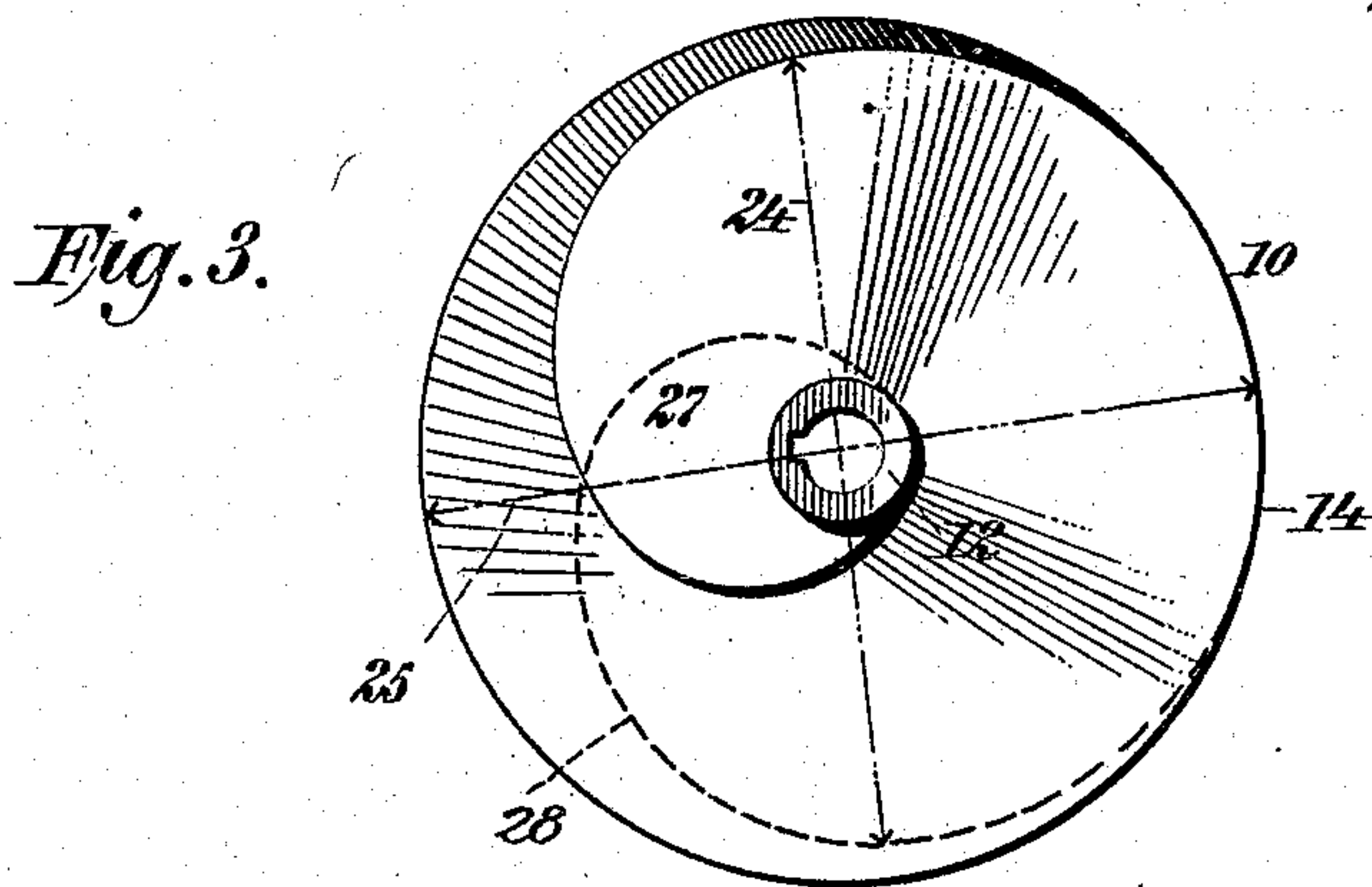
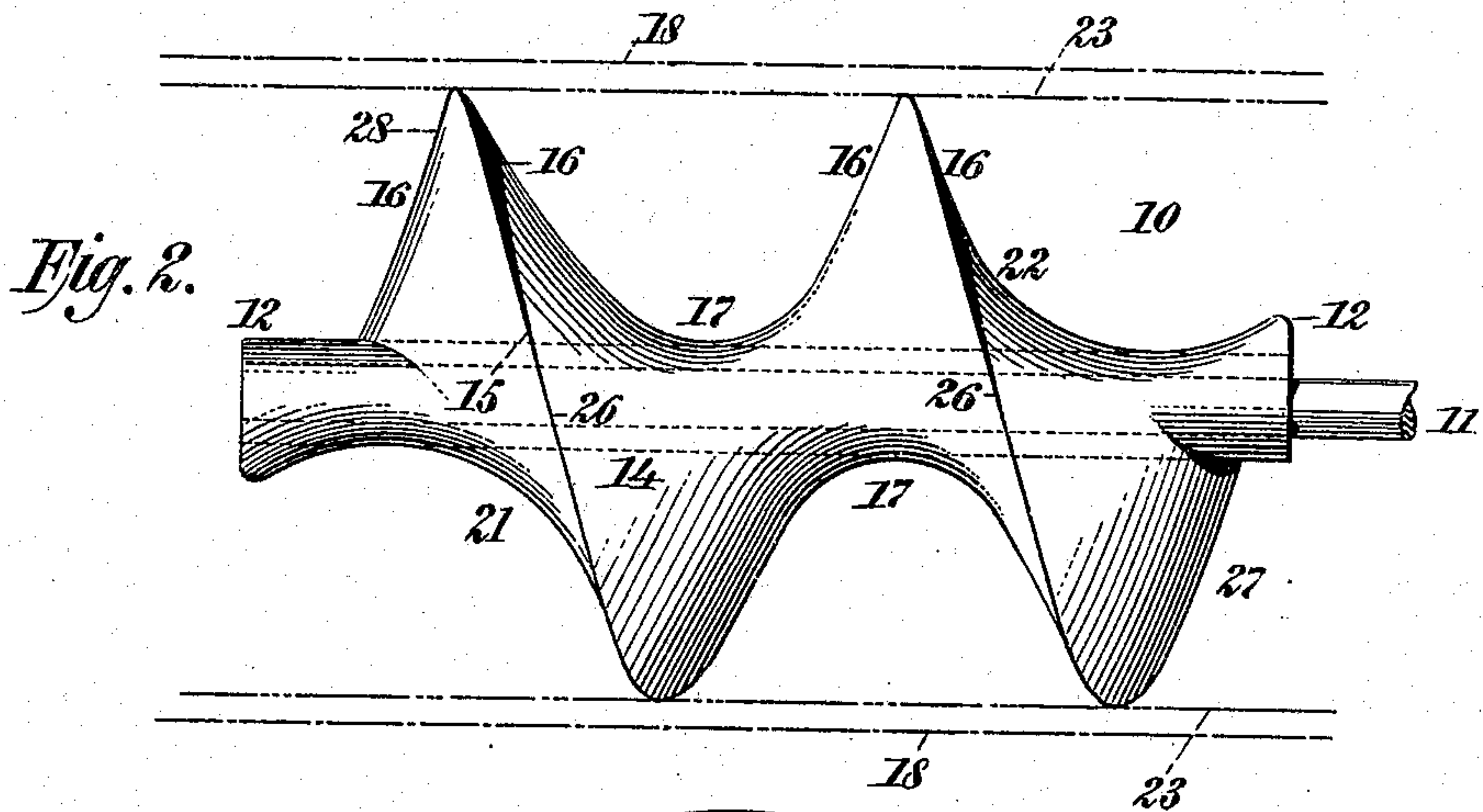
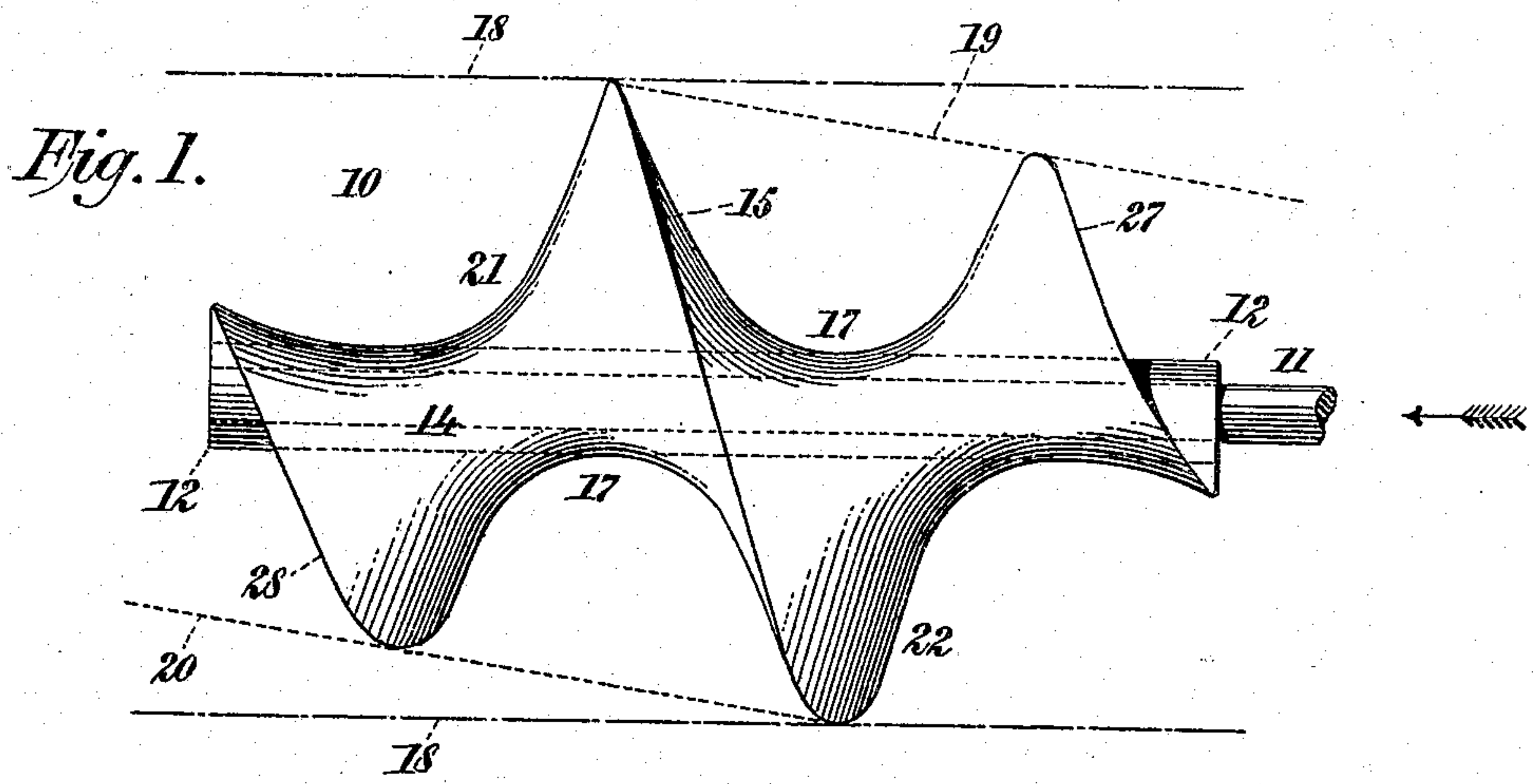


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PROPELLER FOR VESSELS.  
APPLICATION FILED APR. 21, 1908.

930,409.

Patented Aug. 10, 1909.



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# UNITED STATES PATENT OFFICE.

OTTO NIELSEN, OF ANTWERP, BELGIUM, ASSIGNOR OF THREE-TWELFTHS TO S. R. UPHAM  
AND TWO-TWELFTHS TO E. L. KEARNS, BOTH OF PITTSBURG, PENNSYLVANIA.

## PROPELLER FOR VESSELS.

No. 930,409.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed April 21, 1908. Serial No. 428,475.

*To all whom it may concern:*

Be it known that I, OTTO NIELSEN, master mariner, a citizen of the United States, and a resident of Antwerp, Belgium, have invented certain new and useful Improvements in Propellers for Vessels, of which the following is a specification.

The invention relates to improvements in propellers for vessels; and it consists in the novel features and structure hereinafter described, and particularly pointed out in the claims.

The object of the invention is to increase the efficiency of propellers and at the same time eliminate the vibrations and jarring which the propellers at present in use impart to ships and their engines, and in carrying out my invention I produce a screw propeller of novel type and operation the characteristics of which will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation of a screw propeller embodying my invention; Fig. 2 is a like view of the same but representing the propeller as it appears after having made a one-quarter turn from its position shown in Fig. 1; and Fig. 3 is an end view of the same, taken from the right hand end of Fig. 1.

In the drawings, 10 designates the propeller, and 11 a shaft for the same, said shaft in practice extending from within the vessel and being driven by suitable engines and connections of familiar character.

The propeller is of screw type and comprises, preferably integrally, a hub 12 and a continuous single worm 14, the latter in its novel form and operation constituting my invention. The exact outline of the worm 14 may be best understood from the drawings, a description in words merely being insufficient to convey an accurate impression as to the same. The worm in every part, considered in cross-section, is conical, the apex of the cone being at the reasonably sharp outer edge 15 of the worm, from which edge the sides 16 of the worm diverge toward the hub portion thereof and thence merge on curved lines 17 into the diverging sides of other portions of the worm, there being no defined hub except at the ends of the worm, whereby the worm proper from

end to end presents successive surfaces in different planes adapted for continuous uniform action against the water.

The worm 14 is a continuous single worm and when viewed from the side shown in Fig. 1, presents its greatest transverse diameter (denoted between the horizontal lines 18) at its middle portion, whence as indicated by the tangent lines 19, 20, respectively, the worm tapers at its upper side from the apex 15 of the middle portion of the convolution toward the inner end thereof and at its lower side toward the outer end thereof, there being an open space 21 (looking at Fig. 1) at the outer or left hand side of the upper portion of said middle part of the convolution and an open space 22 at the inner or right hand side of the lower portion of said middle part of said convolution. The outline presented in Fig. 1 is, of course, permanent and unchanging during the rotation of the worm, but during such rotation the spaces 21, 22 change their position, a quarter turn of the worm from its position shown in Fig. 1 to that illustrated in Fig. 2 causing said space 21 to appear at the lower left hand side of the outer convolution of the worm and the space 22 to appear at the upper right hand side of the inner convolution. The worm when given a quarter rotation from the position shown in Fig. 1 to that illustrated in Fig. 2, also presents, in side elevation, a different appearance from that illustrated in Fig. 1, this being due to the fact that the greatest diameter of the worm is then on a transverse horizontal line through the worm and that the end portions of the worm are projecting in substantially opposite directions, the right hand end portion of the blade of the worm facing frontwardly and the left hand end portion of the same facing in an opposite direction. When the worm is in the position shown in Fig. 2, its diameter, vertically considered, is less than the diameter represented by the dotted lines 18 in Fig. 1, the vertical diameter of the worm, as shown in Fig. 2, being represented by the dotted lines 23. I place the dotted lines 18 in Fig. 2, so as to indicate between them and the dotted lines 23 the difference in the vertical diameter of the propeller in its two positions represented in Figs. 1 and 2. In Fig. 3 the dotted line 24 represents the diameter denoted by the lines



23 in Fig. 2, and the dotted line 25 designates the diameter indicated between the dotted lines 18 in Figs. 1 and 2.

I do not wish to limit myself to the length of the worm, but as shown said worm has about two and one-half convolutions, one convolution comprising that part of the worm denoted between the points 26 in Fig. 2 and the other convolution and a half being made up of a three-fourths convolution 27 at the right hand end of the worm and another three-fourths convolution 28 at the left hand end of the worm, and from the center of the edge of the blade of the worm the latter lessens in diameter toward its opposite ends. The formation of the worm may be clearly understood from Fig. 3, which is a view taken from the right hand end of Fig. 1, the outline of the blade of the worm starting from its right hand end, being clearly shown, and the curved dotted line in Fig. 3 denoting the outline of the other end of the worm where it merges into the hub 12.

The worm is of novel form and in its operation presents several distinguishing characteristics all due to the contour of the worm. The broad end portions of the worm represented at the spaces 21, 22 enables the worm to act against the water with great efficiency and uniformity and the increasing diameter of the blade toward its middle, as represented by the tangent lines 19, 20 in Fig. 1, enables the blade during its rotations to constantly present new surfaces to new parts of the water, whereby no one portion of the worm is enabled to so churn up the water that the succeeding portion of the blade is deprived of efficient action, and as a result of this the slippage of the worm is reduced to a minimum and material drag or suction on the edge of the worm is entirely obviated. The uniform action of the worm against the water results in an absence of that jarring of engines and vibration in ships at present so objectionable and due in large measure to the lack of uniform action in the propellers at present in use. The

vibration in ships has been reduced to some extent by the employment of turbine engines, but experience has demonstrated that even with the use of the most improved turbine engines the vibration has continued to an objectionable though less pronounced extent and that this vibration is in large measure caused by the lack of continuous uniform action of the propellers against the water.

I shall preferably form the entire worm in one integral casting, as it is shown in the drawings, but the worm may, of course, be formed in separate sections securely united together. The worm aside from its other important advantages is of an outline presenting great strength and durability.

What I claim as my invention and desire to secure by Letters Patent, is:

1. A propeller comprising a continuous spiral worm tapering in diameter from its center toward its ends and having a blade which in cross-section is conical and whose sides at one section merge on curved lines into the sides of adjacent sections; substantially as set forth.

2. A propeller consisting of a continuous single spiral worm tapering in diameter from its center toward its ends and having diverging sides and at its ends terminating at opposite sides of the axis of the propeller, whereby at the end portions of the worm broad surfaces of the larger convolutions thereof become directly exposed to the water inwardly from and unobstructed by the restricted ends of the worm, said broad surface being at one side of the worm at one end thereof and at the opposite side of the worm at the other end thereof; substantially as set forth.

Signed at New York city, in the county of New York, and State of New York, this 18th day of April A. D. 1908.

OTTO NIELSEN.

Witnesses:

ARTHUR MARION,  
CHAS. C. GILL.