

May 24, 1932.

G. LOENING

1,859,306

AIRPLANE

Filed Nov. 7, 1930

2 Sheets-Sheet 1

Fig.1

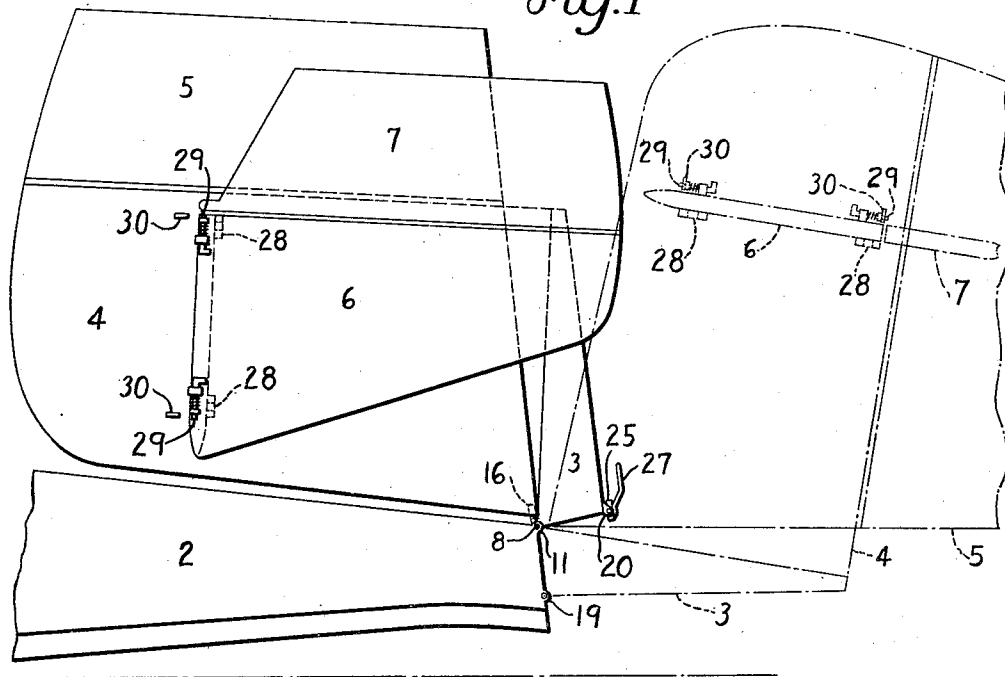
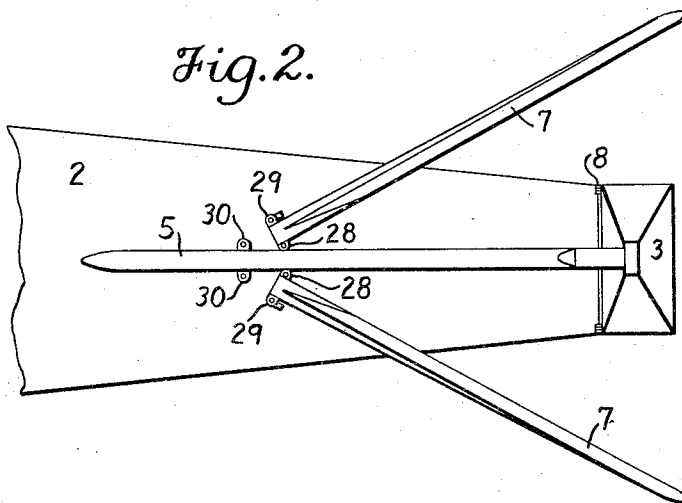


Fig. 2.



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Fig. 3.

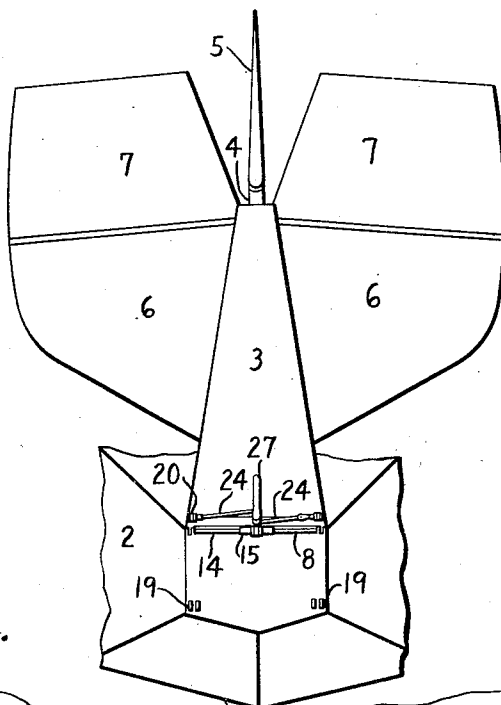


Fig. 4.

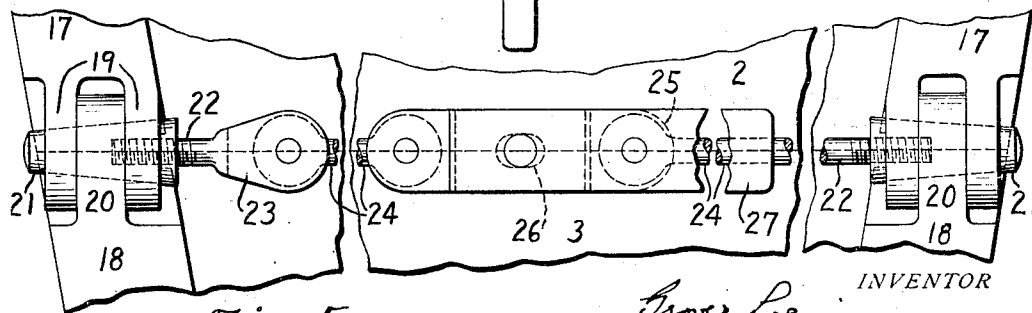
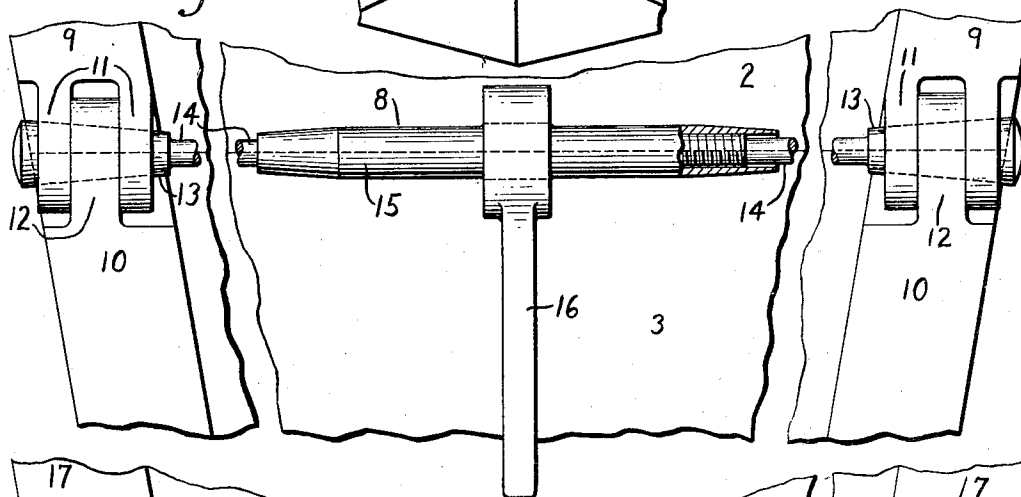


Fig. 5.

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UNITED STATES PATENT OFFICE

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AIRPLANE

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The subject of this invention is an airplane body the entire tail structure of which can be folded over on the fuselage or other rearwardly extending frame to secure compactness in stowing. A special object of this improvement is to enable the machine to be stored in a tank of as small size as possible carried by a submarine. The purpose is, therefore, to reduce length and width, without increasing height. Means of a simple and effective nature are provided for solidly locking the tail frame section in rearward extension with the main frame when the airplane is to be used. The invention is applicable to land planes, seaplanes or flying-boats.

In the accompanying drawings forming part hereof:

Fig. 1 is a side elevation of the rear portion of the body of a flying-boat with the tail section with all the empennage folded over on the main frame, the broken lines showing the tail structure in position for flight.

Fig. 2 is a plan view showing the folded condition.

Fig. 3 is a rear elevation showing the tail structure folded as before.

Fig. 4 is a fragmentary top plan view on a larger scale, with a portion in section, showing a taper pintle hinge which can be tightened or loosened, this hinge connecting the tail with the main frame.

Fig. 5 is a fragmentary bottom plan view showing a taper pin locking means for fastening and unfastening the tail.

The drawings illustrate the rear portion 2 of the flotation body of a flying-boat, this part being representative of any body, fuselage or frame, whether enclosed or not which forms part of the supporting structure of the airplane and which ordinarily extends rearward to the tail. In the present invention, however, this body or frame terminates close in front of the tail, and a separate tail end section 3 is constructed to carry the fin 4, the rudder 5, the stabilizer 6 and the rudder 7. This tail can be disposed in rearward extension with the main frame, that is to say with the empennage or group of tail surfaces in

proper positions for flight, and can also be displaced for compact stowing.

The tail frame section, or tail support, is preferably hinged to the main frame, at the top of their adjoining regions, the hinge being marked 8, so that the tail can be folded forward over the main frame, as shown in Figs. 1 to 3. Hinging of the tail is advantageous for reasons of strength and simplicity and because it permits the tail to fold without disconnecting or disarranging the control cables which operate the rudder and elevators, but the tail section may be entirely disconnectible and indeed that is possible with the construction illustrated herein.

It is highly important that when the tail is placed in the service position it be not only strongly fastened but that it be secured in a manner which insures rigidity. This is provided for in the hinge and fastenings forming part of the invention. The preferred form of these devices will now be described, but it will be understood that other equivalent constructions may be employed.

Hinge members 9 are fixed to the rear end of the main frame 2, at the upper corner regions, and complementary hinge members 10 are fixed to the tail frame section 3. The interfitting lugs 11, 12 of these hinge members have tapering pintle openings, so formed that the taper of the openings is continuous in the group of lugs of each hinge. The openings of the hinge lugs are fitted by correspondingly tapered pintles 13 which can be drawn or forced in the direction of their smaller ends so as to bind wedgingly in the pintle sockets, thereby producing a solid connection, free of all looseness, when the machine is to be flown.

A common means is preferably provided for tightening and loosening the hinges, though the provision of a common device is not essential. In the construction illustrated the stems 14 of the pintles are screw-threaded into a turn-buckle sleeve 15, which can be turned by a handle 16 either directly or through a ratchet.

Socket members 17 and 18 are fixed to the adjoining portions of the main frame and the tail frame section respectively, adjacent

the lower corner regions. These members are shown as being similar to the hinge members 9 and 10. Their interfitting lugs 19 and 20 are likewise formed with tapering socket openings, into which correspondingly tapered locking pins 21 can be forced and from which they can be withdrawn. These pins could be wedged and secured in place individually, but it is convenient to operate and secure them by a common device, and a simple arrangement has been illustrated in which the pins have the stems 22 of eyes 23 screwed into them for purpose of adjustment, these eyes, only one of which is seen in Fig. 5, being pivoted to push and pull links 24, which in turn are pivotally connected to a double arm 25, which is loosely pivoted at 26 to the tail support and has a handle 27 for turning it. When this handle is turned in one direction the pins 21 are withdrawn sufficiently from the sockets to permit the members 17 and 18 to separate for folding or displacement of the tail. Movement of the handle in the opposite direction thrusts the tapered locking pins forcibly into the sockets, binding them tightly together, in which condition the pins are held as shown in Fig. 5.

As a further part of the invention the stabilizers 6 are connected to the fin 4 in such manner that the stabilizers, and with them the elevators can either be disconnected or, preferably, can be folded in toward the fin, as shown in Fig. 2, in order that the machine may be stowed in as narrow a space as possible. For this purpose, the stabilizers are preferably connected to the fin by hinges 28 and pins 29, and socket fittings 30 are provided for locking the stabilizers in their extended or flying positions.

Figs. 1 and 2 show the very substantial contraction in length and width which are made possible by the invention when the body is to be stowed in a cylindrical tank or other small space. This is accomplished with little or no increase in height of the empennage when folded.

It is desired that the drawings and description be understood as being illustrative of a preferred mode of carrying out the invention rather than in a limiting sense, since numerous changes may be made and various equivalent constructions may be devised without departing from the scope of the appended claims.

I claim:

1. An airplane body having a separate tail end section which carries all the empennage and which can be displaced for compact stowing, and fastenings comprising complementary sockets on the adjoining portions of the main frame and the tail end section, in combination with taper pins for connecting and disconnecting said sockets, an operating handle and connections between said handle and said pins for moving a plurality of the

pins in different directions to tighten them simultaneously in the sockets by operation of the handle.

2. In an airplane body having a rearwardly extending frame and a separate tail end section which carries all the empennage and which can be folded over the main frame, hinge means connecting said tail end section with the main frame adjacent the empennage, said hinge means comprising tapered sockets and pintles adapted to bind the hinges to form a solid connection between the tail and the main frame.

3. In an airplane body having a rearwardly extending frame and a separate foldable tail end section, a plurality of hinges connecting said tail end section with the main frame, said hinges having tapered sockets and pintles, and means for simultaneously forcing said pintles in opposite directions in the sockets.

4. In an airplane body, the combination with a main rearwardly extending frame and a foldable tail end section, of hinge means connecting said tail end section with the main frame, and fastening means for locking said tail end section to the main frame in the flying position, said hinge means and said fastening means each comprising tapered sockets and pins adapted to hold the tail end section in rigid relation to the main frame.

5. An airplane body having a rearwardly extending frame, and a separate tail end section which carries all the empennage and which can be displaced to dispose said empennage forwardly on top of said frame, the joint between said frame and tail end section being adjacent the empennage, the stabilizers of said empennage being also displaceably connected with the tail section.

6. In an airplane body, the combination of a rearwardly extending frame, a separate tail end section which carries all the empennage and which is hinged to the top of said frame adjacent the empennage, so that the empennage can be folded forwardly on top of said frame, said empennage comprising a fin and stabilizers, said stabilizers being hingedly connected to said fin so that they can be folded in toward the fin, the combination enabling length and width to be reduced without increasing height.

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