Dec. 5, 1933. N. STRAUSSLER 1,937,729

FOLDING BOAT AND THE LIKE

Filed Feb. 18, 1931

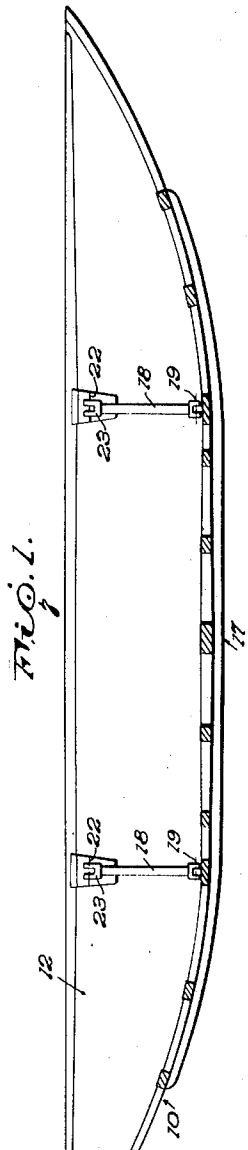


Fig. 1.

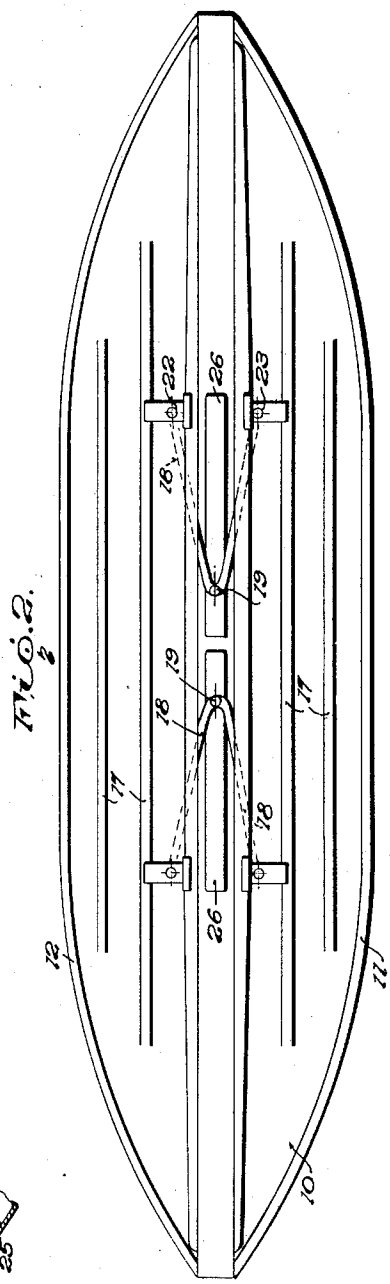


Fig. 2.

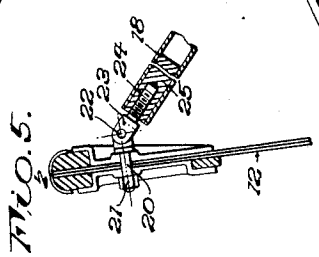


Fig. 5.

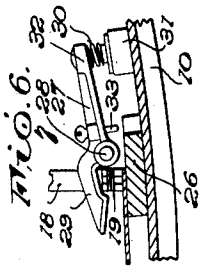


Fig. 6.

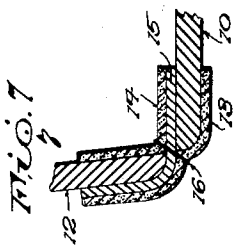


Fig. 7.

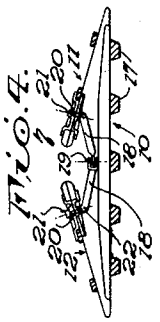


Fig. 4.

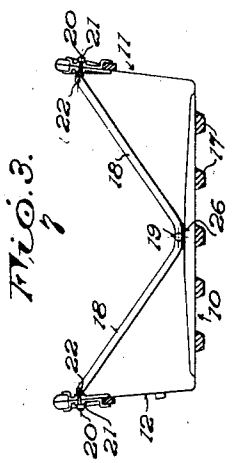


Fig. 3.

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FOLDING BOAT AND THE LIKE

Nicholas Straussler, London, England

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and in Great Britain March 20, 1930

20 Claims. (Cl. 9—2)

This invention relates to folding boats, pontoons, and other analogous structures of the character having walls that are adapted to be collapsed for storage, transport, etc., and which for convenience will be referred to generically as folding boats.

An object of this invention is to provide improved means for holding the walls of such a structure in their open or operative position.

Another object of this invention is to provide improved means for holding the walls of such a structure in open position which are permanently connected with said walls, so as to avoid any danger of such means being lost or removed from the collapsed structure with the attendant danger that when need for the boat or the like arises the means for retaining the same in open position, through accident or carelessness, may not be present.

Another object of this invention is to provide such a folding structure with an improved joint between the relatively folding parts thereof.

The folding boat itself may be of any suitable construction, but preferably is of the general type disclosed in my prior Patent No. 1,720,701, granted July 16, 1929, as a division of my Patent No. 1,650,914, granted November 29, 1927. To provide the folding boat with means for retaining the same in open or erected position, one or more pairs of struts or stays are connected by universal joints to the walls of the structure adjacent the upper or free edges thereof and the struts or stays of each pair are hinged together at the longitudinal center line of the floor but slidable lengthwise of the boat, so that when the structure is collapsed by folding down the side walls thereof the struts or stays of each pair may not only move toward each other but the inner hinged ends of the same may slide in a longitudinal direction until the struts or stays lie relatively side by side at an acute angle and in a generally horizontal direction, on or adjacent to the floor of the boat.

In my prior patents above identified I have disclosed joints between the floor and side walls of the folding structure formed by strips of flexible material, for example thick webbing, secured respectively to the inside and to the outside of the parts to be connected, such strips being long enough to follow the contour of the connected edges from end to end, and the strips being stitched or otherwise connected together along the whole length of the joint to provide a protecting covering for the edges of the joined sections as well as to prevent slackness or relative movement between the joined sections when the structure is in use. In accordance with the present invention the joint structure so provided is reenforced and strengthened, and additional protection afforded for the edges of the joined sections, by providing a strip of flexible material which extends the length of the joint between the sections and which along one edge is attached to the outside of one of said sections and which along the other edge is attached to the inside of the other of said sections, so as to provide an interleaving, strengthening, and reenforcing as well as protecting, element.

The invention is capable of receiving a variety of mechanical expressions, one of which is shown on the accompanying drawing, but it is to be expressly understood that the drawing is for purposes of illustration only and is not to be construed as a definition of the limits of the invention, reference being had to the appended claims for that purpose.

Referring in detail to the drawing wherein the same reference characters are employed to designate corresponding parts in the several figures:—

Fig. 1 is a central longitudinal section of a folding boat embodying the present invention;

Fig. 2 is a plan of said boat in its collapsed or folded-down condition;

Fig. 3 represents a somewhat diagrammatic cross section of said boat, on a smaller scale, when opened out for use;

Fig. 4 is a similar view illustrating the sides of the boat collapsed toward their folded-down position;

Fig. 5 is an enlarged detail of one of the universal joints;

Fig. 6 is a detail of a suitable detent for a pair of struts or stays; and

Fig. 7 is an enlarged cross section of the improved joint between the floor and a wall of the boat.

In the form shown, the folding boat has a floor 10 and sides 11 and 12. By preference, the boat is constructed in accordance with the principles disclosed in my earlier patents above identified, and therefore the bottom and sides are made of a relatively rigid but sufficiently flexible material, such as ply wood, to permit the bottom and sides to be flexed into curves when the boat is erected by opening the sides with respect to the bottom. The lower edges of the side walls 11 and 12 have substantially the same contour as the edges of the floor 10, throughout the length of the same, when the

parts are collapsed as shown in Fig. 2, and the floor and side walls are hinged in any suitable way throughout the length of their contiguous edges, so that when the side walls are moved from a position in substantial parallelism to the floor to a position substantially at right angles thereto, the lateral walls are bent inwardly adjacent their ends to conform with the contour of the floor, and the floor is bent upwardly adjacent its ends to conform with the contour of the lateral walls, as disclosed in my earlier patents.

The hinge or joint connections between the floor and lateral walls, as in my earlier patents, are preferably composed of strips 13 and 14 of flexible material, such as webbing, respectively secured in any suitable way, as by glueing, tacking, or use of other suitable securing means, to the outside and inside of the contiguous edges of the lateral walls and the floor, so as to form a water-tight hinge joint therebetween. In accordance with the present invention this connection is reenforced and strengthened by an additional strip of webbing 15 which is secured to the outer surface of one of the contiguous edges, as that of the side wall 12 (Fig. 7), and to the inner surface of the other of the contiguous edges, as the floor 10. The strip 15 therefore passes between and separates the contiguous edges of the walls 10 and 12, and being secured to said walls with the webs 13 and 14, forms a reenforcement therefor.

A line of stitching 16 is then passed through the strips 13, 15, 14 along the line of junction between each lateral wall and the floor so as to unite said strips together, thereby providing hinge lines for the lateral walls. Not only does this stitching prevent slackness of the webs and relative movement between the floor and walls when the structure is in use, but the interposed reenforcing strip 15 takes up any shocks or strains to which the adjacent edges of the structure might be exposed, as in the case of grounding, while at the same time relieving the stitching from attendant strain.

The floor and lateral walls of the boat may be additionally strengthened if desired. Thus longitudinal battens 17 may be secured to the outside of the boat along the floor thereof to strengthen it and receive any strains of contact in the event of grounding, and the lateral walls may be provided with similar battens 17 if desired to protect the same against bumping, scraping and other contacts with external objects.

In accordance with the present invention means which are permanently attached to the boat are provided for holding the boat in its opened-out or operative condition. In the form shown two pairs of struts or stays 18 are provided, one adjacent each end of the boat, but additional pairs may be provided if found necessary or desirable, while in some instances a single pair may be found sufficient. Said struts or stays are made of any suitable material, preferably of tubular material, and each pair is jointed or hinged together at their inner or lower ends as shown at 19. Said struts, at their outer or upper ends, are permanently but universally connected to the sides of the boat adjacent their upper edges by joints of any suitable construction. In the form illustrated in Fig. 5 each joint consists of a pivot pin or bolt 20 having a screw-threaded shank free to rotate in a bearing carried by the boat just below the gunwale, detachment of the bolt being prevented by a nut 21 threaded thereon. Pivotally connected to the flattened and bored head of the bolt 20, as by pivot pin 22, is a fork 23 having a screw-threaded shank 24 which is received in and rotatable with respect to a bushing 25 attached in any suitable way in or to the end of the strut 18.

When the boat is in its open or erected condition as shown in Fig. 3, each pair of struts forms an obtuse angle in a plane transverse to the longitudinal axis of the boat, but when the boat is being collapsed, the pair of struts 18 not only approach each other by reason of the hinge 19, but said hinged end is adapted to slide along the bottom of the boat until said struts not only lie at an acute angle, but also substantially horizontally, owing to the rotation of the struts through an angle of nearly 90° with respect to the side of the boat. Preferably a strip 26 of metal, as steel, is attached to the bottom of the boat along its longitudinal axis and it extends for a sufficient length to accommodate the full length of movement of the hinged ends 19 of the corresponding struts, so as to provide a wear plate upon which said hinged ends may slide as the boat is being collapsed or opened up.

Means are preferably provided for retaining each pair of struts in their position for retaining the boat in open or erected condition, and such means may be of any suitable construction. In the form shown a catch or detent lever 27 is pivoted in a bearing 28 at or adjacent the outer end of the strip 26 and carries a hook-shaped detent portion 29 which is designed to pass over and make locking engagement with the hinged ends of the struts 18 when moved into position for retaining the sides of the boat in their open relation. In order to urge detent lever 27 into its position for locking the struts 18 a spring 30 may be interposed between the end of the lever 27 and a spring abutment 31 carried by the bottom of the boat in the plate 26. To facilitate the release of the detent 27 the end of the lever may be formed as a pedal as shown at 32, so that by depressing the pedal against the opposition of spring 30 the end 29 of the detent may be lifted clear of the struts 18 when it is desired to collapse the boat. To prevent accidental release of the struts or stays, a set screw 33 may be provided in the lever 27 so that it may be threaded into a position for engagement with the end of the strip 26, to prevent releasing movement of the lever 27 even though weight is imposed on the pedal 32.

From the foregoing description the operation of the device is believed to be clear. When the boat is to be stored or transported the sides 11 and 12 lie substantially parallel to the floor 10 with the struts 18 at an acute angle and also substantially parallel to the floor, as shown in Fig. 2. In this position the parts are collapsed into a single flat unit whose thickness is little more than the sum of the thicknesses of the bottom two lateral walls of the boat. When it is desired to erect the boat the sides are moved from their relatively horizontal position to their relatively vertical position about the hinges provided by the flexible strips 13, 15, 14, until the sides are substantially at right angles to the floor of the boat. During this opening of the boat the lateral walls are bent inwardly at their ends and the bottom wall is bent upwardly at its ends as explained in my earlier patents, and at the same time the struts 18 move relatively about

their hinged connections 19 into the form of a relatively obtuse angle and said hinged connections 19 move lengthwise along the wear plates 26 until the struts are in planes substantially at right angles to the axis of the boat, in which position said struts snap under the detent portions 29 of the levers 27, where they are retained against accidental displacement by the set screws 33. The parts will be retained in this erected or open position until such time as the set screws are backed out, after which the struts can be released by depressing the pedals 32, and then the lateral walls may be laid down onto the floor of the boat, the struts of each pair approaching until they are at a relatively sharp angle and sliding along the wear plates 26 until they lie in a substantially horizontal position.

The improved hinge connections reenforce and strengthen the joints between the lateral walls and floor, and not only relieve the stitching between the inner and outer webs 13 and 14 of strain, but also prevent the edges of the bottom and the lateral walls from receiving undue strains. Hence the edges of the floor and lateral walls are effectively protected and the webbing which forms the hinges is prevented from relative movement, slackness, etc., so that a strong reenforced protective joint or hinge is afforded.

While the embodiment illustrated has been described with considerable particularity, it is to be expressly understood that the invention is not restricted thereto, as the same is capable of receiving a variety of mechanical expressions, some of which will now readily suggest themselves to those skilled in the art, while changes may be made in the details of construction, arrangement and proportion of parts without departing from the spirit of this invention. Moreover, the hinge of the present invention is capable of use in other constructions than that illustrated, and with or without the use of the improved struts or stays, while the improved struts or stays are capable of use in other constructions and of boats with or without the use of the improved hinge construction. Reference is therefore to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a device of the character described, a plurality of walls foldable with respect to each other, and means flexibly connecting said walls along their contiguous edges, said last named means comprising flexible strips attached to said walls interiorly and exteriorly thereof, a flexible strip interposed between said contiguous edges and attached to both of said walls, and means connecting said strips along the line between said walls.

2. In a device of the character described, a plurality of walls foldable with respect to each other, and means flexibly connecting said walls along their contiguous edges, said last named means comprising fabric strips attached to said walls interiorly and exteriorly thereof, a fabric strip attached at its opposite edges to the exterior of one of said walls and the interior of the other of said walls and passing between the contiguous edges of said walls, and means connecting said strips along the line between said contiguous edges.

3. In a device of the character described, a plurality of walls foldable with respect to each other, and means flexibly connecting said walls along their contiguous edges, said last named means comprising a strip of flexible material attached along its opposite edges to said walls and passing between the contiguous edges thereof, flexible material attached to corresponding surfaces of said walls, and a line of stitching passing through said flexible material along the line between the contiguous edges of said walls.

4. In a device of the character described, a plurality of walls foldable with respect to each other, and means flexibly connecting said walls along their contiguous edges said last named means comprising a strip of flexible material attached along its opposite edges to opposite surfaces of said walls and passing between the contiguous edges of said walls, flexible material attached to corresponding surfaces of said walls, and a line of stitching passing through said flexible material along the line between the contiguous edges of said walls.

5. In a device of the character described, a plurality of walls foldable with respect to each other, and means flexibly connecting said walls along their contiguous edges, a flexible strip having its opposite edges respectively attached to the inside and outside of said walls and passing between the contiguous edges thereof, flexible strips respectively attached to the outer and inner faces of said walls, and a line of stitching passing through said flexible strips along the line between the contiguous edges of said wall.

6. In a device of the character described, in combination with relatively foldable bottom and lateral walls with said lateral walls foldable relatively toward each other, one or more pairs of struts for retaining said walls in open relation, the struts of each pair being operatively connected into a unit for movement relatively to said walls and being permanently and pivotally connected for universal movement to said lateral walls adjacent the upper or free edges of the same to permit relatively inward and downward movement of said lateral walls with respect to said bottom wall.

7. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, each pair comprising struts permanently but pivotally connected to said lateral walls adjacent the upper or free edges of the same and pivotally connected together adjacent their inner ends.

8. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising members hinged together and pivotally connected to the lateral walls of the boat.

9. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising members hinged together at their inner ends and connected by means of universal joints with the lateral walls of the boat adjacent the upper or free edges thereof.

10. In the device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising members hinged together at their inner ends and universally connected to the lateral walls of the boat at their

opposite ends, and a member along which the hinged ends of a pair of struts is adapted to slide when the boat is being opened and collapsed.

11. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising a pair of members hinged together at their inner ends and universally connected to the lateral walls of the boat at their opposite ends, and means for retaining said struts in position for holding the walls in open relation.

12. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising members hinged together at their inner ends and universally connected to the lateral walls of the boat at their opposite ends, and a spring-pressed detent for retaining said struts in a plane transverse to the longitudinal axis of the boat.

13. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising members hinged together at their inner ends and universally connected to the lateral walls of the boat at their opposite ends, and a pedal operated detent for retaining said struts in their position for holding the walls in open relation.

14. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising members hinged together at their inner ends and universally connected to the lateral walls of the boat at their opposite ends, a detent for retaining said struts in their position for holding the wall in open relation, and means for preventing disengagement of the detent from said struts.

15. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising hinged members having jointed connections with the boat and adapted to lie in a position substantially parallel to the bottom of the boat when the boat is collapsed.

16. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising hinged members having jointed connections with the sides of the boat and adapted to assume a substantially vertical position at an obtuse angle with respect to each other when the walls are in open or operative relation.

17. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising hinged members having jointed connections with the lateral walls of the boat and adapted to be moved relatively during the collapsing of the boat from a position wherein said members are at substantially right angles to the longitudinal axis of the boat and at an obtuse angle with respect to each other to a position wherein they lie at an acute angle and substantially parallel to the bottom of the boat.

18. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising members connected to the lateral walls of the boat by pivotal joints and having their inner ends pivoted together and adapted to move relatively to the walls when the boat is opened or collapsed.

19. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising members connected to the sides of the boat by pivotal joints and having their inner ends pivoted together and adapted to move relatively to the walls when the boat is opened or collapsed, and means for retaining said members in their position for holding the sides of the boat in their open or operative relation.

20. In a device of the character described, in combination with relatively foldable bottom and lateral walls, one or more pairs of struts for retaining said walls in open relation, the struts of each pair comprising members connected to the lateral walls of said boat by pivotal joints and having their inner ends pivoted together, said members being movable with respect to each other and the boat to permit the lateral walls of the boat to be folded into a position substantially parallel to the bottom wall thereof or to be opened up into a position at substantially right angles thereto.

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