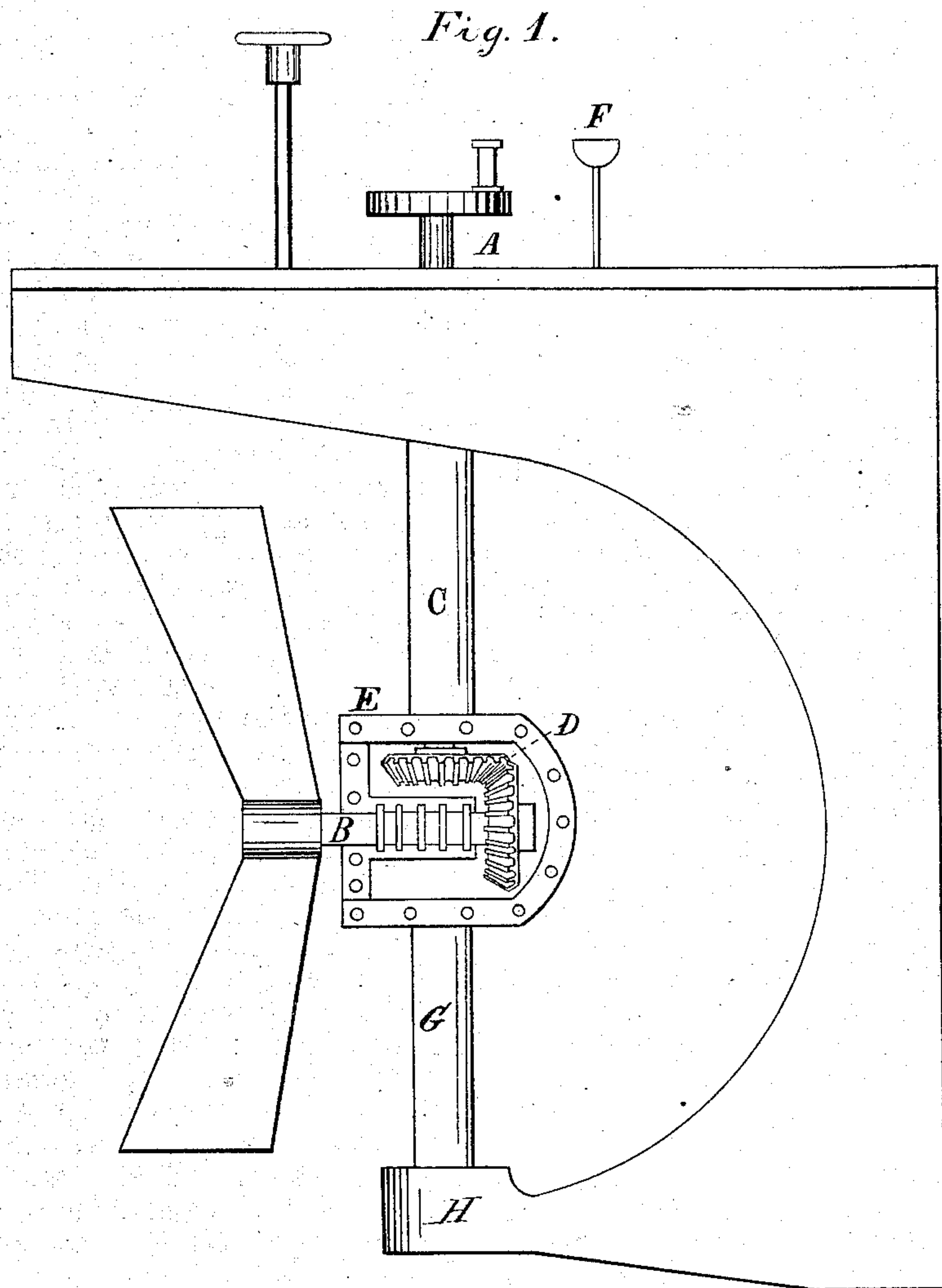


F. G. FOWLER.

Lubricating Devices for Marine-Propellers.

No. 158,791.

Patented Jan. 19, 1875.



Witnesses:

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UNITED STATES PATENT OFFICE.

FRANK G. FOWLER, OF BRIDGEPORT, CONNECTICUT.

IMPROVEMENT IN LUBRICATING DEVICES FOR MARINE PROPELLERS.

Specification forming part of Letters Patent No. **158,791**, dated January 19, 1875; application filed August 1, 1874.

To all whom it may concern:

Be it known that I, FRANK G. FOWLER, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and Improved Marine Propeller; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and letters of reference marked thereon, making a part of this specification, in which—

Figure 1 is a side elevation of a marine propeller with portions removed, so as to show the application of my improvement.

Propellers have been constructed with vertical engine-shafts and horizontal screw-shafts, motion being communicated from the former to the latter by miter-gears, and both supported by a sleeve or hollow shaft which surrounds them. The sleeve is connected to the helm so that it can be turned to any point of the compass, whereby the propeller is made a steering propeller. This device, as heretofore constructed, is defective, for the reason that the gears and thrust-bearing of the screw-shaft are submerged in water, and can be lubricated only with water, and that is a very inferior lubricant for metals. Besides, sea-water contains a great variety of acids, which attack and render rough the surfaces of the bearings and gears, by which they will cut and wear rapidly away, as experience has amply demonstrated; and it has been demonstrated that the texture of iron and bronze is injured by being submerged in water impregnated with acids, by which their strength is greatly impaired. This invention consists in removing the water that is in contact with the gears and bearings, and supplying its place with oil, mercury, or other lubricants, so that the same are amply lubricated and protected from the action of salt-water.

In other propellers the thrust-bearing of the screw-shaft is formed by interposing pieces of lignum-vitæ between the surfaces of the hub of the propeller and the after side of the case that covers the gears, the same being lubricated with water. This arrangement is defective; for, in order to get any considerable amount of bearing the hub of the propeller and case must be of large size, and that makes additional resistance in the water. The rub-

bing surfaces of the bearing will be far removed from the center of motion, by which their friction is greatly increased, resulting in a loss of power.

My invention consists, secondly, in forming the thrust-bearing of the screw-shaft on the inside of the case enveloping the gears, whereby the same may be lubricated with oil, and forming the bearing by a succession of projecting metallic rings, whereby the rubbing surfaces are brought near the center of motion, which results in greatly decreasing friction and economizing power. In other propellers the support or steadiment below the case is formed by carrying the upright or engine shaft down through the step-box of the propeller, the shaft below the case being covered by a sleeve that is a continuation of the case, which comes nearly down to but does not enter the step-box. This arrangement is defective, as it produces double friction, the same being caused by pressing the sleeve against the upright shaft, and the shaft being pressed against the step-box when the shaft is turning rapidly. This friction makes it difficult to turn the helm.

This invention consists, third, in terminating the upright shaft above the screw-shaft, and forming the step by carrying a rigid shaft down from the case through the step-box. This results in saving a great amount of friction that is produced between the upright shaft and sleeve and step-box, and renders the vessel more easy to steer, as there is not that tendency of the helm to revolve with the engine, on account of friction, as above explained.

Having stated the general nature of my invention, I will now proceed more fully to explain its construction and operation.

A represents the vertical shaft of an engine; B a horizontal screw-shaft with thrust-bearing, and having one of the boxes of the bearing removed, so as to show the rings. C is a sleeve or hollow shaft containing and supporting the other shafts. D represents a pair of miter-gears, that communicate motion from the engine-shaft to the screw-shaft. E is a case enveloping gears and thrust-bearing, and having one of its sides removed, so as to expose the same. When the cover or side is replaced,

it forms a water-tight box, and there is no chance of the entrance of water except from above, through the space between the engine-shaft and hollow shaft, and also through the space around the screw-shaft, where it passes out of the box or case E, which it is impossible to keep water-tight. Communicating with the space between the sleeve and engine-shaft is a tube, terminating in the funnel F. H is a step-box attached to a prolongation of the keel, and G is a shaft either attached rigidly to the case E, so as to move with it, or cast in one piece with it.

If the boat be launched the space around the gears and between the hollow shaft and engine-shaft will be filled with water up to the water-line by leakage around the screw-shaft; but if a quantity of mercury be poured into the funnel F it will pass down into the bottom of the case E, expelling a quantity of water, which will pass out through the space around the screw-shaft. This may be continued till the water in the case is expelled up to the screw-shaft, and its place supplied with mercury.

Fresh water may next be introduced, which, having a specific gravity less than salt-water, will rest on the top of it to a great extent, and force it down and out through the leakage around the screw-shaft, till the space in the case and between the shafts is filled with fresh water. A quantity of lard, or a mixture of tar and lard, sufficient in quantity to nearly fill the space in the case occupied with fresh water, and melted and raised to a high temperature, may next be introduced. The specific gravity of lard is about that of water. Accordingly, when it is poured into the passage which is partly above and partly below the water-line, it will press the column of water downward till the column of lard is below and above the water-line, when it will come to an equilibrium. In this manner the water might be expelled from the case E, and the space between the two shafts, if a sufficient quantity of lard were introduced to fill the whole space, the water passing out at the leakage around the screw-shaft, the only condition being necessary is to have the funnel F one-tenth of the entire

distance from the case to the funnel above the water-line, in order to secure sufficient pressure to force the water out.

After the heated lard has been introduced it may be followed by a quantity of lubricating-oil of a specific gravity less than the lard, which will force all the lard down into the case E, expelling all the water, and then, by congealing, tend to seal up the leakage around the screw-shaft.

The gears and bearings will now be submerged in a quantity of mercury, oil, and soap-suds, all of which are excellent lubricants. Besides, the alkali in the soap, as well as the oil, will neutralize any trace of acid that may remain in the case, and which would tend to corrode the bearing. These substances may be renewed at any time by pouring them into the funnel, and by this means the gears and thrust are thoroughly lubricated.

I claim as my invention—

1. The mode of lubricating a submerged propeller-shaft and gearing attached thereto, by providing the same with a close case, and connecting it with a funnel, through which the case is filled with mercury and tar, oil, or similar compounds, which expel the sea-water from the case, and from contact with the gears and bearings, and lubricate the same, substantially as set forth.

2. The mode of expelling sea-water from and around propeller-shafts and gearing attached thereto, by introducing within a case or sleeve that surrounds such parts, mercury, fresh water, and oil, lard, or tar, the latter either separate or combined, substantially as shown.

3. The combination of the step-box H, and shaft G, and sleeve C, attached rigidly to the case E, whereby the friction on engine-shaft is greatly lessened, and the ease with which the helm may be turned greatly enhanced, as shown and described.

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Witnesses:

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