No. 858,749. PATENTED JULY 2, 1907.

F. A. VON OLDENBURG.

SCREW PROPELLER.

APPLICATION FILED JULY 19, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

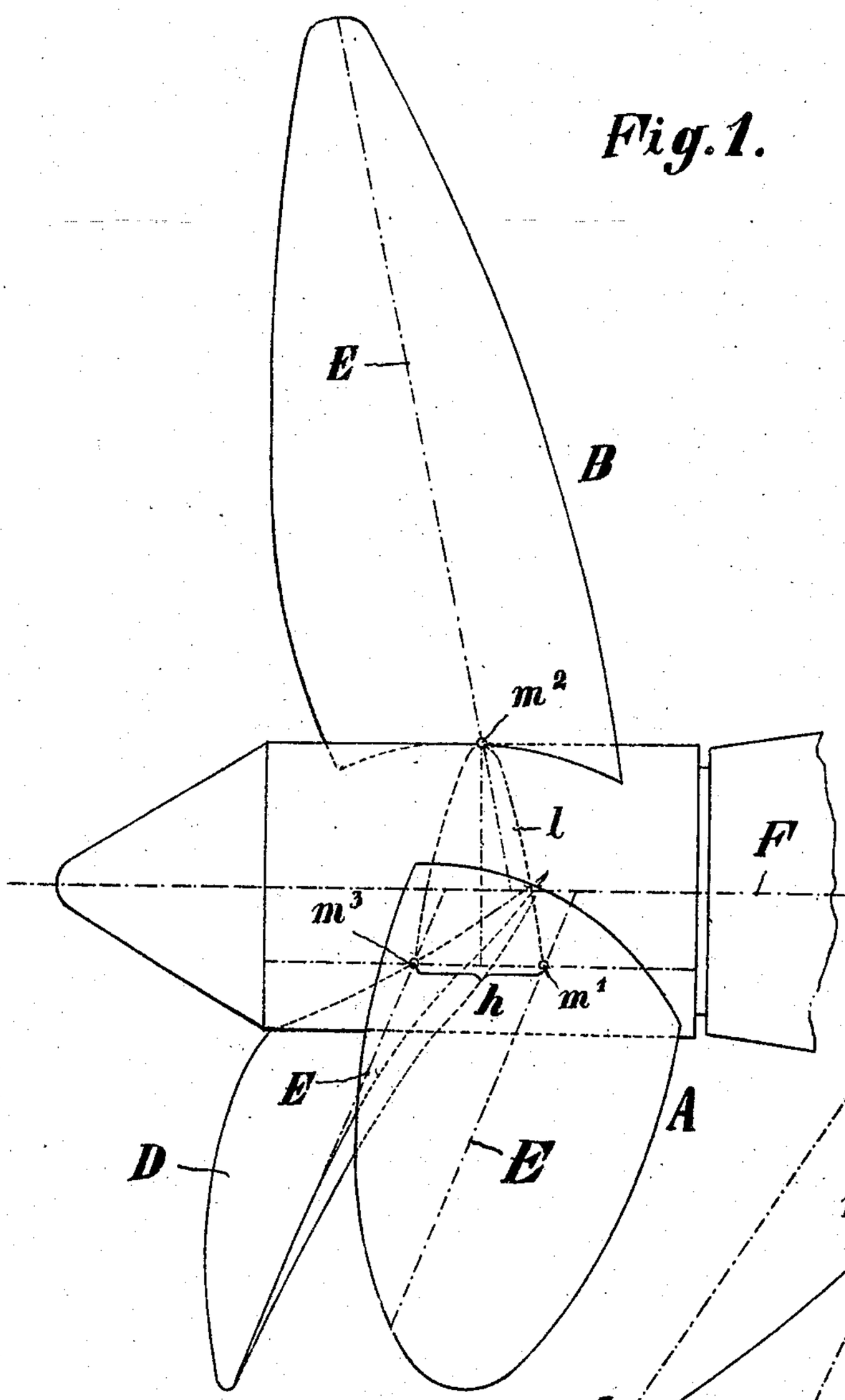


Fig. 4.

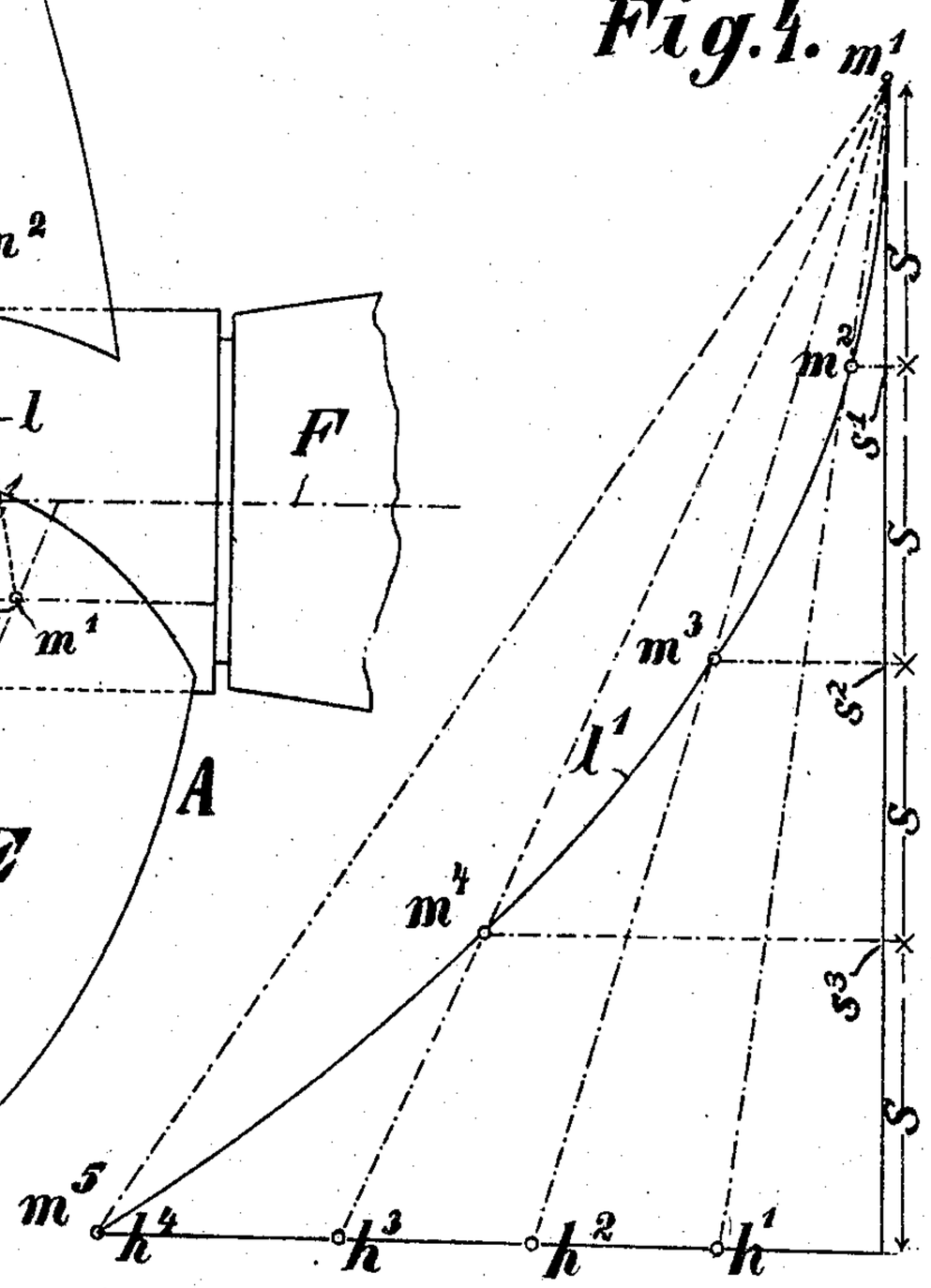
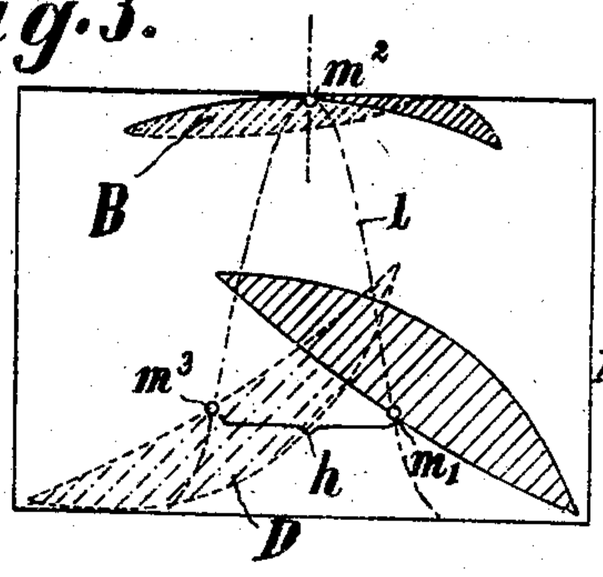


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 2.

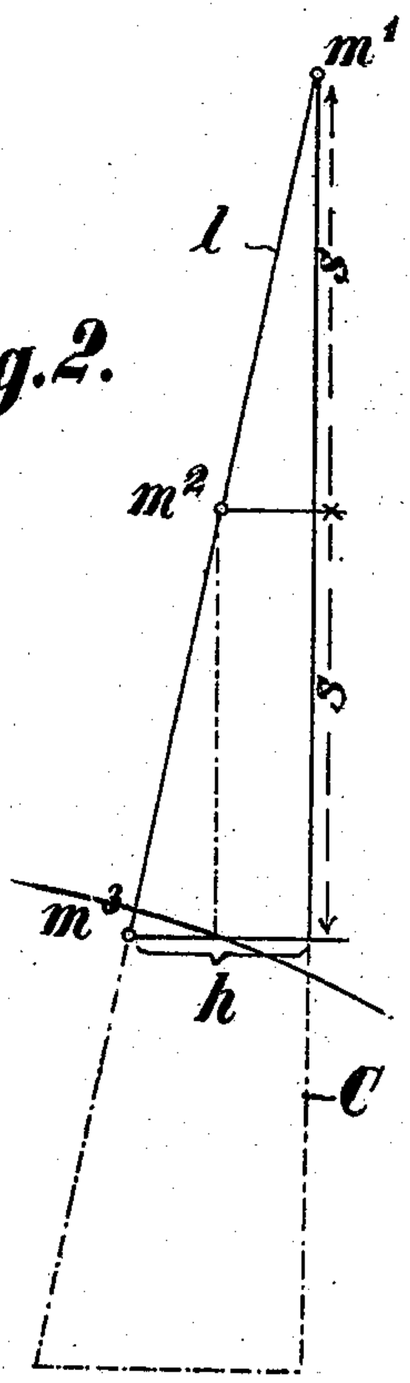
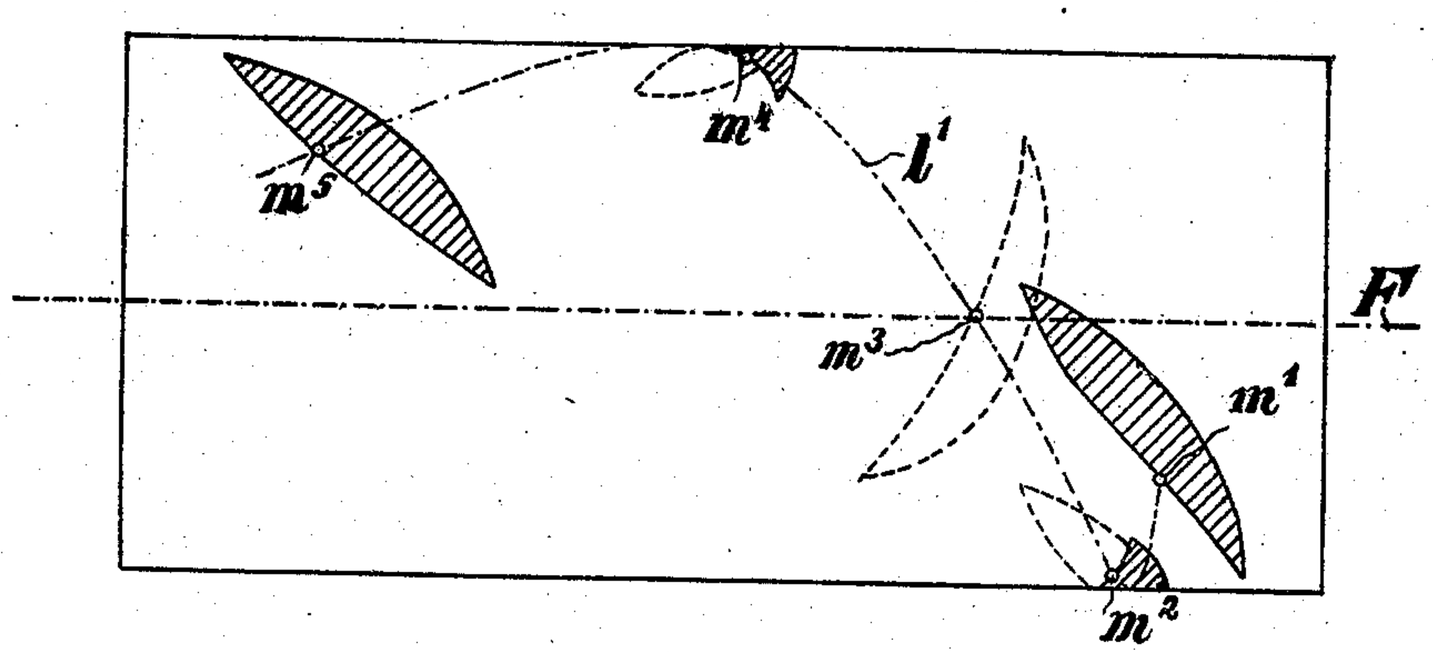


Fig. 5.



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UNITED STATES PATENT OFFICE.

FRIEDRICH AUGUST VON OLDENBURG, OF OLDENBURG, GERMANY.

SCREW-PROPELLER.

No. 858,749. Specification of Letters Patent. Patented July 2, 1907.

Application filed July 19, 1904. Serial No. 217,274.

To all whom it may concern:

Be it known that I, FRIEDRICH AUGUST VON OLDENBURG, residing at Oldenburg, in the Grand Duchy of Oldenburg and German Empire, have invented certain new and useful Improvements in Screw-Propellers, of which the following is a full, clear, and exact description.

The present invention relates to improvements in screw propellers and has for its object to considerably increase the action of ordinary screw propellers with constant or varying inclination. Usually with such screws, especially with a high number of revolutions and considerable inclinations there are formed, in consequence of insufficient flow of water to the center of the screw, cavities in the water (the so called cavitation) which prevent the propeller from exerting its full power, as each following blade enters more or less into the cavity produced by the previous one. If a ship's screw were provided with one single blade which is of course impracticable, as it would place all the stress on one side of the shaft, this cavitation would probably be diminished. A very considerable reduction of same takes place however, as demonstrated by experiments with screws of two and more blades, when the central portions of the screw blades, that is the commencing points m^1, m^2, m^3, of the generating line E at the boss (Figure 1 of the annexed drawing) are not arranged in a plane perpendicular to the axis of the shaft as usual, but following each other in a spiral line 1 arranged in such a manner round the circumference of the boss that the blade A nearest to the energizing end of the shaft acts first, then the second one B placed further back, then the third D, and so forth.

In the invention which the present patent application is designed to protect the bases of the blade as shown by Fig. 3 do not as usual follow the spiral line 1, Fig. 2, or 1^1 Fig. 4, but instead the bases are arranged across the line and at an angle thereto. This arrangement which diminishes cavitation would be of great value, especially for turbine steamers.

Private experiments have further shown that by varying the adjustment of the inclination and surfaces of the blades fixed to a boss, the efficiency of the arrangement of blades to which the present invention refers can be still further increased.

Fig. 1 of the annexed drawing is a side view of a three-blade propeller constructed according to the present invention. Fig. 2 is the development of a spiral line of constant inclination, on which the blades of the propeller represented in Fig. 1 are arranged. Fig. 3 shows the boss of the propeller represented in Fig. 1 with the three blades cut off close to the circumference of the spindle, in order to clearly show the angle of the bases of the propeller blades to the spiral line on which they are arranged. A three-blade right-handed screw propeller forms the basis of Figs. 1 to 3. Fig. 4 shows the construction of a developed spiral line with varying inclination which can be used for the construction of a propeller instead of the spiral line shown on Fig. 2. Fig. 5 is a view similar to Fig. 3, showing the bases of a five-blade propeller arranged along a spiral line with varying inclination.

For the further comprehension of the figures it may be mentioned that the letters E in Fig. 1 represent the generating lines of the three propeller blades A B D. These generating lines the inner ends of which usually intersect the center line F of the shaft pass through the three points m^1 m^2 m^3 of the spiral line 1, (Fig. 1) the inclination of which corresponds with the developed spiral line 1, Fig. 2. The distance h measured in the direction of the axis of the propeller shaft, Fig. 1, between the two blades A and D, thus corresponds with the distance h in Fig. 2; at half the distance of h the blade B is fixed. The length of the base C in Fig. 2 corresponds with the circumference of the cylindrical boss represented in Figs. 1 and 3, or with the mean diameter of a boss deviating from the cylindrical form.

In Fig. 4 is represented the construction of a spiral line with varying inclination intended for a small propeller provided with five blades, such as might be employed for a vessel propelled by steam turbines for example. The points m^1 to m^5 again designate those points on the circumference of the boss occupied by the central lines, that is to say the generating lines of the propeller blades. The letters s designate the angular distances at which the blades of the propeller are to be arranged behind one another in the direction of the circumference of the boss. The letters h^1 to h^4 designate accessory points, through the union of which with the initial point m^1 the points m^2 m^3 m^4 of the spiral line 1 of varying inclination are found by drawing verticals from the points s^1 s^2 s^3. The distances s (Figs. 2 and 4) have been made equal, with the object of attaining, as far as possible, a uniform stress upon the propeller shaft. They may, however, be made unequal.

In all cases it will be observed that the blades have the same general pitch direction as the spiral line upon which they are positioned on the propeller hub. But while the pitch direction is the same as that of this spiral line, the actual inclination or pitch value is different. In other words, the propeller blades have a greater pitch angle than the pitch of the spiral line on which they are positioned. This is a very important feature of the invention, in that while it avoids the cavitation incident to ordinary propellers, it does not cause the damming up of the water which is produced where the blades are set on a spiral line corresponding to their pitch. In other words, each blade has an opportunity to act on the still water toward which the propeller is always moving, rather than

moving in the churned and eddying water which follows behind the propeller.

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

1. A screw propeller having successive blades arranged one behind the other, from front to rear—with their centers located on one geometric spiral line, and the base of each blade being arranged across and at an acute angle to the said spiral line, the angle of the bases of the several blades to said line being different, substantially as set forth.

2. A screw propeller having its blades arranged successively in rear of each other on one spiral line, the inclination of which constantly varies, and the base of each blade being set at an acute angle to such spiral line, and the angle of the base of each blade to said line, being different from the others, substantially as set forth.

3. A screw propeller having successive blades arranged one behind the other, from front to rear—with their centers located on one geometric spiral line, and the base of each blade being arranged across and at an acute angle to the said spiral line, the angle of the bases of the several blades to said line being different, substantially as set forth.

4. A screw propeller having its blades arranged successively in rear of each other on one spiral line, the inclination of which constantly varies, and the base of each blade being set at an acute angle to such spiral line, and the angle of the base of each blade to said line, being different from the others, substantially as set forth.

5. A screw propeller provided with a plurality of blades, the bases of which are disposed on the boss on a spiral or helical line having the same pitch direction as that of the blades, but having a smaller pitch value than that of the blades.

In witness whereof, we subscribe our signature, in presence of two witnesses.

FRIEDRICH AUGUST VON OLDENBURG.

Witnesses:

FRH. VON DALWIGT,

VON VEDVERKOP.