

Jan. 29, 1963

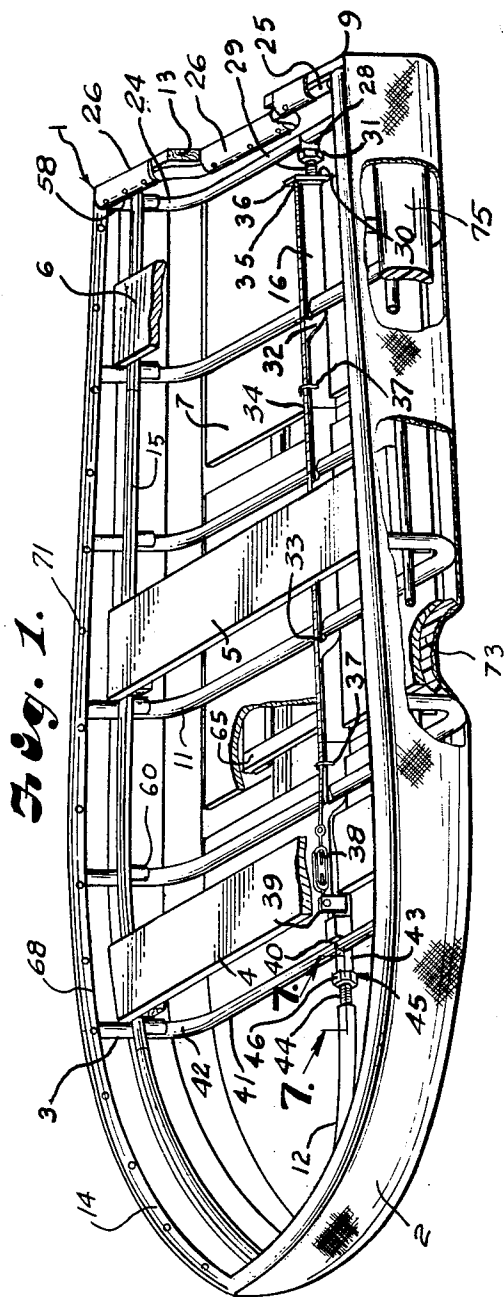
C. T. LEWIS

3,075,207

PORTABLE COLLAPSIBLE BOAT

Filed Oct. 20, 1960

3 Sheets-Sheet 1



Jan. 29, 1963

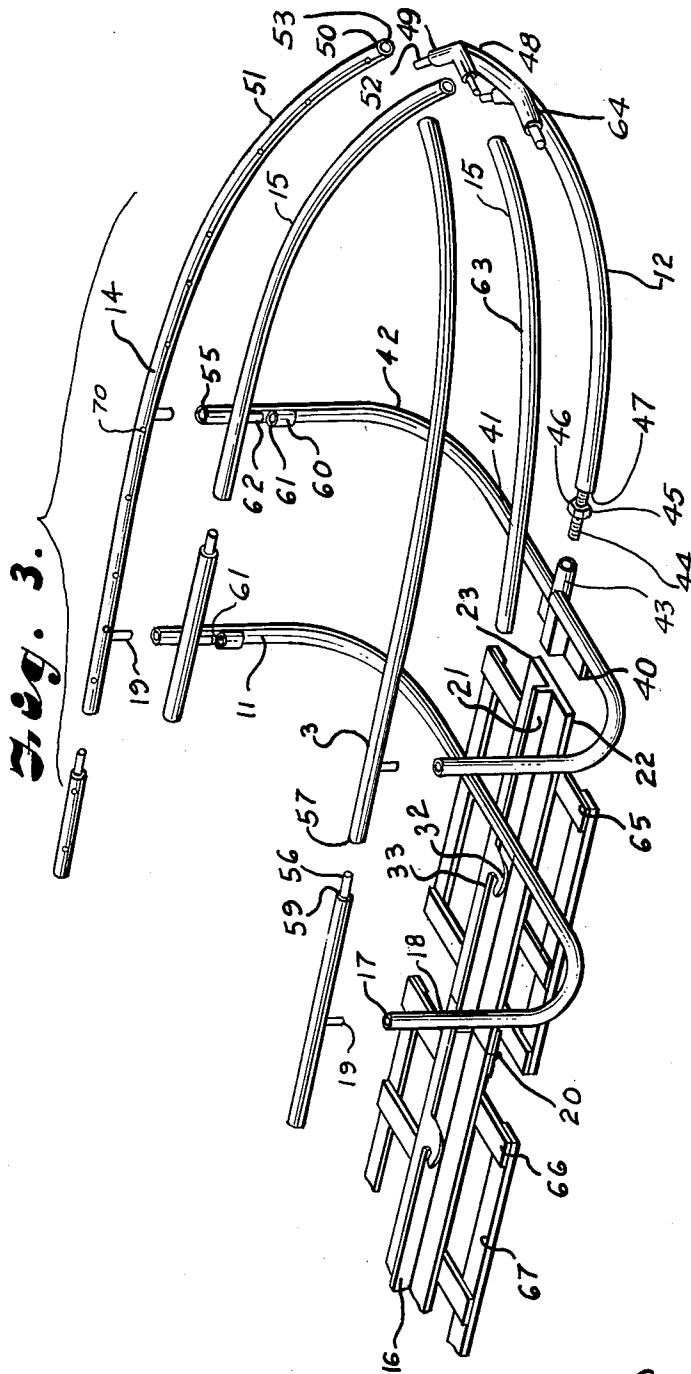
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3 Sheets-Sheet 2



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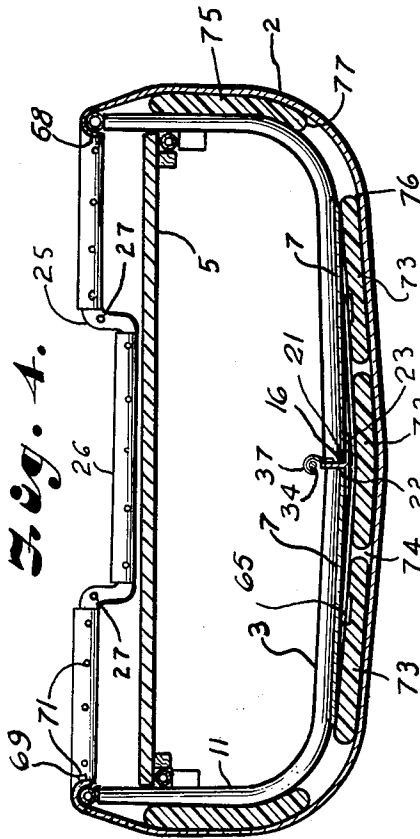
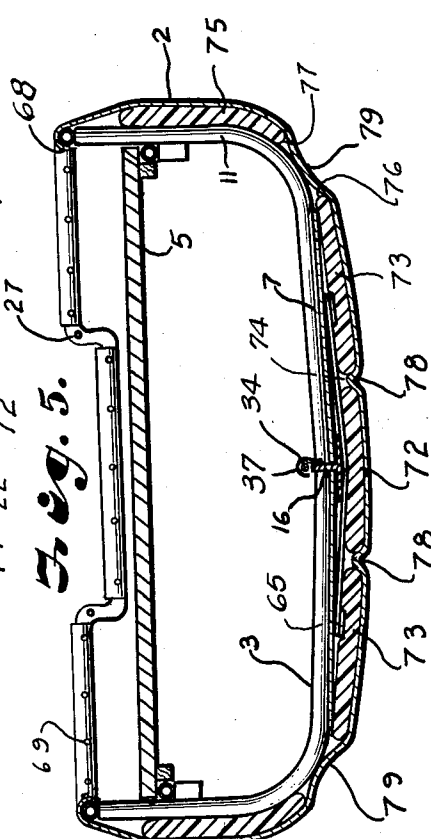
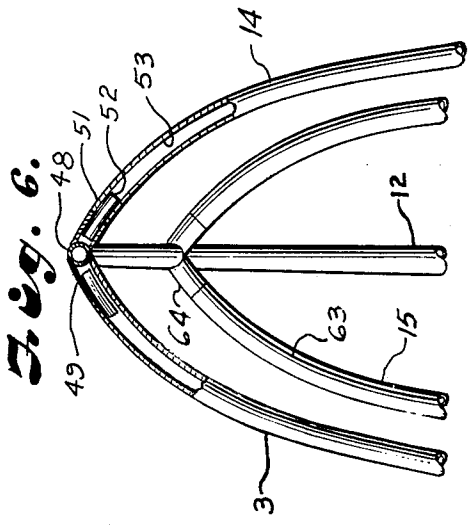
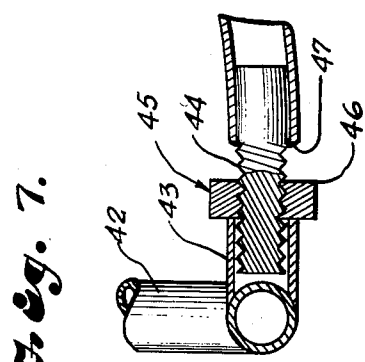
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3 Sheets-Sheet 3



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3,075,207

PORTABLE COLLAPSIBLE BOAT

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4 Claims. (Cl. 9-2)

This invention relates to collapsible boats and, more particularly, to such boats of the open type having flexible covering over a sectional frame.

The principal objects of the invention are to provide a novel form of portable collapsible boat having a flexible waterproof covering secured to a substantially rigid frame when erected which is light in weight and easily disassembled and collapsed into a comparatively small space; to provide such a boat wherein the frame has tubular metal sections with connecting joints held together by expansion of portions of the frame and tension of the covering; to provide such a boat with elastic plank-like members between the frame and covering to support said covering and maintain an outer surface that is relatively unobstructed longitudinally of the boat; to provide such a boat structure in which the elastic planks extend longitudinally of the boat and have lateral spacing whereby water pressure inwardly on said cover deforms same and the planks inwardly to form tunnel or channel portions extending longitudinally of the boat at the sides and bottom for stabilizing the boat; to provide such a boat wherein the elastic planks are of resilient foamed synthetic resin having unicellular structure to maintain maximum buoyancy even when wet; to provide such a boat structure wherein water pressure on the bottom and sides during movement of the boat particularly in turns deforms the outer shell or skin in inwardly concave areas to reduce side slipping and otherwise stabilizing a substantially keelless boat of the rounded or flat bottom type; and to provide a portable collapsible boat that is economically manufactured, easily assembled, and a stable, seaworthy structure.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

FIG. 1 is a perspective view of a boat embodying the features of the present invention with portions broken away to illustrate details of the structure thereof.

FIG. 2 is a longitudinal sectional view through the boat in erected position.

FIG. 3 is a fragmentary perspective view of the prow portion of the framework in disassembled relation.

FIG. 4 is a transverse sectional view through the boat on the line 4-4, FIG. 2.

FIG. 5 is a transverse sectional view through the boat illustrating the position of portions thereof due to water pressure in negotiating a turn.

FIG. 6 is a fragmentary plan view of the prow portion of the framework with portions broken away to illustrate connecting joints thereof.

FIG. 7 is a detail sectional view through the frame expansion structure taken on the line 7-7, FIG. 1.

Referring more in detail to the drawings:

1 generally designates a portable collapsible boat which, in the illustrated structure, is in the form of an open type boat adapted to be propelled by oars or outboard motor; however, it is adaptable for various sizes of boats and also

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partially enclosed or top covered boat structures. The illustrated boat includes an outer shell or skin 2 stretched and secured over a collapsible framework 3, the boat preferably having a plurality of spaced seats 4, 5 and 6, flooring or foot boards 7 and a transom 8 at the stern 9 carried by said framework. The shell or skin 2 is preferably of suitable waterproof flexible fabric as, for example, I have found that a closely woven nylon fabric coated with a flexible waterproof coating such as neoprene provides a strong, durable skin that is resistant to abrading action, providing long life even with rough handling.

The framework 3 includes a series of U-shaped ribs 11, a curved prow member 12, a stern frame 13, a gunwale 14 and side rail members 15, each preferably being of lightweight tubular metal. The framework also includes a longitudinal beam 16. The rib members 11 vary in size to provide the desired transverse shape to the boat and have openings 17 at the upper ends of upstanding portions or legs 18 forming sockets for receiving connecting shanks or pins 19 on the gunwale 14, as later described. The center beam 16, in the illustrated structure, is preferably sectional with the sections connected together at their adjacent ends by suitable hinge members 20 whereby the beam may be folded to facilitate collapsing into a small space. The illustrated beam is a structural member such as a T with the web 21 upstanding from outwardly extending flanges 22 and 23 with the hinges 20 secured to the bottoms of the flanges whereby, when in beam-forming position, the webs of the adjacent T abut, as illustrated in FIGS. 1 and 3.

The rear portion of the beam member 16 is suitably connected to the stern frame 13 to eliminate relative lateral movement but providing for movement of the beam toward and away from the stern frame longitudinally of the boat by a controlled adjustment. In the illustrated structure, the stern frame 13 is formed of tubular metal members arranged in a U-shape substantially the same as the ribs 11 with the upper ends of the legs or upstanding portions 24 connected by a transverse bar 25 having a central downwardly offset portion 26 to conform substantially to the shape of the upper portion of the transom 8, said transom being suitably secured to the stern frame by suitable fastening devices such as screws or the like 27. The central lower member of the stern frame has a forwardly extending tubular portion 28 adapted to slidably receive a threaded post or shank 29 of an extensible member or jack having its other end suitably secured as at 30 to the rear of the beam 16. An adjusting member 31, such as a nut, is screwed on the threaded shank and is adapted to abut the forward end of the tubular portion 28 whereby rotation of the nut will effect movement of the beam toward or away from the stern frame.

The web 21 of the beam 16 has rib-receiving slots 32 extending downwardly and rearwardly therein whereby with a rib positioned in a respective slot a portion 33 of the web rearwardly of the opening of the slot extends over the rib and retains same against vertical movement relative to the beam. In the illustrated structure, the slots 32 are spaced along the length of the beam, said slots being four in number to receive the center portions of four ribs 11, as illustrated in FIG. 2. With the ribs positioned in the slots, a flexible member 34 such as a wire rope is tensioned along the upper edge of the web 21 to prevent hinging movement of the beam sections and thereby form a rigid structure. In the illustrated struc-

ture, the rope 34 has its one end secured as at 35 to a bracket 36 at the rear of the beam, the rope extending along the web under hooks 37 spaced longitudinally of the beam with the forward end of the rope connected to an adjusting device such as a turnbuckle 38 with the other end of the turnbuckle connected to a bracket 39 whereby the turnbuckle can be actuated to apply desired tension to the rope 34. The forward end of the beam 16 is slidably mounted in a socket member 40 secured to and extending rearwardly of the center portion of the transverse member 41 of a forward U-shaped rib 42, said forward rib having a forwardly extending tubular portion 43 for slidably receiving a threaded shank 44 of an adjusting jack 45 forming an extensible connection between the forward rib 42 and the prow member 12. One end of the threaded shank 44 extends into the tubular portion 43 and an adjusting member 46 threaded on the shank is adapted to abut the forward end of the tubular member 43. The other end of the shank is fixed to the tubular rear end portion 47 of the prow member 12.

The prow member 12 curves forwardly and upwardly and, at its upper end 48, has rearwardly diverging portions 49 adapted for slip connection with the forward ends 50 of forward gunwale sections 51. In the structure illustrated, the portions 49 terminate in pins 52 extending axially therefrom which are slidably received in the forward ends of bores or sockets 53 of the gunwale sections. The gunwale sections curve outwardly and rearwardly and are adapted to be positioned in overlying relation to the upper ends 17 of the rib sections, the gunwale sections having depending pins 19 adapted for slidable reception into the bores or sockets 55 at the upper ends of the legs of said rib sections, forming the slip connections between the gunwale sections and the rib sections. The gunwales are preferably formed in sections with slip connections therebetween whereby in adjacent ends of aligned sections one end has a pin portion 56 extending therefrom and adapted to be moved into and fit in the bore or socket 57 of the other of said adjacent ends of the gunwale sections, with the rearmost of the gunwale sections having a depending pin 58 adapted to be inserted into a socket member 58' secured to the forward portion of the stern frame 13 at the ends of the cross member 25. The gunwale sections are each connected to adjacent sections by such slip joints and there are depending pins on the gunwale sections that extend into the upper ends of each of the transverse rib sections 11 and 42 to position the gunwale sections and rib sections and retain same in related position when erected. In each of the slip joints, the pin portions that extend into the bores or sockets define a shoulder 59 adjacent the fixed end of the pin which shoulder will engage the end of the member surrounding the opening to the socket or bore adapted to receive said respective pin, thereby forming a stop whereby the adjacent ends of the sections are abutted.

The side portions of the stern frame 13, ribs 11 and forward rib 42 each have inwardly extending portions or socket members 60 secured thereto in downwardly spaced relation relative to the upper ends thereof, said portions 60 being upwardly spaced from the cross member of the respective ribs or frames, said portions 60 having upwardly opening bores or sockets 61 adapted to receive depending pins 62 on the side rail members 15. It is preferable that the rail members be sectional with the adjacent ends of the sections having sockets and pins forming slip joints functioning in the same manner as the slip joints on the gunwale section.

The forward sections 63 of the side rails 15 are curved forwardly and inwardly from the forward rib section 42 and have slip joint connections with rearwardly diverging members 64 on the prow section 12 and spaced downwardly thereon from the portions 49, the connections of the forward ends of the forward sections 63 with the portions 64 being substantially in the same manner as the

connections of the forward ends of the gunwale sections with the portions 49.

The beam 16 preferably has floor supports 65 extending laterally therefrom and, in the illustrated structure, the beam sections have transversely extending bars 66 secured to the bottom of the flanges 22 and 23 and extending laterally therefrom with the outer ends of the bars connected by longitudinal bars 67 to form a rigid frame on which the flooring 7 is secured. It is preferable that the flooring consist of sheets of plywood secured to the support 65 and extending outwardly therefrom with the plywood positioned under the lower or transverse member of the rib sections, as illustrated in FIG. 4.

The skin or shell 2 is made up and shaped to conform to the shape and size of the outside of the boat when erected whereby the shell is substantially one piece, with the upper edge or marginal portion 68 adapted to extend over the gunwale, transom and stern frame. It is preferable that interconnecting separable fasteners be fixed on the upper marginal portions of the shell 2 and on the gunwales and stern frame. Such separable fasteners 69 may be of any suitable form, for example, snap fasteners wherein male snap portions 70 are fixed to the gunwales on the innermost surfaces and the stern frame cross member 25 in spaced relation longitudinally therealong and female fastener portions 71 fixed to the marginal portions 68 at the upper end of the shell to register with the male members whereby the shell or skin may be tensioned and then secured by such fasteners.

A plurality of yieldable or elastic plank-like members are interposed between the frame and the shell or skin 2, as illustrated in FIGS. 2 and 4. It is preferable that the plank-like portions be of low density, lightweight material and have high buoyancy. The plank-like members are preferably arranged whereby they extend longitudinally of the boat and have lateral spacing as, in the illustrated structure, wherein one of the plank-like portions 72 is positioned under and arranged along the beam 16 and lower portion of the prow member 12 with another plank-like portion 73 on each side of the center plank member 72 and spaced therefrom as at 74 whereby the outer bottom plank portions 73 extend outwardly to approximately the outer sides of the flooring panels whereby the center plank 72 and bottom planks 73 substantially define the bottom portion of the boat, as illustrated in FIG. 4. Side plank members 75 extend longitudinally of the boat in interposed relation between the upstanding portions of the rib members and the sides of the shell or skin 2, said side plank members 75 preferably extending from the transom 8 to the prow member 12. The plank members are preferably formed of a unicellular, synthetic resin wherein the cells are separate or discrete with the synthetic resin having resiliency as, for example, a cellular polyethylene, polyvinyl chloride or other cellular or foamed synthetic resin or elastic material such as rubber and the like. It has been found that for small boats the cellular synthetic resin in strips approximately 10 inches wide and 2½ inches thick in static condition provides desired buoyancy, cushioning and resiliency. Also, when the shell or skin 2 is pulled upwardly for fastening the upper portion to the gunwale or frame, it should be of such size that it must be tensioned to align the fasteners and, in such tensioning, the plank members 72, 73 and 75 will be compressed between the skin and the frame whereby the resiliency of the plank members tends to maintain the skin under tension. The spacing between the lower planks 72 and 73 allows water pressure at the bottom of the boat to force the skin upwardly between the planks to form longitudinal troughs in the bottom and also the spacing between the outer side edges 76 of the side planks 73 and the lower edges 77 of the side planks 75 provides a spacing whereby water pressure on the skin between said edges will force the skin upwardly forming concaved or downwardly opening troughs which contribute to stabilization of the boat.

In assembling a boat constructed as described, the nuts or adjusting members 31 and 46 are threaded toward the fixed end of the shanks and the rope 34 is released. The shell or skin 2 is then unfolded and laid out preferably on a flat surface. The bottom cellular planks 72 and 73 are then placed on the inner surface of the skin extending longitudinally thereof and then the beam is unfolded and, with the floor panels 7 on the supports of the beam, said beam in its in-line position is laid on the bottom planks 72 and 73 with the beam member 16 centered and extending longitudinally of the center plank 72. The U-shaped ribs 11 have their lower portions inserted into the respective slots 32 of the beam and said ribs arranged whereby the upright portions thereof are equally spaced laterally of the beam 16. The turnbuckle 38 on the rope 34 is then connected to the bracket 39 and said turnbuckle actuated with the ropes engaged under the hooks 37 to tighten the rope, applying substantial tension thereto to hold the beam 16 as a rigid member. The forward rib 42 is then positioned at the forward end of the beam and the socket member 40 sleeved over the end of the beam. Then the prow member has the rear portion of the shank 46 sleeved into the tubular portion 43 of said forward rib. The gunwale sections are then connected to the prow portions and the depending portions of the pins 19 on the gunwale sections inserted into the upper ends of the sockets of the ribs until all of the gunwale sections are assembled. Then the stern frame is connected by the slip joint to the gunwale sections and the tubular portion 28 sleeved over the shank 29 extending from the rear of the beam. The side rails 15 are then assembled and connected by the slip joints to the prow section, and the pins on the side rails inserted into the socket members 60 on the ribs and stern frame. The skin is then pulled upwardly and the side plank members 75 inserted and then the upper end portions of said skin pulled over the gunwales whereby the fastening portions 70 and 71 of the fastening devices 69 are aligned and engaged to secure the skin to the gunwales and frame. Then the adjusting members or nuts 31 and 46 are turned on the threaded shanks to move toward the tubular portions 28 and 43 respectively forming extensible jacks tending to separate the lower portion of the stern frame from the rear end of the beam and the rear portion of the prow member from the forward rib or forward end of the beam. This extends the length of the total frame, tightening the frame in the skin, and thereby eliminating looseness if any that was present to facilitate the fastening of the upper portion of the skin to the frame.

The seats, 4, 5 and 6, are then placed on the side rails and suitably secured thereto, and the boat is ready to be placed into the water. When used as a motor boat, an outboard motor will be secured to the transom in the conventional manner, and it is found that during operation of the boat the pressure of the water will force the skin upwardly between the planks to form downwardly opening troughs, as at 78, which extend longitudinally of the boat and, also, downwardly and outwardly opening troughs, as at 79, which facilitate in maintaining the boat in its direction of travel and reducing side slippage. It has also been found that in relatively short turns at substantial speed, the increased pressure of the water at the side of the boat towards which the boat tends to slip deforms the skin and planks inwardly increasing the concavity of the trough, providing increased resistance to side slippage whereby the boat has great stability. Also, its lightness in weight and the buoyancy of the material provide great ease of handling in a structure that in itself will not sink even if inverted.

It is to be understood that while I have illustrated and described one form of my invention, it is not to be limited to the specific form or arrangement of parts herein described and shown except insofar as such limitations are included in the claims.

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

1. A collapsible boat including, a framework and a flexible waterproof skin, said framework comprising a plurality of tubular U-shaped rib members of size to determine the transverse shape of the boat, a stern frame, a transom secured to said stern frame, a prow member defining the forward end of the framework and extending downwardly and rearwardly therefrom, a sectional gunwale connecting the stern frame and the forward end of the prow member, a sectional beam extending longitudinally of the boat, hinge means connecting the adjacent ends of the beam sections with portions of said beam extending above the hinge means in abutting relation when the beam sections are in aligned relation, tension means secured to the ends of the beam in upwardly spaced relation to the hinge means to retain the beam sections in a rigid structure, and an extensible member connecting the beam and one of the stern frame and prow member, said beam having portions spaced longitudinally thereof receiving central portions of said ribs, pins and sockets on the gunwale sections and U-shaped ribs for connecting one to the other, said skin having a fabric body shaped to fit around the framework in covering relation thereto, interengaging means on the gunwale and the skin to secure one to the other.

2. A collapsible boat including, a framework and a flexible waterproof skin, said framework comprising a plurality of tubular U-shaped rib members of size to determine the transverse shape of the boat, a stern frame, a transom secured to said stern frame, a prow member defining the forward end of the framework and extending downwardly and rearwardly therefrom, a sectional gunwale connecting the stern frame and the forward end of the prow member, a sectional beam extending longitudinally of the boat, hinge means connecting the adjacent ends of the beam sections with portions of said beam extending above the hinge means in abutting relation when the beam sections are in aligned relation, tension means secured to the ends of the beam in upwardly spaced relation to the hinge means to retain the beam sections in a rigid structure, an extensible member connecting the beam and one of the stern frame and prow member, said beam having portions spaced longitudinally thereof receiving central portions of said ribs, pins and sockets on the gunwale sections and U-shaped ribs for connecting one to the other, said skin having a fabric body shaped to fit around the framework in covering relation thereto, interengaging means on the gunwale and the skin to secure one to the other, and resilient planks of unicellular material extending longitudinally of the boat between the skin and framework.

3. A collapsible boat including, a framework and a flexible waterproof skin, said framework comprising a plurality of tubular U-shaped rib members of size to determine the transverse shape of the boat, a stern frame, a transom secured to said stern frame, a prow member defining the forward end of the framework and extending downwardly and rearwardly therefrom, a sectional gunwale connecting the stern frame and the forward end of the prow member, a sectional beam extending longitudinally of the boat, hinge means connecting the adjacent ends of the beam sections with portions of said beam extending above the hinge means in abutting relation when the beam sections are in aligned relation, tension means secured to the ends of the beam in upwardly spaced relation to the hinge means to retain the beam in sectional alignment forming a rigid beam, extensible members connecting one end of the beam and the stern frame and the other end of the beam and the prow member, said beam having portions spaced longitudinally thereof receiving central portions of said ribs, pins and sockets on the gunwale sections and U-shaped ribs for connecting one to the other, said skin having a fabric body shaped to fit around the framework in covering relation thereto, interengaging means on the gunwale and the skin to secure one to the other, and resilient planks of unicellular material

extending longitudinally of the boat between the skin and framework, said planks being shock resistant and having lateral spacing one from the other whereby pressure of water from the exterior forces the skin inwardly between the planks to form longitudinally extending downwardly opening stabilizing channels. 5

4. The structure defined in claim 3 including support means extending laterally from the beam sections, and floor panels positioned on said support means to form a floor for the boat in overlying relation to the resilient planks. 10

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