

(No Model.)

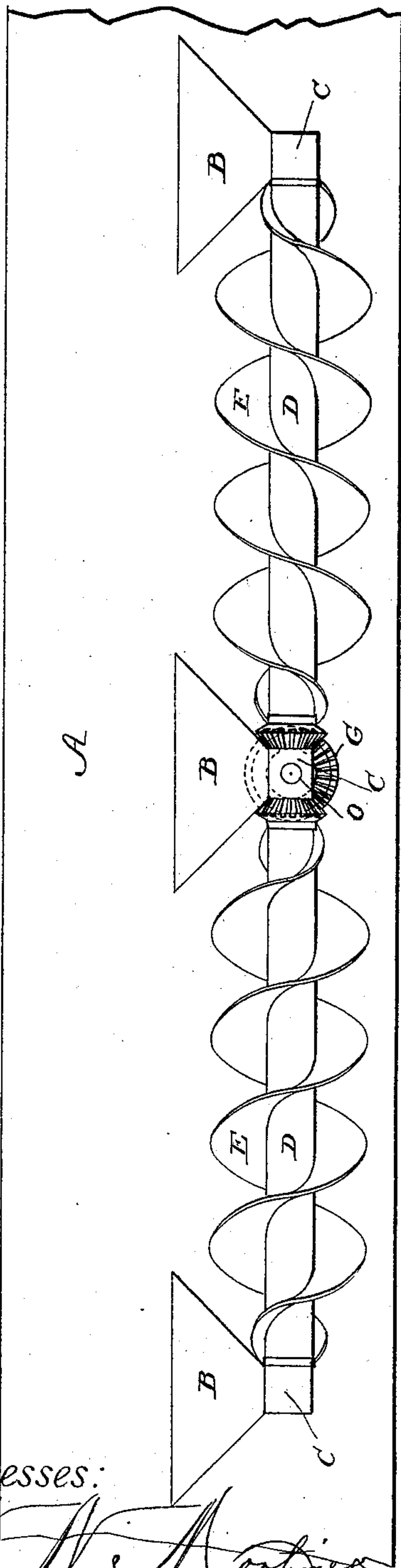
2 Sheets—Sheet 1.

T. T. WOODRUFF.
SCREW PROPELLER.

No. 387,671.

Patented Aug. 14, 1888.

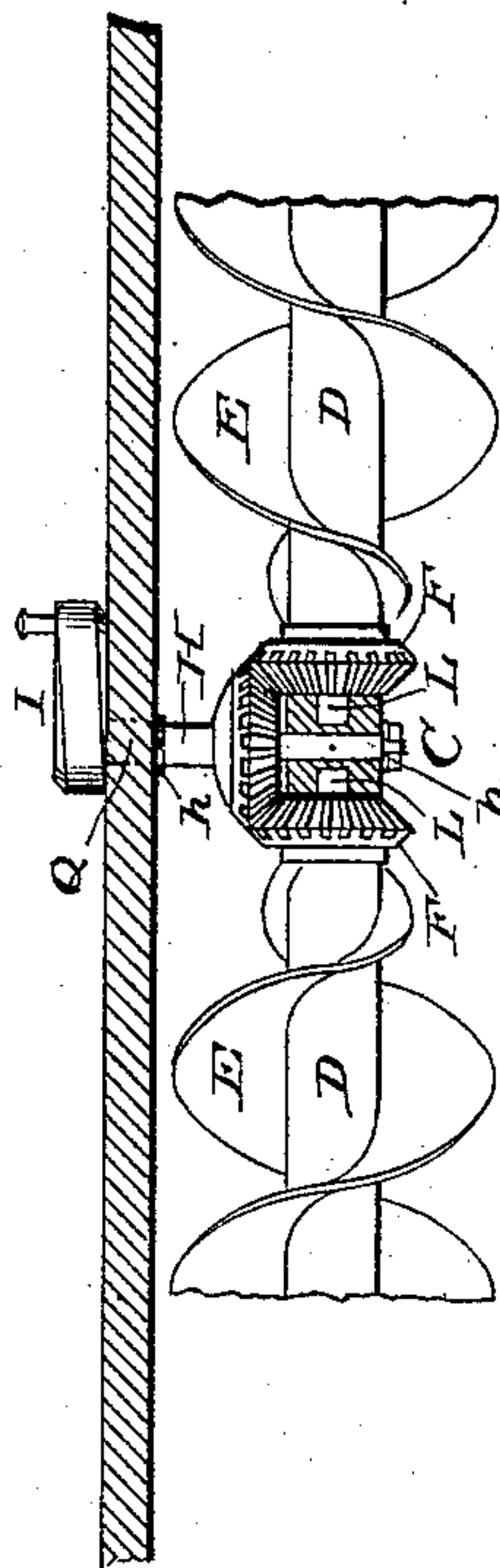
—Fig. 1.



Witnesses:

N. H. Mortimer
R. M. Elliott

—Fig. 2.



Inventor :

Theo. T. Woodruff,

by

R. S. Dyer
his Attorney.

(No Model.)

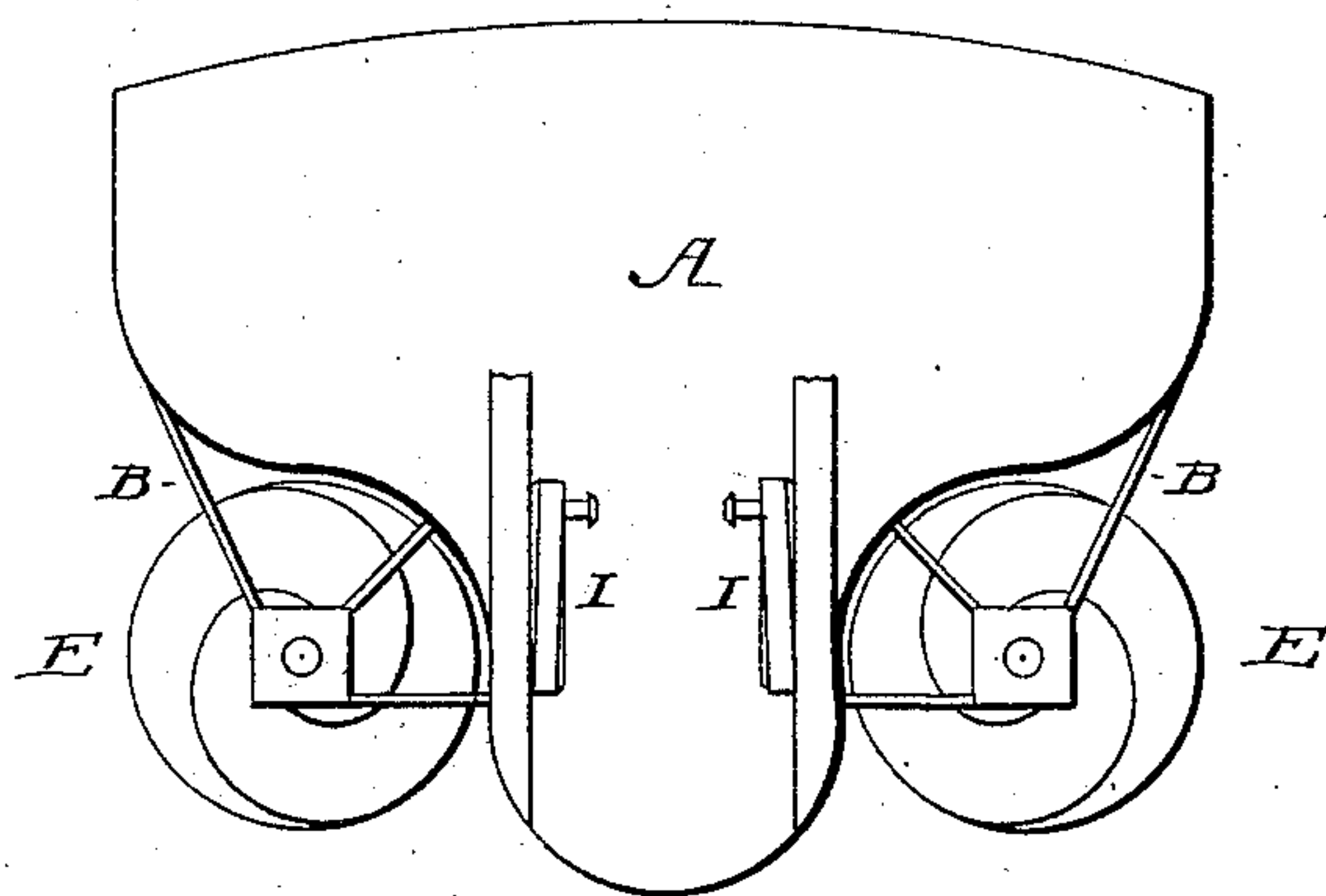
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T. T. WOODRUFF.
SCREW PROPELLER.

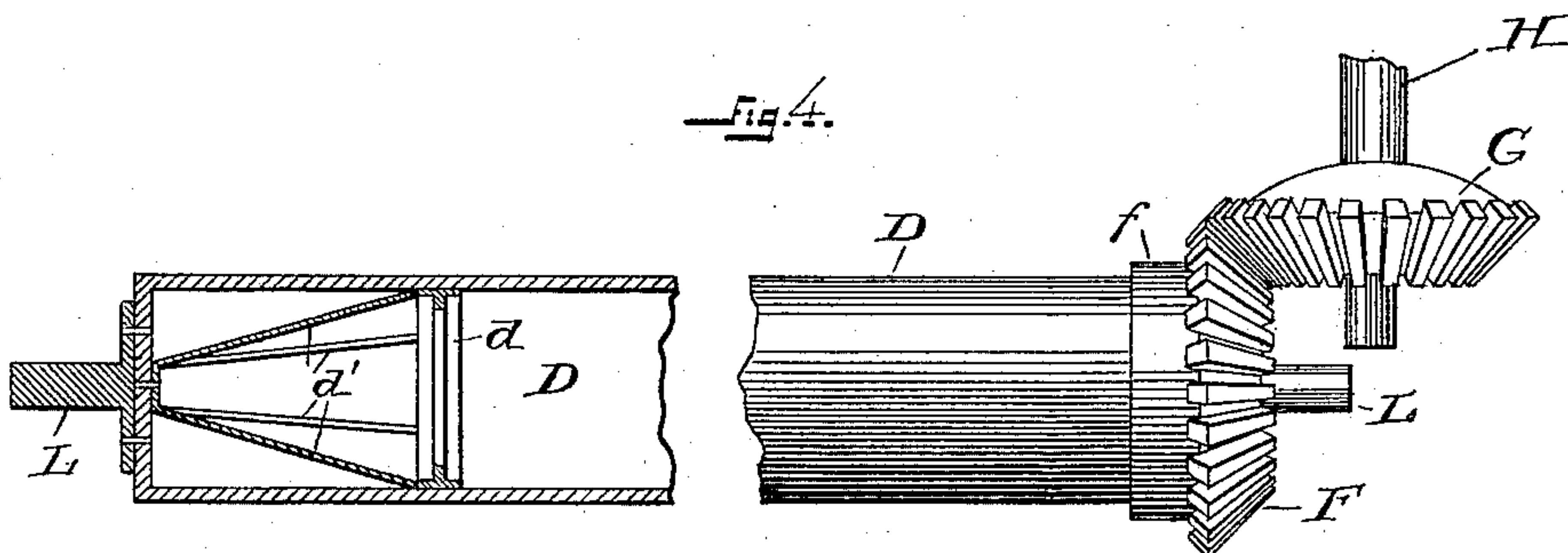
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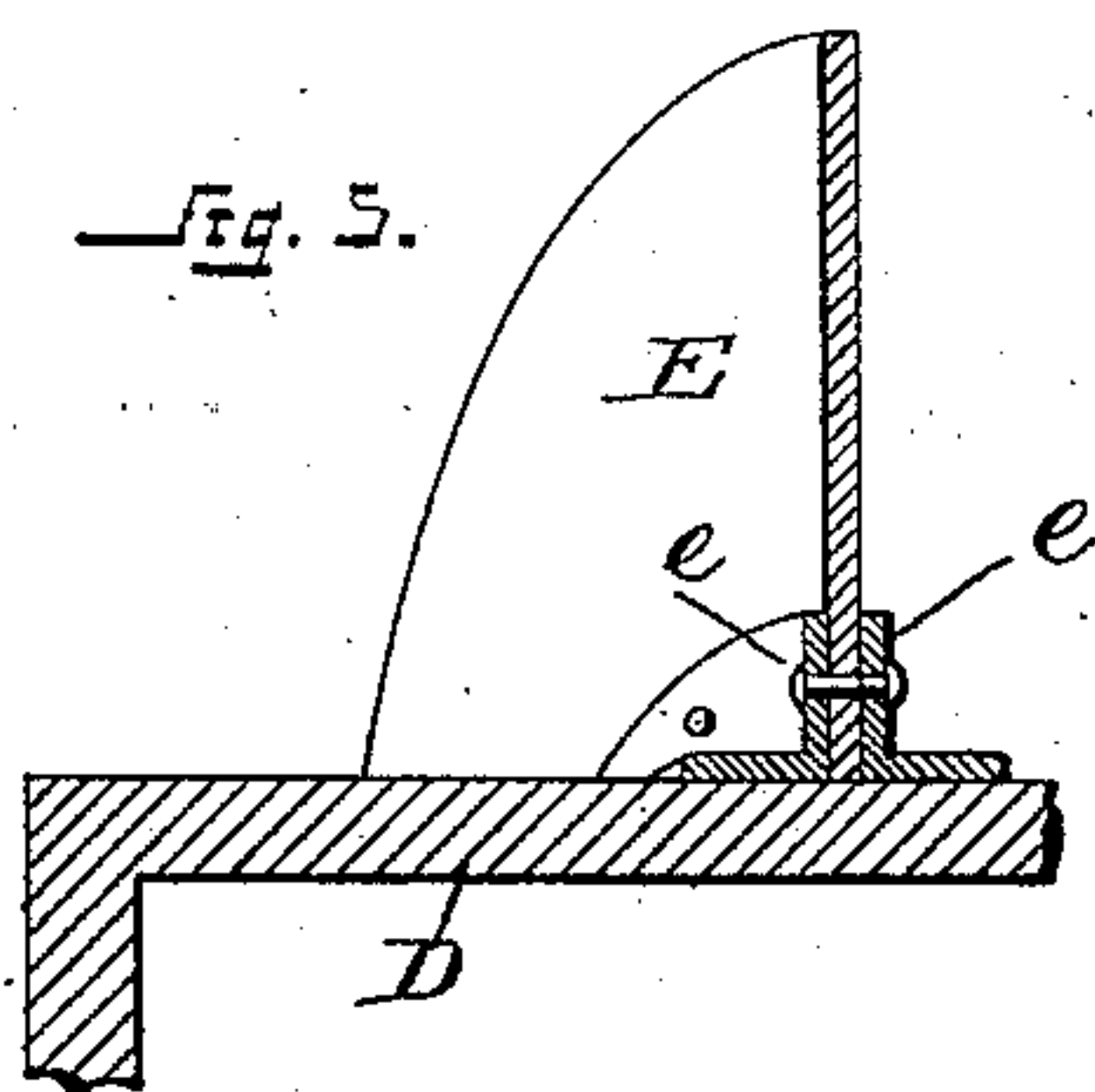
—Fig. 2.



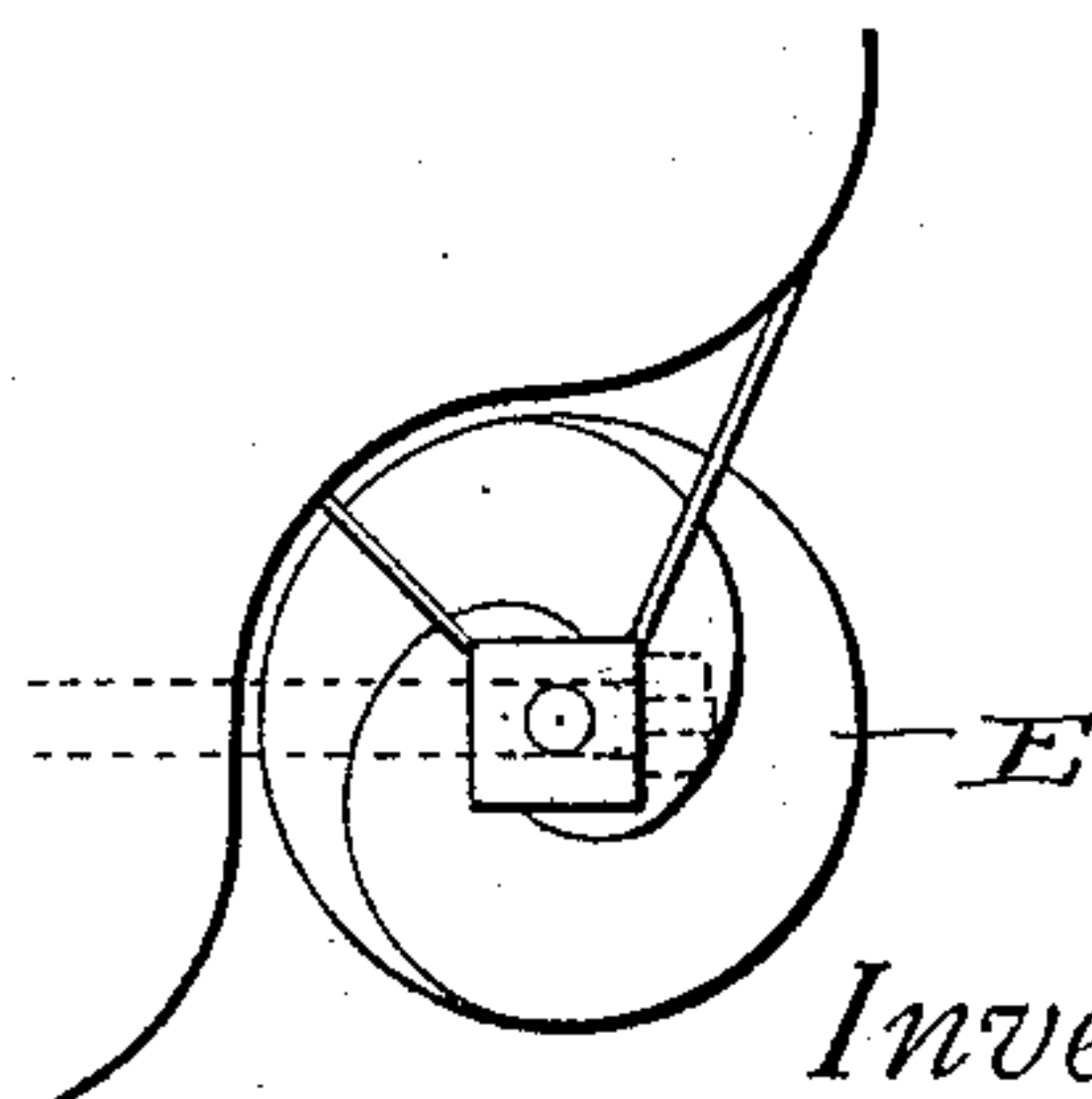
—Fig. 4.



—Fig. 5.



—Fig. 6.



Witnesses:

W. N. Mortimer
R. M. Elliott

by

Inventor :

Theo. T. Woodruff.

R. S. Dyer
his Attorney.

UNITED STATES PATENT OFFICE.

THEODORE T. WOODRUFF, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO ELIZA M. WOODRUFF, JOHN E. McMANUS, AND ADAM WARTHAM, OF
SAME PLACE.

SCREW-PROPELLER.

SPECIFICATION forming part of Letters Patent No. 387,671, dated August 14, 1888.

Application filed September 23, 1887. Serial No. 250,504. (No model.)

To all whom it may concern:

Be it known that I, THEODORE T. WOODRUFF, a citizen of the United States, residing in Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Screw-Propellers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to propelling devices.

The object of my invention is to provide a more direct and constant application of propelling force to the deep, dead, or quiescent water which is the agent of propulsion, or the abutment against which the propeller acts.

A further object of the invention is to provide propelling devices of such construction as to enable their easy and ready application to a vessel the hull of which is coved and bilged above the coves.

A further object of the invention is the provision of a screw-propeller which shall be very light, strong, and durable in construction, easy of application to vessels, thoroughly efficient in operation, and inexpensive of manufacture.

To attain the desired objects the invention may be stated, briefly, to consist in two propeller-shafts formed of hollow metal having an internal annular flange and inclined stay or brace rods at one end; further, in the hollow propeller-shafts having the internal annular flange and inclined brace-rods at one end and a bevel gear-wheel at the opposite end; further, in the propeller-shafts formed of hollow metal having the internal annular flanges and the brace-rods at one end, the bevel gear-wheel at the opposite end, and the flanges on the outer surfaces of the propeller-shafts secured thereon by means of angle-irons; further, in the combination, with a vessel the hull of which is coved and bilged above the coves, of hangers depending from the bilged sides having closed journal-boxes in which the outer ends of the propeller-shafts are journaled, and a central journal-box in which the inner ends of the shafts and the driving-shaft

are journaled; further, in the combination, with a vessel having the hangers provided with closed journal-boxes depending therefrom, of the propeller-shafts journaled at their outer ends in said journal-boxes and at their inner ends in a journal-box carried by the driving-shaft; further, in the combination, with the propeller-shafts having the bevel-gear meshing with said bevel gear-wheels and having its shaft arranged at right angles to the propeller-shafts; and, finally, the invention consists in the novel construction, arrangement, and adaptation of parts for service, as hereinafter described, and particularly as pointed out in the claims.

In the accompanying drawings, forming part of this specification, and in which like letters of reference indicate corresponding parts, Figure 1 represents an elevation of a longitudinal portion of the side of a steamship, showing the employment of combined floating tapering-flangescrew-propellers as attached to the sides of the ship by a series of hangers. Fig. 2 represents a vertical cross-section of the ship, taken at the line of the hangers upon opposite sides of the ship's hull, showing the configuration of the ship's hull with coved sides and with bilged sides above the coves, and having a deep narrow buoyant section below the axis of the longitudinal coves, showing the screw-flanges of the ship's propellers, and also showing the attachments of the propellers to the ship by the hangers. Fig. 3 represents a longitudinal horizontal plan of the propellers, showing the connection of their driving-gear to the ship by cogged wheels, a portion of the ship's side being broken away to show the position of the driving-shaft. Fig. 4 represents the exterior and interior construction of one of the floating propeller-shafts, showing its connection with its driving-wheel, the annular flange of the gear-wheel, internal strengthening-flanges, and stay-rods to hold the ends. Fig. 5 illustrates the manner of attaching the screw-flange to the hollow shaft. Fig. 6 is a detail view of the central hanger.

In the drawings, A represents the ship's hull, each side of which is coved out in breadth

equal, say, to three-tenths of the breadth of the beam at midships, and is bilged above the coves, and has a deep narrow buoyant center section below the axis of the longitudinal coves, (see Fig. 2,) this longitudinal center section of the ship's hull possessing great buoyancy and displacing but little water, and thus serving all the purposes of a center-board or slip-keel, and measurably preventing lateral rolling of the ship, and therefore keeping the propellers constantly under water. To the said hull, upon each side thereof, is permanently attached (centrally with the ship's length) a line of shaft-hangers, B, the end ones of which have three arms, the purpose of which is to brace the ends of the shafts and prevent them from movement sidewise, and the central one of which has two, this central one being braced laterally by a provision on the projecting driving-shaft, as hereinafter more fully described, each hanger being provided with journal-boxes and each being of such length that a line passing through the journal-boxes upon the same side of the ship will hang longitudinally central to the axis of the said cove. In the side of the ship the said journal-boxes, which are incased at C, will receive and carry the journals L on hollow or drum shafts D, having tapering screw-flanges E and cogged gear-wheels F, the whole forming a line of propellers upon each side of the ship.

H represents the driving-shaft, and I its crank. G represents cogged driving-wheels, which are rigidly and securely fastened to the driving-shaft on each side of the vessel. The shaft H is provided with journals having a shoulder, h, at the outside of each, which will prevent lateral swaying of the central hanger, B, as this has not a third or lateral arm to brace it sidewise. The said shaft will be carried in its journal-box in hanger B at O and by a plumber-block within. It will also be provided with a stuffing-box where it passes through the side of the ship at Q. The cogs of the driving-wheel G will mesh with the cogs of its fellow wheels, F F, on the propeller-shaft, and motion and force will be transmitted to the propellers through the cogged driving-wheels G, which will revolve the propellers in opposite directions, the direction of action, however, being made the same for each—that is to say, each propeller tending to drive in the same direction—by reversing the lead, run, or inclination of the screw-flanges—namely, the screw-flange of one propeller being right-hand lead and the screw-flange of its fellow propeller being left-hand lead—that is, the lead of the screw-flanges of the two propellers being in the same direction, though revolving in opposite directions.

Each propeller-shaft D is made preferably of plate-steel of cylindrical form, and has heads to which the journals L are attached. Each cogged wheel F has fixed to it an annular flange, f, and the end of the shell of the cylindrical shaft will be riveted to this annular

flange on the cogged wheel F, as shown in Fig. 4, thus firmly fixing the cogged wheel upon the shaft. The cylindrical shaft may be strengthened by the employment of internal annular flanges, d, riveted to it, and by the employment of lateral stay-rods d', the whole to be riveted and made water-tight. The screw-propeller flanges are made preferably of steel-plate cut to the proper diameter, and swaged to a tapering screw form and to suit the diameter of the drum-shaft, and are fastened to it by the employment of angle-iron e upon one or both sides of the flanges.

The weight of water displaced by this drum propeller-shaft will be in excess of the weight of the material employed in the construction of the propellers; hence it will be a compound cylindrical floating flange screw-propeller.

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

1. The propeller-shaft herein described, formed of hollow metal, provided at one end with the strengthening internal annular flange and the inclined stay or brace rods, for the purpose described.

2. The propeller-shaft herein described, formed of hollow metal, provided with the internal flange and stay-rods at one end and with bevel gear-wheel at the opposite end, for the purpose described.

3. The propeller-shaft herein described, formed of hollow metal, having internal flange and stay-rods at one end, bevel gear-wheel on opposite end, and the flange on the outer surface secured to the shaft by means of angle-irons, substantially as described.

4. The combination, with the hull of a vessel having the bilges and coves, of hangers depending from the bilged sides at the ends and center of the hull, closed journal-boxes in the said hangers in which the outer ends of the shaft are carried, and a central journal-box in which the inner ends of the shafts and the driving-shaft are carried, substantially as described.

5. The combination, with the vessel having the hangers provided with closed journal-boxes depending therefrom, of the propeller-shafts carried at their outer ends in the said journal-boxes and at their inner ends carried in a box carried by the driving-shaft, whereby the driving-shaft forms a central support for the shafts, substantially as described.

6. The combination, with the hollow propeller-shafts having the bevel gear-wheels on their inner ends, of the driving gear-wheel meshing with said gear-wheels and having its shaft arranged at right angles to the propeller-shafts to form a support for the inner ends of said shafts, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

THEODORE T. WOODRUFF.

Witnesses:

FRED. KEEFER,

W. W. MORTIMER.

It is hereby certified that the name of one of the assignees in Letters Patent No. 387,671, granted August 14, 1888, upon the application of Theodore T. Woodruff, of Philadelphia, Pennsylvania, for an improvement in "Screw-Propellers," was erroneously written and printed "Adam Wartham," whereas said name should have been written and printed *Adam Warthman*; and that the Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 21st day of August, A. D. 1888.

[SEAL.]

D. L. HAWKINS,
Assistant Secretary of the Interior.

Countersigned:

BENTON J. HALL,
Commissioner of Patents.