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2,145,459

METHOD OF LAUNCHING SEAPLANES

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2 Sheets-Sheet 1

Fig. 2

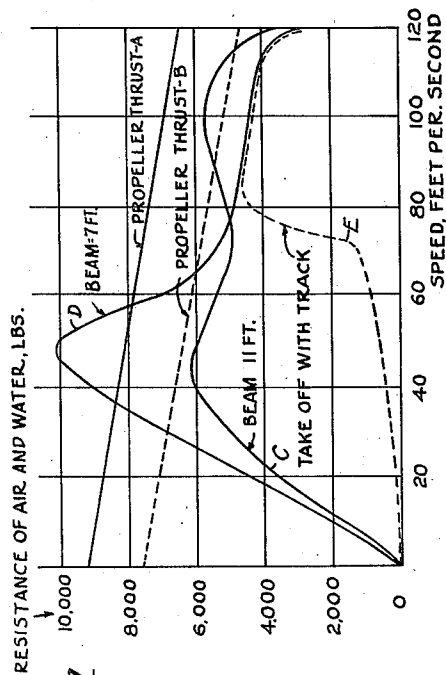
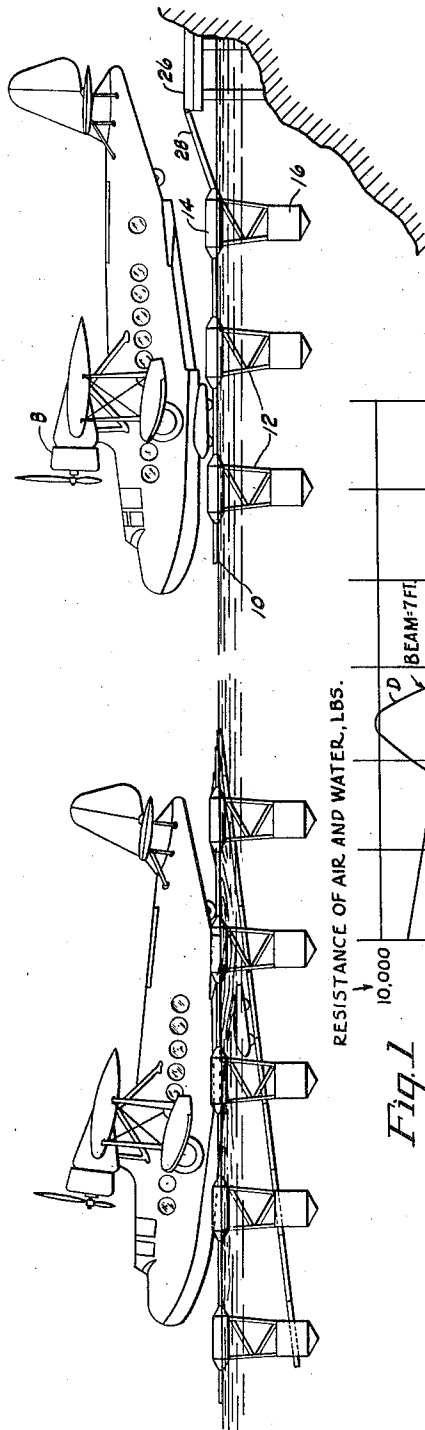


Fig. 1

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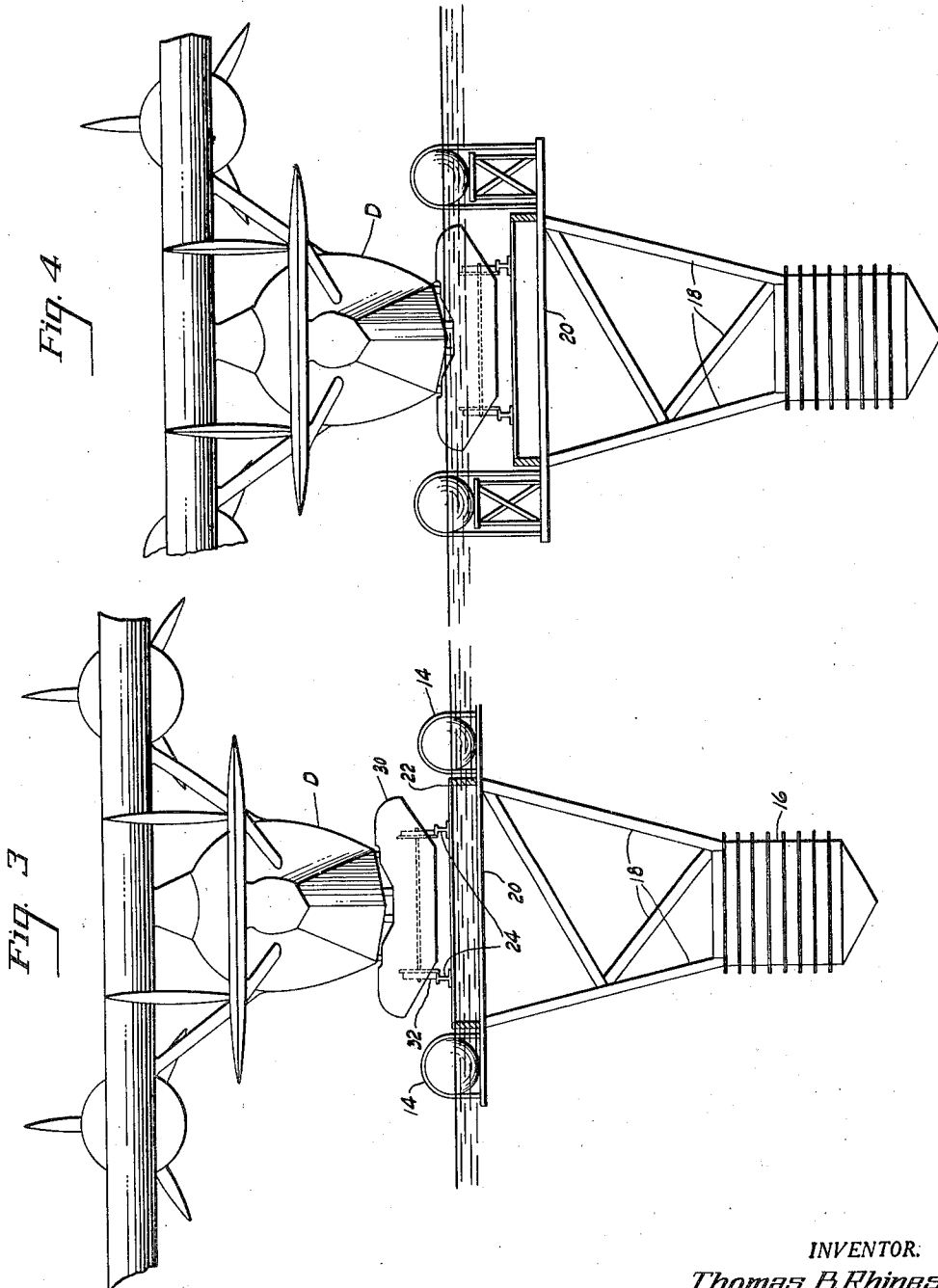
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METHOD OF LAUNCHING SEAPLANES

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9 Claims. (Cl. 244—63)

This invention relates to improvements in methods of launching seaplanes and has for an object the provision of an improved method and apparatus for launching seaplanes whereby a seaplane designed for efficient flight may be launched from the water with an amount of power proportioned to the weight of the seaplane for economy and efficiency in flight rather than primarily for getting the seaplane off the water and into the air.

A further object resides in the provision of an improved method and apparatus for launching seaplanes which will not subject the seaplane to unusual strains and which does not necessitate the use of power additional to that provided by the seaplane itself nor necessitate complicated attachment to the seaplane nor difficult methods of handling although additional power for launching may be utilized if desired.

A still further object resides in the provision of a method and apparatus for launching seaplanes which is not unduly expensive to install and operate and which may be efficiently used under all practical launching conditions.

Other objects and advantages will be more particularly pointed out hereinafter or will become apparent as the description proceeds.

In the accompanying drawings, in which like reference numerals are used to designate similar parts throughout, there is illustrated more or less diagrammatically, an illustrative apparatus by means of which the improved method forming the subject matter of the invention may be carried out. The drawings, however, are for the purpose of illustration only and are not to be taken as limiting the invention the scope of which is to be measured entirely by the scope of the appended claims.

In the drawings—

Fig. 1 is an illustrative group of curves graphically illustrating the conditions encountered in the launching of seaplanes.

Fig. 2 is a somewhat schematic illustration of a suitable apparatus and method of launching seaplanes, according to the idea of this invention.

Fig. 3 is a cross-sectional view of the seaplane launching apparatus taken at a location in which the seaplane is entirely out of the water and,

Fig. 4 is a sectional view similar to Fig. 3 taken at a position in which the seaplane is entering the water.

Referring to the drawings in detail and particularly to Fig. 1, it will be observed that a primary consideration in the launching of sea-

planes involves the breadth of beam of the hull or float, and the power loading.

As a suitable exemplification of the conditions encountered, the full line curve C shows the launching characteristics of a relatively wide beam flying boat, a beam of approximately 11 feet having been chosen for the purpose of the illustration. The curve D represents the launching characteristics of a relatively narrow beam boat, a beam of 7 feet having been chosen as illustrative of such conditions. The two curves C and D then illustrate the launching characteristics of two similar boats having the same weight and the same dimensions except that their beam widths are in the ratio of 11 to 7. The curves or lines A and B represent two possible power loadings in terms of direct propeller thrust for the two boats, the curve B indicating a power loading giving a propeller thrust entirely adequate for efficient flight when the boat is in the air, and the curve A representing a much higher power, that is a much greater propeller thrust in proportion to the weight of the boat, such as is at present conventionally applied in the design of flying boats.

Looking at the curves C and D it will be observed that there are two critical stages in the launching of a seaplane or flying boat in which the resistance of the boat to take-off reaches a maximum. The first stage occurs in obtaining the forward speed necessary to get the seaplane up onto the aquaplaning step of the hull or float, and the second condition occurs in breaking the suction attraction between the step and the water and getting the seaplane entirely into the air. From the curves it will be observed that a narrow beam seaplane is extremely difficult to get up onto the step but that once it has started to plane on the step, it will take off with relatively little difficulty. This is true because the step is narrow and relatively large forces necessitating high forward speed are required to get the seaplane up onto the step. On the other hand the wide beam seaplane C will come onto the step fairly easily but because of the large area of the step and the consequent large amount of resistance to breaking the suction between the step and the water the seaplane will not so easily take off after it has started to plane on the step, in many cases a much greater amount of power being required to get the seaplane into the air than is required for efficient flight after the take-off.

From a consideration of Fig. 1 it will be observed that the narrow beam seaplane D, which is

designed for high aerodynamic efficiency will not take off with power loading of either A or B since the greater propeller thrust A is still not sufficient to overcome the first resistance and get the seaplane up onto the step. The wide beam seaplane C will obviously take off with the propeller thrust A but will not take off with propeller thrust B since that thrust, although entirely sufficient for efficient operation once the seaplane is in the air, is not sufficient to break the suction between the step and the water and get the seaplane into the air.

The conclusion to be drawn from the illustrative curves A, B, C and D is that with ordinary methods of launching, the seaplane must be designed for take-off from the water rather than for good aerodynamic efficiency, and must be given power greatly in excess of that necessary to the efficient operation of the seaplane when in flight. The wide beam causes the seaplane to have an excessive drag in the air since the bottom of the hull or float of the seaplane is the only portion of the boat that cannot be streamlined. The greater power necessary for take-off adds additional weight and results in a lower fuel economy than would be possible if the correct amount of power for efficient flight were carried. As the major part of a seaplane's operation is in the air, and take-off is only an incidental and temporary condition of operation, it is apparent that the necessity of designing a seaplane for take-off is a compromise which is highly expensive to efficient operation.

Still referring to Fig. 1 the curve indicated by E represents the take-off condition that can be obtained with the improved method and apparatus forming the subject matter of this invention.

Under the conditions indicated by the curve E the seaplane float or hull is kept out of the water until the seaplane has reached a forward speed greater than the speed necessary to place it on the planing step. The seaplane is then permitted to enter the water as indicated by the vertical rise in the curve, (at approximately 80 miles as indicated on the chart shown in Fig. 1). Using the narrow beam float D, the power supplied by the propellers in addition to the momentum of the seaplane will keep the seaplane on the step for the short period necessary before the seaplane entirely leaves the water. Thus by the use of the improved method and apparatus a seaplane having narrow beam hull or float designed for high aerodynamic efficiency may be launched with a power loading designed for efficient operation in flight rather than primarily for take-off conditions, and thus the optimum operating conditions may be obtained.

The apparatus for carrying out the improved launching method comprises a track 10 supported by suitable spaced floats as indicated at 12. The floats may be, and preferably are, designed with both surface flotation elements and submerged flotation elements as indicated at 14 and 16 respectively to give the maximum stability to the track. The floats of each group are rigidly secured together by suitable frame work, as indicated at 18 and 20 in Figs. 3 and 4, and the groups are secured together by a suitable track bed 22 upon which is mounted the track 24. The land end of the track may be connected to a wharf or apron 26 by a suitable ramp 28, and the track is preferably movable so that it can be located in various conditions favorable to the prevailing wind.

The track starts at a level above the water line and continues above the water line for a predetermined distance, as indicated in Figs. 2 and 3 in order that during this portion of its travel the seaplane may attain the forward speed necessary to sustain it on the planing step. At the end of the above distance the track gradually inclines downwardly into the water, as indicated in Fig. 4, to bring the seaplane onto the water in a position to continue the take-off from the planing step.

The seaplane is carried upon the track 24 by a suitable dolly 30 provided with anti-friction wheels or rollers 32. This dolly is so designed that the seaplane may be balanced upon it without any tension connections between the seaplane and the dolly so that as soon as the seaplane takes to the water, it will leave the dolly and the dolly will continue for a short distance under water and will be entirely free of the seaplane at the instant of launching.

Landing with the narrow beam hull or float B presents no difficulties and in fact has material advantages in that a seaplane with a narrow beam tends to lose its forward speed much more quickly when it is brought down on the water and there is less tendency for such a seaplane to bounce or skip than there is in the case of a seaplane having a wide beam hull or float.

With the arrangement described the track may be made relatively short since the seaplane does not traverse a great distance in increasing its speed from zero to its planing speed. Obviously the distances traversed for slight increases in speed are relatively greater as the speed increases so that while the time elapsed between the instant the seaplane enters the water on its planing step to the instant of take-off may be quite short, the distance traversed in that time may be relatively great as the seaplane is then moving at high velocity.

While there has been schematically illustrated and described a suitable method and apparatus for applying the method in accordance with the idea of the invention, it is to be understood that the method may be applied in various ways and may utilize various forms of apparatus, the principal object being that the seaplane shall have attained its planing speed before it enters the water and, upon entering the water is sufficiently sustained by the lift incident to its forward speed that it will remain on the planing step during the interval necessary to gain sufficient additional speed for take-off.

While there has been illustrated and described a method and apparatus sufficient to fully disclose the idea of the invention to those skilled in the art, it is to be understood that the invention is not limited to the particular method and apparatus so illustrated and described, but that such changes may be resorted to as come within the scope of the appended claims.

Having now described the improved method and apparatus so that others skilled in the art may clearly understand the same, what is claimed and what it is desired to secure by Letters Patent is as follows:

1. An improved method of launching a seaplane which comprises sustaining the seaplane above the surface of the water until the seaplane has reached a forward velocity at which it will ride on its planing step, and then transferring the seaplane to the water.

2. A method of launching an aircraft adapted to take-off from water which comprises, sup-

porting the aircraft out of the water and on a track during the initial portion of the take-off run and until the aircraft has attained a forward velocity such that its resistance to forward movement if the aircraft were in the water would remain less than the propulsive force of the available power, and then gradually transferring the aircraft to the water for the remainder of the take-off run.

3. A method of launching an airplane adapted to take-off from water which comprises accelerating the airplane out of the water until the airplane has reached a forward velocity such that it would ride on its planing step if in the water, and then transferring the airplane to the water.

4. A method of launching a seaplane which comprises accelerating the seaplane under land-plane conditions to a speed such that the seaplane would ride on its planing step if the seaplane were in the water, transferring the seaplane to the water, then completing the take-off under seaplane conditions.

5. A method of launching a seaplane which comprises accelerating the seaplane along a track which supports the seaplane free of the water to a speed such that the seaplane would ride upon its planing step if the seaplane were in the water, transferring the seaplane to the water, then further accelerating the seaplane along the surface of the water.

6. A method of launching an aircraft adapted to take-off from water which comprises accelerating the aircraft while sustained under land-plane conditions to a speed such that the resistance to forward motion, if the craft were in the water, would continue to decrease up to the point

of take-off, transferring the craft to the water, then further accelerating the aircraft while on the water under seaplane conditions until the aircraft is launched.

7. A method of launching a seaplane having a relation of beam width to seaplane weight and engine power such that the seaplane is unable to accelerate to planing speed while in the water which comprises, accelerating the seaplane along a track which supports the seaplane free of the water for a distance sufficient to acquire the speed which would be necessary to maintain the seaplane on its planing step if the seaplane were in the water, transferring the seaplane to the water, and completing the remainder of the take-off run on the water.

8. A method of launching an airplane adapted to take-off from the water and having at certain speeds a resistance to forward motion if in the water, greater than the available propulsive thrust, which comprises, accelerating the airplane out of the water to a speed, greater than said certain speeds, where the propulsive thrust is greater than said resistance, and then transferring the airplane to the water.

9. A method of launching an airplane adapted to take-off from the water and having at certain speeds a resistance to forward motion, if in the water, greater than the available propulsive thrust, which comprises accelerating the airplane out of the water to a speed, greater than said certain speeds, where the propulsive thrust remains greater than said resistance up to the point of take-off, and then transferring the airplane to the water.

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