

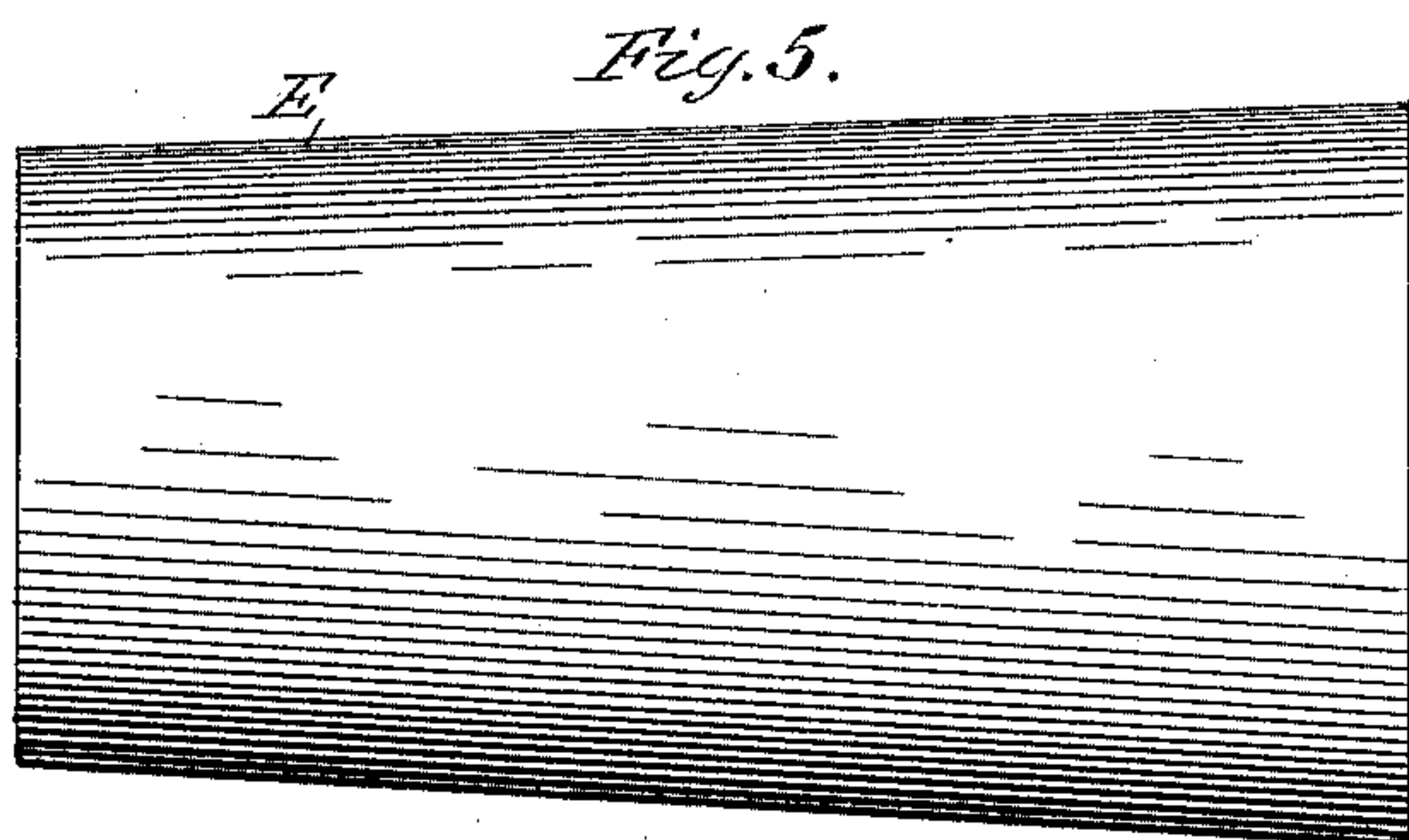
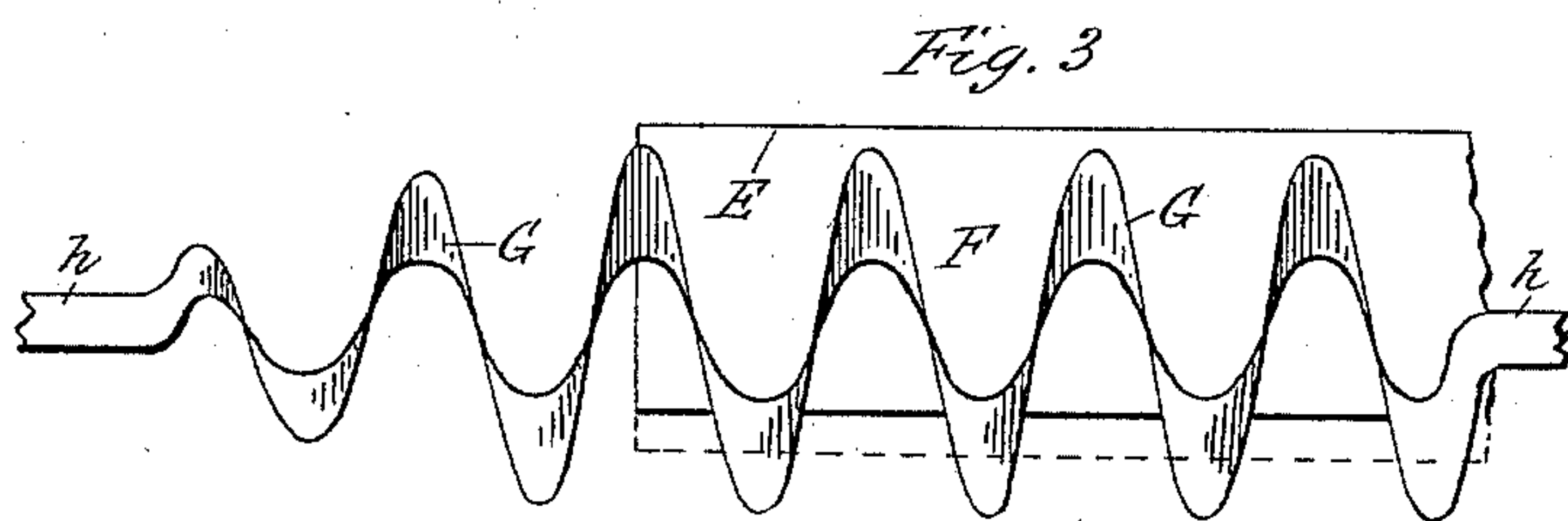
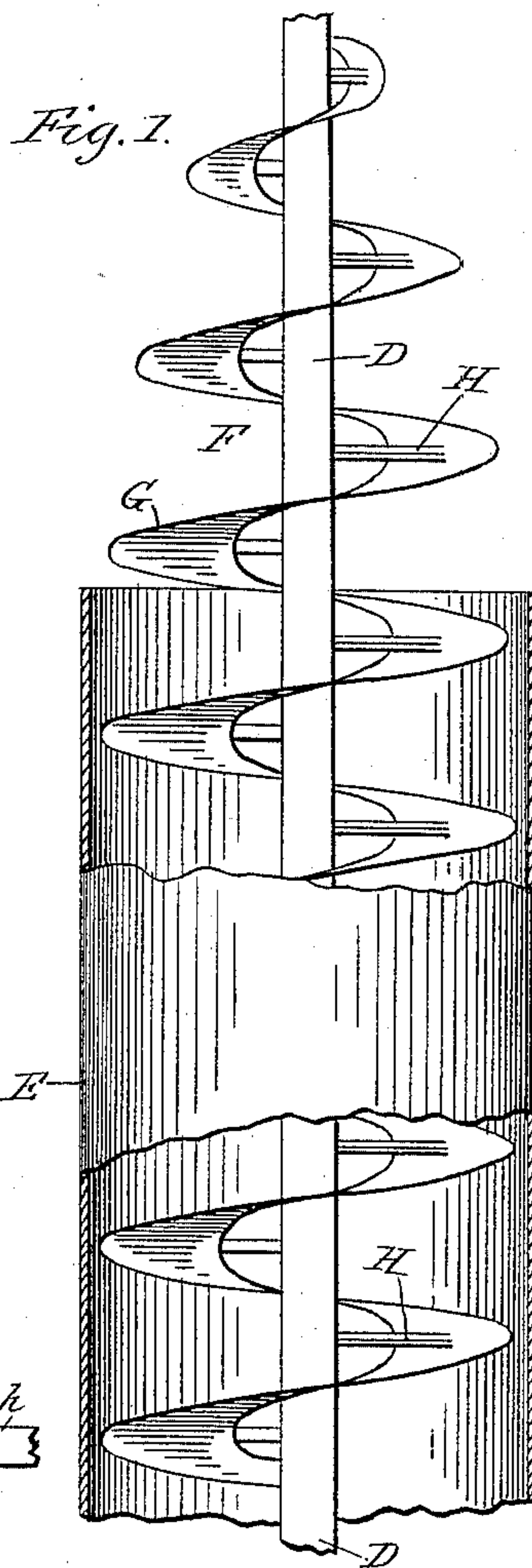
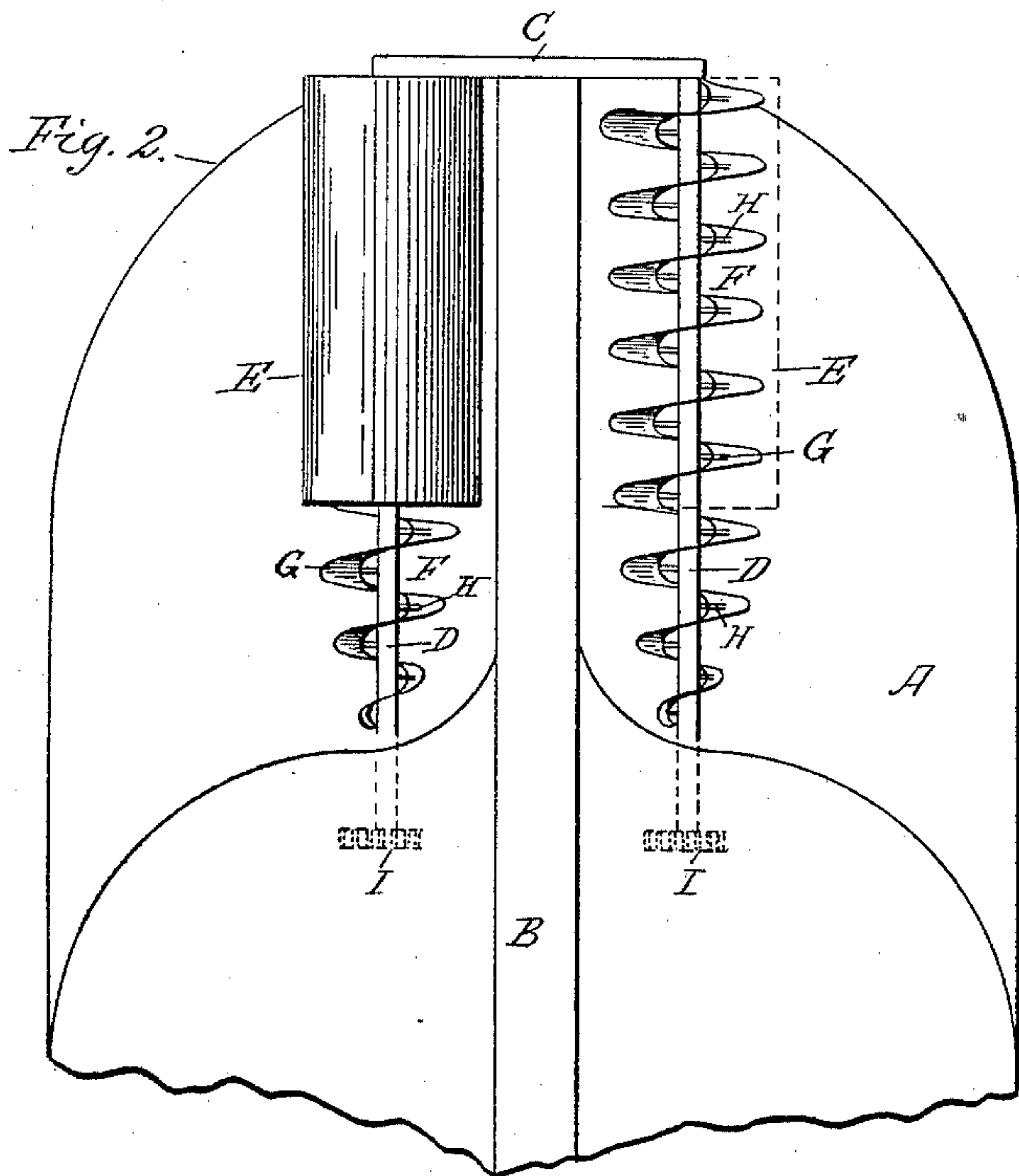
(No Model.)

2 Sheets—Sheet 1.

J. C. STREET & H. P. NORTON.  
SCREW PROPELLER.

No. 475,826.

Patented May 31, 1892.



Witnesses:  
J. R. Stuart.  
H. Y. Davis.

By

Inventors:  
Joseph C. Street.  
Harlan P. Norton.  
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Attorney.

(No Model.)

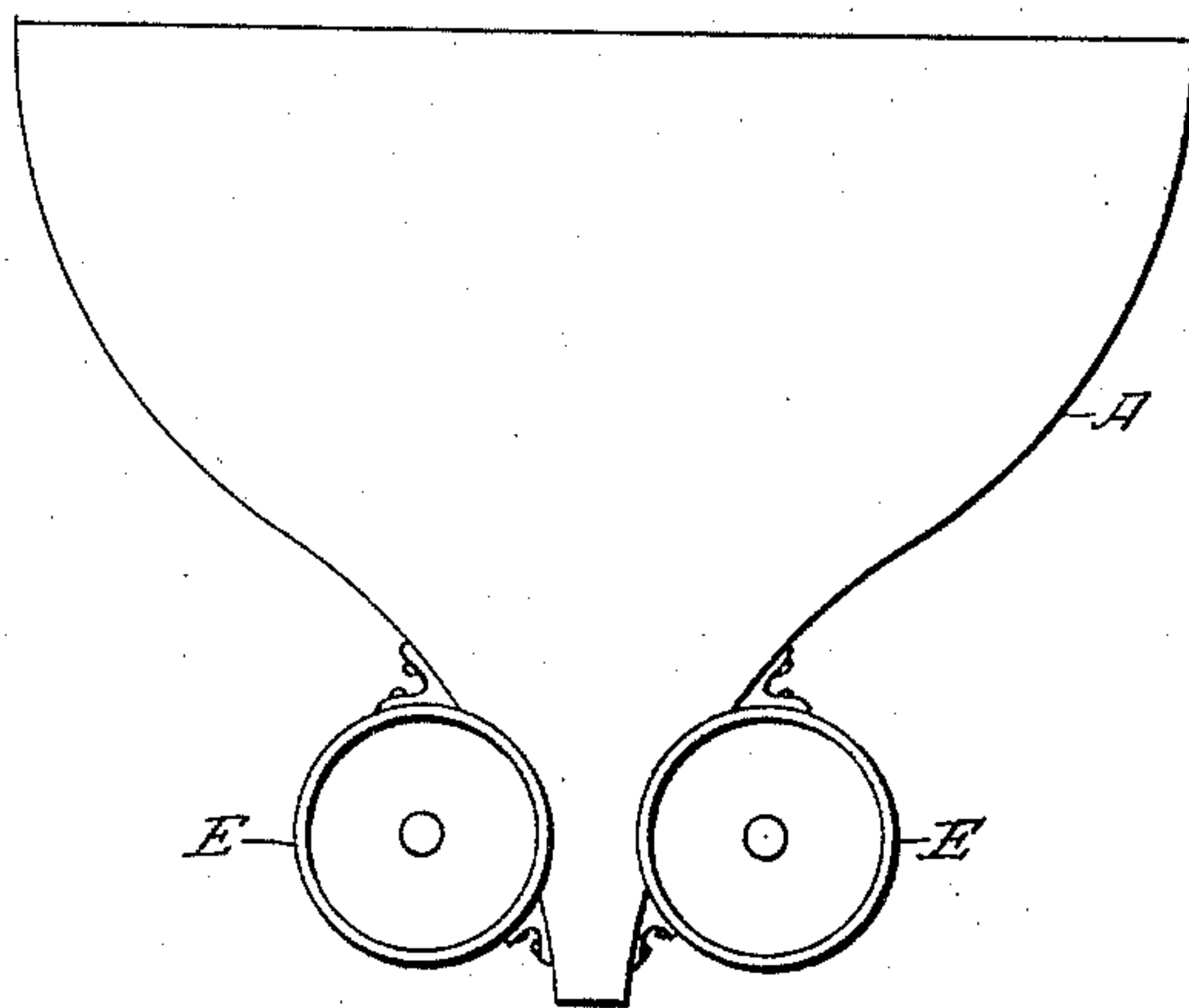
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*Fig. 4.*



*Witnesses:*

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# UNITED STATES PATENT OFFICE.

JOSEPH C. STREET, OF BOSTON, MASSACHUSETTS, AND HARLAN P. NORTON,  
OF ST. JOSEPH, MICHIGAN.

## SCREW-PROPELLER.

SPECIFICATION forming part of Letters Patent No. 475,826, dated May 31, 1892.

Application filed November 25, 1891. Serial No. 413,110. (No model.)

*To all whom it may concern:*

Be it known that we, JOSEPH C. STREET, of Boston, in the county of Suffolk and State of Massachusetts, and HARLAN P. NORTON, of St. Joseph, in the county of Berrien and State of Michigan, citizens of the United States, have invented certain new and useful Improvements in Screw-Propellers; and we 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.

Our invention relates to improvements in screw-propellers, and particularly to that class of screw-propellers which revolve within a tube which serves to confine the water acted upon, so as to prevent it from being discharged in any direction other than directly astern; and it consists in the novel construction hereinafter described and illustrated, and particularly pointed out in the claims.

The object of our invention is to provide a propeller which shall be more efficient than any hitherto in use, and thus to economize power and increase the speed of which steam-vessels are capable.

By all screw-propellers hitherto in use water is treated as a substance which may be displaced and moved with but little expenditure of energy; but it is known that this assumption is fallacious, and that a large percentage of the power absorbed by screw-propellers is expended in moving the water acted upon in directions other than those in which energy is most efficiently expended in driving the vessel onward. It is our plan to produce as little movement of the water as possible and to confine this movement entirely to a sternward direction—the direction in which energy is most efficiently expended in propelling the vessel—and also to give the water an initial impulse in a rotary or spiral direction prior to its entrance into the tube.

In the drawings forming part of this specification the same letters refer to similar parts.

Figure 1 represents a plan view of our improved propeller, showing the same detached from the hull of the vessel and with the inclosing tube partially broken away to show

more clearly the construction and arrangement of the parts. Fig. 2 shows the propeller when used as a twin screw in place on the hull of the vessel, which is shown bottom up in order that the various parts of the propeller may be more clearly visible. Fig. 3 shows a side elevation of a modified form of propeller, showing the tube in section. Fig. 4 is an end view showing one manner of attaching the cylinder to the vessel, and Fig. 5 is a side elevation of a modified form of cylinder.

In the drawings, A represents the hull of the vessel, B the keel, and C a cross-piece attached to the end of the keel, which serves as a support for the rear bearings of the screw-shafts D.

E represents the propeller-tubes, which are fastened to the hull of the vessel at each side of the keel, and preferably let into the sides of the keel and also into the bottom of the vessel, as clearly shown in the end view, Fig. 4, and secured in any desired manner and within which revolve the screws F. The screws F consist each of a central shaft D, around which is wound the spiral ribbon-flange G, supported from and attached to the shaft D by the spokes H, the ends of said ribbon being attached in any desired manner to said shaft. The ribbon G is not of uniform diameter, but, as shown, commencing at the circumference of the shaft near where the latter passes through the hull of the vessel, gradually increases in diameter for three or more turns, when it reaches its greatest diameter, and from there on continues of uniform diameter throughout its length. The tube E is somewhat shorter than the screw F, the forward portion of the screw being used simply to start the water in motion gradually and carry it into the tube, where it is acted upon by the revolving screw and forced astern; or, what is the same thing, the vessel by the reaction against the main body of water outside the tube is pushed ahead. The tube E is made of only slightly-greater diameter than the screw and serves by confining the water to prevent the escape of any at the sides, so that the entire stream is sent directly astern.



As shown in Fig. 5, we may form the tube slightly conical and arrange the same with its larger end forward, the object of which being to give the water passing therethrough a greater force.

In Fig. 2 both screws are shown as of the same kind—that is, left-handed; but they may also be of different kinds—one right-handed and the other left-handed—in which case they would be revolved in opposite directions.

As shown in Fig. 3, we may dispense with the central shaft D when the screw is to be used on small craft, the ribbon G being made of sufficient strength and stiffness as not to require strengthening by a central shaft and having its ends formed with a cylindrical portion *h*, by which the screw may be supported and operated.

The tube E may be incomplete, being left open longitudinally at the bottom for from one-third or less to one-half the circumference of the tube, as shown in Fig. 3.

The screw-shafts may be connected to the engine-shafts in any suitable manner; but we prefer to have the power transmitted from the engine-shaft to the screw-shafts through gears I, which may be bevel-gears, so that the axis of the screws and the tube surrounding the same may be inclined slightly upward from front to rear, thus coinciding more nearly with the direction of movement of the water, which rises up under the stern of the vessel to fill the space left by the forward movement of the vessel.

While we have shown our propeller arranged at each side of the keel of the vessel, as a twin screw, it is not our intention to be confined to such an arrangement, as it is evident the single screw may be used, in which event the keel would be cut away and the screw and its tube arranged thereon, the lines of the vessel being formed so as to permit a free ingress of water to the tube.

The operation of the screw is as follows: When the screw is revolved in the direction opposite to that in which the ribbon is wound around the shaft, water is given its initial movement and drawn into the tube E by the forward portion of the screw F, and there is acted upon by the ribbon, which pushes it astern, the vessel, by the reaction of the moving water against the main body of water outside the tube, being pushed ahead. The tube E acts to confine the water and prevent the escape of any at the side, where it would have little or no effect.

It will be observed from the foregoing description of the construction and arrangement of our screw-propeller that it will work gradually and easily into the water, which we treat as a semi-solid substance, with comparatively small resistance, the great number of threads or spiral winding of the ribbon which compose our screw being adapted to enter and hold the water, as a long screw holds in wood,

and the tube preventing the sidewise escape of the water and the consequent loss of power, the whole body of water entering the tube being forced through the same to the rear and before it is discharged, and consequently the whole force or power of the water is exerted to move the shaft forward.

The screws may be attached to the forward end of the vessel in addition to those at the rear when great speed is to be attained, in which case the screws are arranged at an incline, the forward end being raised and the rear end depressed in order to throw the current of water beneath instead of against the vessel.

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

1. A screw-propeller formed of a spiral ribbon which gradually increases in diameter from its forward end for a suitable distance of the length and continues therefrom of uniform diameter to its rearward extremity, and suitable supports for its revolution, substantially as described.

2. A screw-propeller formed of a spiral ribbon which gradually increases in diameter from its forward end for a suitable distance of its length and continues therefrom of uniform diameter to its rearward extremity, in combination with a cylinder surrounding a portion of the same and in which it is adapted to revolve, substantially as and for the purpose set forth.

3. A screw-propeller which gradually increases in diameter from its forward end and continues therefrom of equal diameter to its rearward extremity, in combination with a cylinder inclosing that portion of the propeller which is of equal diameter and having its forward portion extending beyond said cylinder and in front thereof, substantially as and for the purpose described.

4. The combination, with a screw-propeller which gradually increases in diameter from its forward end for a portion of its length, of a tapering or conical tube partly inclosing said screw-propeller, substantially as described.

5. A screw-propeller formed of a spiral ribbon which gradually increases in diameter from its forward end for a portion of its length, a shaft therefor, and means for connecting said ribbon to said shaft, substantially as described.

6. A screw-propeller formed of a spiral ribbon which gradually increases in diameter from its forward end for a suitable distance of its length and continues therefrom of uniform diameter to its rear end, in combination with a tube having an open bottom surrounding the main or body portion of the screw, substantially as described.

7. A screw-propeller formed of a spiral ribbon which gradually increases in diameter from its forward end for a suitable distance

of its length and continues therefrom of a  
uniform diameter to its rear end, a shaft pass-  
ing through said ribbon, and spokes connect-  
ing said ribbon and shaft, said ribbon hav-  
5 ing its end directly secured to said shaft, in  
combination with a tube partly surrounding  
a portion of said screw, substantially as de-  
scribed.

In testimony whereof we affix our signatures  
in presence of two witnesses.

JOSEPH C. STREET.  
HARLAN P. NORTON.

Witnesses:

W. D. STEWART,  
HELEN M. MILLAR.