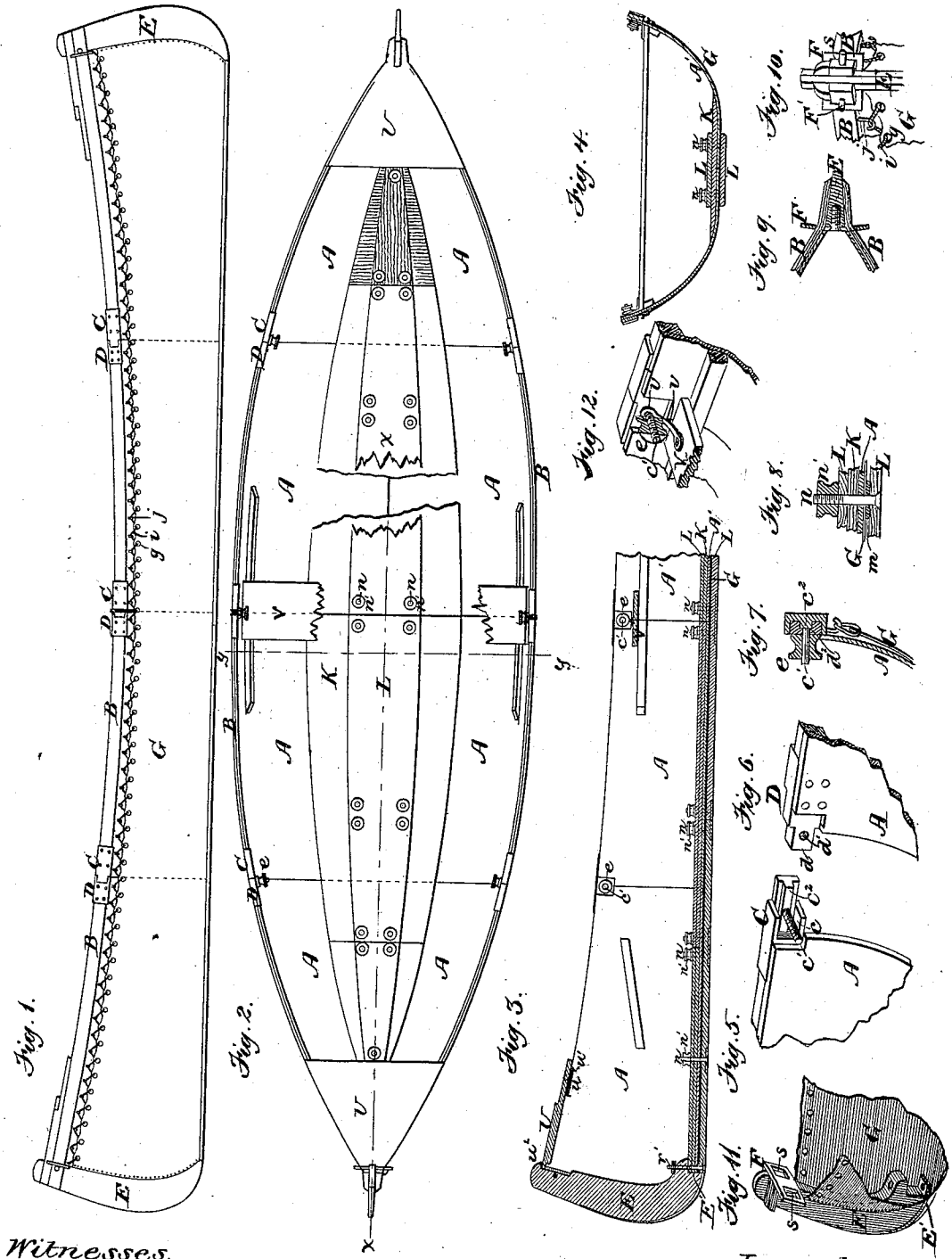
# F. D. GRAVES.

## SECTIONAL BOATS.

No. 193,814. Patented Aug. 7, 1877.

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# UNITED STATES PATENT OFFICE.

FREDERICK D. GRAVES, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN SECTIONAL BOATS.

Specification forming part of Letters Patent No. **193,814**, dated August 7, 1877; application filed March 24, 1877.

*To all whom it may concern:*

Be it known that I, FREDERICK D. GRAVES, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Sectional or Folding Boats, of which the following is a specification:

In the accompanying drawings, forming a part of this specification, Figure 1 represents a side view of my improved boat. Fig. 2 represents a top view. Fig. 3 represents a section on the plane of line *x x*, Fig. 2. Fig. 4 represents a section on the plane of line *y y*, Fig. 2. Figs. 5, 6, 7, 8, 9 represent views of parts in detail.

Similar letters of reference refer to like parts.

This invention has for its object to provide a sectional or folding boat adapted to be taken apart and packed in small compass, which shall be light, strong, symmetrical in proportion, tight, and adapted to be easily and quickly taken apart and put together.

To these ends my invention consists, as a whole, in a sectional or folding boat composed of a flexible water-proof outer hull or cover, provided with rigid end pieces, and a sectional rigid inner hull or lining, adapted to be placed inside the flexible hull or cover to stiffen and support the same, the two hulls being detachable from each other, and the rigid hull being adapted to be taken apart.

My invention also consists in certain combinations of parts and details of construction, all of which I will now proceed to describe.

In carrying out my invention, I construct a cover or outer hull, G, of canvas or other suitable flexible material, made thoroughly water-proof, and attached securely to two rigid end pieces, E E, which constitute, in the present instance, the cutwaters of the boat, although, if desired, one may constitute a cutwater and the other a stern-piece when the boat is not made alike at both ends. The flexible hull or cover is formed with reference to fitting closely and conforming to the outer surface of the rigid inner hull or lining, which is composed of any desired number of independent sections, A, these sections being detachable from each other, and of such form that, collectively, they constitute a rigid hull of any desired or suitable shape.

I usually make the sections A by first making a solid hull (from sheets of veneering or papier-maché, or other suitable material) of the desired form, and then dividing this hull transversely into the desired number of cross-sections, and subsequently dividing the hull longitudinally at the center, so as to convert each cross-section into two equal parts.

The shape of the sections A will obviously depend upon the kind of boat to be made. In the present instance I have shown them adapted to constitute a canoe shaped hull—alike at both ends. Each section is provided with a gunwale strip or section, B, extending along its edge on the outer side, and these gunwale-strips are adapted to be coupled when the sections are put together, so as to form continuous gunwales extending the entire length of the boat.

Any suitable devices may be employed for connecting the gunwale-strips. I prefer to employ the devices shown in Figs. 5 and 6, the same consisting of metallic plates C D, rigidly attached to the proximate ends of the gunwale-strips. The plates C are each provided with a recess, *c*, and a threaded bolt or pin, $c^1$, projecting inwardly from the recess, and each plate D is provided with a tongue, *d*, adapted to enter the recess *c*, and with an orifice, $d^1$, adapted to receive the bolt $c^1$.

When the plates C D are connected the bolt $c^1$ extends through the orifice $d^1$, and is provided with a nut, *e*, which, when screwed up, clamps the plate D firmly against the plate C, as shown in Fig. 7, the walls of the recess *c* keeping the tongue *d* from vertical or outward displacement. If desired, the plate C may be provided with a longitudinal rib, $c^2$, and the plate D with a recess, $d^2$, adapted to receive the rib.

The flexible hull or cover G and its end pieces E are adapted to be detachably connected to the sectional lining A. Any suitable devices may be employed for this purpose. I prefer to connect the end pieces E to the ends of the gunwales B by means of plates F, attached to the inner edges of the pieces E near their upper ends, these plates projecting on each side, and being provided with slots *s s*, which receive the ends of the gunwale-strips, as shown in Figs. 9 and 10. Linch-

pins F′ may be employed to prevent the ends of the gunwales from being withdrawn from the slots *s*.

For connecting the edges of the flexible hull or cover G to the inner hull or lining I prefer to employ cords *i*, passing through grommets *g* in the hull or cover G, and engaging with hooks *j*, depending from the gunwales B. By this arrangement I am enabled to draw the hull or cover G closely over the bottom and sides of the inner hull or lining, as well as to disconnect it therefrom.

K represents a removable flooring applied to the inner hull or lining, composed of any desired number of wooden strips, the grain of which extends transversely of the boat, this flooring being of varying width, as shown in Fig. 2. The ends of the pieces composing the flooring K are preferably scarfed off to fit the curvature of the sides of the sections, as shown in Fig. 4.

L L represent clamping-strips, which I employ for connecting the sections A A′ of the inner hull together along the bottom of the boat, and for connecting the flooring K and the central part of the flexible hull or cover G to the inner hull. These clamping-strips are preferably made of wood, with the grain running lengthwise of the boat, and they extend the entire length of the boat, and are placed one above the flooring K and the other below the flexible hull or cover G. Each of the clamping-strips is composed of three or more independent sections, and the sections of each strip are so arranged as to break joints with the sections of the other strip, the sections of the bottom strip also breaking joints with the sections A of the boat.

The clamping-strips L L are connected to each other and to the intermediate layers by bolts *n*, passing through the strips L, the flooring K, the sections A, and the hull or cover G, their upper ends being threaded and provided with suitable clamping-nuts *n′*. The bolts *n* are surrounded by rubber gaskets or packings *m*, between the bottom clamping-strip L and the bottom of the hull or cover G, as shown in Fig. 8, these gaskets preventing leakage around the bolts when compressed by the screwing down of the nuts *n′*.

The lower ends of the end pieces E are detachably connected to the clamping-strips L L and the intermediate layers. For this purpose I at present provide the pieces E with recesses E′, adapted to receive the ends of the clamping-strips and intermediate layers, as shown in Figs. 3 and 11. These parts are securely connected to the pieces E by bolts *r′*.

U U represent detachable deck-pieces, which cover the ends of the sectional hull, and are held in place by hooks *u* at their inner ends, which engage with staples $u^1$ on the sections A, and by projections $u^2$ on the pieces E, at their outer ends, as shown in Fig. 3.

V represents a seat or thwart, which is connected to the sides of the boat at the center by detachable links or braces *v*, which are rigidly attached to the seat, and have eyes *v′*, adapted to inclose the bolts *c′* of the gunwale-couplings, and to be confined on said bolts by the nuts *e*, as shown in Fig. 10. The seat and its braces *v* prevent the sectional hull from spreading at the center.

From the foregoing description, it will be seen that the boat can be taken apart by unscrewing the nuts *e* of the gunwale-couplings, and the nuts *n′* of the bottom clamping-strips, and detaching the cords *i* of the covering from the hooks *j*.

When taken apart, the end pieces E can be rolled up with the flexible hull or cover G, and the sections A, being entirely disconnected from each other, can be readily packed with the flooring K and clamping-strips L, in close compass. A boat thirteen feet long and having over three feet breadth of beam, constructed in accordance with my invention, can be packed in a box about four feet long and sixteen inches square in cross-section.

When adapted for use the boat is light, strong, and water-tight. The flooring K keeps the sides of the sectional hull in shape by reason of its form and the direction of the grain of the wood composing it.

In consequence of the grain of the strips L running at right angles with that of the floor, the bottom of the boat is prevented from warping.

It is obvious that the several improvements can be applied to boats of various forms.

If desired, the bottom clamping-strip L may be provided with a keel, and one of the end pieces E with a rudder.

I claim as my invention—

1. The flexible hull or cover G, having the rigid end pieces E, combined with the rigid sectional lining or inner hull, and means, substantially as described, for detachably connecting said outer hull or cover and end pieces to the inner hull or lining, as set forth.

2. The inner hull or lining composed of the sections A, secured together by detachable couplings along the gunwales, and by detachable clamping devices along the bottom, as set forth.

3. The end pieces E, provided with slotted plates F at their upper ends, adapted to receive the ends of the gunwale-strips, and with recesses E′ at their lower ends, adapted to receive the ends of the clamping-strips, substantially as and for the purpose specified.

4. The gunwale-couplings or locking devices, each composed of a recessed plate, C, having a bolt, $c^1$, a tongued plate, D, having an orifice, $d^1$, and a clamping-nut, *e*, as set forth.

5. In a sectional boat, the detachable flooring K, combined with the sections A and devices whereby it is detachably clamped to said sections, as set forth.

6. In combination with the sections A, the wooden flooring K, having its grain running transversely of the boat, and the clamping-

strips L, having their grain running lengthwise of the boat, as set forth.

7. The end pieces E, having slotted plates F, combined with the gunwale-strips B, as set forth.

8. The detachable deck-pieces U, having hooks $u$, combined with the sectional hull having staples $u^1$, and the end pieces E, having projections $w^2$, as set forth.

9. The end pieces E, having recesses E′, and adapted to be secured to the ends of the strips L L, as set forth.

10. The thwart-piece V, having braces or links $v$, adapted to be detachably connected to the sides of the boat, and prevent the latter from spreading, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK D. GRAVES.

Witnesses:
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