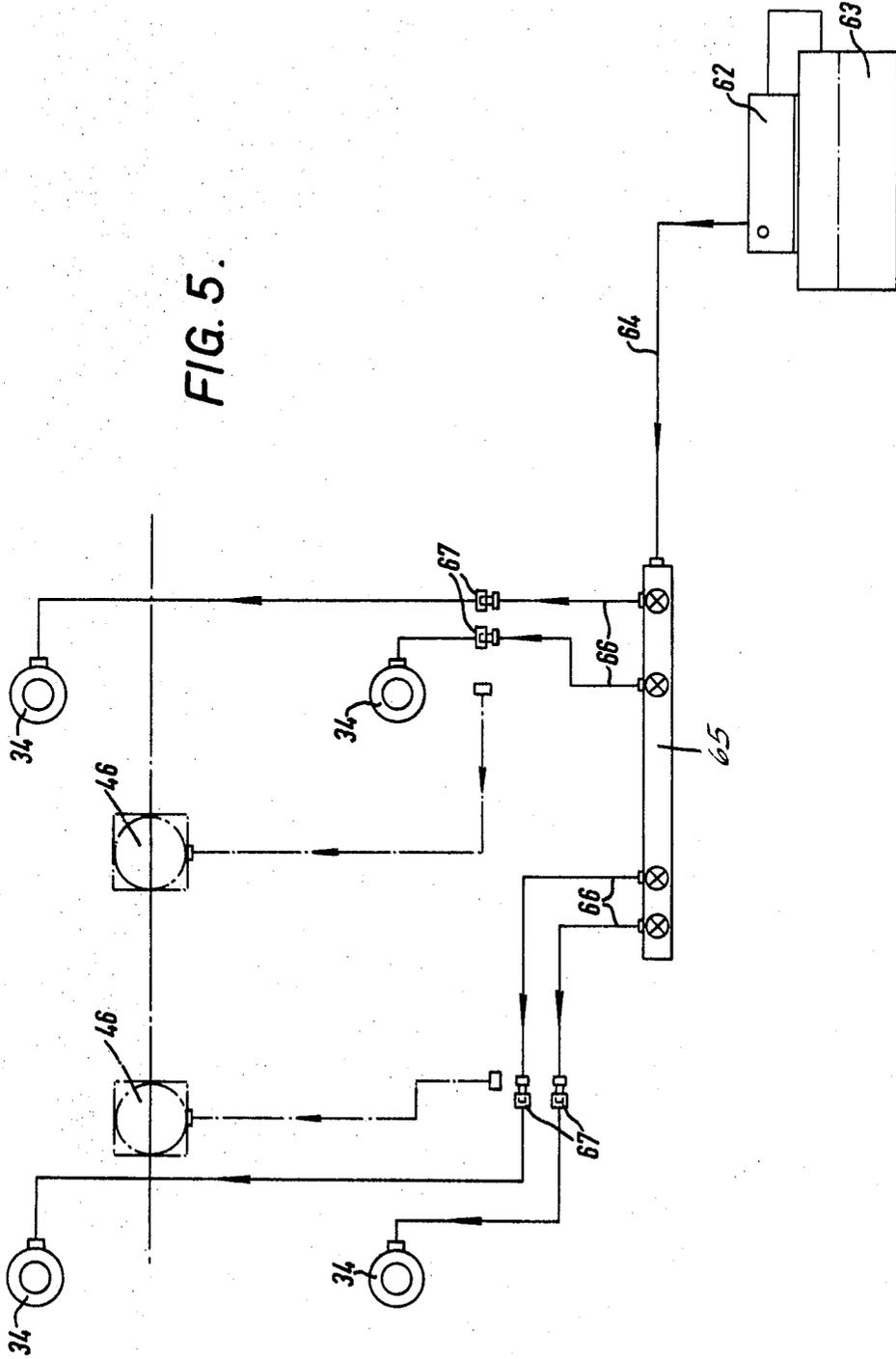


FIG. 5.



## TAIL-SHAFT BEARING ASSEMBLY

The present invention relates to propeller shaft bearing arrangements, to ships provided with such arrangements, and to methods of assembling propeller shaft bearings in ships.

It has previously been proposed to provide a propeller shaft bearing at the stern of a ship which is at least partially removable without disturbance of the shaft to permit inspection of the shaft while the ship is afloat.

It is an object of the present invention to provide an improved propeller shaft bearing arrangement for use at the stern of a ship which likewise allows inspection of the shaft while the ship is afloat and which can be readily provided in the stern of the ship and, if necessary, replaced.

The present invention provides a propeller shaft bearing arrangement for use in a ship, comprising a hollow housing for insertion into an opening in the stern of the ship, the housing being provided with means forming a split bearing, the arrangement being such that when the housing is mounted in the opening with a propeller shaft of the ship supported in the bearing means, the bearing means are releasable to allow inspection of the shaft without removal of the shaft.

The present invention further provides a propeller shaft bearing arrangement in a ship, comprising a housing releasably secured in an opening in the stern of the ship, the housing being provided with means forming a split bearing for supporting a propeller shaft, and the bearing means being releasable to allow inspection of the shaft without removal of the shaft.

The present invention still further provides a method of mounting a propeller shaft bearing assembly in a ship which comprises inserting a housing into an opening in the stern of the ship, releasably securing the housing in the opening, and supporting a propeller shaft of the ship in bearing means which are provided in the housing and which are releasable to allow inspection of the shaft without removal of the shaft.

The invention will be more readily understood from the following description, given by way of example, of the embodiment thereof illustrated in the accompanying drawings wherein:

FIG. 1 shows a broken-away view taken in longitudinal cross section through a tail-shaft bearing arrangement mounted in a stern frame with a propeller boss and shaft shown partly in section;

FIG. 2 shows a view taken in section along the line II-II of FIG. 1;

FIG. 3 shows a broken-away view taken in section along the line III-III of FIG. 2;

FIG. 4 shows a view taken in transverse section through a piston and cylinder device forming part of the bearing arrangement of FIGS. 1 to 3; and

FIG. 5 shows diagrammatically a hydraulic control arrangement.

As shown in the drawings, a flanged tail-shaft 10 is supported in a split bearing having two bearing linings or halves 11 and 12 which are encased in a housing 14 provided with a bearing cap 16.

The housing 14 is mounted in an opening 18 in a stern frame 19, which is formed with a cradle portion 20 in which the housing 14 is seated.

The housing 14 has an outer cylindrical surface 21 of the same radius as the opening 18, and the housing 14 and the bearing cap 16 have inner semicylindrical surfaces 23 and 24 of substantially the same radius as the outer surfaces of the bearing halves 11 and 12.

The housing 14 is formed at its aftermost end with an arcuate inwardly projecting shoulder 26 which is sealed by sealing means to an outwardly projecting semiradial flange 27 on the bearing cap 16 to seal-off lubricating oil flowing from the rear-most ends of the bearing halves 11. The housing 14 also has an outwardly extending flange 28 seated against and sealed to the aftermost end of the cradle portion 20. A mechanical seal 30 is provided around the bearing between the shoulder 26 and flange 28 and a flange 31 on the end of the tail-shaft 10, and a

propeller 32, which may be a controllable pitch propeller, is bolted to the flange 31. A further mechanical seal 33 is provided between the forward ends of the bearing halves 11 and 12 and the tail-shaft 10.

As shown in FIGS. 2 and 3 a pair of hydraulic jacks 34 spaced longitudinally of the bearing extend between the housing 14 and the bearing cap 16 at each side of the longitudinal axis of the bearing. By expansion of the four hydraulic jacks 34, the bearing cap 16 is urged downwardly towards the tail-shaft 10 for securely retaining the bearing half 11.

Each of the hydraulic jacks 34 has a base portion 36 seated on a projection 37 formed on the bearing cap 16, a nut 38 slidable in the base portion 36 and in threaded engagement with a bolt 39, and a hydraulically inflatable ring 40 of resilient material. When the bearing cap 16 is to be secured in position, it is firstly mounted in the position shown in the drawings, and the hydraulic jacks 34 are placed on the projections 37. The bolt 39 of each hydraulic jack 34 is then rotated manually until its top bears against a downward projection 42 on the housing 14 and the rings 40 are subsequently hydraulically inflated to allow the insertion of shims 43 between the nuts 38 and the bottom portions 36 of the jacks 34 as shown in FIG. 3. The hydraulic pressure in the rings 40 is then released.

On the underside of the top of the housing 14 there is provided a track 45 along which run a pair of piston and cylinder devices 46. The of these piston and cylinder devices is to lift the bearing cap 16, after release of the hydraulic jacks 34, so that the piston and cylinder devices 46 can then be run along the track 45 to carry the bearing cap 16 out of the way for inspection of the bearing and the shaft. The shaft can then be inspected as far as the flange 31 without disturbance and removal of the shaft and while the ship is afloat.

FIG. 4 shows one of the piston and cylinder devices 46 in greater detail. As shown in FIG. 4, a piston 48 is slidable in a cylinder 49 which is secured between a trolley block 50 and an end cover 51 by nuts 52 and bolts 53, the piston 48 being provided with a seal 55. The trolley block 50 is supported by four rollers, 56, of which only two are shown in FIG. 4, on the track 45. An inlet passage 57 through which hydraulic fluid is supplied to and exhausted from the cylinder 49 for displacing the piston 48 is formed in the end cover 51, and the piston 48 has a piston rod 59 provided at its lower end with a collar 60 which is readily engageable in one of a pair of open-sided projections 61 (FIG. 1) on the top of the bearing cap 16.

The hydraulic control arrangement shown in FIG. 5 comprises a hand pump 62 for pumping hydraulic fluid from a tank 63 through a pipeline 64 to a control valve assembly 65. Four pipelines 66 extending from the valve assembly 65 are readily connectable by quick-connect self-sealing couplings 67 to the hydraulic jacks 34 as shown during the securing of the bearing cap 14 as described above. For removal of the bearing cap 14, the couplings 67 are released and two of the pipelines 66 are coupled to the piston and cylinder devices 46.

The bearing arrangement is mounted in the stern frame 19 by inserting the housing 14 into the opening 18 from the exterior of the ship and then assembling the bearing liners 11 and 12, the bearing cap 16, the shaft 10 and the seals 30 and 33 in the positions shown in FIG. 1. An annular rope guard 40 bolted to the stern frame 19 releasably secures the housing in the opening 18.

By providing the shaft bearing in a plug-in housing 14 as described above, the bearing assembly can be readily inserted into the stern frame of the ship without requiring the lines of the stern frame to be specially designed to suit the bearing assembly as heretofore required in the art.

I claim:

1. In a propeller shaft bearing arranged for a ship comprising a split bearing extending into an opening in the stern of the ship, said split bearing comprising a removable bearing part, means defining a radial spacing between said removable bearing part and the periphery of said opening to permit removal of said bearing part to allow inspection of said shaft from within said ship, seal means for preventing the entry of water

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into the ship through said opening, and bearing securing means for releasably urging said removable bearing part into position around said shaft, the improvement comprising a hollow housing for insertion into said stern opening, the propeller shaft extending through said hollow housing, said housing containing said split bearing and being open at opposite ends thereof, said means defining a radial spacing being between said removable bearing part and the inner periphery of said hollow housing to allow the inspection of said shaft through said open housing ends, means for releasably securing said housing in said stern opening, and said bearing securing means being disposed between the inner periphery of said hollow housing and said removable bearing part.

2. A propeller shaft bearing assembly as set forth in claim 1, wherein said removable bearing part includes a bearing cap which fits in said hollow housing with a spacing between said bearing cap and the inner periphery of said housing to allow removal of the bearing cap.

3. A propeller shaft bearing assembly as set forth in claim 2, and further comprising closure means projecting from said bearing cap and forming a seal between said closure means and said housing for closing the spacing between said bearing cap and said housing.

4. A propeller shaft bearing assembly as set forth in claim 1, wherein said removable bearing part includes a bearing cap and said bearing securing means includes locking means for locking said bearing cap relative to said housing in a shaft encasement position.

5. A propeller shaft bearing assembly as set forth in claim 1, wherein said removable bearing part includes a bearing cap, a track extending longitudinally of the inner periphery of said housing, and means for lifting said bearing cap, said lifting means being movable along said track for removal of said bearing cap from said housing.

6. In a ship, a stern bearing arrangement comprising means defining an opening in the stern frame, a hollow housing inserted into and closing the stern opening, first securing means releasably securing said housing in the stern opening, a split bearing supported in said hollow housing, a propeller shaft extending through said housing and supported in said split bearing, said split bearing including a removable bearing cap, second securing means releasably urging said removable bear-

ing cap into a shaft encasement position on said shaft, said hollow housing having an inner peripheral wall portion, said inner peripheral wall portion and said bearing cap defining therebetween a radial spacing to permit removal of said bearing cap from said housing and inspection of said propeller shaft without disturbance of said housing and said propeller shaft.

7. A propeller shaft bearing assembly as set forth in claim 6, and further comprising a propeller flange on said shaft, said housing projecting rearwardly from the opening to adjacent said propeller flange.

8. A propeller shaft bearing assembly as set forth in claim 7, and further comprising a mechanical seal around said propeller shaft between said propeller flange and said housing, a closure projection on said bearing cap, and sealing means between said closure projection and said housing for sealing said spacing between said bearing cap and said housing.

9. A propeller shaft bearing assembly as set forth in claim 6, wherein said housing has a cylindrical outer surface fitting into said opening and said first securing means include flange means projecting outwardly from said cylindrical surface and seated against the outer surface of the stern of said ship.

10. A propeller shaft bearing assembly as set forth in claim 6, and further comprising a propeller flange on said shaft, a portion of said housing extending rearwardly of said opening to adjacent said propeller flange, a mechanical seal around said projection housing portion sealing said propeller flange to said housing, a closure projection on said bearing cap, means sealing said closure projection to said housing to seal said spacing between said bearing cap and said housing, said second securing means comprising hydraulic jack means acting between said housing and said bearing cap, and means connected between said housing and bearing cap in said radial spacing for lifting said bearing cap, on release of said hydraulic jack means, to expose said propeller shaft for inspection.

11. A propeller shaft bearing assembly as set forth in claim 7, wherein said housing has a portion projecting rearwardly from said opening and supporting said shaft to adjacent said propeller flange, and a mechanical seal between said propeller flange and said housing extends around said rearwardly projecting housing portion.

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