T. SLOPER.

HYDROAEROPLANE, HYDROPLANE, AND THE LIKE.

APPLICATION FILED APR. 29, 1915.

1,161,896.

Patented Nov. 30, 1915.

2 SHEETS—SHEET 1.

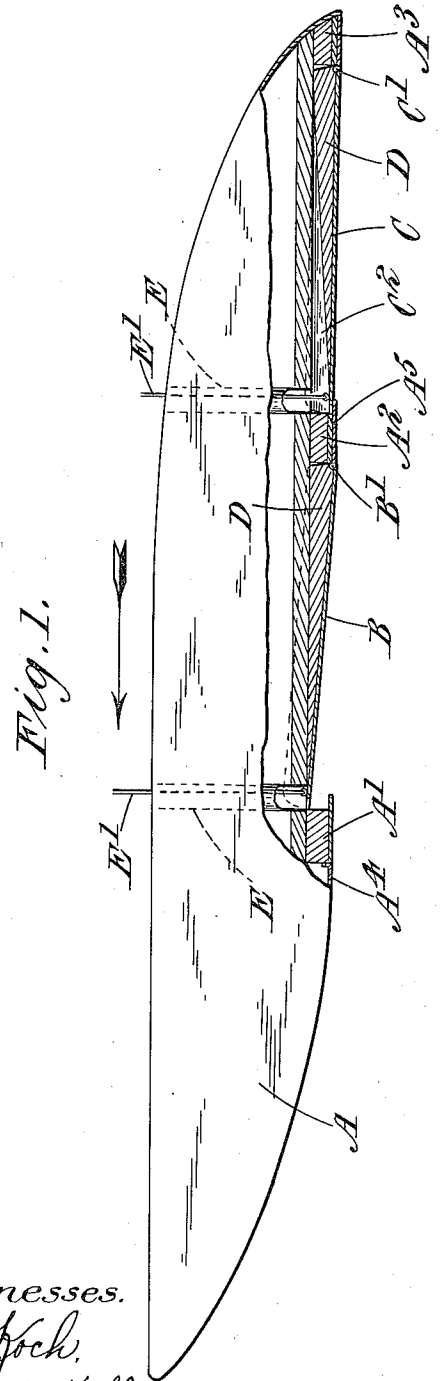


Fig. 1.

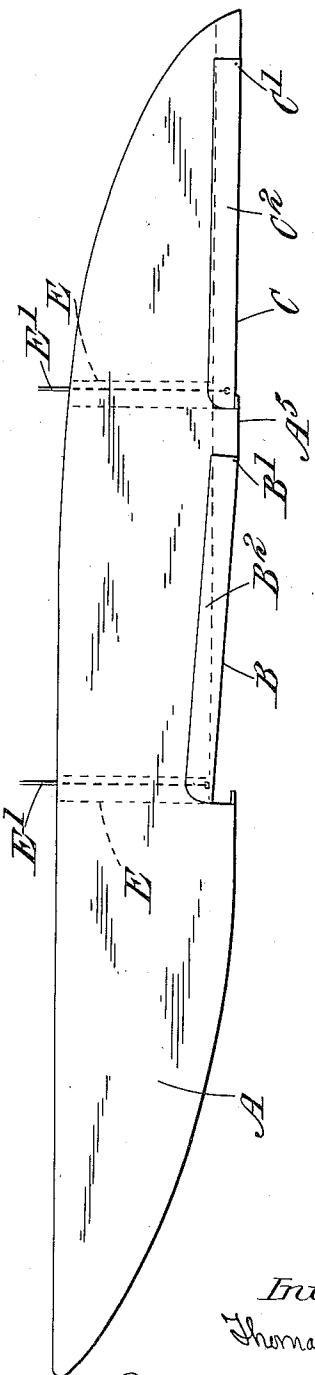


Fig. 2.

Witnesses.
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2 SHEETS—SHEET 2.

Fig. 3.

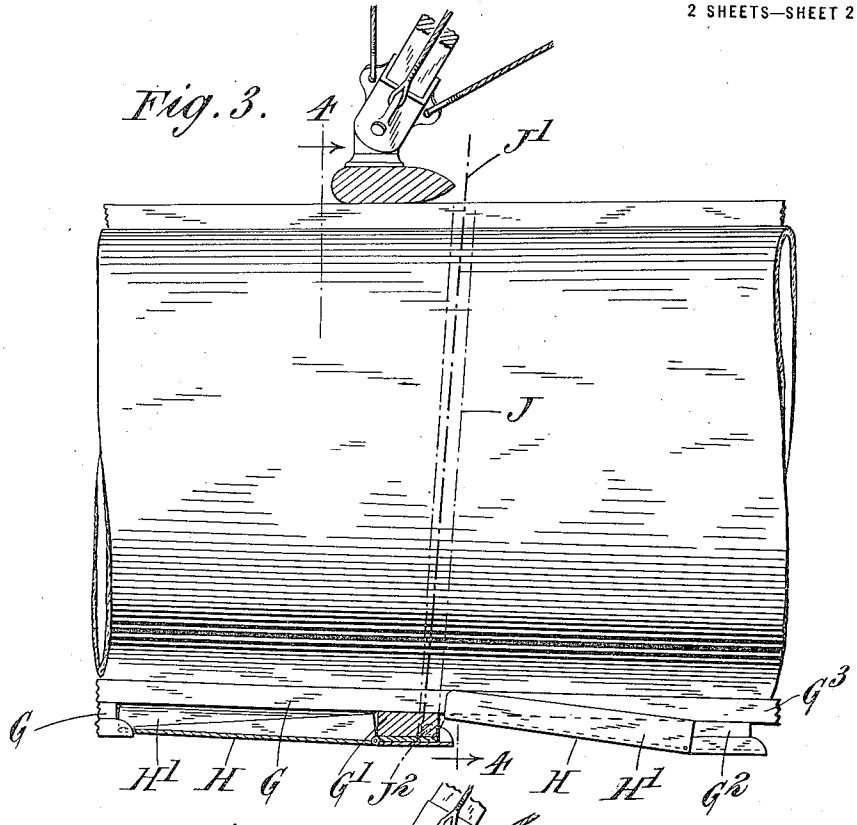
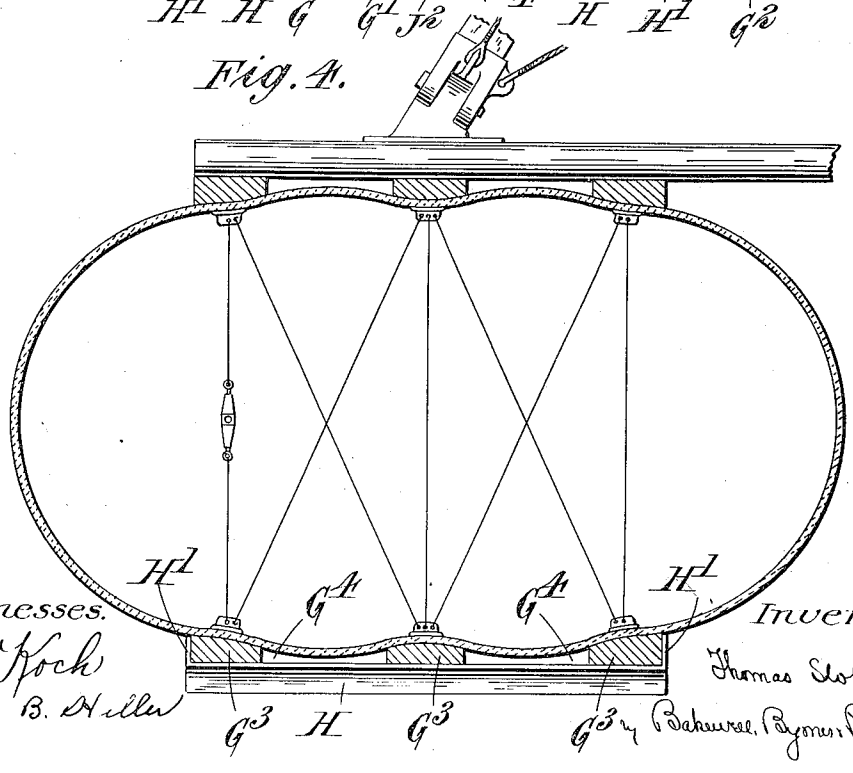


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

THOMAS SLOPER, OF DEVIZES, ENGLAND.

HYDROAEROPLANE, HYDROPLANE, AND THE LIKE.

1,161,896. Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed April 29, 1915. Serial No. 24,727.

To all whom it may concern:

Be it known that I, THOMAS SLOPER, a subject of the King of England, and residing in Devizes, Wiltshire, in England, have invented certain new and useful Improvements in Hydroaeroplanes, Hydroplanes, and the like, of which the following is a specification.

This invention is for improvements in or relating to hydro-aeroplanes, hydroplanes and the like and has for its object to provide such craft with steps which will assist in leaving the water and will not retard the craft when the stepped portion lifts from the water.

According to the present invention, there is employed with steps formed on the under-side of the craft which comes into contact with the water, means for filling out the steps, automatically or otherwise, when said surface is lifted from the water so that the steps, which would retard the progress of the craft through the air, are filled out, and the under-side presents a smooth surface to the air-currents of the stepped surface presented to the water.

The filling means may take the form of a flap or filling-piece hinged behind each step, so that it can be raised or lowered as it is desired to render the step operative or inoperative. The filling-piece may be arranged to be moved out of position by the drive of a part such as the aforesaid flap against the water, or by a float, for example a buoyant portion formed on the flap, or both.

The invention involves other constructional details which are hereinafter fully described and the novel features thereof pointed out in the claims.

In the accompanying drawings:—Figure 1 is a side elevation in part section of a float provided with steps and filling-pieces according to one method of carrying out this invention; Fig. 2 is a full side elevation of the same; Fig. 3 is a side elevation in part section of a portion of another form of float provided with steps and filling-pieces according to the present invention, and Fig. 4 is a transverse section through the same float immediately behind one of the steps.

The same letters indicate the same parts throughout the drawings.

The float A, the body-portion of which may be of wood and of known construction, is provided on its under-side with three transverse-members A^1, A^2, A^3, respectively. From the transverse-member A^1 up to the top of the float extends a curved plate A^4 which gives an easy rise to the forward part of the float and prevents the member A^1 from impeding the progress of the float as it would do if allowed to stand out from the general contour of the underside of the float.

Behind the member A^1 is hinged a flap B. The flap may be of metal and is hinged at B^1 to the transverse-member A^2 at a point which is flush with the under-side of the member. The plate A^4 is extended back behind the member A^1 sufficiently to engage the free end of the flap B so that the latter can rest upon it when it is allowed to fall. Behind the member A^2 is a second flap C hinged at C^1 to the member A^3. This flap is shown in the lowered position and rests upon a plate A^5 secured to the under-side of the member A^2 and extended back sufficiently to catch the free end of the flap C.

Each flap has secured on the top of it a buoyant body D which serves as a float. The outer sides of the flaps have upwardly-turned edges B^2 and C^2 respectively which cover the side spaces which otherwise would occur behind each step when the flap was lowered.

The operation of this device is as follows:—When the float is driven through the water in the direction of the arrow, the buoyant portions D on the flaps B, C, cause the flaps to rise, so that the steps formed by the members A^1, A^2 are rendered operative. Moreover, the rush of water against the under-side of the flaps in itself tends to raise them, and as the float in operation is usually brought to a position in which the front of the float is upwardly inclined, the force of the water striking the flaps is considerable and insures their being kept up, so that the steps can have the desired operative effect. Obviously the flaps could be provided with extensions or units operatively connected to them either to act as inclined planes against the water to lift them, or as buoyant bodies for the same purpose, instead of relying on the flaps themselves for the lifting action. As soon as the float leaves the water, the weight of the flaps causes them to drop so that they rest in the position in which the flap C is shown, and thus constitute filling-pieces which fill out the step and provide a smooth under-surface to the float, whereby

eddy currents which would otherwise be formed behind the steps are avoided, and so the resistance of the float through the air is reduced. It will be seen that the filling-pieces when lowered constitute a continuation of the line of the plate A^4. When lowered, the upwardly turned sides B^2, C^2 effectually seal the side spaces behind the steps so that no in-rush of air takes place at these points. The space behind the steps is commonly provided with means whereby it may be kept in communication with the atmosphere when the step is submerged, and if it is not desired to rely upon any of the before-mentioned means for lifting the flaps, the means for admitting air to the steps may be utilized for making connection between an operating-lever and the flaps so that these can be mechanically lifted. For this purpose, tubes E are shown which extend from behind the step right up through the float and communicate freely with the atmosphere at the top of the float. Through these tubes operating cables E^1 are threaded and connected to the ends of the flaps. These cables may be connected with a lever situated near the pilot so that he can at will raise the flaps by a movement of the lever in one direction, or allow them to fall by a reverse movement of the lever; obviously the flaps may be spring-controlled to insure their return movement whether the cables for raising them are employed or not.

In Figs. 3 and 4 I have shown a modification of my invention which has the advantage that when used as a stepped float with filling means behind the steps the air can readily be admitted to each step without the provision of tubes passing through the body of the float. In this construction, the transverse members G, G^1, G^2, constituting the steps, are carried by longitudinal members G^3, and between the longitudinal members, air-spaces G^4 are left.

The flaps H, H^1 operate as before, but it will be appreciated that air can rush in from the front of the float along air-spaces G^4 between the longitudinal members, and thus relieve the suction between the underside of the float and the water, which, as is well-known, is the purpose for which the steps are provided.

If desired, means may be provided for locking the flaps down, as for example, when the craft is allowed to travel along the water with the flaps submerged and without any immediate intention of lifting from the water. In such case, the flaps being up would only hinder the progress of the craft. Any means may be provided for locking the flaps down, and in Fig. 3 a tube J is indicated in chain line, which passes through the float and allows a cable J^1 to be carried down to a pulley J^2 at the bottom of the step G^1, so that the cable may pass over this pulley and be secured to the under-side of the flap H^1.

Obviously each flap may be provided with an arrangement of this kind, and the cables all connected to one operating-lever so that they can be positively held down when desired. Such an arrangement may be applied to either of the forms of float indicated in the drawings, though it will be understood that that part of the invention which relates to locking-means for the flap is not restricted to this particular means.

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

1. In a hydroaeroplane, hydroplane, or the like, the combination of fixed steps on the underside thereof, which underside comes in contact with the water, and filling flaps mounted one behind each step and pivoted each by its rearward end at a point flush with the bottom of the step so that the forward end can be raised up behind the step or lowered flush with the bottom of the step for the purpose described.

2. A hydro-aeroplane, hydro-plane, or the like, having steps formed on the under side thereof which comes in contact with the water, and means for filling out said steps to provide a flush surface, said means consisting of filling pieces or flaps hinged at their rearward ends, one behind each step and capable of being raised or lowered at their forward ends so that the latter will be up behind the step or flush with the bottom of the step, said flaps or filling pieces having means whereby they are moved by contact with the water, substantially as described.

3. A hydro-aeroplane, hydro-plane, or the like, having steps formed on the under side thereof which comes in contact with the water, and means for filling out said steps to provide a flush surface, said means consisting of filling pieces or flaps hinged at their rearward ends, one behind each step and capable of being raised or lowered at their forward ends so that the latter will be up behind the step or flush with the bottom of the step, said flaps or filling pieces having means for returning them to operative position when relieved from the pressure of the water, substantially as described.

4. A hydro-aeroplane, hydro-plane, or the like, having steps formed by a plurality of transverse members constituting a part of the framework of the under side or float portion of the craft, and a series of flaps for filling said steps, each of said flaps being hinged at its rearward end to one transverse member and reaching forward to another transverse member, said flaps being capable of being raised up behind the step at their forward ends or lowered flush with the bottom of the step, substantially as described.

5. A hydro-aeroplane, hydro-plane, or the

like, having steps formed on the under side thereof which comes in contact with the water, and means for filling out said steps to provide a flush surface, said means consisting of filling pieces or flaps hinged behind each step and capable of being raised or lowered, said flaps or filling pieces having side plates adapted to seal the side spaces behind the steps, substantially as described.

6. A hydro-aeroplane, hydroplane, or the like, having steps formed on the under-side thereof which comes in contact with the water, which steps face the rear of the craft the under-side being sloped gradually down to them at the front, and means for filling out said steps to provide a flush surface from the lower point of one to the lower point of the other when the machine is lifted from the water, substantially as described.

7. A hydro-aeroplane, hydroplane, or the like, having steps formed on the under-side thereof which comes in contact with the water, which steps face the rear of the craft, the under-side being sloped gradually down to them at the front, and means for filling out said steps to provide a flush surface from the lower point of one to the lower point of the other when the machine is lifted from the water, said means consisting of filling-pieces or flaps hinged behind each step and capable of being raised or lowered, substantially as described.

8. A hydro-aeroplane, hydroplane, or the like, having steps formed on the under-side thereof which comes in contact with the water, which steps face the rear of the craft the under-side being sloped gradually down to them at the front, means for filling out said steps to provide a flush surface from the lower point of one to the lower point of the other when the machine is lifted from the water, said means consisting of filling-pieces or flaps hinged behind each step and capable of being raised or lowered, and said flaps or filling-pieces having means whereby they are moved by contact with the water, substantially as described.

9. In a hydro-aeroplane, hydroplane, or the like whereof the under-side is formed of flexible material distended by pneumatic means, the combination of longitudinal members secured to the flexible material on the said under-side and spaced apart laterally, transverse members secured across the longitudinal members and to the under-side of the same, an upwardly-directed filling-piece (A^4) secured to and extending forwardly of the first transverse member so that a smooth surface is presented to the water in front of it while the back portion of said member constitutes a step, and hinged filling-pieces between this and the next and the following transverse members which can be moved to present an inclined surface from the upper portion of one transverse member down to the lowest point of the next rearwardly-situated transverse member when the craft is on the water but can be lowered to provide a flush surface between the said transverse members when the craft is out of the water, a free space being at all times left between the longitudinal members above the filling-pieces for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS SLOPER.

Witnesses:

HARRY B. MIDGE,

STANLEY R. MOORE.