April 28, 1931. F. WURTH 1,802,996

FLYING BOAT

Filed April 5, 1930 2 Sheets-Sheet 1

Fig. 1.

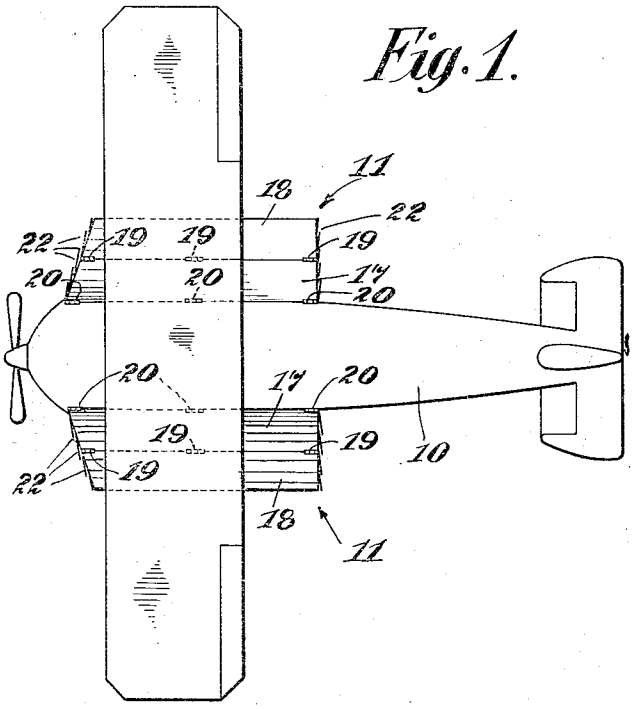


Fig. 2.

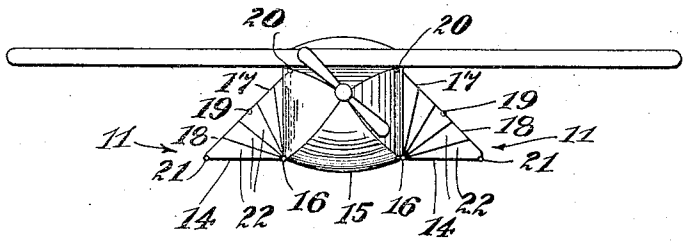
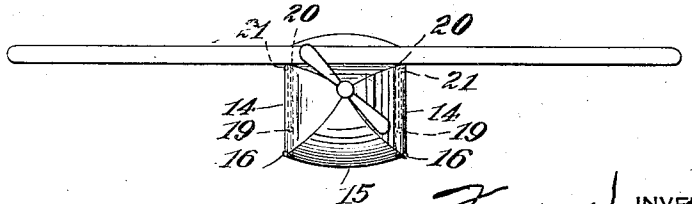


Fig. 3.



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Fig. 4.

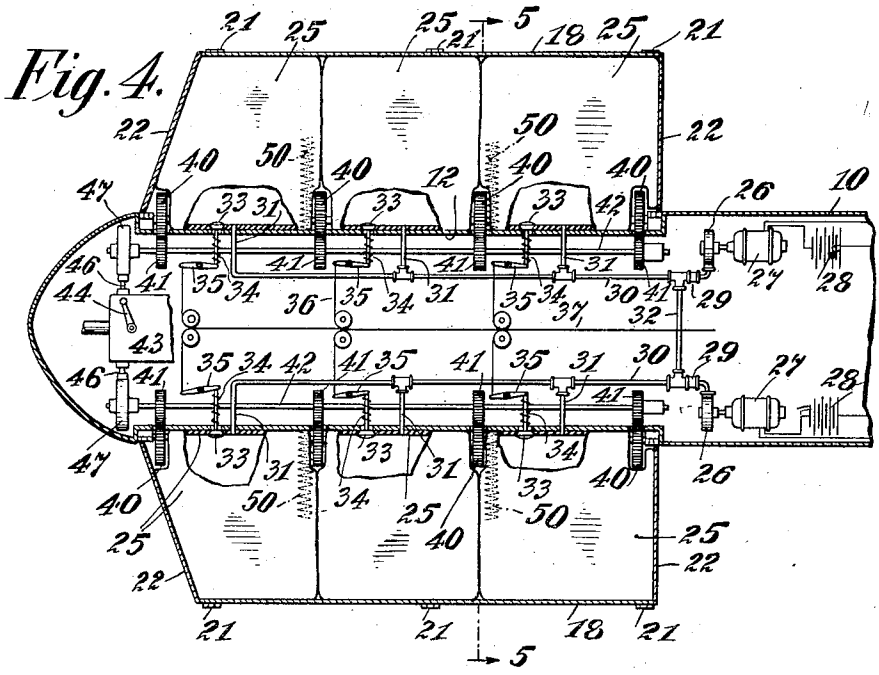


Fig. 5.

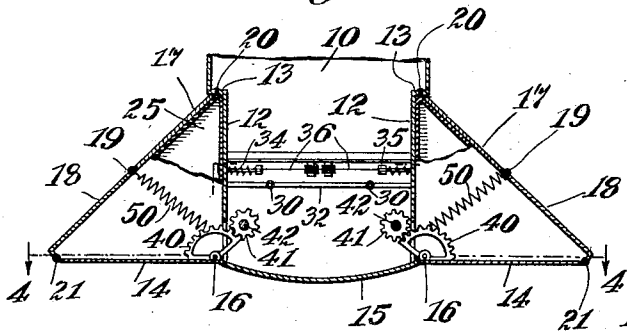


Fig. 7.

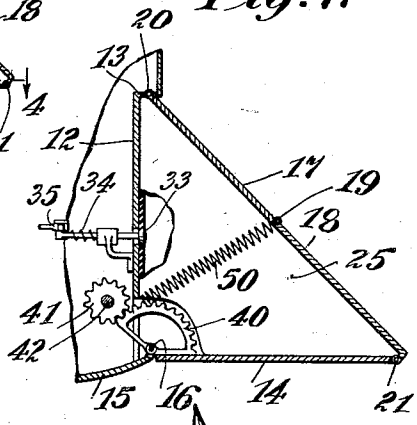
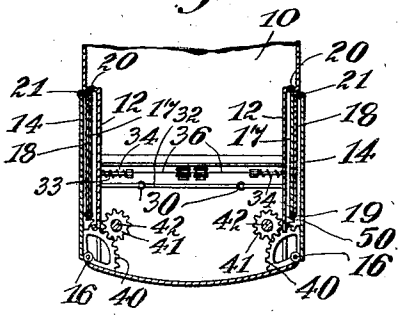


Fig. 6.



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Patented Apr. 28, 1931

1,802,996

UNITED STATES PATENT OFFICE

FRANZ WURTH, OF NEW YORK, N. Y.

FLYING BOAT

Application filed April 5, 1930, Serial No. 441,756, and in Germany January 9, 1928.

My invention relates to aeroplanes of the boat type and its principal object is to increase the displacement, or floating capacity of the craft, and resistance to wave shocks or pounding when resting on the water, and at the same time to avoid increasing the hull area and air resistance when flying.

To this end, the invention provides at opposite sides of the hull, collapsible flotation chambers which may be open or expanded while the craft is resting on the water, and collapsed while flying to such a position that the parts of the chamber structure do not extend beyond the ordinary or normal outlines of the hull, and therefore air resistance is no greater than in the case of an ordinary flying boat hull structure.

Suitable means are provided, under control of the pilot, for moving the chambers to expanded or collapsed positions. Preferably the chambers enclose flexible air containers, of the nature of rubber bags, which make the chambers practically or completely water-tight and also assist in maintaining them in expanded position. The air containers may be filled with air at atmospheric pressure in the act of expanding the chambers, or means may be provided for pumping air into the air bags at any desired pressure.

The characteristics and advantages of the invention are further sufficiently explained in connection with the following detail description of the accompanying drawings, which show representative embodiments. After considering these examples, skilled persons will understand that many variations may be made without departing from the principles disclosed, and I contemplate the employment of any structures that are properly within the scope of the appended claims.

Fig. 1 is a top plan of a flying boat embodying the invention in one form.

Fig. 2 is a front elevation showing the flotation chambers extended or expanded.

Fig. 3 is a similar view showing the chambers collapsed.

Fig. 4 is an enlarged horizontal section in the plane 4—4, Fig. 5.

Fig. 5 is a transverse section at 5—5, Fig. 4.

Fig. 6 is a similar section showing the chambers collapsed.

Fig. 7 is a detail view in cross-section through one of the chambers as arranged for inflation of its air bags at atmospheric pressure.

The air craft shown is a flying boat of monoplane type but obviously the invention is not limited as to number of arrangement of the wings or air-foils. The hull 10 may be as usual with the exception of expansible flotation chambers 11, one at each side of the hull and usually extending from a point near the bow to a desired distance aft, say, as shown, to a point approximately amidship. For the accommodation of the chambers when collapsed within a normal hull outline, the forward vertical walls 12 of the hull are preferably inset as best shown in Figs. 5 and 6, with shallow horizontal wall portions 13 above the vertical walls. Each collapsible chamber includes an outer or bottom plate 14 hingedly connected to the lower edge of the adjacent wall 12, or to the hull bottom 15 at a longitudinal axis 16, and upper and lower side or outer plates 17 and 18 respectively. The latter plates are hingedly connected together at 19; upper plates 17 are hingedly connected at 20 in slot formations in the horizontal walls 13, and the lower plates are hingedly connected at 21 to the outer edges of the bottom plates 14. The front and rear ends of the chambers consist of substantially triangular plates 22, in overlapping relation and pivotally connected at the hinge axis 16. These plates act as the chambers are opened or collapsed, in the same manner as a part of an iris diaphragm.

Each chamber encloses one, or usually, as shown, a desired plurality of air bags 25, of suitable flexible, air and water-tight material such as rubber or rubberized fabric. For inflating these bags at greater than atmospheric pressure, I provide one, or preferably, as shown, at least two air pumps 26 of any suitable type, each driven by an electric motor 27, energized by a battery 28. The provision of the pumps and motors in duplicate insures proper inflation of the bags in case of breakdown of either unit. The pumps

discharge through check valves 29 to pipes 30 having branch connections 31 to the various air bags; and preferably pipes 30 also have a cross-connection 32 adjacent the check valves, so that both pipes and all the air bags may be properly inflated by air supplied from either pump. Each air bag has a discharge valve 33 seating outwardly, and held in closed position by a light spring 34. The valve stems are operated by levers 35 and cord connections 36 leading to a common control cord 37 which may terminate at any convenient point for manual operation and simultaneously opening all of the valves as the flotation chambers are collapsed and the air bags deflated.

In some cases the air pumps and connections to the bags may be omitted and provision is then made (as shown in Fig. 7) for inflation of the bags by atmospheric pressure. The valves 33 may be arranged and operated as previously for release of air. When the chambers are expanded the light valve springs 34 permit the valves to open and admit air which fills the bags at atmospheric pressure.

For positively or mechanically expanding and collapsing the chambers, each of the bottom plates 14 has one or a suitable plurality of gear segments 40 centered at the corresponding hinge axis 16, and these segments are engaged by pinions 41 on longitudinal shafts 42. In some cases the shafts may be suitably connected and simultaneously operated by manual power, but usually mechanical power is required for proper and rapid operation of the chambers. Thus, as shown, a gear box 43 contains suitable reversing gearing and a friction clutch controlled by a hand lever 44. From the clutch transverse shafts 46 extend to gear boxes 47 containing worm and worm connections to the respective pinion shafts 42. Thus by proper manipulation of the controlling lever 44 the pinion shafts may be rotated in either direction, and the pinions act on gear segments 40 to move plates 14 to outward or extended position as shown in Fig. 5, or to inward or collapsed position as shown in Fig. 6 where these plates are parallel to the sides of the hull and practically flush with the sides. As plates 14 are moved upward or inward, the side plates 17 and 18 fold inward at their hinged joints 19, and to insure the proper initial movement of the latter plates to folded position, springs 50 may be provided, tensioned between the hinge joints 19 and fixed points on side walls 12. When the plates 14 are in collapsed or folded position as in Fig. 6, plates 17 and 18 are also folded into contact with each other and are enclosed between plates 14 and walls 12. In the collapsing action the air valves 33 are of course opened to permit deflation and collapse of the air bags. When plates 14 are moved outward, plates 17 and 18 are automatically unfolded, or moved to the position of Fig. 5 and as the chambers are thus expanded the air pumps are operated to inflate the air bags under positive pressure, or in accordance with Fig. 7 the bags are permitted to fill at atmospheric pressure by the automatic opening of valves 33.

When the chambers are expanded as shown in Figs. 5 and 7, plates 17 and 18 are aligned in a single plane and act practically as a straightened toggle link, to positively maintain the entire chamber structure in the stated position, with ample resistance to wave impact or other forces tending to cause collapse of the chambers.

The chambers are expanded and the bags filled with air before alighting on the water (or of course in some cases the chambers may be expanded after alighting); and after rising from the water the chambers are collapsed so that they are contained within the normal cross-sectional outline of the hull and cause no added air resistance.

When a plurality of gear segments such as 40 are provided, those at intermediate points lengthwise of the chambers may be accommodated between the adjacent air bags, as sufficiently shown in Fig. 4.

I claim:

1. A flying boat comprising a hull, and collapsible flotation chambers at opposite sides of the hull, and one or more air bags in each chamber, and a check valve for each bag arranged to admit and retain air therein, and common means for operating the check valves to release air from the bags.

2. A flying boat comprising a hull, and collapsible flotation chambers at opposite sides of the hull, each chamber comprising a lower plate hingedly connected to the hull near the bottom, and hinge-connected upper and lower outer plates hingedly connected to the hull at an upper position and to the lower plate at its outer edge, said upper and lower outer plates in operative position being in single-plane alinement.

3. A flying boat comprising a hull, and collapsible flotation chambers at opposite sides of the hull, air bags within said chambers when in expanded and collapsed positions and means positioned entirely within said hull and chambers for positively moving said chambers and air bags to expanded or collapsed position by power of the air-craft engine, said means comprising gear segments attached to said chambers and meshing shaft pinions operatively connected to said engine.

4. A flying boat comprising a hull, collapsible flotation chambers at opposite sides of the hull, air bags entirely enclosed within said chambers when in both expanded and collapsed positions and means positioned entirely within said hull and chambers for operating the chambers and contained air bags to expanded or collapsed position.

5. A flying boat comprising a hull, collapsible flotation chambers at opposite sides of the hull, and means for operating the chambers to expanded or collapsed position, and an air bag in each chamber, and a check valve for each bag arranged to admit and retain air therein, and means for positively opening said valves to release air from said bags, said means comprising lever and cord connections controlled by the operator for actuating said valves.

6. A flying boat comprising a hull, collapsible flotation chambers at opposite sides of the hull, and means for operating the chambers to expanded or collapsed position, and an air bag in each chamber, and a check valve for each bag arranged to admit and retain air therein, and means operable by a pilot during flight for positively operating the check valves to release air from the bags.

In testimony whereof I affix my signature.

FRANZ WURTH.