

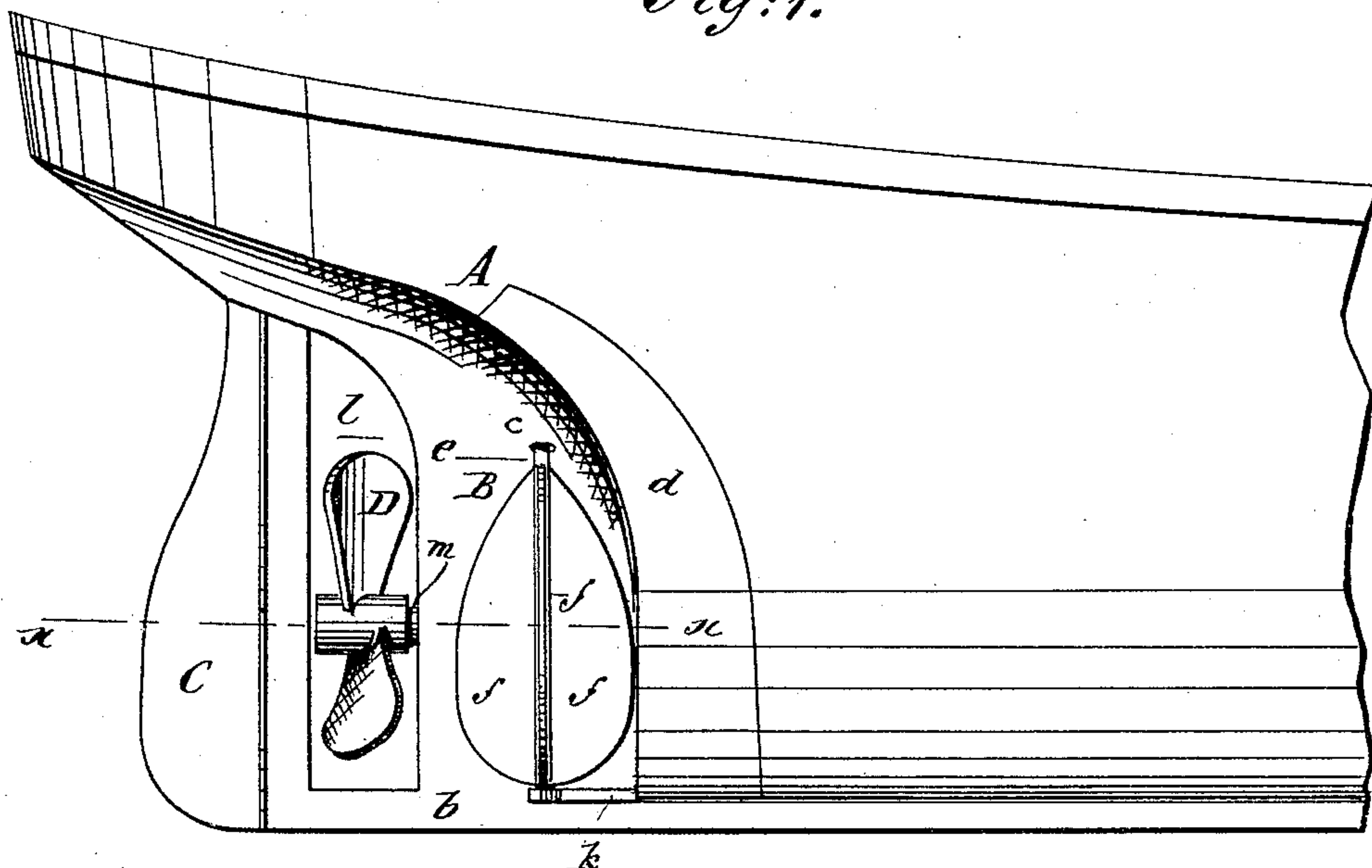
(No Model.)

E. W. GRAM.  
MEANS FOR PROPELLING VESSELS.

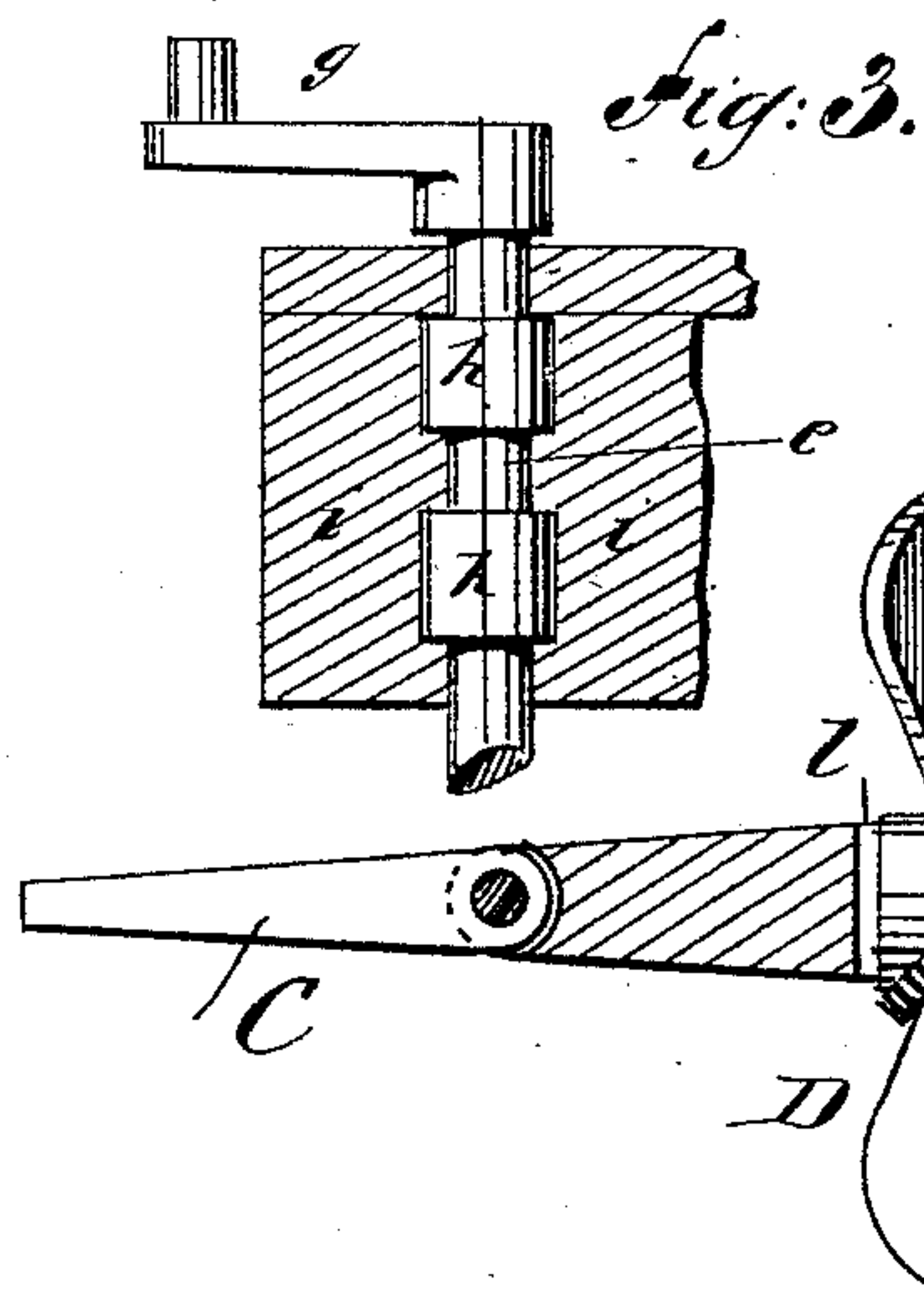
No. 452,669.

Patented May 19, 1891.

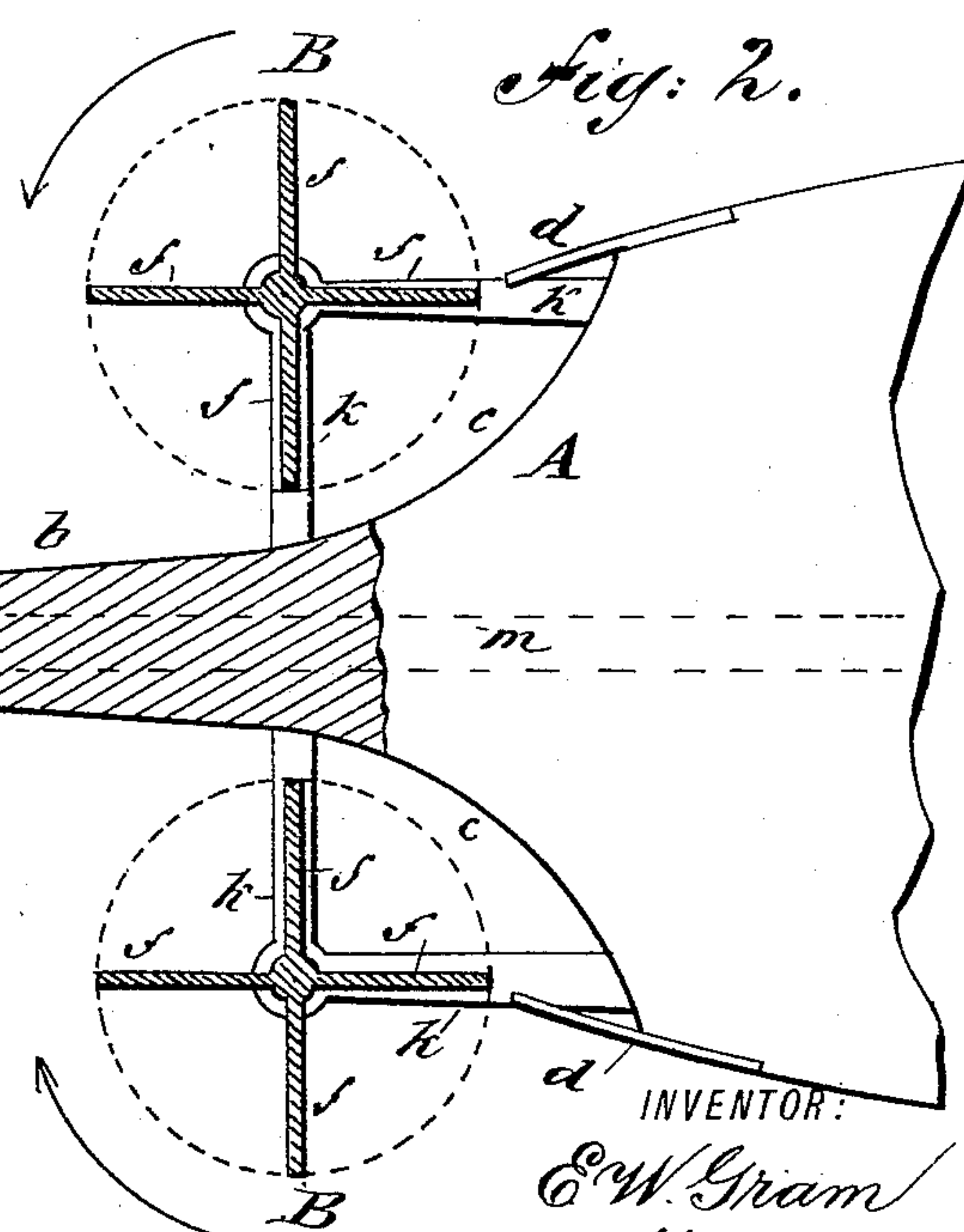
*Fig: 1.*



*Fig: 3.*



*Fig: 2.*



**WITNESSES:**

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# UNITED STATES PATENT OFFICE.

ERNST WILHELM GRAM, OF LAS VEGAS, TERRITORY OF NEW MEXICO.

## MEANS FOR PROPELLING VESSELS.

SPECIFICATION forming part of Letters Patent No. 452,669, dated May 19, 1891.

Application filed July 31, 1890. Serial No. 360,502. (No model.)

*To all whom it may concern:*

Be it known that I, ERNST WILHELM GRAM, of Las Vegas, in the county of San Miguel and Territory of New Mexico, have invented a new and useful Improvement in Means for Propelling Vessels, of which the following is a full, clear, and exact description.

This invention consists in a combination, with the hull of the vessel having a stern of peculiar and recessed construction, of a series of propelling devices composed of a pair of paddle-wheels having vertical axes and arranged to work within opposite sides of the recessed stern, and a screw-propeller having a horizontal axis and arranged to work centrally within and through a reduced portion of the stern in rear of the paddle-wheels, substantially as hereinafter described, and pointed out in the claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 represents a side view of the stern portion of the hull of a vessel constructed in accordance with my invention and with the series of propelling devices applied. Fig. 2 is a mainly sectional horizontal view upon the line  $x x$  in Fig. 1, and Fig. 3 is an upright view of either paddle-wheel shaft with blocks designed to support it and keep it from dropping.

A indicates the stern portion of the hull of a vessel, which is constructed with a long rearward-tapering section  $b$ , arranged to leave a deep recess  $c$  on each side of the stern, extending out to the side plating  $d$  of the hull and overlapped by said plating. Within these recesses  $c$  are two paddle-wheels  $B B$ —that is, one on each side of the stern. Each of these paddle-wheels is carried by an independent upright shaft  $e$  and has curved upright floats  $f$ . Consequently said paddle-wheels are what may be termed "upright" ones. They are arranged so that the floats leave a clearance opening or space between them and the overlapping plates  $d$  of the stern portion of the hull, the floats working both within and outside of the recesses  $c$ . To keep these wheels from dropping, their shafts  $e$ , each of which may be driven by an upper crank  $g$ , are made with collars or swells  $h h$  on them, and the

same made to revolve within and through correspondingly-shaped bearings formed by cast-iron or other metal blocks  $i i$ , as shown in Fig. 3. Said shafts are supported below by triangular or other suitably-arranged bars or beams  $k k$ , applied to the stern. The paddles themselves may be made of any suitable materials. The stem-like section  $b$  of the stern, which also forms the post for the rudder  $C$ , has an aperture  $l$  through it for a screw-propeller  $D$  to work within and through, said propeller being arranged to work centrally back of the upright paddle-wheels  $B B$ , and being carried and driven by a horizontal or longitudinal shaft  $m$ .

In the operation the recessed and stem-like construction of the stern performs an important part and secures an efficient action for the upright paddle-wheels on either side of the stern to propel the vessel in addition to the action of the screw-propeller in rear of said wheels, and the courses in which the water is displaced by the paddle-wheels and screw-propeller being perpendicular to each other—that is, the axes of the paddle-wheels being perpendicular to the axis of the screw-propeller, all the propelling means work in a most efficient manner to propel the vessel, and much more satisfactorily so than if the axes of the several propelling means were parallel with one another. By reversing the action of the side or paddle wheel—that is, either wheel—the vessel may be turned about her own length; also, if one wheel or shaft becomes disabled there will still be sufficient power left to propel the vessel.

It will be noticed that each upright paddle-wheel  $B$  has about half its width sheltered or under cover, as it were, of the walls of the recess  $c$  in the stern of the hull and of the guard or extension of the side plating  $d$  beyond the hull. This causes the floats, as they project laterally beyond said recess and side plating, to act upon the main body of the water outside of the hull to propel the vessel, while the floats which are on the inner side of the axis of the wheel simply act upon dead water within the recess  $c$  and side-plating extension  $d$  without producing any propelling effect, the resistance on these floats being equal to the force of the water as driven against the hull or walls of the recess. Thus the floats, having

a lateral position outside of the recessed portion of the stern and acting freely upon the main body of water outside of the hull, exert their required propelling effect.

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

10 The combination, with the hull of the vessel having its stern of tapering construction to form recesses on each side of the stern adjacent to the main body of the hull, of the paddle-wheels having upright axes and up-

right floats arranged to work both within and outside of said recesses, and a revolving screw-propeller arranged to work within and through 15 said tapering portion of the stern centrally in rear of the paddle-wheels, the axes of the paddle-wheels being perpendicular to the axis of the screw-propeller, substantially as shown and described.

ERNST WILHELM GRAM.

Witnesses:

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