(No Model.)

2 Sheets—Sheet 1.

W. H. GAMBLE & D. H. ALLEN.

COLLAPSIBLE AND FOLDING BOAT.

No. 495,549. Patented Apr. 18, 1893.

Fig. 1.

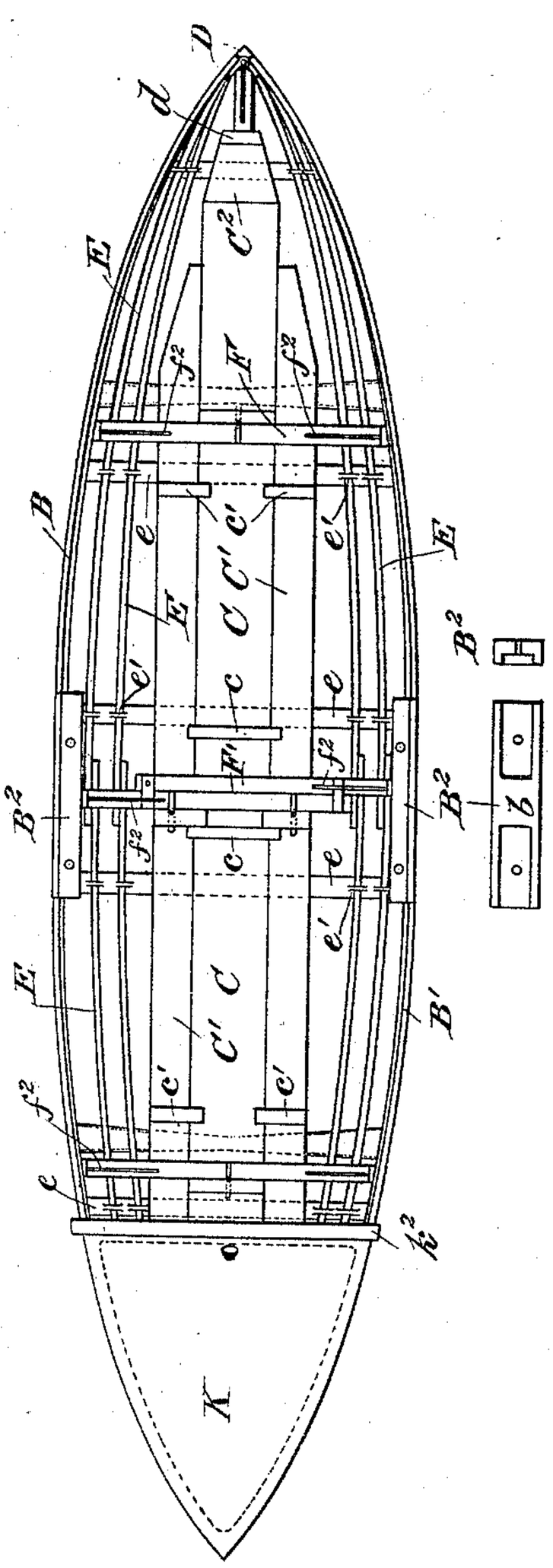
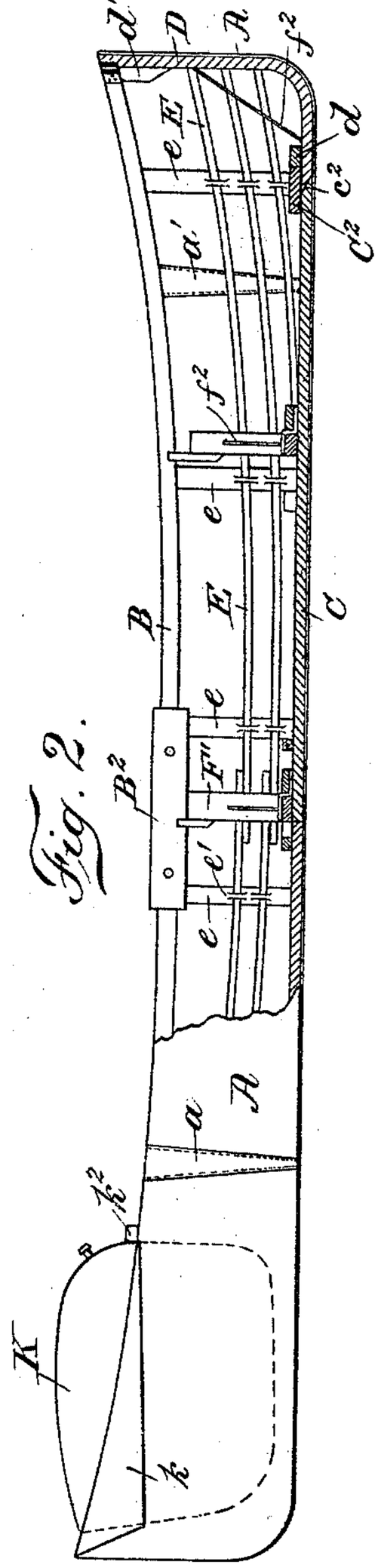


Fig. 2.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

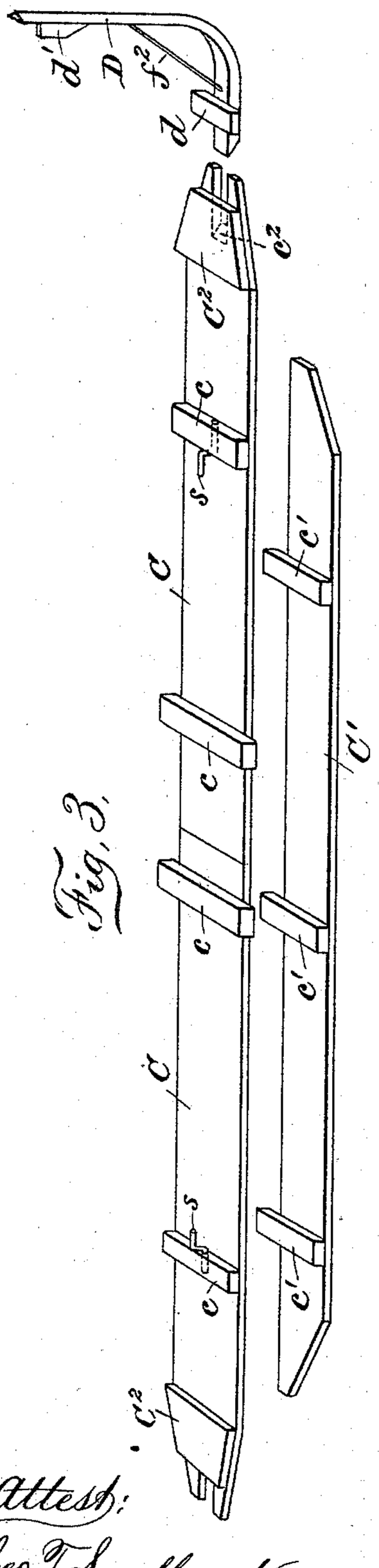

Fig. 6.

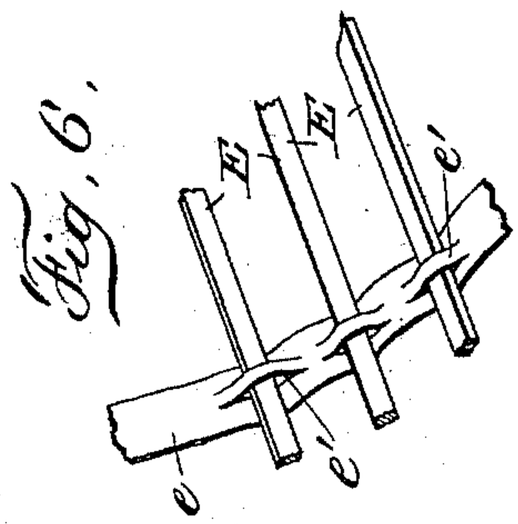

Fig. 5.

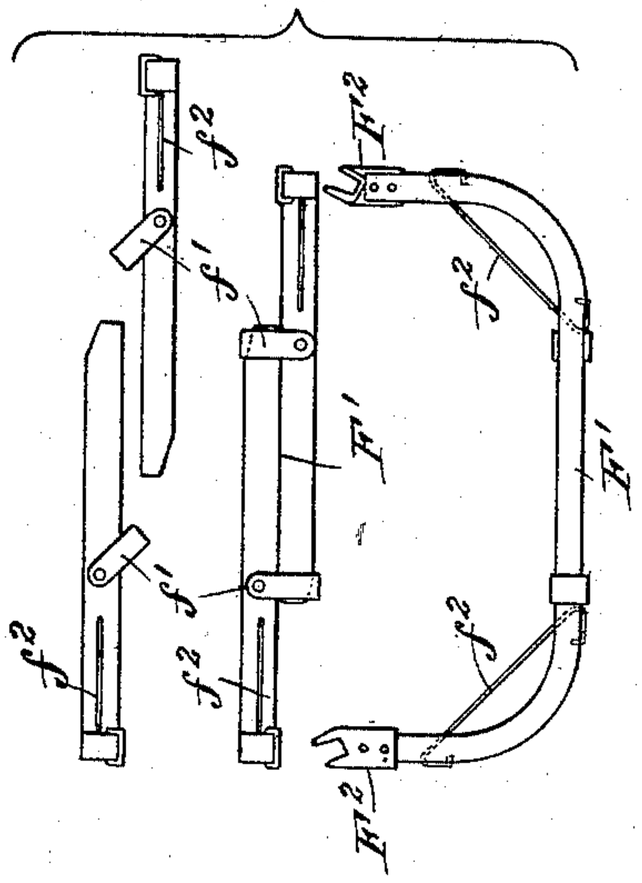

Fig. 4.

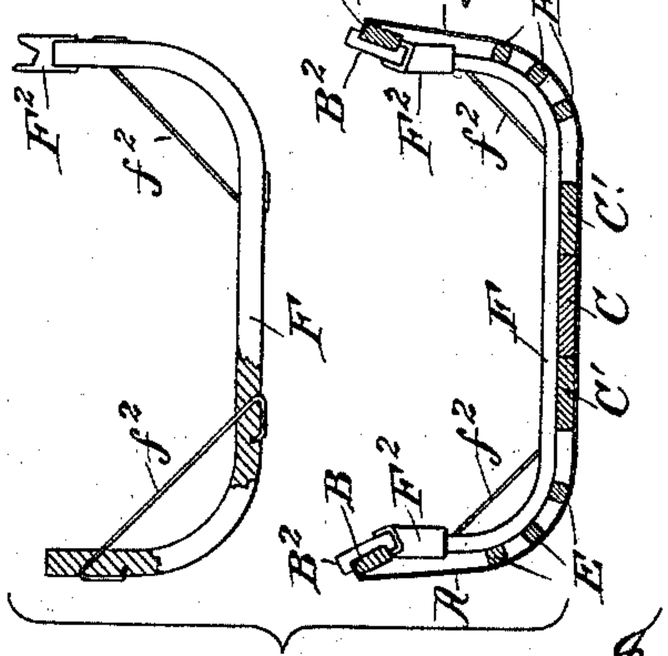

Fig. 8.

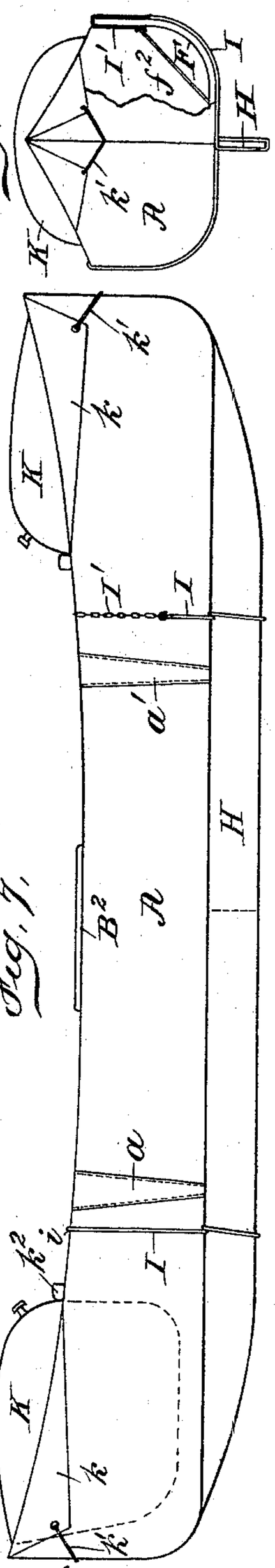

Fig. 7.

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UNITED STATES PATENT OFFICE.

WILLIAM H. GAMBLE AND DAVID H. ALLEN, OF MIAMISBURG, OHIO.

COLLAPSIBLE AND FOLDING BOAT.

SPECIFICATION forming part of Letters Patent No. 495,549, dated April 18, 1893.

Application filed October 17, 1892. Serial No. 449,145. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. GAMBLE and DAVID H. ALLEN, citizens of the United States, and residents of Miamisburg, county of Montgomery, and State of Ohio, have invented a new and useful Improvement in Collapsible and Folding Boats, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification.

Our invention relates to certain details of improvement in collapsible and folding boats and will be readily understood from the following description and claims, reference being had to the accompanying drawings, in which,

Figure 1 is a plan or top view of our improved boat with one of the removable, end air tanks in place. Fig. 2 is a side view of the same, partly in section. Fig. 3 is a perspective view of the central flooring boards, one side flooring board and one removable stem post. Fig. 4 shows transverse sections through and adjacent to one of the ribs; Fig. 5, detail views of the jointed central rib. Fig. 6 is a perspective view of a portion of one of the flexible strips or bands connecting the gunwales and to which the longitudinal slats are connected. Fig. 7 is a side view, and, Fig. 8, an end view, partly broken away, showing the manner of attaching the keel.

A indicates the removable canvas sack or covering of the boat frame, made boat-shaped, to conform to the shape of the frame and B, B′ the gunwales of the boat, made in sections hinged together at the ends or stem and stern, the sections extending thence to near the center in length of the boat where they are united in blocks B^2, having each a solid center against which the adjoining ends of the gunwale sections abut and grooved or flanged ends in which said sections ends are bolted or otherwise firmly secured. The opposite gunwales are connected by strips *e* of canvas or other suitable flexible material, in pendent loop form, conforming to the shape, in cross section, of that part of the boat to which they are to be applied and provided, preferably, with vertical parallel slits forming loops *e′* through which the longitudinal slats E are inserted, for securing them to the bands *e* in proper relation to each other. These slats extend from end to end of the boat, being divided centrally of their length, the adjoining ends of the sections overlapping slightly, as shown. The grooved blocks B^2 have an ungrooved center or blank, at *b*, between the adjacent ends of the gunwale sections, leaving a space between said ends which, in connection with the divided slats E, when the blocks B^2 are removed, permits the frame to be folded in the center of its length.

C indicates the central flooring board, divided centrally of its length, with the adjoining ends abutting, as shown, and C′ C′ are two side flooring boards, which cross the joint in the central board and have cleats or cross bars *c′*, the inner ends of which project over the central board, as shown. The central board also has cleats *c*, *c*, the ends of which project over the side bottom boards when the parts are in place, this construction serving to unite the four pieces of the bottom board firmly, while permitting their ready separation and folding, for transportation. The ends of the sections are tapered to conform to the ends of the boat and those of the central board are bifurcated or slotted, the wall c^2 at the inner end of the slot being beveled downward to conform to a bevel on the end of the stem post D, fitting in said slot. The slot is partly covered by a cross-piece or bar C^2, and the horizontal arm of the stem post has also a cross bar *d*, secured to it which, when the stem post is inserted in the slot and driven into place, abuts against the piece C^2, the two, in connection with the beveled end wall of the slot and beveled end of the stem post, serving to form a rigid joint between the bottom board and the stem post. The stem post is bent, with its lower, horizontal arm, fitting the bottom-board slot, nearly at right angles to its upright arm or stem portion proper, and said lower arm is left square, to fit the slot, while the upright arm is made triangular in form to present an acute angle to the water. These stem posts are, preferably, bent into the desired form and are stiffened by means of a wire rod or brace f^2, connecting the upright and horizontal arms and applied the same as the rib braces hereinafter described. Each stem post has, near its upper end, a fixed block *d′*, on which the hinges connecting the ends of the gunwales rest, the

ends themselves abutting against the inner face of the post. The ribs of the boat, except the center one, are made, preferably, each in a single piece, bent into the desired shape, as shown, at F, Fig. 4, to conform to the position it is to occupy in the boat. They are provided, on each upturned end, with what we term a "yoke" F^2, made, preferably, in U-shape, to embrace the rib on three sides and provided with perforations to receive set-screws or other fastening device permitting the adjustment of the yoke up or down on the rib ends and serving to hold the yokes at the desired adjustment. The upper ends of these yokes are notched or recessed to engage and hold the gunwales and the adjustment of the yokes serves to give the desired tension to the boat cover and strips *e* connected to said gunwales. The central rib F′, is made, preferably, wider and stronger than the others and is divided, in its horizontal portion, the ends thereof overlapping and being beveled to engage socket blocks *f′*, secured one to each part of the rib, as shown in Fig. 5. In inserting the ribs, they are held in an inclined position and the yokes engaged with the gunwales, after which the bottom of the rib is slid along the flooring until the rib assumes an upright position and engages crank-shaped arms *s*, pivotally connected with the cleats *c* and which serve to clamp the flooring and ribs together and prevent the bottom from settling away from the ribs when loaded. These crank arms are turned down, out of the way when the boat is folded. The central rib F′ is inserted after the parts thereof are coupled together and in all, the upright and horizontal arms are rigidly connected by restraining wire rods f^2, which prevent the ribs from straightening out when exposed to the weather and the ends of which are passed through holes in the ribs, from the inside outward, and then bent and clinched into the wood, as shown in Fig. 4, so as not to come in wearing contact with the cover. Preferably, said wires or the protruding ends thereof and other metallic parts of the boat are galvanized, to prevent injury from rust, either to the parts themselves or to those with which they come in contact.

The keel, indicated at H, is secured to the boat by means of wires I, which pass, in loop-form, snugly around it and have their ends turned up to conform to the shape of the sides of the boat, as shown, one end of each wire having a hook, at *i*, to engage the gunwale on one side, the other having a chain connected with it, as shown at I′, and which is passed up over the opposite gunwale drawn taut and secured to a brace f^2, or other suitable point of attachment. Preferably the keel is divided to permit its being folded and the two parts may be connected by hinges or in any other convenient manner, for use.

The air tanks, one of which is indicated at K, are made air and water tight, from canvas, suitably coated and in shape to conform to the part of the boat in which it is to be placed, that shown being applied at one end. At the edges of the upper or deck portion it has flap side extensions *k*, which extend over the gunwales and are secured, in any suitable manner, as, by loop *k′* connecting the side flaps around the stem post and by a transverse rod at k^2, secured to the rear edge of the deck portion and extending over and lashed to the gunwales. By this construction the tanks can be readily removed when not required, and, when in use, the upper surfaces thereof form deck portions. They are provided with valves at k^3 through which they can be inflated.

The boat sack or cover is similar to that described in Letters Patent No. 403,171, granted to us May 14, 1889, except that it is permanently fastened to the gunwale sections, and, that, in order to make it fit the frame snugly we form tapering or wedge-shaped plaits *a*, *a′* in each quarter, at points about midway between the center and each end of the boat, said plaits being made widest at the gunwales, where the slack is greatest, and tapering thence to the bottom or keel, where the opposing plaits join and where they are made just wide enough to prevent puckering or fullness. By this construction the sack may be made to fit snugly all parts of the skeleton frame. These plaits or folds are, preferably, turned inward, so as not to present an obstruction to the water.

Having now described our improvements, we claim as new and desire to secure by Letters Patent—

1. The combination with a collapsible boat frame of a boat-shaped sack or cover having on each quarter, about midway between the center and each end of the boat, a wedge-shaped plait extending from the keel and gradually widening to the gunwales, substantially as described.

2. The combination with the boat-shaped sack and the divided gunwales hinged together at both ends of the boat and permanently fastened to the boat sack, of the connecting blocks provided with grooves or flanges at each end, and, means for holding the adjoining ends of the divided gunwales between the flanges and against the blocks, substantially as described.

3. The combination with the divided gunwales, of the flexible strips or bands extending from gunwale to gunwale in pendent, loop-form, conforming to the shape of the boat, in cross section, and the divided longitudinal slats connected to said flexible strips, substantially as described.

4. The central bottom board C, divided transversely, centrally of its length, in combination with the boards C′ C′ arranged at the sides of the central board and crossing the joint therein and laterally-projecting cleats on each board overlying the adjacent board, substantially as described.

5. The bottom board having the slotted or bifurcated end, in combination with the stem post engaging said slotted end, and the cross-

bars, for stiffening the junction of said board and stem post, substantially as described.

6. The combination with the boat flooring and ribs, of the pivoted and vertically adjustable crank arms or hooks *s*, for coupling said flooring and ribs together, substantially as described.

7. The combination with the curved boat ribs, of the wire restraining rods passing through and clinched against the outer sides of the upright and horizontal arms of said ribs, substantially as described.

8. The divided rib F′, the sections thereof having the overlapping lower ends, in combination with the socket pieces engaging said ends, substantially as described.

9. The combination with the upright ends of the boat ribs of the adjustable yokes, notched or recessed to engage and hold the gunwales, substantially as described.

10. The curved stem posts having each a square horizontal arm to engage the slotted floor board and the triangular upright arm, presenting an acute angle to the water and fitting the canvas sack, in front of the gunwale ends and the blocks for supporting said ends, in combination with the gunwales, substantially as described.

11. A collapsible and folding boat, in combination with the removable keel and the detachable supports therefor conforming to the shape of the boat in cross section and having rigid loops engaging and upholding the keel, said supports serving to secure the keel to the gunwale of the boat, substantially as described.

12. The removable inflatable air tanks K, constructed to form decks and conforming in shape to and secured in place within the portions of the boat to which they are applied, substantially as described.

In testimony whereof we have hereunto set our hands this 14th day of October, A. D. 1892.

WM. H. GAMBLE.
DAVID H. ALLEN.

Witnesses:
C. S. JUDY,
J. C. MYERS.