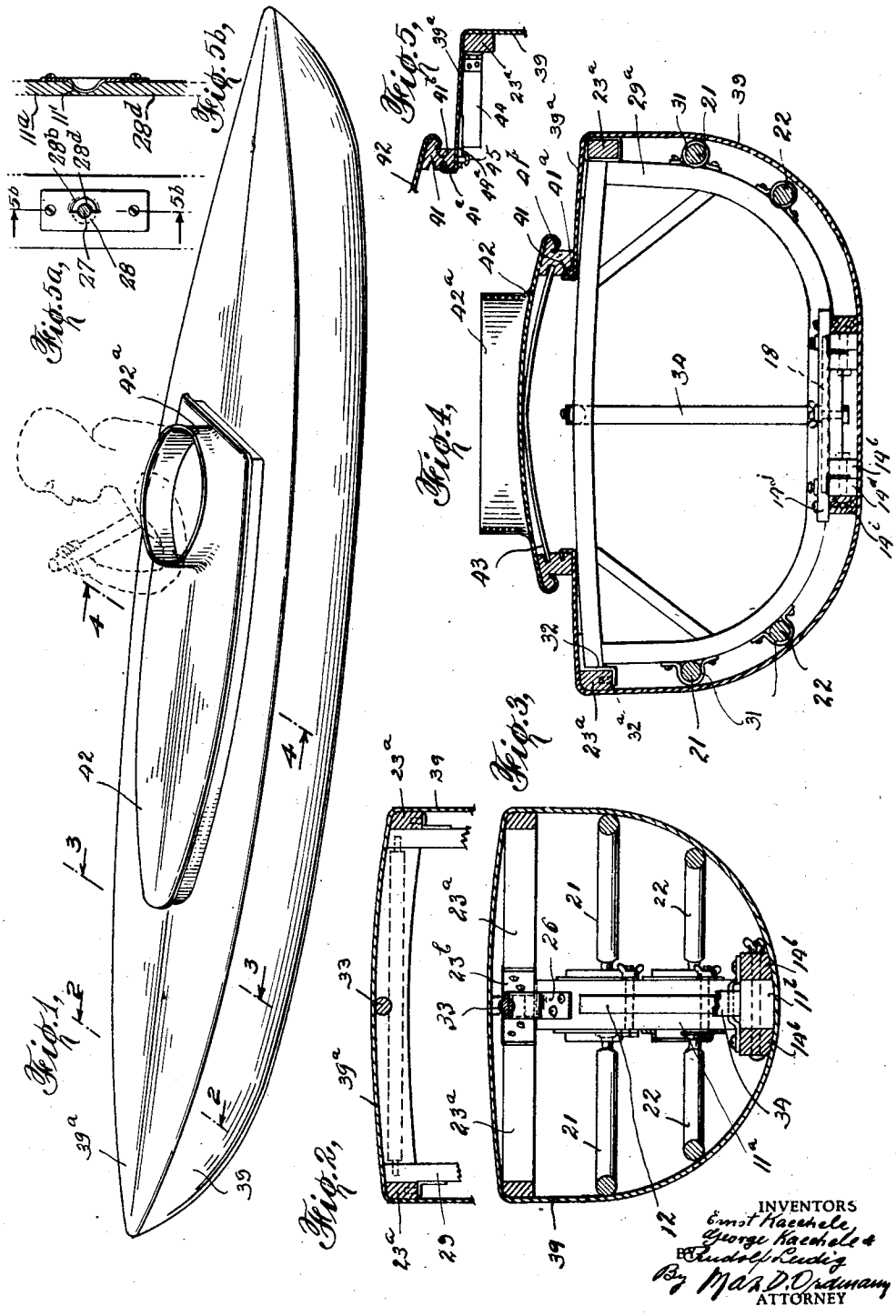
Nov. 15, 1927. 1,649,311

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COLLAPSIBLE BOAT

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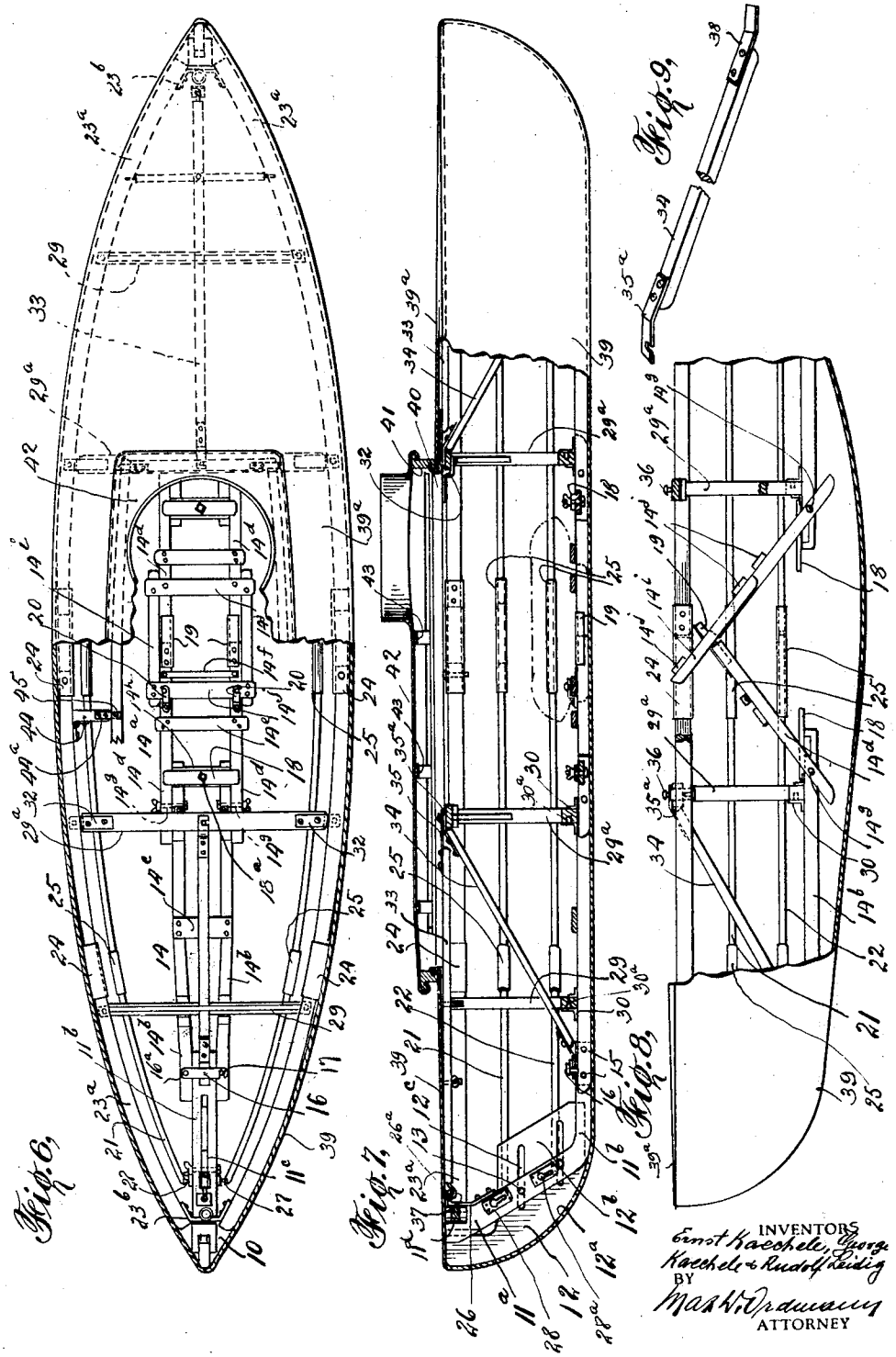


Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

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UNITED STATES PATENT OFFICE.

ERNEST KAECHELE, OF NEW YORK, AND GEORGE KAECHELE AND RUDOLF LEIDIG, OF BROOKLYN, NEW YORK.

COLLAPSIBLE BOAT.

Application filed March 9, 1927. Serial No. 173,838.

This invention relates to canoes or canoe like boats, and has for its main subject to provide a boat that can be easily collapsed and taken apart to be convenient for transportation from place to place in a knapsack or the like for being carried along on a journey.

It also has for its subject to provide a construction in which the boat is composed of a skeleton sectional hull and a flexible waterproof covering which will render the boat watertight and at the same time hold the individual sections of the hull against accidental detachment.

A further object of this invention is to provide the boat with a foldable or collapsible keel to facilitate the mounting of the waterproof covering around the hull.

A still further object is to render the boat adjustable in length to enable the tightening or retightening of the waterproof covering around the hull whenever required.

With these and other objects in view our invention consists of the novel arrangement, construction and combination of parts as will be hereinafter more fully described and defined in the appended claims.

In the accompanying drawings which form part of this specification and in which similar reference characters denote corresponding parts Fig. 1, is a perspective view of the assembled boat; Fig. 2, is a cross-section on line 2—2 of Fig. 1; Fig. 3, a cross-section on line 3—3 of Fig. 1; Fig. 4 is a cross-section on line 4—4 of Fig. 1; Fig. 5, is a sectional view of a detail of the means for fastening the cross frames to the hull; Fig. 5^a is a front view of a modified socket for the side rods of the frame; Fig. 5^b is a section on line 5^b—5^b of Fig. 6; Fig. 6, is a top plan view of the assembled boat, partly in section; Fig. 7, is a partial longitudinal section thereof; Fig. 8, is a side view with a part of one side broken out, showing the keel in collapsed condition and Fig. 9 is a perspective view of a detail.

The hull of the boat is in form of a skeleton frame made up of sectional easily detachable wooden beams, strips and rods and an outer waterproof covering adapted to envelop the hull so as to render the boat watertight and reinforce the connections between the individual sections of said frame. Before mounting the covering around the hull, the latter is built up or assembled into two substantially uniform halves, each half being adapted to be separately passed into the waterproof covering or shell which is shaped to tightly embrace the hull, as will be hereinafter more fully described. After the two halves are lodged in the shell so as to extend with their inner ends toward one another they are forced into the narrow ends of the covering and locked together.

As the parts used to build up each half of the hull are substantially of identically the same construction we will in the following describe only the detail construction of one half of the hull.

10 denotes the bow, which comprises an angular or substantially L-shaped beam whose vertical leg 11^a is slightly inclined outwardly and is longitudinally recessed and whose horizontal leg 11^b is centrally grooved as at 11^c on its inner face. The bow 10 also comprises a comparatively thin wooden board 12 whose outer edge 12^a is curved and whose inner edge is angular forming a tail shaped extension 12^b. The same is adapted to be adjustably borne in the recess of the vertical leg 11^a and to be guided in the groove 11^c of the horizontal leg 11^b. This board is provided with two or more horizontal slots 12^c, through which pass clamping screws 13 borne in the vertical leg 11^a and whereby the board 12 is secured in adjusted position. By the adjustment of the boards 12 in longitudinal direction of the boat the latter can be extended or contracted for the purpose to be hereinafter described.

The keel of each half of the hull is composed of two frame like sections 14, 14^a arranged in longitudinal extension of one another and of which the outer section 14 is adapted to be removably attached to the inner end of the horizontal leg 11^b. This frame 14 is composed of two parallel beams 14^b connected together by a cross slat or slats 14^c and each adapted to be joined to said leg 11^c by two or more pins 15 remova-

bly engaging apertures in said leg. A hook shaped cross member 16 pivoted to one of said beams as at 16^a is adapted to overbridge the leg 11^b and engage with its hook a pin 17 projecting from the beam 14^b on the other side of said leg 11^b so as to hold said beams in engagement with said leg 11^b. This frame section 14 when attached to the leg 11^b is adapted to extend horizontally and be rigid. The second frame section 14^a of the keel is made collapsible, in order to facilitate the positioning of the two halves of the hull in the waterproof shell or covering. To this end said second frame section is composed of two parallel beams 14^d which like beams 14^b are connected together by cross slats 14^e, 14^f and the rear ends of which are pivoted to the forward ends of the rigid frame section 14 as at 14^g. A locking bar or bolt 18 pivoted at 18^a to a cross slat 14^h of the frame 14 is adapted to lock said collapsible frame 14^a in position against accidental turning. The free ends of the beams 14^d have fixed to them recessed metal hoods 19 which are adapted to project forwardly and engage around the free ends of the beams 14^d of the corresponding collapsible frame section of the other half of the hull, when the two halves are assembled and properly positioned in the covering as will be hereinafter more fully described. To lock the two halves of the keel together the collapsible frame 14^a of one of the halves is provided with an auxiliary rigid frame like extension 14^i whose parallel beams are connected by cross slats 14^j and are spaced apart so that when the two halves are in engagement with one another said beams 14^i will laterally overlap and one or their cross slats 14^j overbridge the beams 14^d of the opposite half and can be locked to the latter by hooks 20.

The side parts of each half of the hull of the boat are composed of sectional waist beams and two or more sets of sectional rods 21 and 22. The end sections 23^a of each waist beam are hinged together at one end as at 23^b and the intermediate sections thereof are adapted to be telescopically connected to one another and to said end sections 23^a by metal sleeves 24. Similarly the the individual sections of the rods 21, 22 are also telescopically connected together by metal sleeves 25. For the removable connection of the end sections 23^a of the waist beams to the bow the upper end of the vertical leg 11^a is grooved as at 11^d and provided with an upwardly projective metal member 26 forming the inner wall of said groove and with the latter a socket in which the hinge 23^b of the end sections 23^a is loosely borne. For the removable attachment of the sectional rods 21, 22 to the bow 10 the end sections of these rods are each provided with headed bolts 27 which are adapted to engage in keyholes shaped recesses 28^a formed in metal plates 28 fixed to the member 10 either on their outer side faces as shown in Fig. 7 or on their inner faces.

Instead of the plates with the key-hole shaped recess 28^a sockets may be employed each consisting of a metal plate having a semi-circular opening 28^b of a diameter larger than that of the head of the pin 27 and formed centrally with a lateral circular extension 28^c of a diameter about equal to that of the stem of the pin 27. The plate of said socket is formed with the semi-spherically arched projection 28^a which extends at the rear and over the larger opening 28^b. The plate is adapted to be secured to the inner face of the leg 11^a of the bow so that the openings 28^b and 28^c coincide with a substantially circular cavity 11′ in said leg, the arched hood projecting into said cavity. It will be seen that owing to this construction the headed pin projecting from a side bar of the frame can be easily slipped with its head portion through the larger opening 28^b so that the stem will bear in the smaller opening and the head engage the part of the rear face of the plate which is adjacent to said smaller opening, while the hood will prevent lateral displacement and therefore accidental disengagement of the side bar from its socket. Two or more skeleton cross frames 29, 29^a are provided which are adapted to be mounted inside the hull to hold the said beams and rods in steady position and secure to the hull the proper shape. These cross frames are of different width and conform in contour with the cross sectional shape of the hull. They are mounted on the stationary parts 14 of the keel and bear in U-shaped metal sockets 30 fixed on the latter. To steady their position in said sockets each cross frame is apertured at its bottom to engage pins 30^a projecting from the inner faces of said sockets. The side rods 21, 22 may have strap connections 31 with said cross frames 29, 29^a and the upper parts of the latter have fixed to them metal members 32 provided with pins 32^a and adapted to embrace the bottom edges of the waist beams (Fig. 4). The pins 32^a are adapted to engage apertures formed in the lower faces of said waist beams. Further reinforcements of the hull may be formed by longitudinal struts 33, 34 of which strut 33 is adapted to extend horizontally and strut 34 obliquely from the bow 10 to the innermost cross frame 29^a of each half of the hull. The inner ends of these two struts are provided with recessed or slotted metal members 35, 35^a adapted to engage a headed pin or bolt 36 (Figs. 6, 7 and 8) projecting centrally from the upper edge of said cross frame 29^a. The outer end of the strut 33 is formed with a hook 37 (Fig. 7) adapted to engage an ear 26^a formed in a metal member 26. The outer end of the strut 34 is pro-

vided with a bent metal catch 38 projecting longitudinally therefrom and adapted to be passed under and be engaged by the hooked bridge 16 (Fig. 6).

The waterproof flexible shell or covering 39 the sides and bottom of which are preferably made of soft rubber shaped to conform with the shape of the boat is adapted to tightly embrace the hull thereof. This shell is provided with a top 39^a which may be made of the same material or of suitable waterproof cloth is cut out about centrally of the boat to form a cockpit 40 for the occupant or occupants of the boat and through which the two halves of the hull of the boat are adapted to be passed into the shell. For the attachment of the covering around the boat we provide a frame 41 (Fig. 4) of the shape and size of the cockpit 40 which frame is mounted on the upper edges of two of the innermost cross frames 29^a of the two halves of the hull, and is suitably and detachably fixed thereto by hooks or the like (not shown). This frame is adapted to project upwardly from said cross frames and constitutes a flange around the mouth of the cockpit. The inner face of said flange is provided with a slanting groove 41^a extending all around said frame and which serves for the engagement of the edges of the top of the covering around the cut out portion (Figs. 4 and 7) which edges may be suitably reinforced by rubber strips (not shown). The cockpit itself may be closed up by a second rubber covering 42 which may be spilt and formed with a garment like portion 42^a to be tightened around the body of the occupant to protect him against high waves. This covering is adapted to be fastened to the flange 41 in a similar manner to that of the shell, by passing its edges into slanting grooves 41^b formed on the outer faces of said flange as shown in Fig. 4.

43, 43 denote stretch rods or the like to prevent the cover 42 from sagging. 44, 44 denote reinforcing cross struts which may be hinged to some of sections of the waist beams and which may be formed at their free ends with recessed metal members 44^a to engage headed pins 45 projecting from the cockpit frame 41 and thereby secure the latter in position.

When the boat is disassembled all sections can be easily accommodated in a knapsack or bag to be carried on the back of a hiker or accommodated in an automobile.

To assemble the boat each half of the hull is built up separately in the aforedescribed manner. Then these halves are passed into the shell through the open cockpit 40 with the inner ends of the collapsible keel sections 14^a extending opposite one another and held in an upwardly tilted position as shown in Fig. 8. Then by depressing said collapsible sections the two halves of the hull will be forced into the narrow end portions of the shell longitudinally. When thus depressed one of the collapsible sections 14^a with its rigid locking extension 14^1 will be slipped over the ends of the other collapsible section 14^a of the keel and brought into horizontal position. In this position the two collapsible keel sections will be interlocked with one another by the hooks 20. Now the opposite sections of the waist beams and rods of two halves of the boat are joined together by the sleeves 24, 25 respectively. Thereupon the frame 41 is mounted in position around the cockpit opening 40 and the edges of the top part 39^a of the covering are slipped into the slots 41^a of said frame.

When using the boat on heavy seas or in stormy weather the protective covering 42 may be stretched over the cockpit opening and slipped in the outer grooves 41^b of said frame.

When it is found that the shell 39 is too tight or not sufficiently tight around the hull, the bows 10 are contracted or expanded by the adjustment of the boards 12 in the member 11 in the aforedescribed manner.

Our boat has been found to be very durable and practically unsinkable.

It is clear that various modifications may be made in the construction of the boat without departing from the principle of our invention. We therefore do not wish to restrict ourselves to the details described and shown.

What we claim is:—

1. A collapsible boat consisting of a skeleton hull and a removable waterproof flexible shell having a recessed top, said hull being composed of side sections and keel sections and adapted to be assembled into separate halves to be separately passed into said shell through its recessed top, means for forcing said halves into the end portions of said shell, means for connecting said side sections and means for locking said keel section together.

2. A collapsible boat consisting of a skeleton sectional hull, cross frames therein, a removable waterproof flexible shell having a top formed with a cockpit opening and a frame removably mounted around said cockpit opening and having means for the attachment of said shell to said hull.

3. A collapsible boat consisting of a skeleton sectional hull, cross frames therein, a removable waterproof flexible shell having a top formed with a cockpit opening, and a grooved frame removably mounted on said cross pieces around said cockpit opening to removably hold said shell around said hull.

4. In a collapsible boat, a hull composed of sections detachably connected together, the connecting means between said sections including a plate formed with an opening

having a central lateral extension of reduced size, said plate being adapted to be secured over a cavity to one section, and a headed pin on the opposite section capable of being passed with its head through the wider opening and to bear with its stem in the reduced extension thereof and means at the rear of said wider opening and projecting into said cavity to prevent accidental disengagement of said headed pin from said opening.

In testimony whereof we affix our signatures.

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