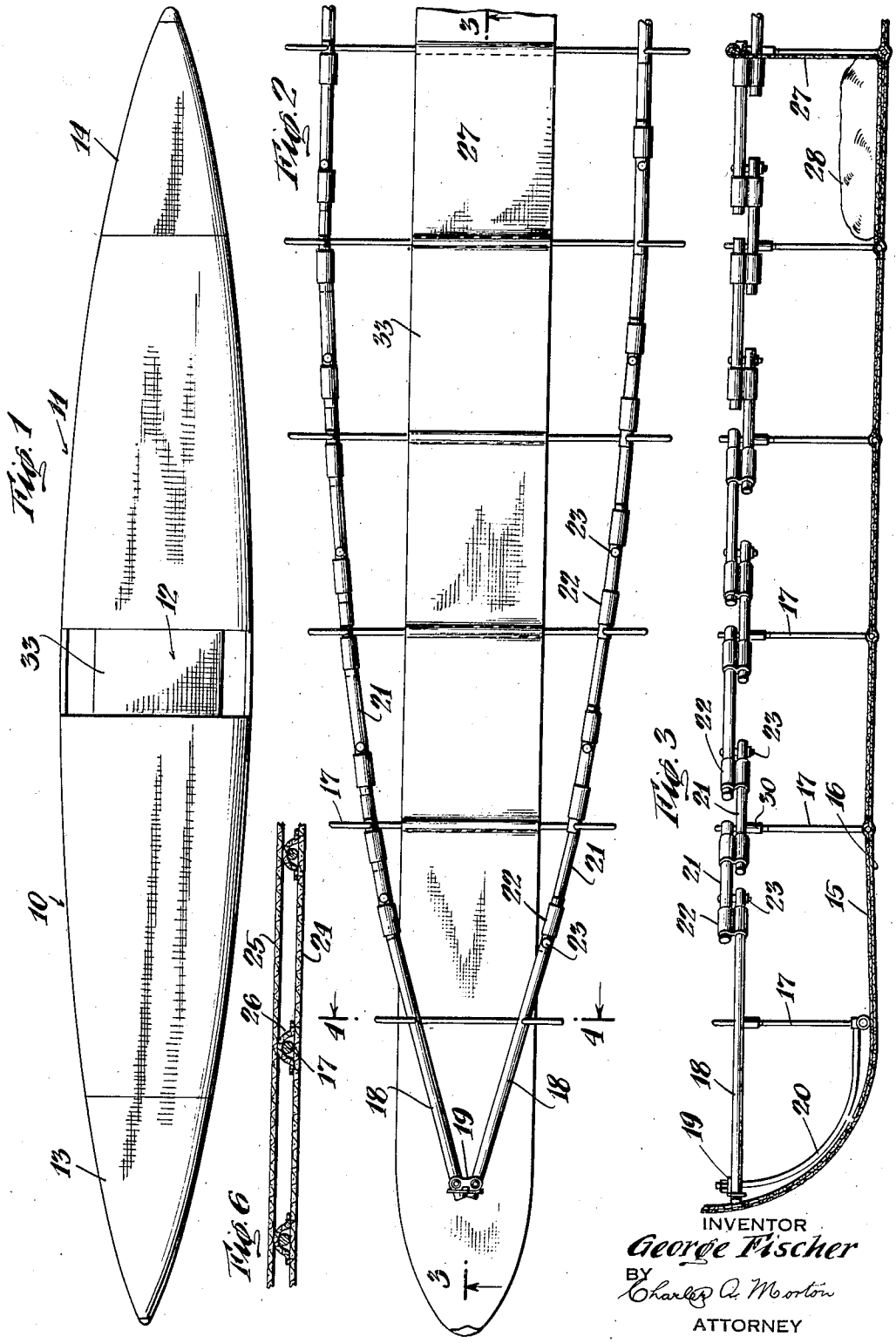
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COLLAPSIBLE BOAT

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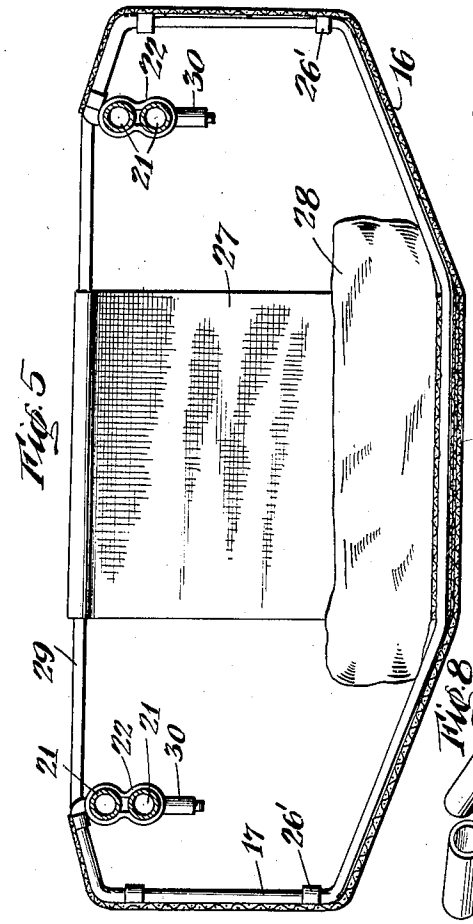


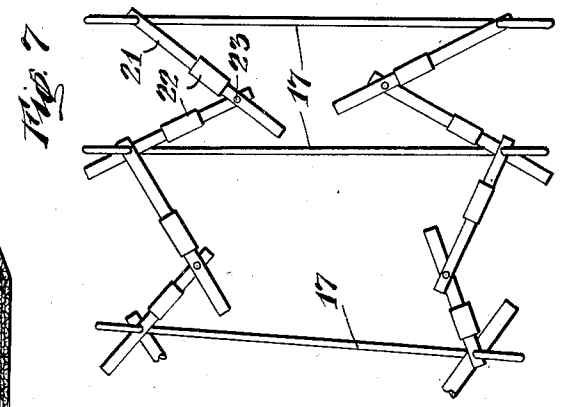
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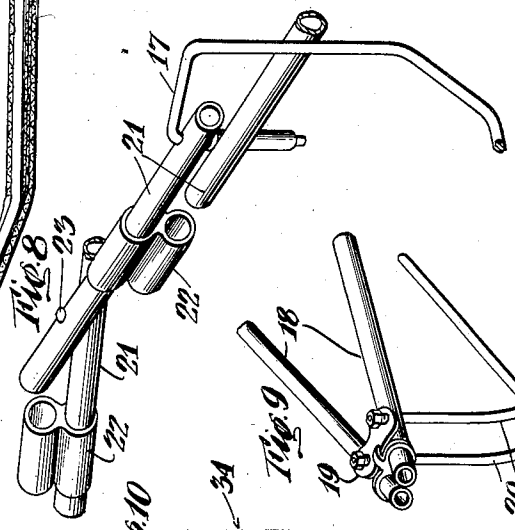
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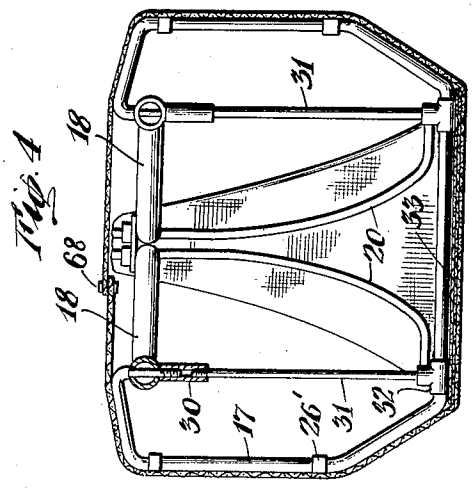
COLLAPSIBLE BOAT

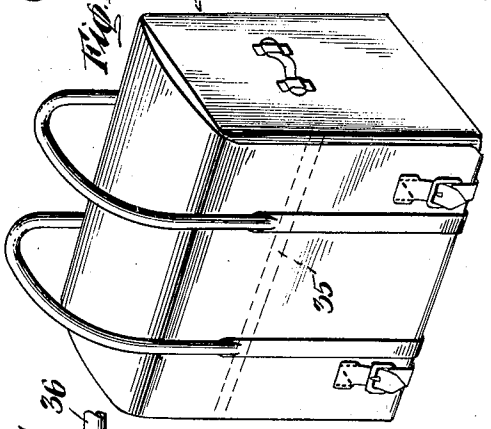
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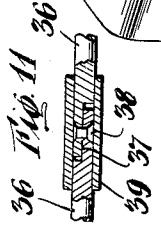












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Dec. 12, 1939. G. FISCHER 2,183,137

COLLAPSIBLE BOAT

Filed Dec. 3, 1937 4 Sheets-Sheet 3

Fig. 12

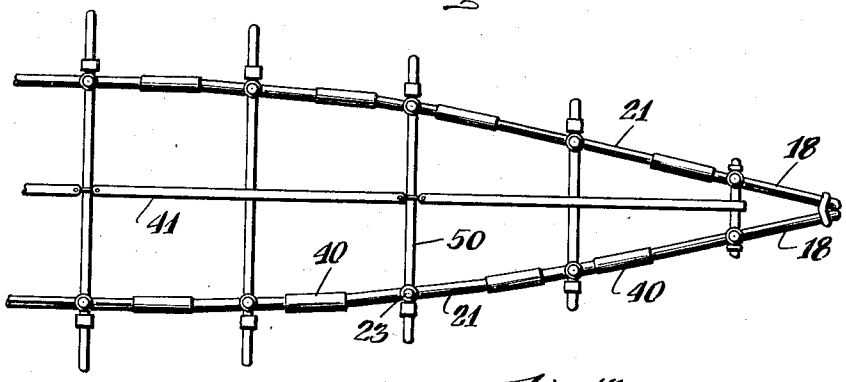


Fig. 13

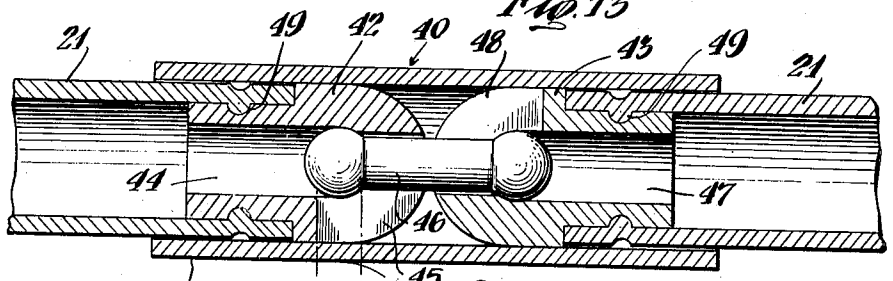


Fig. 14

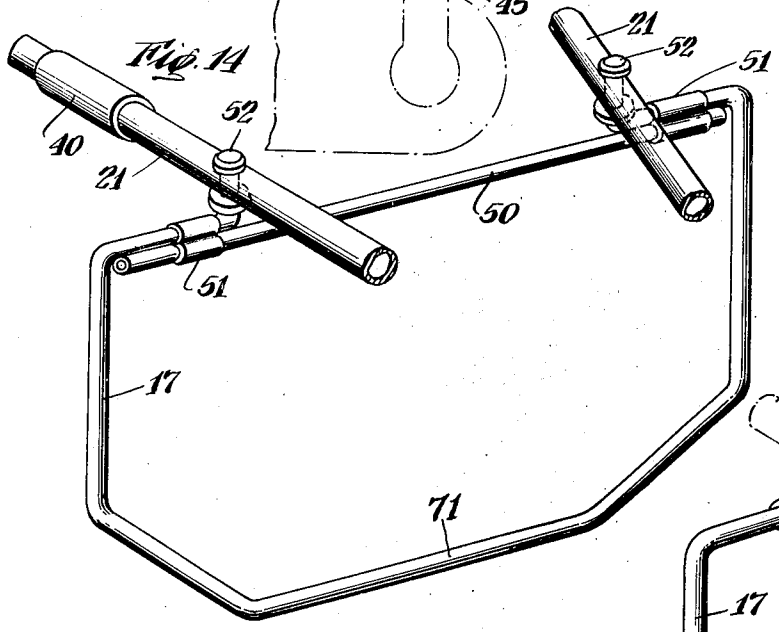
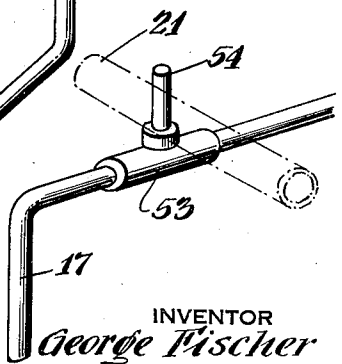


Fig. 15



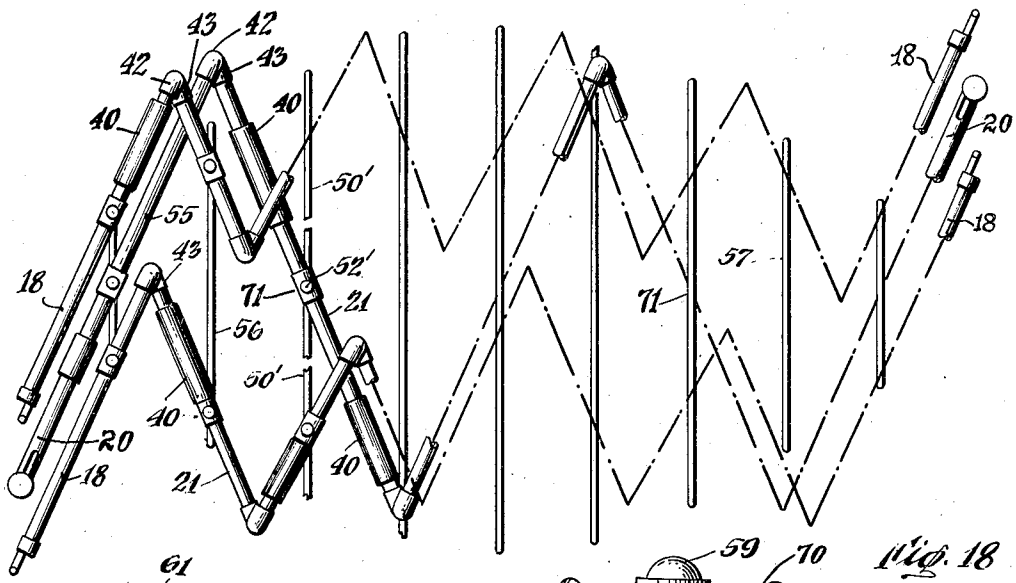
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COLLAPSIBLE BOAT

Filed Dec. 3, 1937 4 Sheets-Sheet 4

Fig. 16



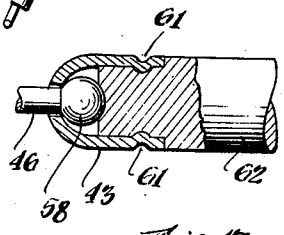


Fig. 17

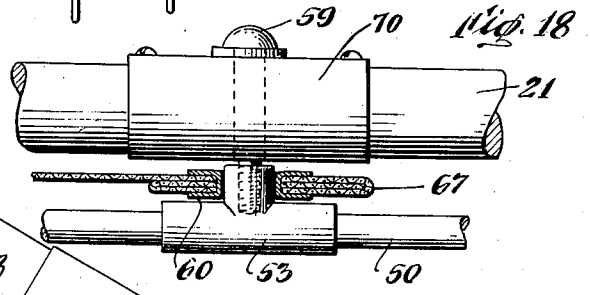


Fig. 18

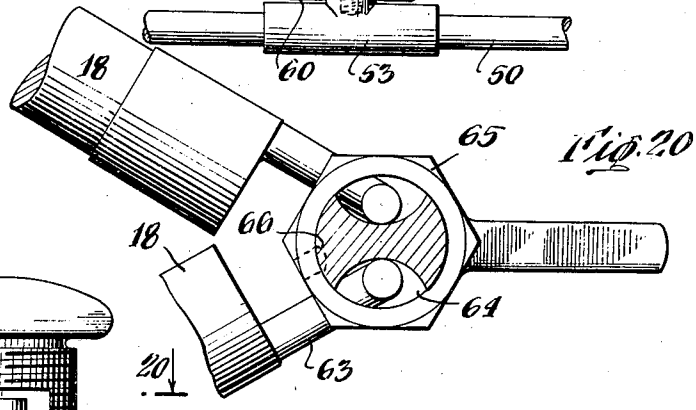
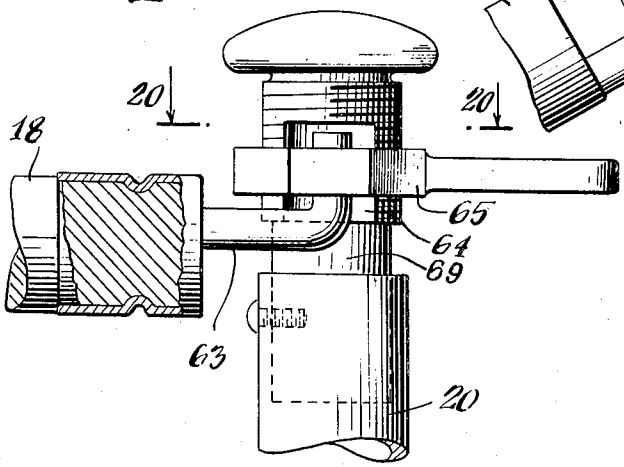


Fig. 20

Fig. 19



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UNITED STATES PATENT OFFICE

2,183,137

COLLAPSIBLE BOAT

George Fischer, Glendale, N. Y.

Application December 3, 1937, Serial No. 177,859

4 Claims. (Cl. 9—2)

This invention relates to improvements in boats of the folding type. It is particularly adapted for use by hiking or cycling parties travelling in small groups of two or three people.

One object of this invention is a portable boat which can be compactly folded, inserted in a knapsack, and carried either upon the back of one person, or between two persons by hand.

Another object is a portable boat which can be collapsed quickly and folded in a compact package, and as quickly unpacked and transformed into a boat ready for use.

Another object is a portable boat relatively light in weight and of few and simple parts.

Other objects will appear from the detailed description.

In the drawings comprising four sheets of twenty figures numbered Figs. 1 to 20 inclusive, certain embodiments of the invention are illustrated.

Fig. 1 is a general top view of the boat assembled ready for use.

Fig. 2 is a top view of one-half of one form of a collapsible framework for said boat.

Fig. 3 is a vertical section taken along the line 3—3 of Fig. 2 looking in the direction of the arrows.

Fig. 4 is a vertical cross sectional view of the boat taken along the line 4—4 of Figure 2 but with the outer shell or skin in position.

Fig. 5 is a vertical cross sectional view of the boat of Figure 1 taken substantially amidships through the cockpit.

Fig. 6 is a vertical cross-section of the canvas double bottom.

Fig. 7 is a top plan view of a portion of the framework in partially open (or collapsed) position.

Fig. 8 is a perspective view showing a portion of the gunwale and of a cross rib.

Fig. 9 is a perspective view showing the bow (or stern) assembly.

Fig. 10 is a perspective view of a knapsack or hand portable bag containing the folded boat packed and ready for transport.

Fig. 11 is a vertical sectional view of an alternative form of joint construction for the gunwale framework.

Fig. 12 is a top view of a modified form of framework.

Fig. 13 is a vertical section of the preferred form of socket joint between framework members.

Fig. 14 is a perspective view of another form of cross rib construction and gunwale mounting.

Fig. 15 is another form of cross rib construction and gunwale mounting.

Fig. 16 is a top view of an alternative form of framework (with certain portions shown in dotted outline) illustrating said framework in partially open (or collapsed) position.

Fig. 17 is a vertical sectional view of an alternative form of frame construction.

Fig. 18 illustrates one method of fastening the canvas shell or skin to the framework.

Fig. 19 is a side view of a bow (or stern) framework assembly; and

Fig. 20 is a plan view taken along the line 20—20 of Fig. 19, looking in the direction of the arrows.

Like reference characters designate corresponding parts throughout the several figures of the drawings.

The invention is preferably embodied in a boat of the double ender type (Fig. 1), having ends 13 and 14 constituting the bow and stern, or the stern and the bow, as the operator chooses. When the end 13 is the bow the covered portion 10 is the forward deck and the covered portion 11 the after deck; and vice versa when the end 14 is the bow. The boat is provided with an open cockpit 12 which is provided with a reinforced double canvas bottom 33 (Fig. 6). The frame may consist of a series of sections of hollow tubing hinged together at the points 23 to form a gunwale 21. A series of cross ribs 17 are positioned at spaced intervals from end to end of the boat, the shape of said cross ribs being illustrated in Figs. 4 and 5. The tubular sections of the gunwale 21 are pivotally supported upon the ends of the cross ribs 17 as illustrated variously in Figs. 4 and 5. A series of double barrelled locking sleeves 22 (Figs. 3, 5, 8) serve to lock adjacent sections of the gunwale together. The locking sleeves 22 are slidably mounted upon the tubular sections of gunwale 21 to quickly engage and disengage when the frame is extended or collapsed. The tubular sections of gunwale 21 may be retained upon the ends of cross ribs 17 by means of a series of sleeves 30 (Figs. 4 and 5); sleeves 30 being retained upon the ends of the cross ribs in any suitable manner as by internal threading (Fig. 4), pinching (Fig. 17), or otherwise.

The bow (and stern) may consist of a pair of curved end frames 20—20 (Figs. 3 and 9) pivotally mounted upon the first (or last) cross rib 17. The upper ends of the end frames 20 pass through openings formed in the forward end of each of the end tubes 18—18; said end tubes 18—18 which form a part of the gunwale are

also pivotally mounted upon the upper end of cross rib 17. The bow (and stern) assembly is further reinforced with an end fastener 19 (Fig. 9). End fastener 19 is provided with openings for receiving the upper ends of the tubings 18—18, and openings for the free ends of the end frames 20—20. These several parts may then be locked together by means of a plurality of locking nuts screwed upon the threaded ends of the end frames 20—20 (Fig. 9).

The cross ribs 17 are secured to the reinforced double canvas bottom 33 at selected spaced intervals as best illustrated in Fig. 6. The canvas bottom 33 may include outer and inner reinforcing strips 24, 25 (Fig. 6), the cross ribs 17 being secured in a series of canvas pockets 26 (Fig. 6). The strips 24 and 25 (Fig. 6), 15 and 16 (Fig. 3), serve to reinforce the bottom of the hull which is made of water-proof canvas or other suitable material; and said strips are also long enough to fold around the end frames 20—20, over the end fastener 19, and engage around the end tubes 18—18, thus further strengthening the boat at bow and stern.

The hull consists of a water-proof fabric fastened to the cross ribs 17, by means of canvas loops 26' (Figs. 4 and 5). If the boat is of the closed kayak type, the canvas hull covers the framework completely except for the open cockpit 12. The free ends of the canvas hull may be fastened together above the cross ribs 17 in any suitable manner as by a series of grommets 68 (Fig. 4). The cockpit may be provided with a seat consisting of a removable unsinkable air cushion 28 and a canvas back rest 27, said back rest being suitably hemmed at the bottom to cross rib 17, and at the top to a transverse supporting rib 29 (Fig. 5).

The boat may be readily prepared by merely turning the tubular sections forming the gunwale 21 about the hinges 23 and the pivots formed by the cross ribs 17, until adjacent tubular sections are in line, when the double barrel locking sleeves 22 are slidably adjusted to lock adjacent sections of gunwale 21 in alignment. The tips of the end frames 20 are passed through the openings in the end tubes 18 and are then brought together at bow and stern and locked in place with the end fasteners 19 (Fig. 9). Reinforcing strips 15 and 16 are fastened around the end frame and secured around the end tubes 18 in any suitable manner as by grommets or tie tapes. The free ends of the outer canvas shell are then brought together above the cross ribs 17 and fastened together in any suitable manner as by grommets 68 (Fig. 4).

To pack the boat the procedure is reversed: The hull fastenings are released; the canvas ends at bow and stern unfastened; the end fasteners 19 released; the sleeves 22 disengaged; and the hinged sections of tubing forming the gunwale 21 turned upon their hinges 23 and the pivots formed by the cross ribs 17 (see Fig. 7) until the framework is completely collapsed. The boat thus collapsed may be folded up and inserted in the knapsack 34 (Fig. 10) ready for transport. The knapsack may be provided with a plurality of ribs 35, designed to hold the walls of the knapsack in extended position.

The bow and stern cross ribs 17 may be reinforced by the braces 31—31 used in conjunction with suitable T members 32—32 (Fig. 4).

A flush hinge 38 (Fig. 11) may be formed by rabbeting the ends 37 of adjoining sections of tubing 36; thus dispensing with the double barrel locking sleeves 22, which may then be replaced with a single locking sleeve 39. The opposite ends of the tubular sections 36 which sections are pivotally mounted upon the cross ribs 17 as pivots, will be similarly rabbeted to form a straight line joint.

A very satisfactory straight line gunwale construction may be obtained by using the type of socket joint illustrated in Figs. 13 and 17. Adjacent ends of the tubular sections 21, are capped with the end caps 42 and 43. These end caps are slotted as best indicated at 45 and 48, to permit turning movement of the double headed link member 46 which pivotally interconnects the end caps 42 and 43. The end caps are provided with shanks 44 and 47 which are flush jointed within the ends of the tubular sections 21—21; the shanks 44 and 47 being secured to the tubular sections 21 by a suitable tongue and groove lock 49 (Fig. 13). A single locking sleeve 40 is used to lock adjacent sections 21—21 in correct alignment. In this construction each cross rib 17 may be provided with a cross brace 50 (Fig. 14); the cross braces 50 may be detachably secured in position by means of double barrel locking sleeves 51—51 similar to sleeves 22 previously described, or they may be fastened in place in any other preferred manner as by means of T sockets 53 (Fig. 15). The pivots for the tubular sections 21 may consist of the headed studs 52 (Fig. 14), or of nipples 54 (Fig. 15).

A folding keel 41 (Fig. 12) may be fastened between the bow and stern cross ribs 17—17 (Fig. 3) to which the bow and stern end frames 20—20 are respectively attached; said keel being held in proper position by loops of canvas secured at spaced intervals to the reinforcing strips 15 and 16 (Fig. 3) or the reinforced double canvas bottom (Fig. 2).

In the embodiment shown in Figs. 16 to 20, the framework includes a plurality of cross ribs 50', and a plurality of floating ribs 56 (or 57) positioned therebetween. By the expression "floating ribs " is meant those ribs which are not attached to the keel. The folding keel 55 is pivotally mounted at 52' at the center of bottom section 71 of each cross rib 50', while each port section and each starboard section of gunwale 21 is pivotally supported at 52 to the port or starboard side, as the case may be, of the upper end of each cross rib 50 and each floating rib 56, 57. Thus while both the cross ribs 50 and the floating ribs 56, 57 are pivotally secured to the gunwale sections, only the cross ribs 50 are pivotally secured to the keel sections, the ribs 56 and 57, etc., being free to float relative to the keel, hence their name "floating ribs". In Fig. 16, certain of the cross ribs and floating ribs are partly broken away to show a pivotal connection 52', and the end caps 42, 43, of keel 55. Instead of using tubular metal sections 21 to form the gunwale, wooden rods 62 (Fig. 17) made of some hard wood such as ash, oak, or the like, may be substituted for the metal sections 21, and the end caps 43 may be secured to said wooden rods 62 in any preferred manner as by the pinch punching 61 (Fig. 17).

The ends of the wooden rods 62 may be cut away to conform to the contour of the ball head 58 of the link member 46. In this construction the pairs of end frames 20—20 shown in Fig. 9, are reduced to two single end frames 20, connected one at the bow end and the other at the stern end of the keel 55. Each end tube 18 terminates in a hook shaped member 63 (Fig. 19)

adapted to fit in one of the recesses 64 formed in a metal cap 69 suitably secured to the upper end of the end frame 20 (Fig. 20). The hooks 63 may be retained in the recesses 64 of the metal cap 69 in any preferred manner as by means of the hexagon nut 65 (Figs. 19 and 20).

The canvas hull may be secured to the cross ribs 50 (Fig. 18) below the gunwale 21. When so constructed the edge of the hull may be folded to form two or more plies 67 locked together by a series of grommets 68, each grommet being provided with an opening large enough to receive the neck of one of the T sockets 53. At their pivotal points the gunwale members 21 may be reinforced by metal sleeves 70, through which a round headed screw bolt 59, threadably secured in the neck of the T socket 53, may be inserted to form the gunwale pivot.

The laterally inwardly projecting portions of the upper end of each cross rib 17 form in effect shoulders or deck frames for supporting the deck 10, 11 at spaced intervals, the deck being of the flush type, with an open cockpit 12 amidships. The cross braces 50 (Figs. 14, 15) reinforce the cross ribs 17, and help them to retain their proper shape, so as not to distort the lines of the hull.

What is claimed is:

1. In a collapsible boat, a plurality of cross ribs of progressively increasing and decreasing width corresponding to the boat's beam and the width of the boat fore and aft of the beam; each of said cross ribs having a substantially V shaped central section conforming to the contour of the boat bottom, perpendicular extension pieces in continuation of the wings of said V shaped section conforming to the contour of the sides and freeboard of the boat, and laterally and inwardly extending pieces conforming generally to the contour of the deck of the boat; a plurality of pairs of tubular sections hinged together to define the boat's gunwale when said sections are extended in alignment, there being as many pairs of tubular sections as there are cross ribs; said pairs of sections being individually pivotally mounted upon the cross ribs, there being a tubular section pivotally mounted adjacent each inner end of each inwardly extending piece; end frames conforming to the contour of the bow and stern secured to the bow and stern cross ribs; means for securing the upper end of each end frame to the end section of the gunwale to complete the boat frame; and a plurality of sleeve members, one for each hinge, slidably mounted upon said tubular sections, for locking adjacent tubular sections in alignment against movement about their hinge.

2. In a collapsible boat, a plurality of cross ribs of progressively increasing and decreasing width corresponding to the boat's beam and the width of the boat fore and aft of the beam; each of said cross ribs having a substantially V shaped central section conforming to the contour of the boat bottom and substantially perpendicular extension pieces in continuation of the wings of said V shaped section conforming to the contour of the sides and freeboard of the boat; a plurality of pairs of tubular sections hinged together to define the boat's gunwale when said sections are extended in alignment the number of pairs of tubular sections being equal to the number of cross ribs; each pair of sections being individually pivotally mounted upon the opposite ends of their associated cross rib; end frames conforming to the contour of the bow and stern secured to the bow and stern cross ribs; means for securing the upper end of each end frame to the end section of the gunwale to complete the boat's frame; and a plurality of sleeve members, one for each hinge, slidably mounted upon said tubular sections, for locking adjacent tubular sections in alignment against movement about their hinge.

3. In a collapsible boat construction, a series of ribs, including cross ribs aligned in parallel spaced relation and floating ribs positioned therebetween, said ribs being of progressively increasing and decreasing width corresponding to the boat's beam and the width of the boat fore and aft of the beam; said ribs conforming to the contour of the bottom, sides, and freeboard, of the boat; a keel comprising a plurality of folding sections adapted to be arranged in end to end abutment when extended; a plurality of ball and socket connections for hingedly securing said keel sections together; said keel sections being pivotally supported by said cross ribs, said keel sections abutting end to end adjacent said floating ribs; a series of rods, each rod being pivotally supported relative to the port or starboard upper end of one of the ribs; a series of ball and socket connections for securing adjacent ends of the pivoted rods together to form the port and starboard gunwales respectively; means for securing the respective end sections of the port and starboard gunwales to the keel fore and aft to form the bow and stern frames; and means, associated with each individual ball and socket connection, operable to lock adjacent keel sections, and adjacent sections of rod forming the gunwale, in alignment, against collapsing movement, to retain the keel, gunwale, cross ribs, and floating ribs, in extended position to complete the framework of the boat.

4. In a collapsible boat construction, a series of ribs, including cross ribs aligned in parallel spaced relation and floating ribs positioned therebetween, said ribs being of progressively increasing and decreasing width corresponding to the boat's beam and the width of the boat fore and aft of the beam; said ribs conforming to the contour of the bottom, sides, and freeboard, of the boat; a keel comprising a plurality of folding sections adapted to be arranged in end to end abutment when extended; a plurality of ball and socket connections for hingedly securing said keel sections together; said keel sections being pivotally supported by said cross ribs, each keel section extending from the floating rib forward to the floating rib aft of its associated pivotal support; a series of rods, each rod being pivotally supported relative to the port or starboard upper end of one of the ribs; a series of ball and socket connections for securing adjacent ends of the pivoted rods together to form the port and starboard gunwales respectively; means for securing the respective end sections of the port and starboard gunwales to the keel fore and aft to form the bow and stern frames; means, associated with each individual ball and socket connection, operable to lock adjacent keel sections, and adjacent sections of rod forming the gunwale, in alignment, against collapsing movement, to retain the keel, gunwale, cross ribs, and floating ribs, in extended position to complete the framework of the boat; a sheet of foldable waterproof fabric adapted when stretched over the completed framework to form the shell of the boat; and means for securing said fabric sheet to said ribs.

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