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M. I. HAAR ET AL

2,991,745

SLOTTED NOSE HYDROSKI

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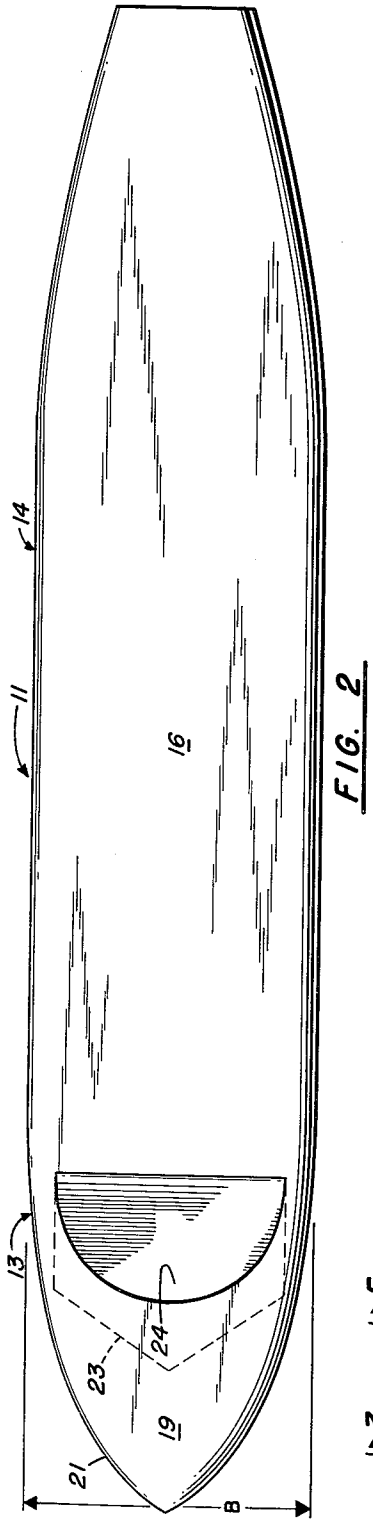


FIG. 2

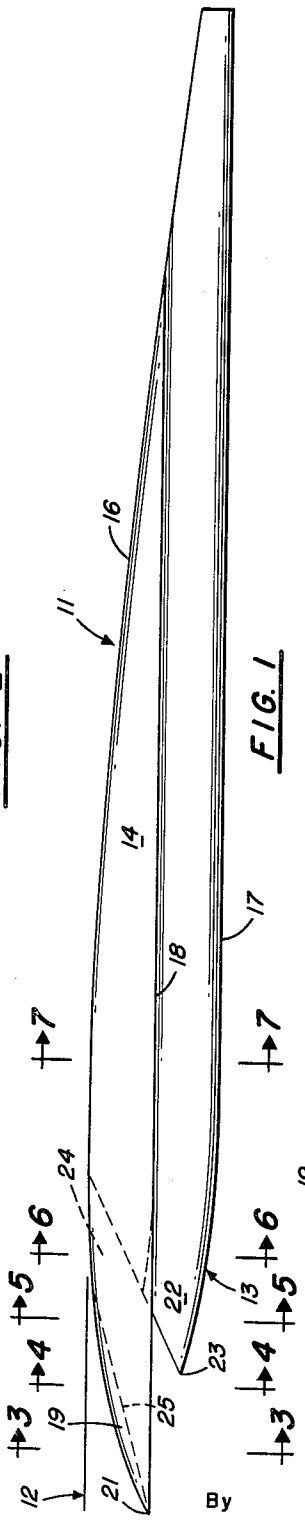


FIG. 1

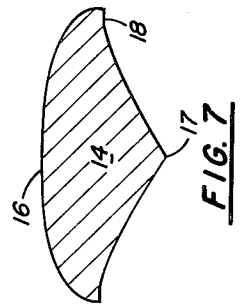


FIG. 7

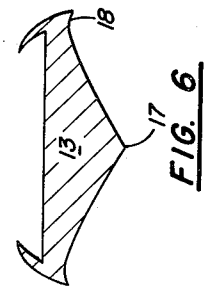


FIG. 6

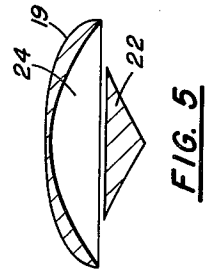


FIG. 5



FIG. 3



FIG. 4

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SLOTTED NOSE HYDROSKI

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The present invention relates to improvements in hydroskis and more particularly to a new and improved hydroski having a slotted nose for reducing unporting spray formed during emergence of a hydroski attached to an aircraft.

In the operation of hydroski aircraft it has been found that a large burst of spray is thrown up at the nose of the ski as it breaks through the water surface and that frequently this spray interferes with the aerodynamic surfaces or propulsive system of the aircraft to an extent which can seriously hamper or prevent take-off. In the past, in order to reduce emergence spray, the ski nose was generally kept pointed. To be effective a long narrow point is required. This introduces structural problems which outweigh the advantages in spray reduction.

The general purpose of the invention is to provide a hydroski which embraces all the advantages of presently employed hydroskis without having emergence spray. To attain this, the present invention consists of the formation of an opening or slot which passes from the upper surface to the lower surface of the hydroski. The slot is arranged and dimensioned so as to substantially reduce emergence or unporting spray.

An object of the present invention is to provide an improved hydroski for reducing emergence or unporting spray.

Another object is to provide an improved hydroski for reducing variations in hydrodynamic forces and moments during emergence.

A further object of the invention is the provision of an improved hydroski having improved hydrodynamic characteristics while remaining structurally sound.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 shows an elevation view of a preferred embodiment of the invention;

FIG. 2 shows a plan view of a preferred embodiment of the invention;

FIG. 3 shows a section of the invention taken on the line 3—3 of FIG. 1 looking in the direction of the arrows;

FIG. 4 shows a section of the invention taken on the line 4—4 of FIG. 1 looking in the direction of the arrows;

FIG. 5 shows a section of the invention taken on the line line 5—5 of FIG. 1 looking in the direction of the arrows;

FIG. 6 shows a section of the invention taken on the line 6—6 of FIG. 1 looking in the direction of the arrows; and

FIG. 7 shows a section of the invention taken on the line 7—7 of FIG. 1 looking in the direction of the arrows.

Referring now to the drawings wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1 a hydroski 11 submerged beneath a water line 12. Said hydroski has a nose portion 13 connected to the bow of body portion 14 which has a deck 16, a keel 17 and a chine 18. The nose portion 13 is especially suited to reduce a particular type of spray called unporting spray which is associated with emerging hydroskis. As forward speed of the hydroski 11 is increased during take-off, a hydrodynamic lift force develops on the ski which causes the ski-nose 13 to come up through the water surface. Normal ski noses produce a large quantity of spray during emergence or unporting. Nose 13, however, is of an improved construction to reduce such spray. In FIG. 1 nose portion 13 is illustrated as having a top hood 19 which in turn has a leading edge 21. The hood 19 is downwardly curved and is relatively thin sectioned as seen in FIGS. 3 through 5. The curved down hood 19 and leading keel portion 22 minimize the disturbance created at the leading edges 21 and 23 and deflect any undesirable flow to the sides aft of the nose 13. Longitudinally rearward of hood 19 a leading keel portion 22 forms the bottom portion of nose portion 13. Keel portion 22 has a leading edge 23. A slot 24 is formed in nose portion 13 so as to pass from bottom surface or keel 17 of the hydroski to the top surface or deck 16 of the hydroski. The slot 24 is placed as far forward as possible and in such a way that top hood 19 is very thin. The slot 24 is made as wide as is structurally feasible and though its longitudinal dimension is dependent upon operating conditions it will be approximately one-half of the ski beam B. Furthermore, the slot 24 is slanted so that the upper end is further aft than the bottom end. The degree of slant is such that the forward wall 25 of the slot is approximately in a horizontal plane when the ski emerges. Fifteen degrees has been found to be suitable degree of slant or trim angle for a workable design.

The operation of the improved hydroski is as follows: In order to better indicate the invention the operation will initially be compared with the hydrodynamic characteristics of an ordinary hydroski. During the emergence of the usual type of hydroski a high pressure occurs at the forward end of the ski. This pressure causes a flow of water up vertically in the bow region of the ski which forms the emergence or unporting spray. The hydrodynamic action during emergence of the improved hydroski set forth above is as follows. As forward speed increases a hydrodynamic lift force develops on the ski and the nose 13 approaches the free water surface 12, the water is disturbed by the leading edge 21 of hood 19, channeled into the slot 24 and washed along the deck 16 of the ski, instead of being thrown up in the form of spray. The water emerging from slot 24 is not thrown up as spray for two reasons: first, because the lifting or planing of the ski effectively places slot 24 in a horizontal position so that water rushes through the slot unimpeded and with no distance to fall; and second, because of the law of fluiddynamics known as the "Coanda effect" which causes fluids to flow smoothly along convex surfaces. As the ski continues to rise the leading edge 23 of keel portion 22 intersects the free water surface and generates a spray. This spray is reflected down by hood 19. Thus, during all phases of emergence unporting spray is effectively reduced so as to avoid resistance and physical damage to the craft being supported by the hydroskis.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A hydroski or the like comprising a body portion having a deck, a chine and a keel, a nose portion attached to the forward end of said body portion, said nose portion having a top hood and a leading keel portion, said nose portion also having a rearwardly slanting slot formed therein between said top hood and said keel portion whereby emergence spray is suppressed.

2. A hydroski or the like comprising a body portion having a deck, a chine and a keel, a nose portion attached to the forward end of said body portion, a hood on said

nose portion, a keel portion on said nose portion, said nose portion having a slot formed therein slanted at 15° so that the upper end is further aft than the bottom end, said slot commencing between said hood and said keel portion and terminating at said deck whereby emergence spray is suppressed.

3. A hydroski or the like comprising a body portion having a deck, a chine and a keel, a nose portion attached to the forward end of said body portion, a downwardly curved hood on said nose portion, a keel portion on said nose portion located aft of said hood, said nose portion having a slot formed therein, said slot slanted at 15° so that the upper end is further aft than the bottom and the degree of slant being such that the forward wall of said slot is approximately in a horizontal plane when the ski emerges, said slot commencing between said hood and said keel portion and terminating at said deck whereby on initial emergence of said hydroski said hood channels water into said slot and along said deck and on higher emergence said keel portion creates spray which is reflected downwardly by said hood so as to minimize emergence spray.

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