Aug. 8, 1961

L. PRZYBYLSKI

2,994,891

COLLAPSIBLE BOAT

Filed July 21, 1958

2 Sheets-Sheet 1

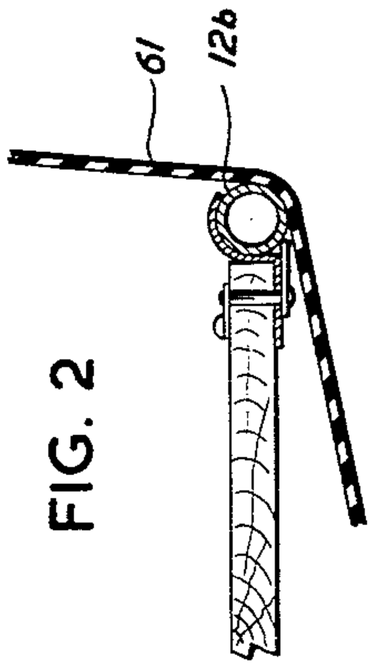

FIG. 2

FIG. 1

FIG. 9

FIG. 3

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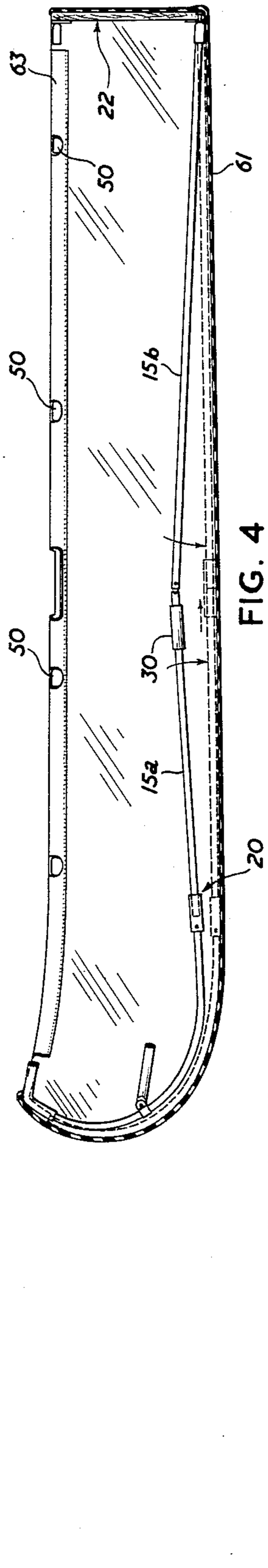

FIG. 4

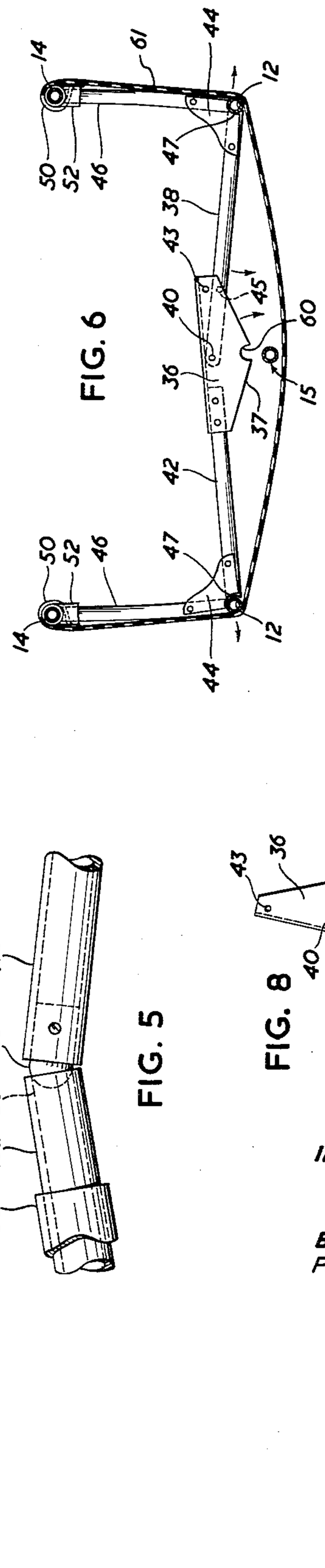

FIG. 6

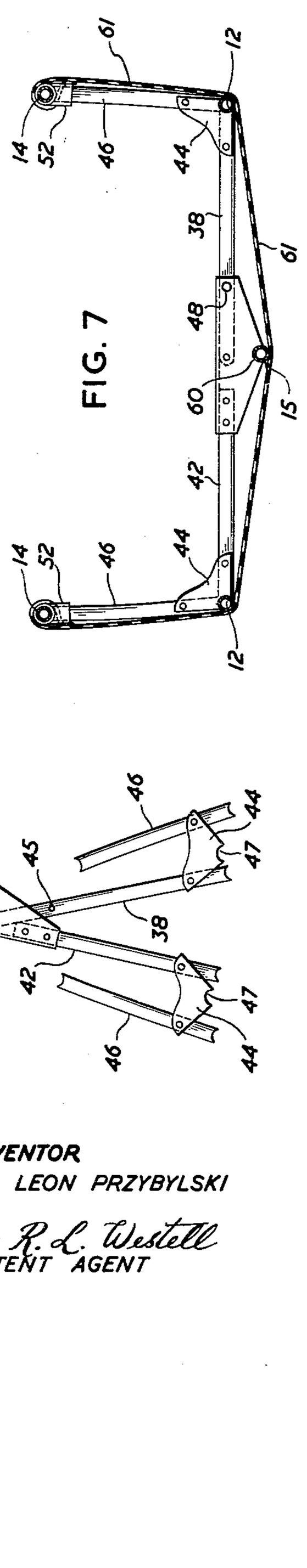

FIG. 7

FIG. 5

FIG. 8

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2,994,891

Patented Aug. 8, 1961

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COLLAPSIBLE BOAT

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Filed July 21, 1958, Ser. No. 749,944
1 Claim. (Cl. 9—2)

This invention relates to a collapsible boat.

It is an object of this invention to provide a boat composed of a metal skeleton defining the shape of the boat and a water tight skin fitted about said skeleton.

It is a further object of this invention to provide such a boat wherein means are provided for rendering the skin taut about the skeleton after the skin has been placed thereabout.

It is a further object of the invention to provide such a boat wherein the longitudinal stringers are made in such a way that their resultant length may be increased after it is placed in the water tight skin, thereby tautening the skin about the skeleton.

It is a further object of the invention to provide further such a boat shaped partially by the longitudinal stringers wherein skeleton cross members are provided to shape and flex the longitudinal stringers.

It is a further object of the invention to design such skeleton cross members in such a way that their resultant length may be increased after it is placed in the water tight skin to flex said longitudinal stringers and tauten said skin.

FIGURE 1 shows a perspective view of a boat in accord with the invention.

FIGURE 2 is a cross section along the line **2—2** of FIGURE 1.

FIGURE 3 is a detailed view of a portion of the said boat.

FIGURE 4 is a side view of the boat showing the means for longitudinally tensioning the skeleton against the skin.

FIGURE 5 is a detailed view of a portion of FIGURE 4.

FIGURES 6 and 7 are views of the skeleton cross members; and

FIGURE 8 is a detailed view of a portion of such cross members.

FIGURE 9 is a detailed view of the end of a stringer member.

In the drawings is shown a boat skeleton comprising two longitudinal stringers **14** defining the upper extremities of the boat side walls and two longitudinal stringers **12** defining the lower extremities of the boat side walls and a central stringer **15** defining the centre of the boat bottom.

A prow member **16** comprises an A shaped member wherein the legs **37** of the A project rearwardly to terminate in telescopic sockets to slidably receive the upper stringers **14**. From the apex of the A a prow rib **18** curves forwardly, downwardly and then rearwardly to define the prow of the boat with the rearward projection of the rib being formed as a socket at **20** to slidably, telescopically receive the forward end of the central stringer **15**.

Vertically disposed between the A shaped member and the lower extremity of the rib are two lengths of tubular material **17**, pivotally mounted on the prow member **18** at **19** and diverging rearwardly and formed with sockets to slidably, telescopically receive the lower stringers **12**.

The two upper, two lower and the central stringers **14**, **12** and **15** are adapted to project to the rear of the boat where they join a rear panel **22** and the panel shapes and forms the back of the boat. The stringers are joined

to the panel member by a means best illustrated in FIGURE 3.

At each of the upper and lower side edges of the panel **22** and at the bottom centre of the panel there is provided a sleeve **24** adapted to slidably receive a stringer, the sleeve being enclosed to the stern member by a bolt or rivet **25** which allows free angular movement of the sleeve about the anchoring bolt **25**. The stringer receiving prow and stern members may be provided with stop members **37** for the extremities of the stringers to avoid wedging of the stringers in the sleeves.

With respect to the telescopic joints already described, it will be understood that the shank and socket members may be reversed within the scope of the invention.

With respect to the number of stringers it will be understood that this number will be selected to suit the size and type of boat desired.

The construction so far described is collapsible as follows:

The central stringer **15**, preferably tubular, is composed of a forward member **15A** and a rearward member **15B**. One of the members **15B** is at the junction provided with a hemispherical projection **26** while the other member **15A** is provided with a complementary socket **28** which is preferably merely the tubular bore of the member. A sleeve **30** is made slidable on the members **15A** and **15B**. This central stringer **15** is assembled in the boat as follows: The forward portion **15A** is slidably attached to the rib **18** of prow member **16** and the rearward portion **15B** is slidably attached to the centre lower sleeve **24**. The shape of the prow member **16** and in particular the angle of rearward projection of rib **18** is such that the forward member **15A** projects upwardly as indicated in solid lines in FIGURE 4. Due to the limited universal movement of sleeve **25**, the rearward member **15B** can also be adjusted to slope upwardly as indicated in solid lines in FIGURE 4. To assemble the central stringer **15**, the forward portion is attached to the prow **16** and the rearward portion to the panel **22** as already described. With the forward member **15A** and the rearward member **15B** sloping upwardly, the hemispherical projection **26** is fitted in the corresponding complementary socket **28**. This is the solid line position of FIGURE 4 and will be known as the "contracted" position of stringer **15**. To extend the stringer **15** both portions of stringer **15** are pushed downwardly until they are aligned with ball **27** still seated in socket **28** and the sleeve **30** is the slide over the ball-socket joint to hold the members **15A** and **15B** in suitable alignment. The natural flexure of members **15A** and **15B** inside sleeve **30** will reasonably maintain it in position to ensure the continued alignment of the members **15A**, **15B**. The aligned position of members **15A**, **15B** is shown in dotted lines in FIGURE 4 and this is known as the extended position of central stringer **15**.

Lower stringers **12** and upper stringers **14** are constructed and connectable in a similar manner to central stringer **15**. This lower stringer **12** comprises a forward portion **12A** and a rearward portion **12B** and includes a hemispherical projection **26** and a socket **28**. Similarly, upper stringers **14** comprise forward portion **14A**, rearward portion **14B** and include a hemispherical projection **26** and socket **28**. Lower and upper stringers **12** and **14** are, therefore, assembled to the stern and prow members in the same manner as the central stringer assembly being somewhat easier if the central stringer is assembled first.

The skeleton cross members are best shown in FIGURES 6, 7 and 8. These comprise a central plate **36** pivotally joined at **40** to an arm **38** extending half the boat bottom width to take in the assembled position of the boat a position adjacent one of the lower stringers

12. An arm 42 is rigidly joined to the central plate 36 to project in such a direction as to take in the assembled position of the boat a position adjacent the other of the lower stringers 12. Corresponding apertures 43 and 45 in the central plate 36 and pivotally mounted arm 38, respectively, allow the insertion of a locking pin 48 to lock the arm 38 in alignment with and projecting in the opposite direction from arm 42.

The central plate 36 is provided with a downwardly directed apex 37 whose depth varies in the various cross members along the length of the boat to shape the bottom contour thereof and the apex is provided with a recess 60 adapted to receive the central stringer 15.

With the pin 48 in place arms 38 and 42 form a single compression beam 38—42 somewhat wider than the distance between lower stringers 12 assumes without such arms in alignment, as shown in FIGURE 6. It should also be noted that without the compression beam spreading the stringers the lower stringers 12 are spaced inwardly relative to the outer stringers 14 a greater distance than they will be under the outward flexure of the compression beam and thus the distance between the respective right hand or left hand stringers will be greater before the arms 38 and 42 are aligned than after. Arms 46 are provided to space the upper and lower stringers when flexed outwardly by the beam 38—42 and to act as a compression beam spacing said stringers. The outer extremity of arm 38 or 42 and the lower extremity of each arm 46 is recessed to receive the lower stringer 12. Each arm 46 is linked to the adjacent arm 42 or 38 by a plate 44 having pivotal connections spaced from the lower stringer. The plate 44 is extended toward and provided with a recess 47 to receive the lower stringer 12.

The upper extremity of each arm 46 is recessed to receive the upper stringers 14. A T-shaped junction 52 member is fitted about the upper stringer 14 at the location of each hole 50, with the cross-bar slidable along the upper stringer 14 and a hollow bored upright extending to receive said arms 46.

The cross members are assembled to the stringers after the stringers are in place connecting the stern and prow members within the skin. First the arms 46 are slid by their upper ends into the hollow uprights of T-shaped members 52 and the recessed lower ends of arms 46 are fitted over the lower stringers 12. There the arms 46 are each fitted easily between the upper and lower stringers before the lower stringers are flexed outwardly by the beam 38—42. The beam 38—42 in flexed form, as shown in FIGURE 6, is fitted at the extremity of arm 38 to one lower stringer 12 and at the extremity of the arm 42 to the other lower stringer 12. At the same time the recesses in the respective junction plates 44 are fitted about the lower stringers. By downward pressure of the hand or foot the arms 38 and 42 are then straightened out, flexing the lower stringers 12 outwardly and the pin 48 is slid into place fixing the arms in place. The outward flexure of the lower stringer 12 carries with it the lower extremities of the arms 46 and, as previously explained, and firmly fixes the arms 46 in place as compression beams spacing the upper and lower stringers. At the same time, another beam 38—42 is being straightened out the recess in plate 36 fits itself over central stringer 15.

The cross member thus firmly flexes and shapes the five stringers and is itself firmly held in place. Each stringer 12 is firmly fixed in position in the recesses of arms 38 and 46 or of arms 42 and 46 and the effect of this fixation plus the plates 44 joining arms 38 and 46 and receiving stringers 12 is to rigidly fix in position the arms 38 and 46 or 42 and 46 relative to each other and to the stringer 12.

It will be noted that the plates 36 of the different cross members are of different depths to control the contour of the central stringer 15. These plates 36 flex the central stringer into the desired shape and the reaction to the upward pressure of the flexed central stringer is transferred by the cross member to the upper stringers.

The stringer and cross members are preferably of tubular construction for strength and lightness but may be of solid cross section.

A watertight skin 61 is provided adapted to assume about the skeleton, the shape of a boat. The skin is on two edges turned upon itself to provide sleeves 63 which are adapted to receive upper stringer 14, the sleeves having apertures therein to allow projection of the uprights of the T-shaped members 52.

The upper stringers 14 are preferably provided with rounded or tapered tips for easy insertion in the sleeves 63.

The collapsibility of the various members will now be discussed. The portions of the boat are therefore as follows:

(*a*) Longitudinal stringers 12, 14 and central stringer 15.

(*b*) Prow member 16.

(*c*) Stern member 22.

(*d*) Cross-members.

(*e*) Skin 61.

The longitudinal stringers may be disassembled into lengths, half the length of the boat as already discussed.

(*b*) and (*c*) The prow and stern members are unitary.

(*d*) The cross-members are collapsible as best shown in FIGURE 8, by folding arms 46 parallel to arms 38 and 42 respectively and by removing pin 48 and folding arm 42 relative to arm 38.

(*e*) The skin is detachable from upper stringers 14 and foldable.

The boat is assembled by threading the upper stringers 14 into the sleeves 63 of skin 61 and ensuring the projection of the T-uprights 52 through the sleeve holes. The lower stringers and the prow or stern members are then placed in the skin and the upper and lower stringers are attached to the bow and stern members 16 and 22 partially shaping the skin into the form of the boat. One end of he forward part 15A of the central stringer is then inserted into the socket of rib 18 in prow member 16, one end of the rearward portion 15B of the central stringer is inserted into a bolt of stern member 22. The two sections are fitted together (in the retracted position). The central stringer is then manually moved to the extended position tautening the skin longitudinally. The sleeve 30 is then slid into place over joint 26—28 to maintain the central stringer in this position. It will be noted that it is the tension of the skin 61 which maintains connected the slidable joints in the stringers and the joints respectively between the bow and stringer members and the stern and stringer members.

I claim:

A collapsible boat comprising: a plurality of longitudinal stringer members, prow and stern members detachably connected to said longitudinal stringer members, a plurality of cross members detachably connected to and shaping said stringer members between said prow and said stern members, a skin overlying and shaped by said stringer members to provide the walls and bottom of a boat and wherein said plurality of longitudinal stringer members comprise two upper longitudinal stringers defining the upper edge of the boat sidewalls and two lower longitudinal stringers defining the lower edge of the boat sidewalls and wherein said cross members comprise arms adapted to extend between said upper and lower stringer members, and connected to space said members and a beam extending between said opposite lower stringers said beam having bearing surfaces designed to bear outwardly on each of said lower stringers, said beam being composed of two pivotally connected members and being designed to be bent to a contracted position and to be locked in an extended position, said lower stringers being arranged to be spaced a distance less than the extended length of said beam,

whereby said beam may be fitted to said lower stringers in its contracted position and locked in said extended position to fix said lower stringers in spread position.

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