Dec. 3, 1929. M. M. BAIR ET AL 1,738,221

FOLDABLE BOAT

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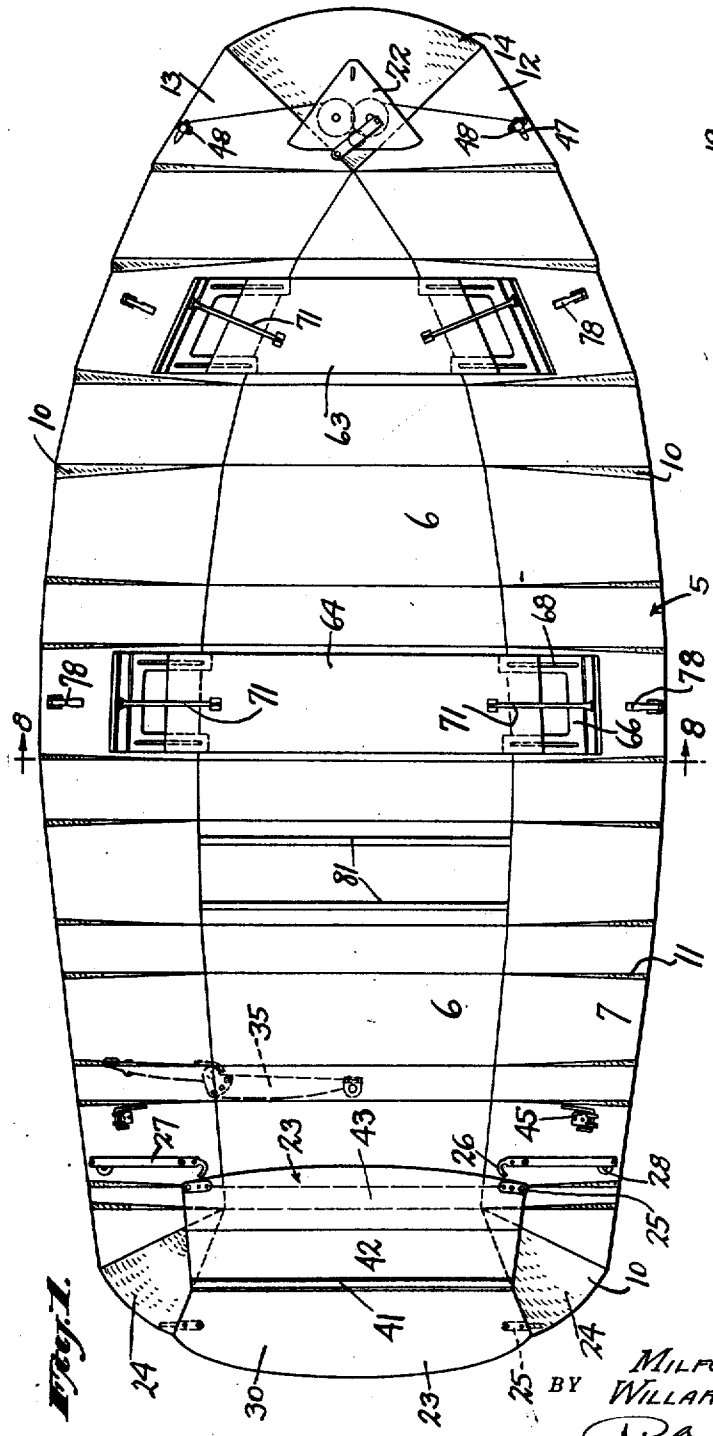


Fig. 1.

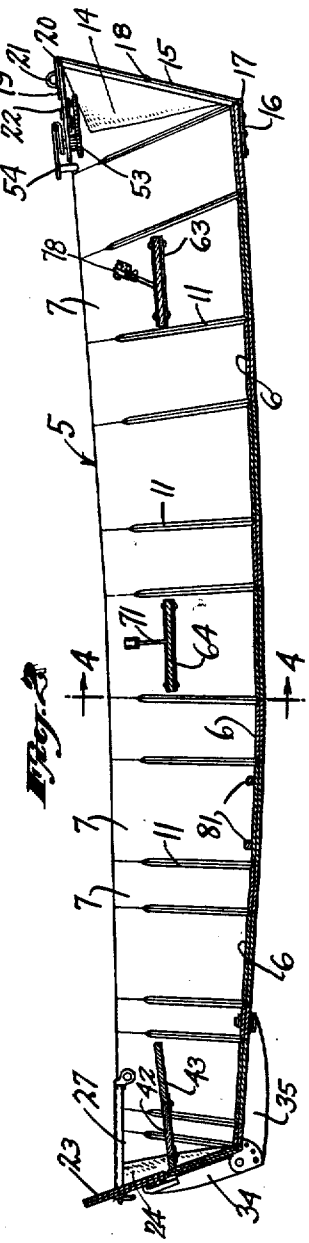


Fig. 2.

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Fig. 3.

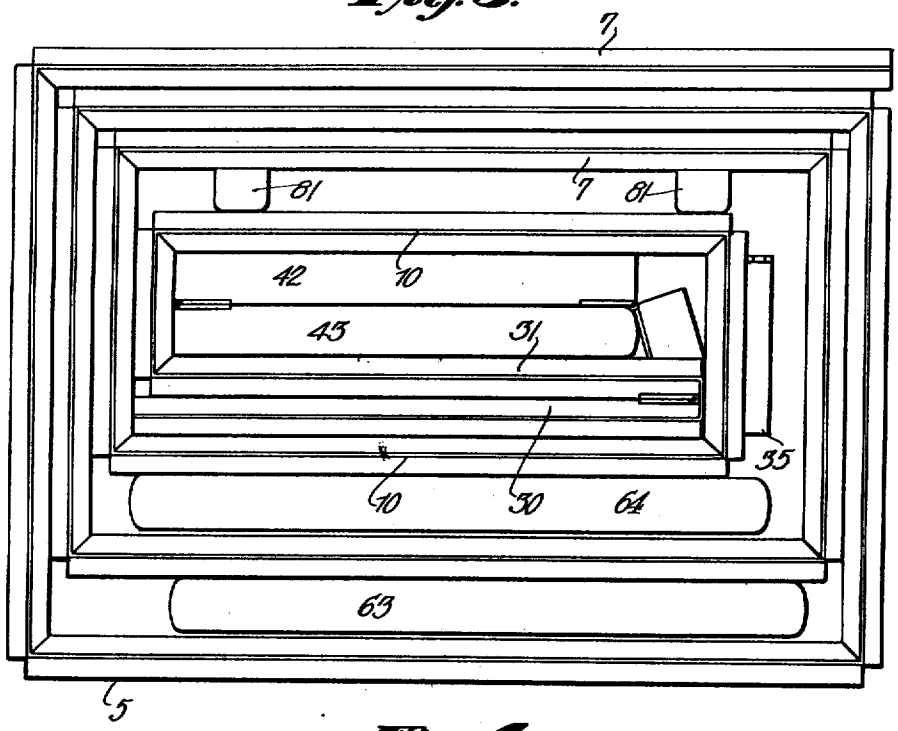


Fig. 4.

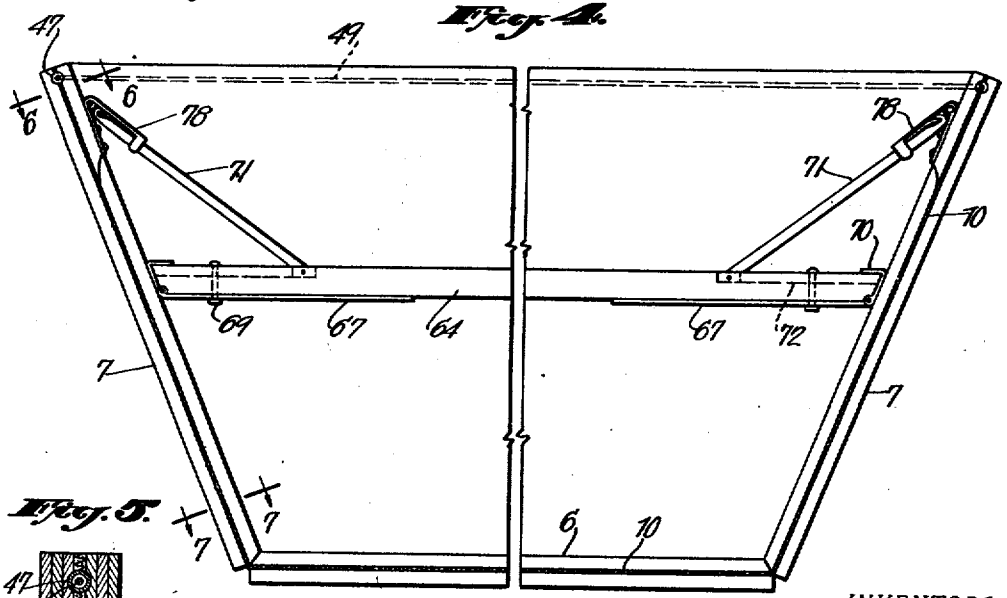


Fig. 5.

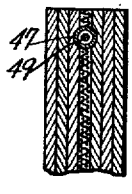


Fig. 6.

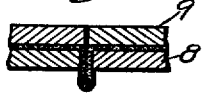


Fig. 7.

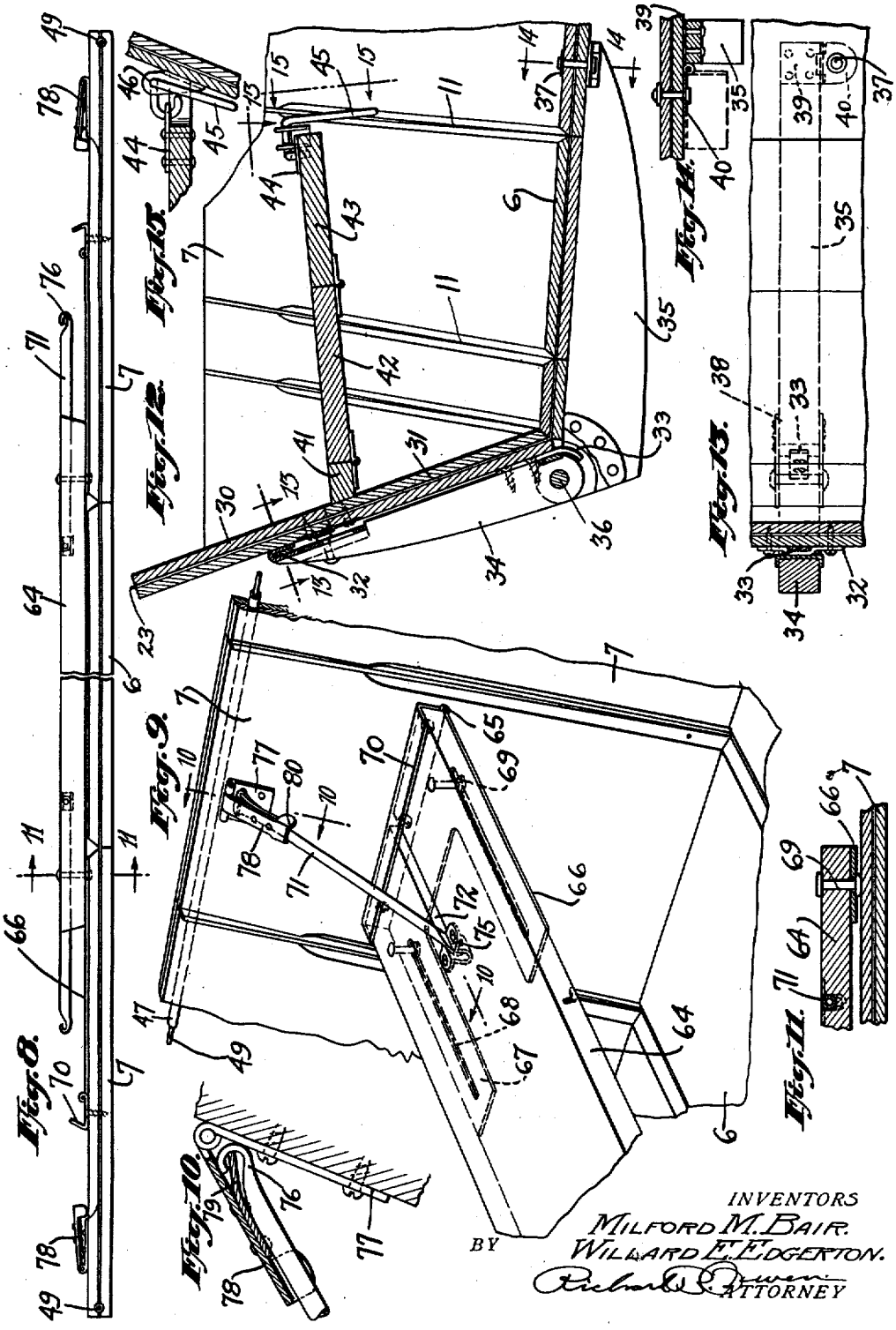


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FOLDABLE BOAT

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Fig. 16.

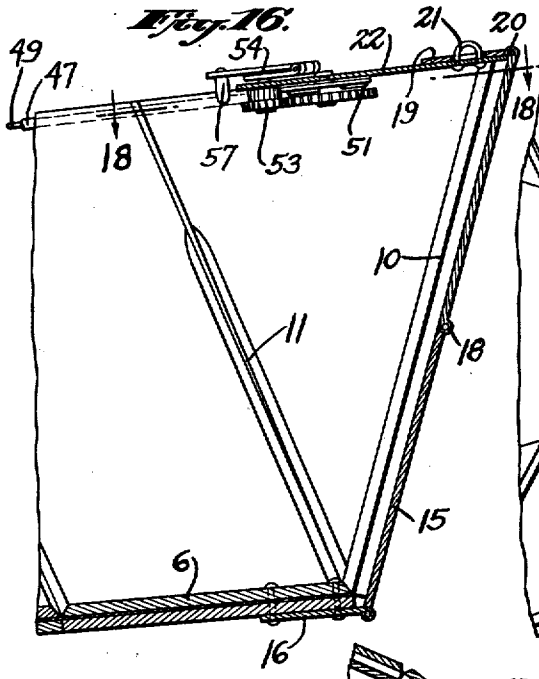


Fig. 17.

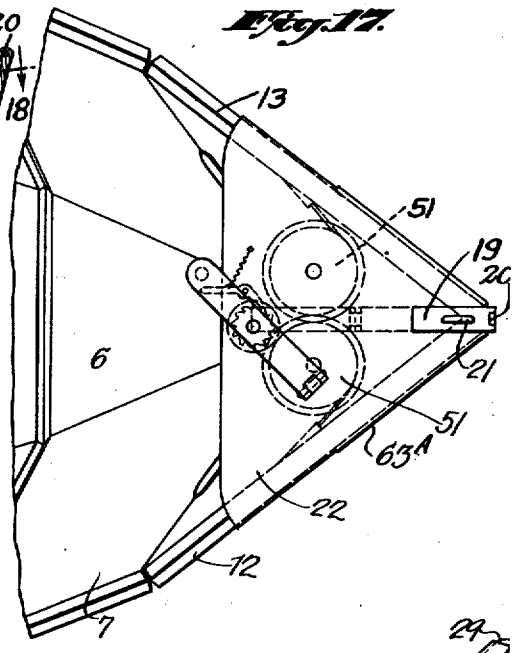


Fig. 18.

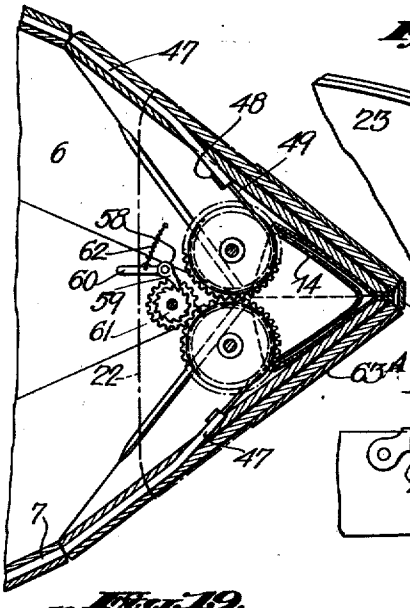


Fig. 20.

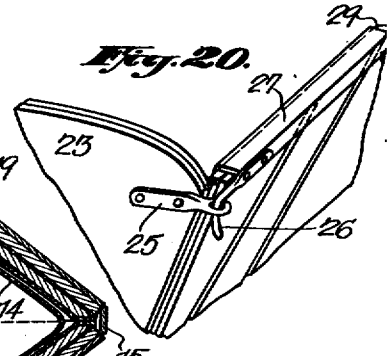


Fig. 21.

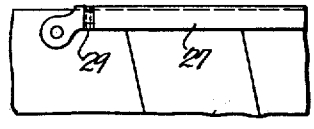
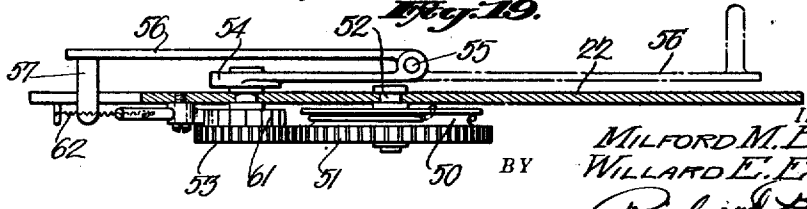


Fig. 19.



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1,738,221

UNITED STATES PATENT OFFICE

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FOLDABLE BOAT

Application filed April 22, 1927. Serial No. 185,843.

This invention relates to folding or roll-up boats and in particular to the kind adapted to be transported and arranged for use at bathing beaches or other watering places.

A particular object of the invention is to provide a boat of solid construction which, when in operating position, will be rigid, seaworthy and strong.

Heretofore in the manufacture of foldable boats or knock-down boats, as they might better be termed, it has been the practice to make the framework up from a number of separate parts which are adapted to be united by fasteners or other securing means, the frame to be fitted into a canvas bag or outer covering which would render the frame buoyant and waterproof. This form of construction has always been objectionable due to the fact that when the canvas or covering becomes wet, it shows the ribs of the framework of the boat and in a frame made up of a number of parts which are temporarily secured together, the necessary rigidity cannot be obtained and it is essential in a boat of this character that it not only be of rigid construction but be also extremely buoyant.

In order to overcome these objections, we have provided a foldable boat construction which can be rolled up and placed, for instance, on the running-board of a motor vehicle for transportation to the seashore, at which point the boat may be laid out flat on the ground, after it has been unrolled and through the medium of a simple winding mechanism may be drawn up to its boat shape and be held in this position securely by lock members which function to position in place seats which are secured permanently to the boat construction.

Another feature of our invention is that we have no parts to be assembled and the canvas or fabric used is built directly into the boat construction and when the boat is in position for use, it cannot be distinguished from any other solidly constructed boat.

Another object of the invention is to provide a boat of such rigid construction that a small motor of the outboard type may be used in connection therewith for propelling the same, the boat construction being such that it will accommodate the same when said motor is positioned over the rear end thereof.

To enable others skilled in the art to fully comprehend the underlying features of our invention that they may embody the same in the various modifications, in structure and relation contemplated, a drawing depicting a preferred form has been annexed as a part of this disclosure and in such drawings, similar reference characters denote corresponding parts throughout all the views, of which,

Figure 1 is a top plan view of our improved boat showing the same in its unrolled, flat position.

Figure 2 is a view in longitudinal section of the boat shaped in position and ready to be put into the water.

Figure 3 is a view in end elevation of the boat showing the same rolled up and ready to be transported.

Figure 4 is a sectional view taken on the line 4—4 of Figure 2, the same being enlarged and taken through the canvas or fabric which joins the wooden members from which the boat is made.

Figure 5 is an enlarged fragmentary cross section taken through the upper edge or gunwale of the boat and showing the position of the guy wire between the laminated wood pieces which form the boat.

Figure 6 is a section taken on the line 6—6 of Figure 4 showing the spacing of the wood members so that the canvas can be accommodated therebetween.

Figure 7 is a sectional view taken on the line 7—7 of Figure 4 showing the bevel formed on the inner wooden members and the relation of the bevel to the square cut edges of the outer wooden members.

Figure 8 is a sectional view taken on the line 8—8 of Figure 1 showing the arrangement of one of the seat members when the boat is opened out flat.

Figure 9 is a view in perspective of the seat member shown in Figure 8 when the sides of the boat have been drawn up to shape the boat and the seat has automatically assumed its position for use and is locked in said position.

Figure 10 is a section taken on the line

10—10 of Figure 9 and shows the locking member in place over the end of the seat hook whereby the seat is retained in its position for use.

Figure 11 is a section taken on the line 11—11 of Figure 8.

Figure 12 is an enlarged view in sectional elevation of the rear end of the boat showing the rear seat positioned for use and the skeg in position on the boat.

Figure 13 is a section taken on the line 13—13 of Figure 12 showing how the skeg is positioned on the rear under side of the boat and also illustrating how the same may be positioned transversely of the boat to allow the same to be rolled up.

Figure 14 is a section taken on the line 14—14 of Figure 12 showing how the end of the skeg is pivotally associated with the under side of the boat.

Figure 15 is a sectional view taken on the line 15—15 of Figure 12 showing how the rear seat is locked in position when the boat is in position for use.

Figure 16 is an enlarged view of the front end of the boat as illustrated in Figure 2, showing the winding mechanism used for drawing the sides of the boat up into position.

Figure 17 is a top plan view of the mechanism and prow of the boat as illustrated in Figure 16.

Figure 18 is a section taken on the line 18—18 of Figure 16 showing the top plate removed, the figure illustrating the position of the gears which are used to draw the cable whereby the boat is shaped to position for use.

Figure 19 is an enlarged view in side elevation of the sheave gears and winding mechanism showing how the operating handle, forming part thereof, may be folded into compact position when the boat is to be rolled up and transported.

Figure 20 is a view in perspective of one of the rear corners of the boat showing how the same is effectively secured together, and

Figure 21 is a fragmentary, detail view of the retaining member used to hold the rear pieces in rigid position.

Referring to the drawings in detail, and particularly to Figures 1 to 7 inclusive, 5 indicates generally our folding boat which is made up of a series of bottom pieces or units and side pieces or units indicated by the numerals 6 and 7 respectively, these units being formed in two parts, an upper part 8 and a lower part 9 and each of the upper and lower parts being, as illustrated, made up of laminated material, such for instance, as wood, but it is to be particularly understood that instead of the laminated portions 8 and 9, we may use a solid piece of metal plate or other material adapted for the purpose. In order to render the boat waterproof and seaworthy and also to allow it to be folded and rolled up, we have provided a unitary piece of fabric 10 or joiner which has been suitably waterproofed and to the opposite sides of which are secured, as by cementing, riveting or the like, the top pieces or units 6 and side pieces or units 7, it of course being understood that the lower and upper parts of each of the bottom and side pieces are cemented to the fabric 10 at the opposite sides thereof, so that each of the units is positioned to enable the entire structure to be folded or rolled as indicated in Figure 3.

In order to accomplish the drawing up of the sides of the boat to the position illustrated in Figure 4, it is necessary that the upper part 8 of the side pieces 7 be bevelled as at 11 and spaced apart to provide what might be called, together with the fabric, pleats which allow for the decrease in circumference in the upper edge or gunwale of the boat when the same is in position for use.

It will of course be evident that the depth and width of these cut out portions 11 may be varied to suit the movement between the adjacent parts in any portion of the boat and, at the prow of the boat, the prow pieces 12 and 13 are separated by an exposed segmental portion 14 of the fabric 10 and, as shown in Figure 2, when these prow pieces 12 and 13 are drawn up to position to form the prow edge, this segmental piece 14 is drawn inside the boat and the meeting edges of the pieces 12 and 13, preventing any water from coming in and being additionally protected by a bow or stem member 15 which is made of strip metal and is secured at one end as at 16 to the bottom of the boat in such position that the forwardly extending portion thereof, which is pivoted as at 17 may protect the meeting edges of the pieces 12 and 13 when the boat is in use. The mid portion of the section 15 is hinged as at 18 so that this guard stem strip may be rolled or folded with the boat. The upper or outer end of this stem piece is provided with an eye plate 19 which is hinged as at 20 to the bow piece and is adapted to pass over the eye 21 carried in the winch plate 22, the purpose of which will be hereinafter described. The stern piece 23 is also separated from the side pieces 7 by the exposed segmental portions 24 of the fabric 10, the stern piece 23 carrying at its opposite upper edges, eyes 25 which are each adapted to be engaged by the hook end 26 carried on the U-shaped binding member or reinforce 27, this reinforce extending forwardly of the boat and being pivoted as at 28 to the side pieces 7, the pivot portion thereof being hinged as at 29 to the main body of the reinforce 27 so that the same can be raised away from the edges of the side pieces and swung to the position shown in Figure 1 when the boat is to be rolled up. As illustrated in Figure 12, the stern piece 23 is made from

an upper and a lower portion 30, and 31 respectively, they being joined in the usual manner and made up similar to the rest of the pieces that go to make up the boat construction, the upper one carrying on its outer face, a suitable strap 32 as does also the lower piece 31, these two straps being identical and being spaced from the surface to which they are attached at their centers so that they may engage and hold the tongue portions 33 of a skeg or keel, the parts of which 34 and 35 are hingedly connected as at 36, the upper edge of the vertically disposed portion 34 being provided, as aforesaid, with the tongue 33, which engages into the strap 32 to hold the skeg in position at the stern of the boat. It will be observed from inspection of Figure 13 that the forward end of the skeg piece 35 is pivotally secured through the medium of a pin 37 to the flooring or one of the bottom pieces 6 of the boat, the purpose of the pivot being to allow the skeg to be folded down and swung around to a position transversely of the boat so that when the same is rolled up for transportation, the skeg does not interfere with the compactness of the bundle. The skeg piece may be made of solid wood and the pivot pin 36 may pass through the side joining plates 38 which are secured in any manner to the sides of the skeg piece 35 and at their upper ends form guides in which skeg piece 34 has pivotal movement. The end of the skeg 35 is provided with the hinged plates 39 in the hinged portion 40 of which is positioned, the pivot pin 37, before referred to.

It is evident from this construction, therefore, that when the skeg piece 35 is drawn out to the position shown in Figure 12 and the boat has been drawn up for use, the throwing up of the skeg piece 34 will cause the extended lips 33 carried thereby to engage into the straps 32 automatically. The stern piece 31 is further provided on its inside surface with a block 41 to which is hinged the seat member 42, the outer portion of the seat being designated by the numeral 43 and being in turn hinged to seat section 42, the outer seat section 43 being provided with an eye plate 44 which is suitably secured thereto and in its eye section is adapted to receive the hook locking member 45 which is pivotally held in the bracket 46, the bracket being secured to the side piece 7 and it also being understood that on the opposite corner of the seat portion 43, there is provided a like locking member. In order to draw the side pieces 7 up so that the boat is in its proper shape, we have provided between the laminated side members of the boat, a tube 47 which is positioned adjacent the upper edge of the gunwale and extends longitudinally of the sides to a point at the rear edge of the side pieces, at which point it is secured in any suitable manner together with the guy or binding wire 49 which passes through said tube 47 and is secured with it in any suitable manner to the rear edge of the side pieces. The tube at the forward end of the boat and adjacent the center of the bow pieces 12 and 13, emerges and, as shown in Figure 1, is secured through the medium of a strap 48 in position so that the wire 49 emerging therefrom may be wrapped about the gear sheave pulleys forming part of the winch member.

It will be evident, of course, that this guy wire and its tubing extend along both sides of the boat and when drawn upon at the front of the boat, will draw the sides up to position to give the boat its proper shape, as shown in Figure 4. The winch plate has secured thereto and on the under side thereof, the sheave gears 51 in which are provided wire engaging grooves 50 in which are suitably secured the ends of the wires 49 that pass through the upper side edges or gunwales of the boat construction and it is evident that the operation of the gears 51 which are in mesh with each other and which revolve toward each other, will cause the wire 49 to wrap into the groove 50, thus causing the raising of the sides of the boat and maintaining them in rigid, longitudinal alignment. The gears 51 are journalled as at 52 in the winch plate 22 and one of the gears 51 is driven by a pinion 53 which has secured integrally therewith, a ratchet wheel 61, the gear being journalled in the winch plate and carrying on its shaft, on the top of the plate 22, the operating handle, 54 which is hinged at its center as at 55 and in its outer portion 56 carries the hand grip 57 through the medium of which the pinion 53 may be operated to wind the gears 51 to cause takeup of the wires 49. In order to prevent any accidental backthrow of the handle or collapse of the boat after the wires have been wound up, we pivot to the under side of the winch plate 22, the ratchet pawl 58, which, provided with a ratchet engaging nose 59 and an extended finger lever 60, the finger lever being connected to the winch plate through the medium of a coil spring 62 which tends to keep the nose 59 of the pawl in connection with the ratchet wheel 61. It is evident that free winding operation may take place but in order for the winding handle to be released, it is necessary that the hand piece 60 of the pawl be operated to allow the handle 54 to be unwound so that the boat may be laid out in its flat position. In order to provide the boat with a seating arrangement, we have illustrated in Figure 1, two seats, 63 and 64 and in view of the fact that the construction of both is identical, with the exception of an angularly disposed brace member, it is believed that a description of bench or seat 64, illustrated in Figure 9, will suffice, and in order to make the seat automatically operable, I have hinged to one of the side pieces 7 of the boat, as at 65, a guide plate 66, which is provided with leg-like extensions 67, hav-

ing slots 68 therein. These slots are engaged by headed pin members 69 which are secured in the end edges of the seat 64 so that the end of the seat has free sliding movement longitudinally of the guide plate leg 67. It is necessary that this movement be allowed for due to the fact that the side pieces 7, when the wire 49 is drawn upon, come up and in order to raise the seat 64 automatically to the position, each of the guide plates, of which there are two, one being positioned at each end of the seat, as will be readily apparent from Figure 1, is hinged to the side 7. and consequently, when the side has a raising movement, the guide plate will be guided in its movement inwardly of the seat until the end of the seat is brought up under the angle edge 70 of the guide plate, wherein it is rigidly positioned and adds rigidity and strength to the boat construction. In order to more securely lock the seat 64 in position, we have provided at the opposite ends thereof, a latching brace 71 which is pivotally secured in a slot 72 in the end of the seat 64, the slot being reinforced through the medium of a pivot bracket 75 which is adapted to retain the lower end of the pivot brace 71, the upper end thereof being flattened and bent into hook shape as at 76, see Figure 10, so that in sliding up the side of the boat when the side is drawn up, it will ride up over a hinge plate 77 and under a brace latch 78, the brace latch being hinged to the plate 77 and being provided on its under side with a spring tongue 79, this tongue being adapted to catch the hook end 76 of the brace rod 71 and prevent its pulling away from the brace latch until it is desired to collapse the boat. It is evident that this construction will allow a great weight on the seat and the heavier the weight on the seat, the more rigid will the boat be because the weight on the seat will have a tendency to pull on the brace rod and consequently draw the sides of the boat up which will relieve the strain on the cables 49 and it has been found in practice that if the cable 49 or wire was to break, the boat, due to its seat connections would not collapse nor would it lose its rigidity and the seat braces are therefore a guard against accident in the event that the wires 49 should break. The brace latch 78 is provided with two downwardly extending lips 80 which extend down over the side of the brace rod 71 and prevent lateral movement of the ends thereof, so that the same are constantly maintained in connection with the spring tongue 79 and cannot be removed except by the person collapsing the boat.

In the front seat 63 there is provided the same arrangement with the exception that the rods 71 must be disposed at an angle to allow for the angular movement of the front of the boat of the sides 7 thereof, as it is understood that these sides will have a movement, not only to a folding position but the take-up of the pleats between the pieces of the sides will cause a longitudinal movement which the angularity of the brace rods 71, as shown in Figure 1 will take care of, and it is well understood that this is a mechanical construction and need not be explained any more fully than has been done with regard to the seat 64, shown in Figures 9 and 10.

In Figure 3, it will be evident that the folding of the boat along its divisional lines may be readily accomplished and the finished boat may be folded as shown and may be bound with wire, cord or other means, placed on the running board of a motor vehicle and be transported from place to place, as desired, without taking up an unnecessary amount of room or greatly adding to the weight of the vehicle.

It is evident, therefore, that we have provided a boat which can be rowed and on the middle seat of which a person may sit to propel the same with oars, the feet of the person resting against the foot rest 81, provided for that purpose, and of course it is understood that the broad seat in the back is readily foldable, out of the way, can be locked in position to firmly brace the boat at the rear end and the other seats 63 and 64 greatly add to the rigidity of the construction.

It is also evident that we have provided a boat having all of the essential features namely, waterproof, sea-worthy, rigid and strong and one which may be readily collapsed and rolled into a bundle for transportation.

It is also evident that we have provided a boat which has no loose parts, which does not require the putting together of a number of parts to make it complete and one in which the canvas and frame are an integral unit and one that can be constructed at a minimum of cost and sold with a saving to the consumer.

It is evident, also, that we have provided a standardized construction of row boat which may be propelled by a small outboard motor or the construction of which may be equally as well adapted to boats of larger size and heavier construction, it of course being understood that any number of plies of flexible fabric material, such as canvas, may be used instead of the single ply shown in the drawing and also this canvas may be reinforced at the point between the wooden member or rigid members by wire mesh strip which will prevent the canvas or material from cracking when the boat is in its rolled position, as illustrated in Figure 3. The plate 22 is further provided with a depending positioning flange 63^{A} which overlies the front gunwale edges of the sides.

While we have illustrated and described our invention with some degree of particularity, we realize that in practice various alterations therein may be made. We therefore reserve the right and privilege of changing

the form of the details of construction or otherwise altering the arrangement of the correlated parts without departing from the spirit of the invention or the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by United States Letters Patent is:—

1. A collapsible boat comprising a plurality of rigid bottom and side members, a flexible member joining the bottom and side members, draw members passing through the sides and means for winding up said draw members whereby the sides are drawn up to complete the boat.

2. A collapsible boat comprising a plurality of rigid bottom and side members, a flexible member passing through and joining the bottom and side members, draw wires passing through the sides and a winch for winding up said draw wires whereby the sides are drawn up to complete the boat.

3. A collapsible boat comprising a plurality of rigid members, a flexible member joining said rigid members in foldable relation, means for drawing some of the rigid members up to adapt the boat for use, a seat for the boat, guide brackets in which the seat is held, brace bars on the seat ends and latches adapted to engage said bars to retain the seat in position when the boat is shaped for use.

4. A collapsible boat comprising a plurality of rigid bottom and side members, a flexible member passing through and joining the bottom and side members, draw members passing through the sides, means for winding up said draw members whereby the sides are drawn up to complete the boat, a seat for the boat, side brackets in which the seat is held, brace bars on the seat ends and latches adapted to automatically engage said bars to retain the seat in position when the sides thereof are drawn up to complete the boat.

5. A collapsible boat comprising a plurality of rigid bottom and side members, a flexible member passing through and joining the bottom and side members, draw wires passing through the sides and a winch for winding up said draw wires whereby the sides are drawn up to complete the boat, a skeg for the boat pivoted to one of the rigid members and arranged to be positioned transversely of the boat when the latter is arranged to be folded and a seat for the boat and means for drawing the seat up into position when the sides of the boat are drawn up to shape the same for use.

6. A collapsible boat comprising a plurality of rigid bottom and side members, a flexible member joining the rigid members in foldable relation, means for drawing some of the side members up to adapt the boat for use, a foldable seat for the boat, latching eyes on the seat and latching members carried by the sides of the boat and arranged to be manipulated to engage said eyes when the sides of the boat have been drawn up to position so that the boat is ready for use.

7. A collapsible boat comprising a plurality of rigid bottom and side members, a flexible member passing through and joining the bottom and side members, draw members passing through the sides and means for winding up said draw members whereby the sides are drawn up to complete the boat, a seat for the boat, guide brackets in which the seat is held, brace bars on the seat ends, latches adapted to engage said bars to retain the seat in position when the boat is shaped for use, a foldable seat for the boat, latching eyes on the seat latching members carried by the sides of the boat and arranged to be manipulated to engage said eyes when the sides of the boat have been drawn up to position so that the boat is ready for use, and a hinged bow piece for protecting the forward edges of some of said side members when the same have been drawn up to form the prow of the boat.

8. A collapsible boat comprising rigid members shaped to form pleat spaces therebetween, a flexible member common to all of said rigid members, the pleat spaces being arranged to expose portions of the flexible member, which exposed portions between the edges of the rigid members, when the latter are shaped to complete the boat, are compressed to form watertight joints.

9. A collapsible boat comprising a plurality of rigid members, a flexible member passing through and joining all of said rigid members in foldable relation, means for drawing some of the rigid members up to adapt the boat for use, a seat for the boat, and connections between said seat ends and some of said rigid members whereby when the latter are drawn up the seat is positioned for use.

10. A collapsible boat comprising a plurality of rigid members, a single flexible member passing through and joining all of said rigid members in foldable relation, a bow piece, a winch plate, a cable passing through some of said rigid members, a winch on the winch plate to which the end of the cable is secured, and a ratchet for preventing the unwinding of said winch when the cable is placed under tension thereby.

11. A collapsible boat comprising rigid members shaped to form pleat spaces therebetween, a flexible member common to all of said rigid members and exposed in said pleat spaces, said exposed portions being arranged to be pinched between said rigid members to form water-tight joints when the rigid members are drawn together to complete the boat.

In testimony whereof we affix our signatures.

MILFORD M. BAIR. [L. S.]
WILLARD E. EDGERTON. [L. S.]