Sept. 28, 1926. 1,601,012

J. VON WALDY

LANDING GEAR

Filed March 8, 1924 3 Sheets-Sheet 1

Fig. 1.

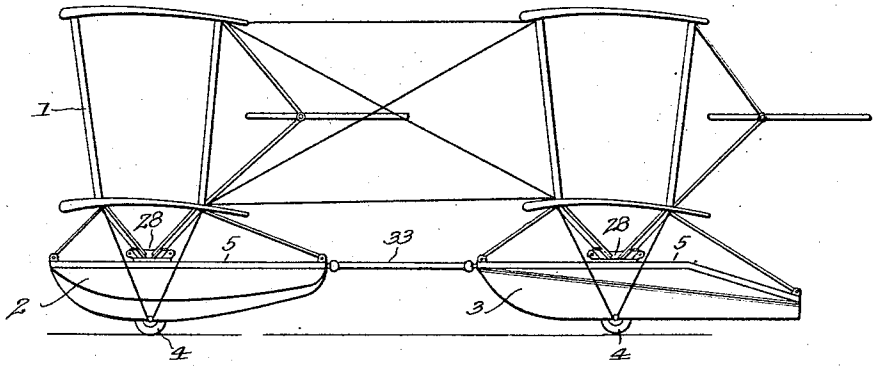


Fig. 8.

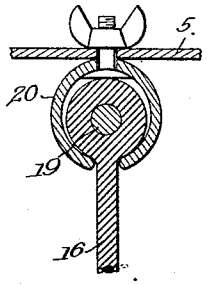


Fig. 2.

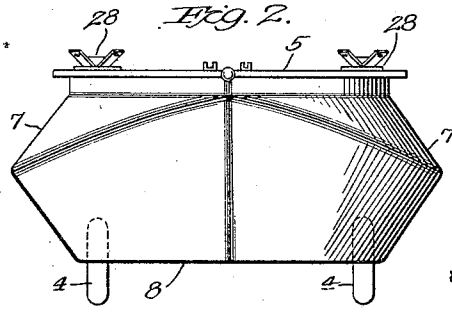
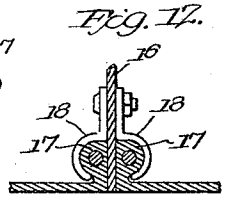


Fig. 7.



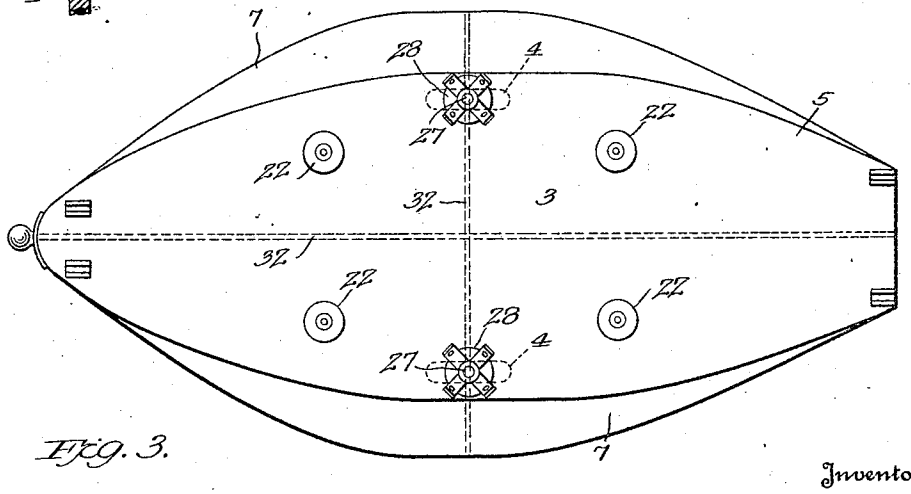


Fig. 3.

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J. VON WALDY

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3 Sheets-Sheet 2

Fig. 4.

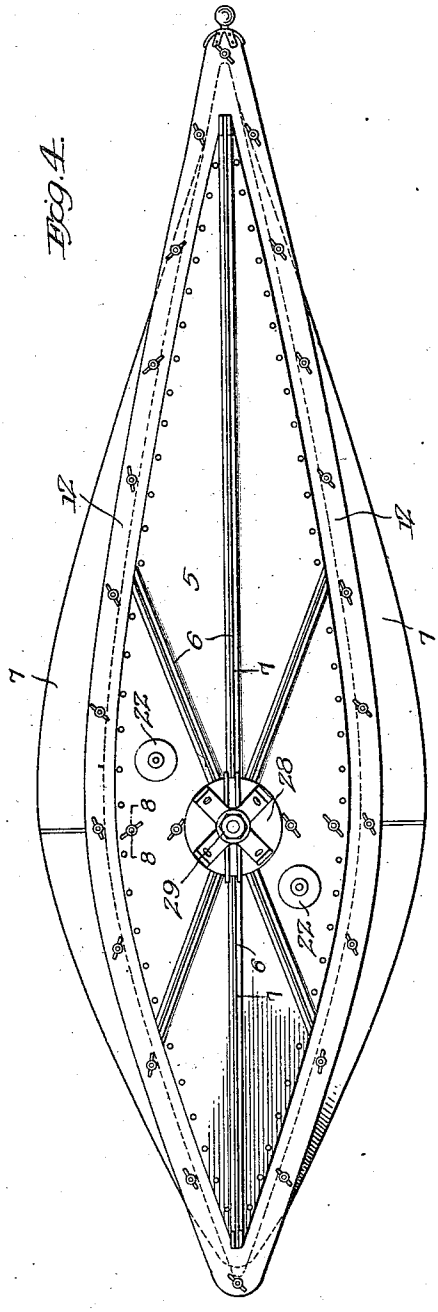
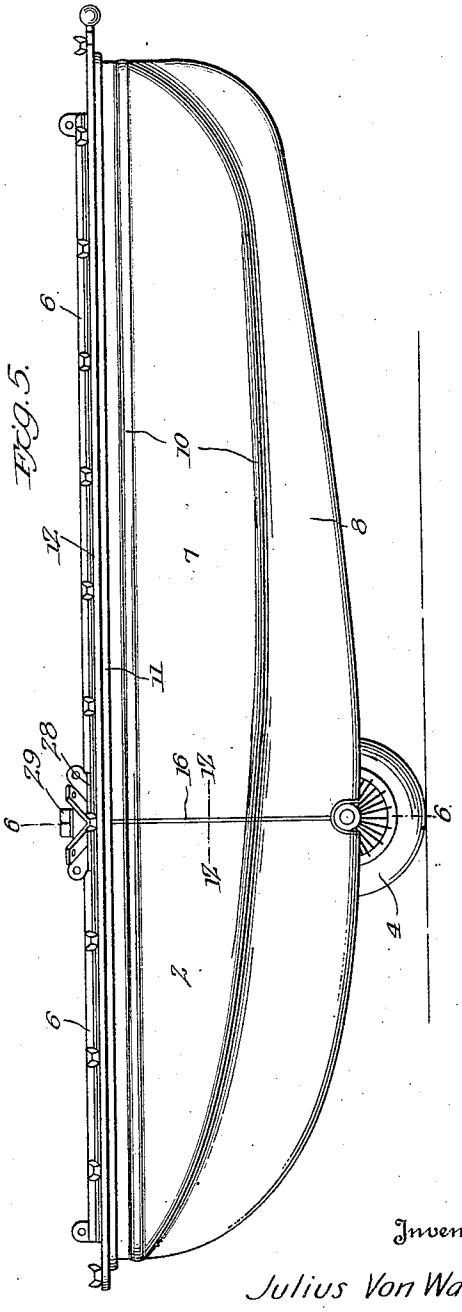


Fig. 5.



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Filed March 8, 1924 3 Sheets-Sheet 3

Fig. 6.

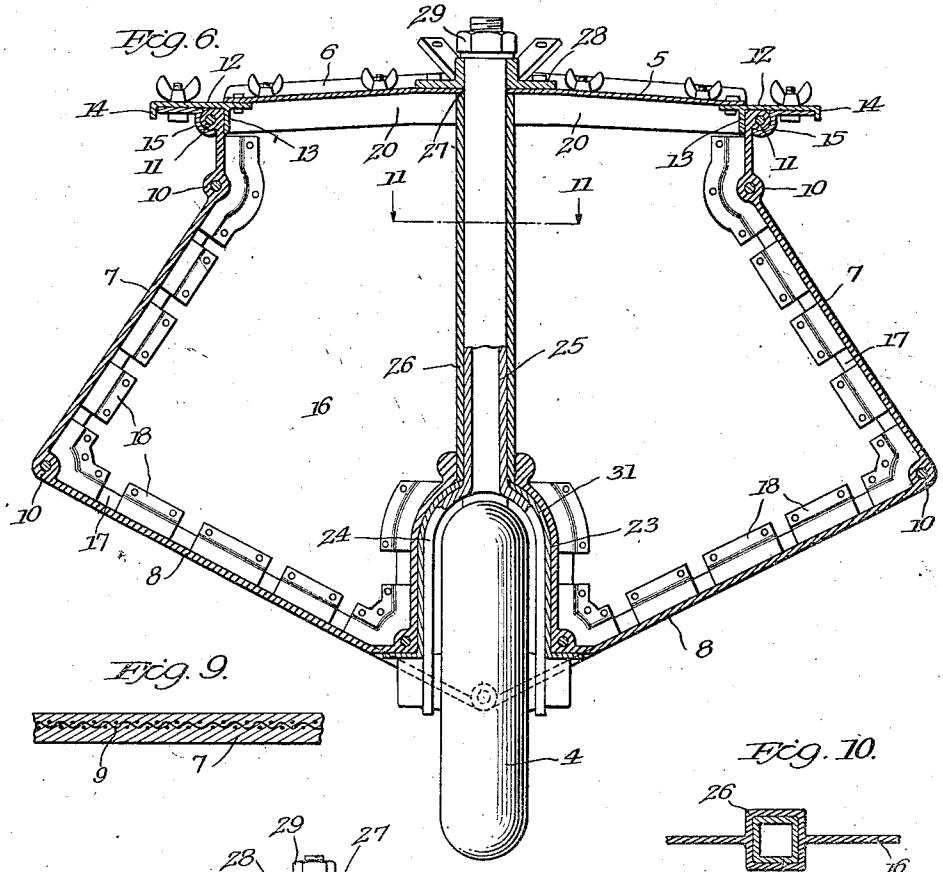


Fig. 9.

Fig. 10.

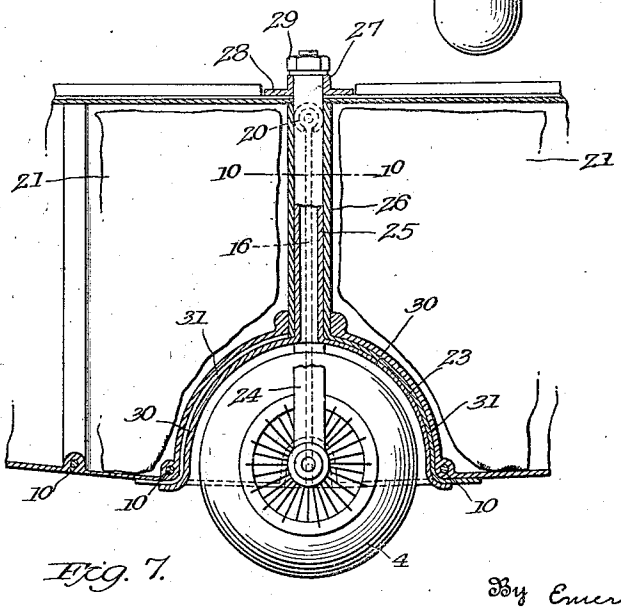
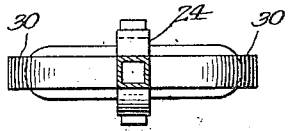


Fig. 7.

Fig. 11.



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UNITED STATES PATENT OFFICE.

JULIUS VON WALDY, OF NEW YORK, N. Y.

LANDING GEAR.

Application filed March 8, 1924. Serial No. 697,914.

This invention aims to provide an improved landing gear for aircraft, and is particularly applicable to heavier than air machines adapted to take off and light upon both land and water.

In the drawings:

Fig. 1 is a side elevation of an aeroplane disclosing my invention applied thereto.

Fig. 2 is a front elevation of a form of pontoon suitable for land and water landing gear such as is shown at the right in Fig. 1.

Fig. 3 is a top plan of the pontoon shown in Fig. 2.

Fig. 4 is a top plan of another form of pontoon such as is shown at the left in Fig. 1.

Fig. 5 is a side elevation of the pontoon shown in Fig. 4.

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 5, parts being shown in elevation.

Fig. 7 is a fragmentary longitudinal sectional view taken on the line 7—7 of Fig. 4, parts being shown in elevation.

Fig. 8 is a fragmentary sectional view taken on the line 8—8 of Fig. 4.

Fig. 9 is a fragmentary sectional view of one of the walls of the pontoons.

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 7.

Fig. 11 is a sectional view taken on the line 11—11 of Fig. 6, parts being omitted, and

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 5.

Referring to the drawings, the illustrative embodiment of my invention therein shown (see Fig. 1), comprises an aeroplane superstructure 1 of any suitable design, having one or more flexible inflatable pontoons such as the pontoons 2 and 3, secured thereto in any convenient manner to provide a landing gear for lighting upon the surface of water. The pontoons have associated with them a plurality of landing wheels 4, so that the craft may also alight upon the ground.

In the arrangement shown in Fig. 1 the pontoons 2 and 3 are preferably arranged with their longitudinal center lines in the longitudinal central plane of flight of the craft, and are boat-shaped so as to offer minimum resistance to forward movement of the craft both during flight and upon alighting on water.

The front pontoon 2 preferably comprises a rigid top wall 5 (see Fig. 6), conveniently made of sheet metal reinforced by suitable reinforcing ribs 6, such as standard T-shapes, and also comprises side walls 7 and bottom wall 8, preferably made of strong flexible material, such for example, as vulcanized rubber, having wire cloth 9 imbedded in it as clearly shown in Fig. 9. The flexible walls, as shown, are made in two sections joined together. However, these walls may conveniently be divided into any desired number of sections, so that the parts thereof may be packed in a small space for shipping purposes. As shown, the walls of each section are moulded in one piece in the desired shape and, at the bends or corners and at intervals along their length, are provided with reinforcing beads 10 each having a core of wire cable to resist undue bellying or distortion of the walls upon inflation.

The upper edges of the flexible side walls 7 preferably have reinforced beads 11, as best shown in Fig. 6, to provide a convenient means for securing them to the top wall 5. To provide a means for connecting these beads to the rigid top plate 5, I preferably employ a flange or rim 12 secured to the lower side of the marginal edge of the top wall and having a depending flange 13 thus providing a seat for the beads. The outer edge of the rim may be bent downwardly to provide a depending flange 14 and, adjacent the edge is a series of openings to receive suitable securing means such as the lugs 15 or other convenient clamps adapted to secure the reinforced beads firmly against the upper wall and flange. The lugs 15 have one edge contacting with the depending flange 14 to prevent them from slipping out of engagement with the beads 11 under severe strains.

The pontoon 2 is preferably divided into a plurality of independent inflatable compartments so that upon accidental deflation of any one compartment, the remaining compartments will remain fully inflated. To this end I have shown a flexible transverse partition 16, preferably of vulcanized fabric, secured to the walls 5, 7 and 8 of the pontoon. This partition is clamped in the joint between the sections of the pontoon as best shown in Fig. 12. The adjoining edges of the walls have reinforced beads 17 somewhat similar to beads 11 at their upper edges and they are clamped together with the margin of the partition 16 between them by suitable clamps 18 having securing bolts passing through the partition wall. The upper edge

of the partition 16 (as shown in section in Fig. 8) has a reinforced bead 19 to which a suitable holder 20 is secured. This holder may be a tube having a longitudinal opening adapted to slide over the bead and to be secured to the top wall 5 by any convenient means, such as bolts and wing nuts. Thus the pontoon is divided into separate compartments.

It is not necessary that the compartments in the pontoon be air tight. As shown in Fig. 7, inflatable air bags 21 of suitable sizes and shapes may be inserted therein through hand-hole openings 22 provided in the top wall 5 (see Fig. 4). Each of the openings has a removable cover plate through which the valve stem of the inflatable bag projects so that the bags may conveniently be inflated from the outside. When it is necessary to remove one of the bags 2 for repairs, the cover plate for the hand-hole may be removed and the bag pulled out through the opening, repaired and reinserted.

The landing wheels 4 are so connected to the pontoons that the inflated portions thereof constitute pneumatic cushions or shock absorbers to relieve the superstructure 1 of the shocks and jars incident to landing upon the ground. As shown in Figs. 6 and 7 the single landing wheel on the front pontoon 2 is partially enclosed in a pocket 23 in the bottom wall 8, this pocket being divided transversely and the walls secured together as shown in Figs. 6 and 12. The weight of the landing wheel is preferably carried by the top wall 5 of the pontoon. To this end I have shown the fork 24 of the landing wheel as having an integral tubular extension or support 25 extending through a fabric well 26 in the partition 16 and its upper end is slidable vertically in a guide opening 27, in the top plate 5, which is preferably provided with a strut securing bracket 28 to which the struts for supporting the airplane superstructure are secured. The fork extension has a nut 29 to provide a stop shoulder coacting with the bracket 28, to carry the weight of the landing wheel assembly.

The tubular extension 25 of the wheel fork 24 is preferably non-circular in cross section, as indicated in Fig. 12, so as to maintain the plane of the wheel properly in the central plane of flight of the craft, being prevented from turning or twisting by the well 26 and guide opening 27. As shown in Fig. 11, the tube may be split at its four corners at the lower end and bent to form the fork and also opposite strips 30 to engage the wall of the pocket 23, thereby providing for transferring any load upon the landing wheel to said wall. A suitable rigid housing 31, preferably of sheet metal, may be slipped into the pocket to distribute the load evenly over the entire area of the pocket walls. Thus, upon landing on the ground the entire load upon the landing wheel is carried by the pontoon: and, since it is inflated, it acts as a pneumatic shock absorber to prevent racking of the superstructure. The tubular support 25 is free to slide in the guide opening 27 when the wheel strikes the ground and flexes the bottom wall 8.

In the illustrative embodiment of the invention shown in the drawings, the rear pontoon 3 is similar in many respects to the front pontoon 2. This pontoon, however, has two landing wheels 4 arranged on opposite sides of the central plane of flight of the craft, and is preferably much wider than the front pontoon (see Figs. 2 and 3). As shown in Fig. 3, it is divided into four inflatable compartments by partitions 32 which may conveniently be secured to the flexible walls 7 and 8 of the pontoon by making them integral therewith. Obviously, this pontoon may also be made in sections and the partitions may be secured as indicated in Fig. 12. These partitions are secured to the top wall 5 in the manner indicated in Fig. 8.

As indicated diagrammatically in Fig. 1, each of the pontoons is firmly secured to the superstructure 1 by a plurality of struts, some of which radiate from the strut brackets or plates 28; and others of which are connected to the front and rear ends of the rigid top walls 5; also, if desired, the landing wheel housings may be braced by additional struts.

In the illustrative embodiment shown in the drawings, the pontoons 2 and 3 are connected to each other for relative universal movement by a tie rod 33 joined to the pontoons by suitable ball and socket joints whereby to maintain them in alignment and yet permit relative universal movements due to yielding of the struts or racking of the superstructure upon landing.

Obviously, my invention is not limited to the illustrative embodiment herein shown and described.

What I claim and desire to secure by Letters Patent is:

1. A landing gear for aircraft comprising, in combination, a pair of aligned boat-shaped pontoons arranged in the line of flight of the craft and connected to each other for relative universal movement.

2. A landing gear for aircraft comprising, in combination, a front inflatable pontoon provided with a pneumatically cushioned landing wheel in the longitudinal central plane of flight of the craft and a single rear inflatable pontoon having a pair of landing wheels on opposite sides of said longitudinal central plane.

3. A landing gear for aircraft, comprising, in combination, a front inflatable pon-

toon and a single rear inflatable pontoon aligned with the front pontoon and a plurality of air cushioned landing wheels connected to said pontoons.

4. In a landing gear for aircraft, a flexible inflatable pontoon, a landing wheel suspended from the top wall of said pontoon, a housing in the bottom wall of said pontoon partially enclosing said wheel and means connecting said wheel to said housing whereby the pontoon constitutes a shock absorber for said wheel upon landing of the craft.

5. In a landing gear for aircraft, a flexible inflatable pontoon having an approximately vertical well therethrough, a concave pocket in the bottom wall of the pontoon at the lower end of said well, a landing wheel partially enclosed within said pocket, a rigid housing for said wheel within said pocket, means extending through said well for suspending said landing wheel from the top wall of the pontoon, and means for transferring the stresses upon said wheel to said housing while the craft is landing, whereby said pontoon constitutes a pneumatic shock absorber for the superstructure of the craft.

6. In a landing gear for aircraft, an inflatable pontoon having a flexible bottom wall provided with a pocket, a rigid housing secured in said pocket, a landing wheel partially enclosed in said housing and a fork for said wheel presenting a portion engaging said housing whereby the shocks on said wheel are transferred through said housing to the body portion of said pontoon, thereby providing a pneumatic shock absorber for the superstructure of the craft.

7. In a landing gear for aircraft, an inflatable pontoon having a reinforced rigid top wall and a flexible bottom wall, a landing wheel projecting from said bottom wall, suspending means for said wheel slidable through the top wall, a strut securing bracket connected to said top wall having a guide opening for said suspending means, and a plurality of struts connected to said bracket and the superstructure of the craft.

8. In a landing gear for aircraft, an inflatable pontoon having a flexible bottom wall presenting a pocket, a landing wheel partially housed within said pocket, a tubular support of square cross section extending through the pontoon for movably suspending said landing wheel from the top wall of the pontoon, said support having an integral fork shaped lower end within and engaging said pocket to provide journal bearings for said wheel, whereby the pontoon constitutes a shock absorber for the craft upon landing.

9. A pontoon for aircraft having flexible fabric walls divided into a plurality of sections, said flexible walls having reinforced beads at their joining edges and clamping means for said beads to hold the walls in assembled relation.

10. An inflatable pontoon made of flexible fabric in a plurality of sections and having a plurality of separate compartments, the joining edges of the fabric having reinforced beads, a flexible partition for the pontoon extending between said beads, and clamps for holding said sections and partition in assembled relation.

11. An inflatable pontoon having a rigid top wall, a flexible partition within the pontoon dividing it into a plurality of independent compartments, a reinforced bead on the upper edge of said partition, and means on the bottom of the top wall of said pontoon for engaging said bead whereby to support said partition.

12. In a landing gear for aircraft, an inflatable boat-shaped pontoon having reinforced vulcanized rubber bottom and side walls, a flexible vulcanized rubber partition dividing said pontoon into separated inflatable compartments, said partition being united with said bottom and side walls and detachably secured to the top wall of said pontoon, and means for securing said pontoon to the superstructure of the craft.

13. An inflatable pontoon comprising reenforced rubberized fabric bottom and side walls, a relatively rigid top wall connected to the side walls, and a flexible partition dividing the space within said walls into a plurality of independent compartments each adapted to contain an air bag, and means affording access to said compartments for inserting and removing said bags.

14. A boat-shaped, flexible, inflatable pontoon for aircraft landing gear having rubberized fabric bottom and side walls, and reenforcing beads in said walls to strengthen and maintain the shape of said pontoon upon inflation.

15. An inflatable pontoon having a rigid top wall, flexible bottom and side walls adapted to be secured adjacent the margin of said top wall, said side walls presenting a top marginal bead, and said top wall provided with means detachably to clamp said beads thereto.

In testimony whereof, I have signed my name to this specification.

JULIUS VON WALDY.