Sept. 12, 1950 M. A. HALL 2,522,037

BOAT HULL ASSEMBLY JIG

Filed Feb. 27, 1947 6 Sheets-Sheet 1

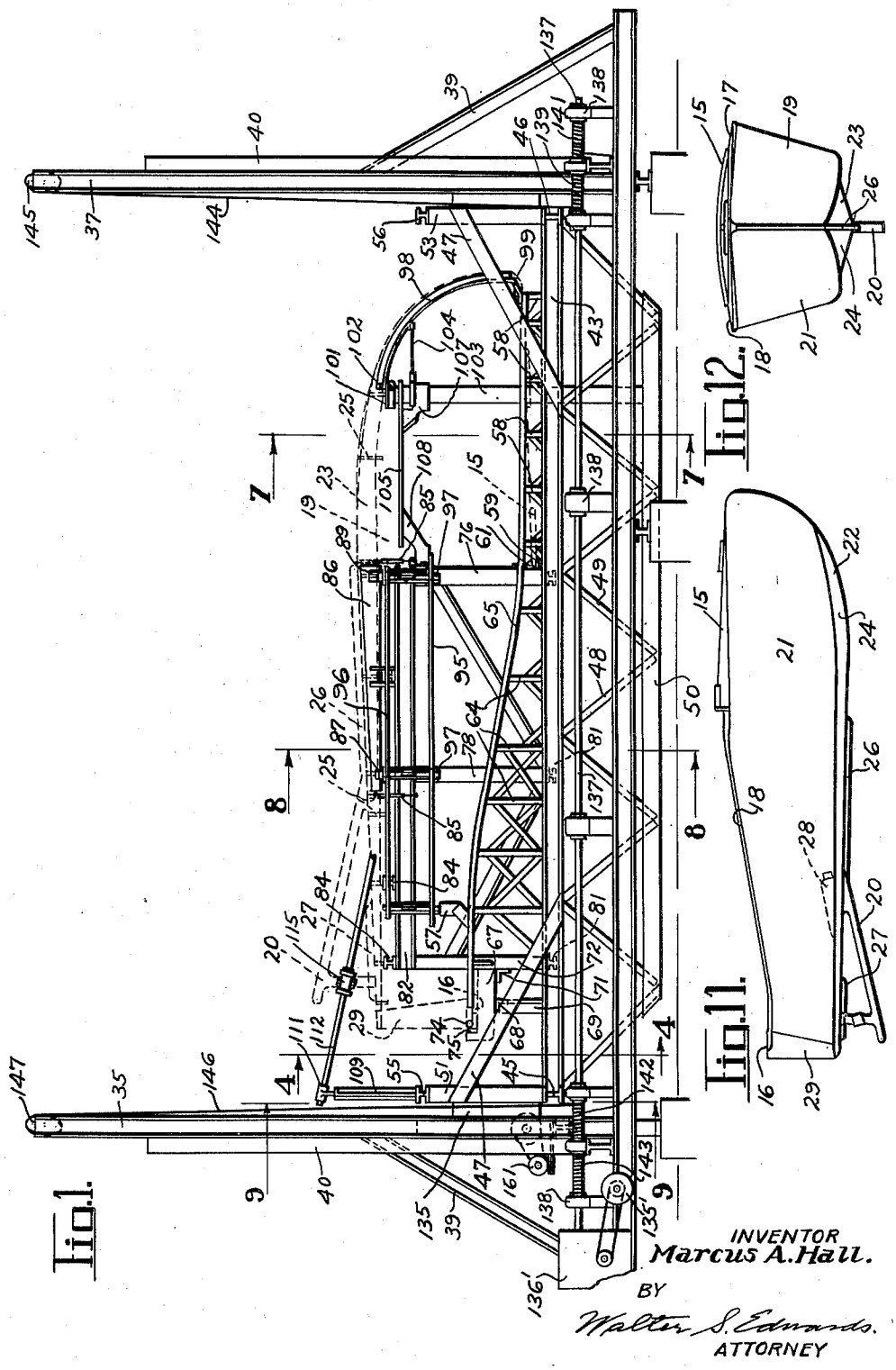


Fig. 1.

Fig. 12.

Fig. 11.

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BOAT HULL ASSEMBLY JIG

Filed Feb. 27, 1947 6 Sheets-Sheet 2

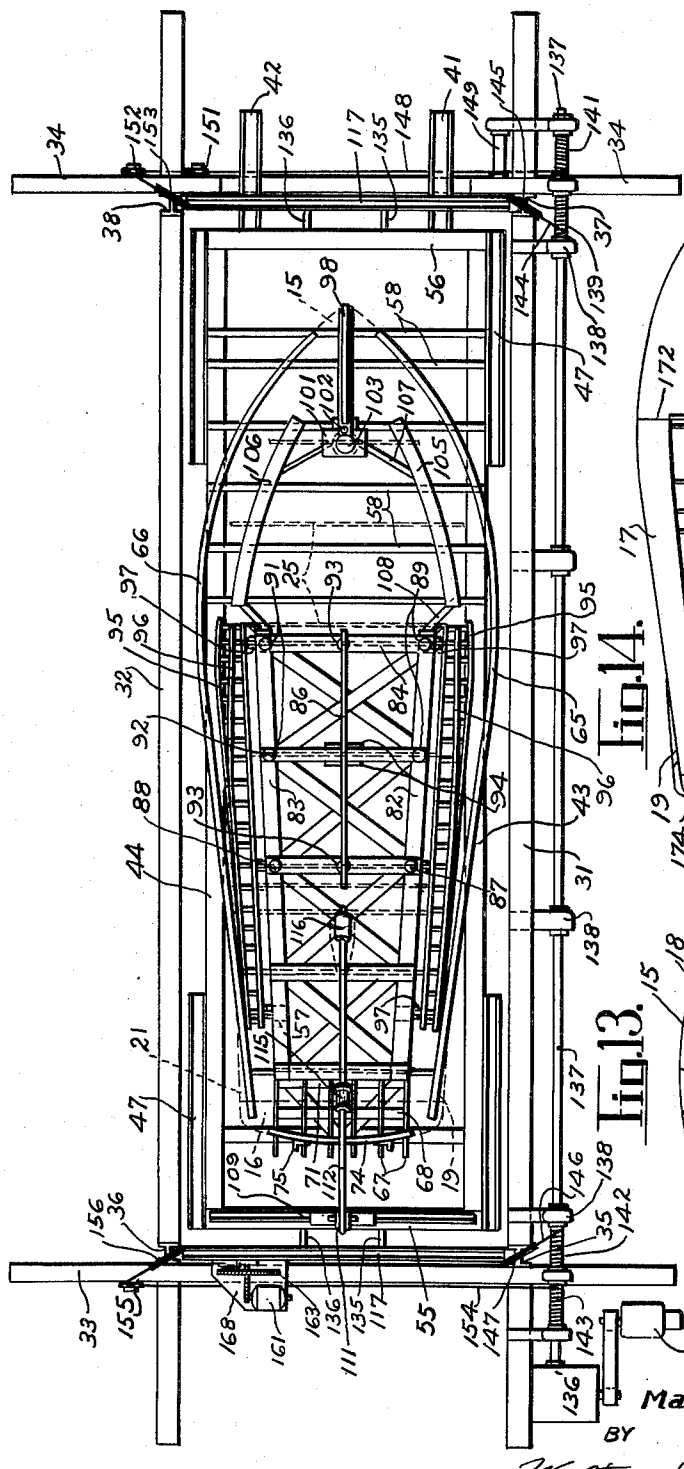


Fig. 2.

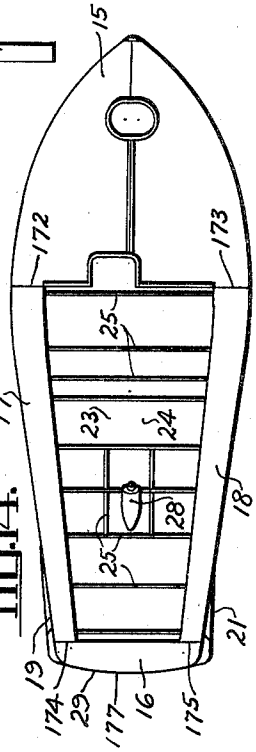


Fig. 14.

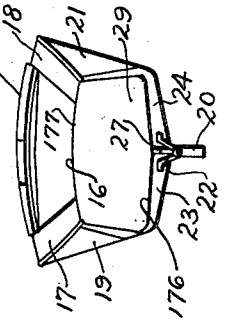


Fig. 13.

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BOAT HULL ASSEMBLY JIG

Filed Feb. 27, 1947 6 Sheets-Sheet 3

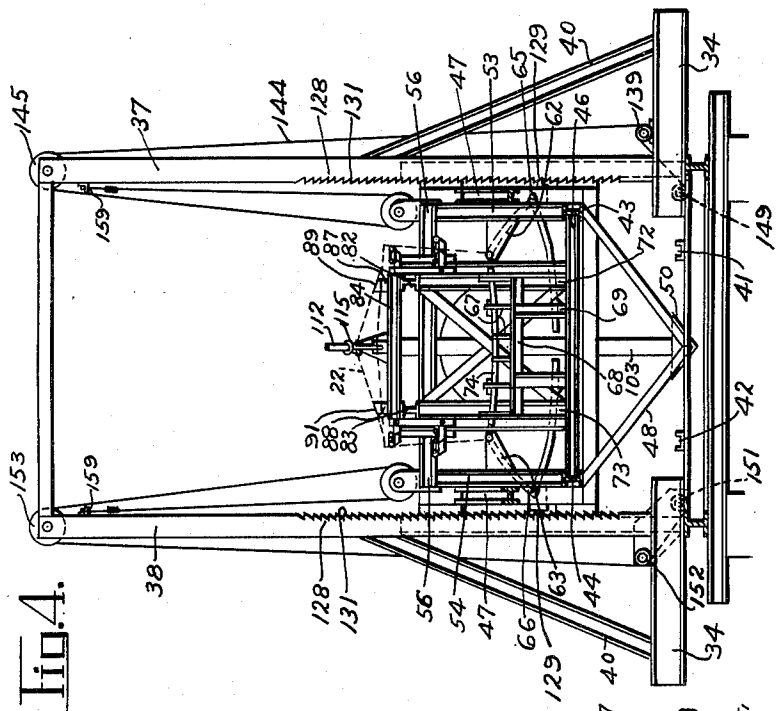


Fig. 4.

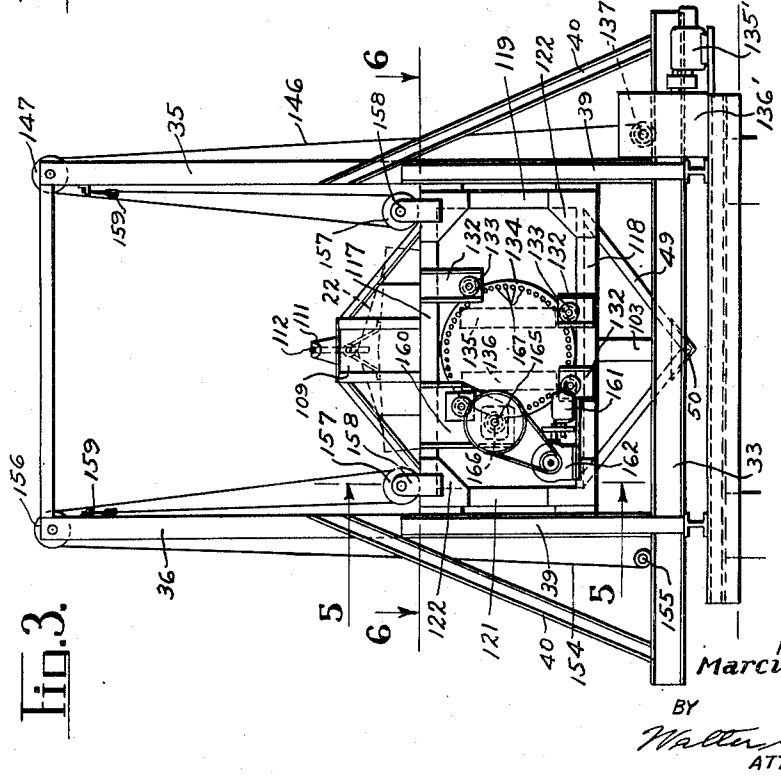


Fig. 3.

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BOAT HULL ASSEMBLY JIG

Filed Feb. 27, 1947 6 Sheets-Sheet 4

Fig. 5.

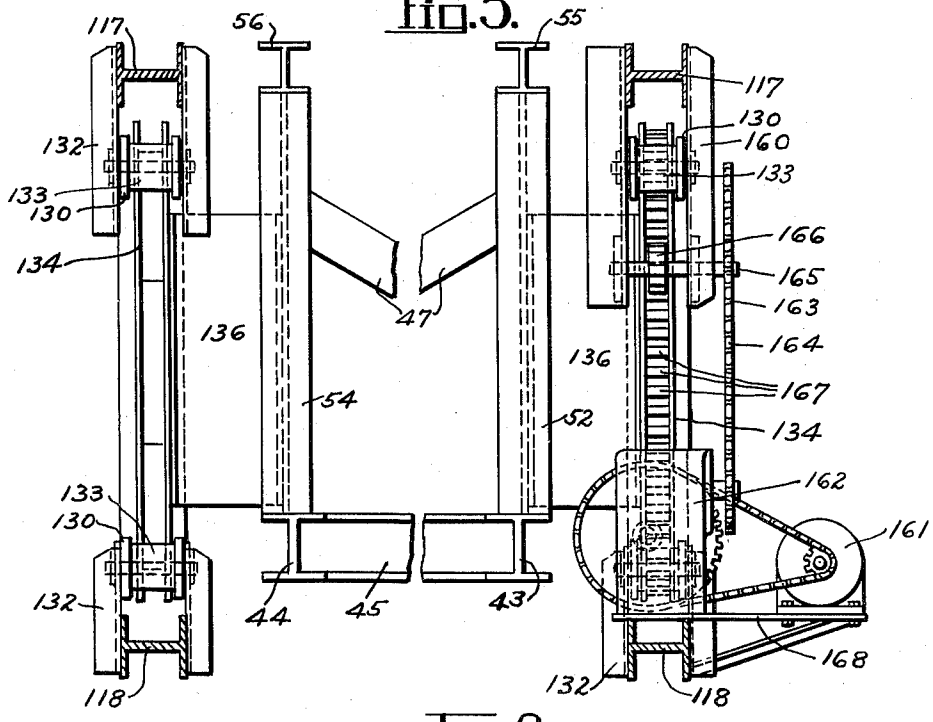
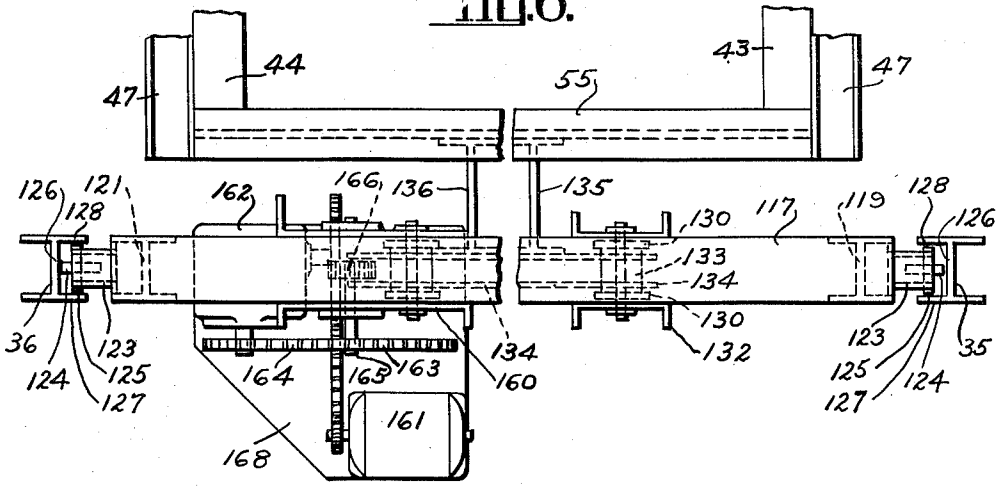


Fig. 6.



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Sept. 12, 1950 M. A. HALL 2,522,037

BOAT HULL ASSEMBLY JIG

Filed Feb. 27, 1947 6 Sheets-Sheet 5

Fig. 7.

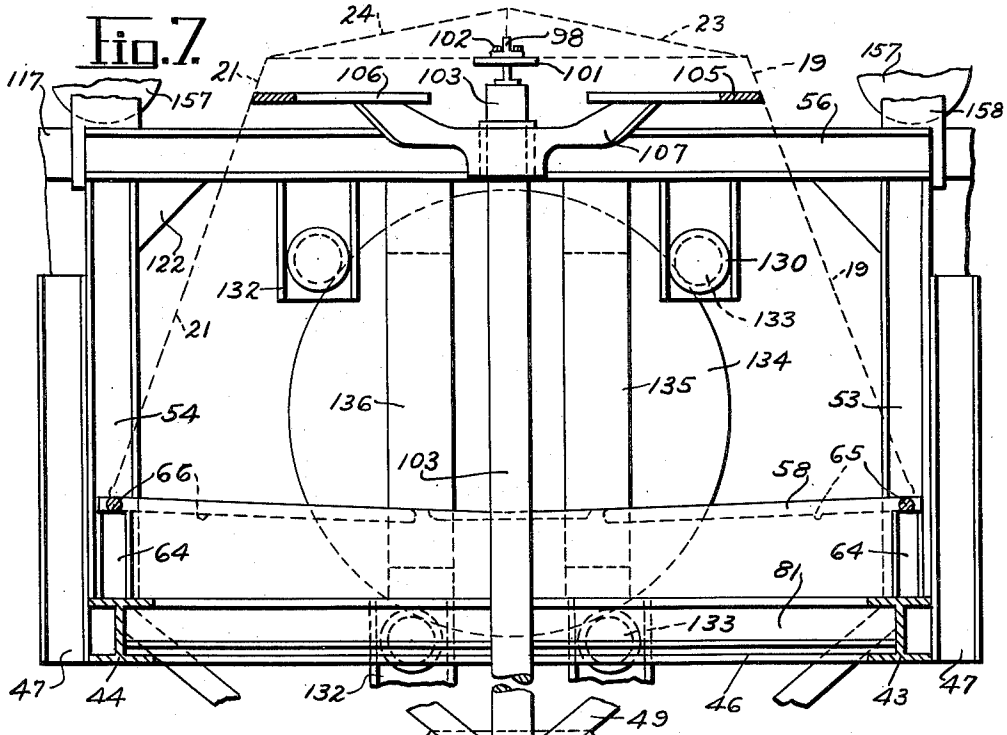
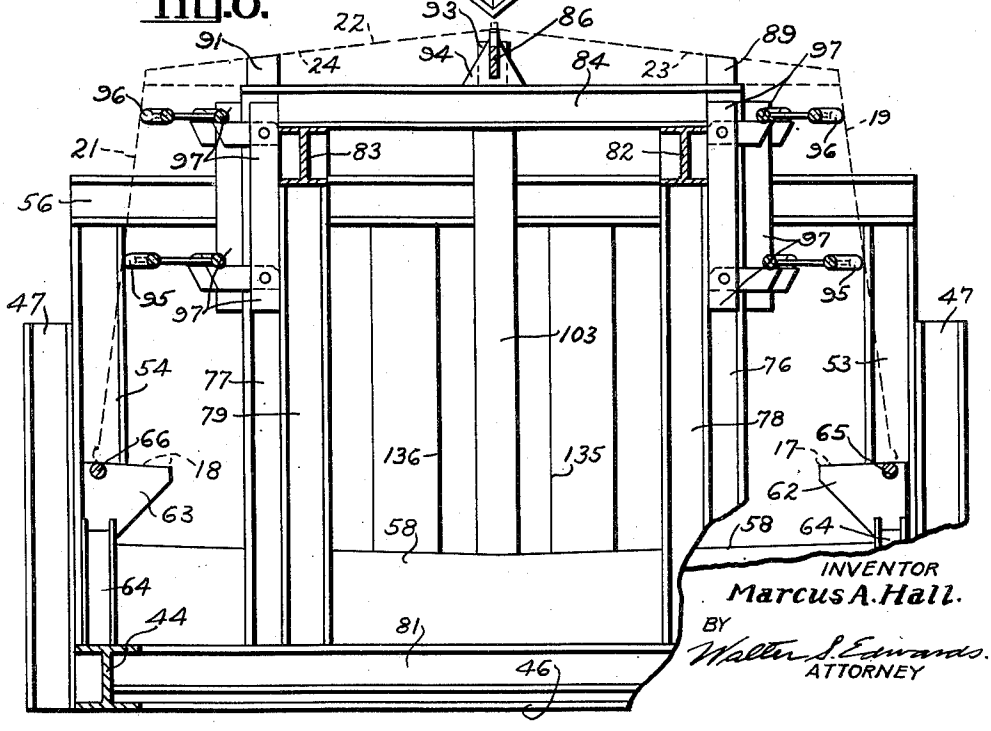


Fig. 8.



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BOAT HULL ASSEMBLY JIG

Filed Feb. 27, 1947 6 Sheets-Sheet 6

Fig. 9.

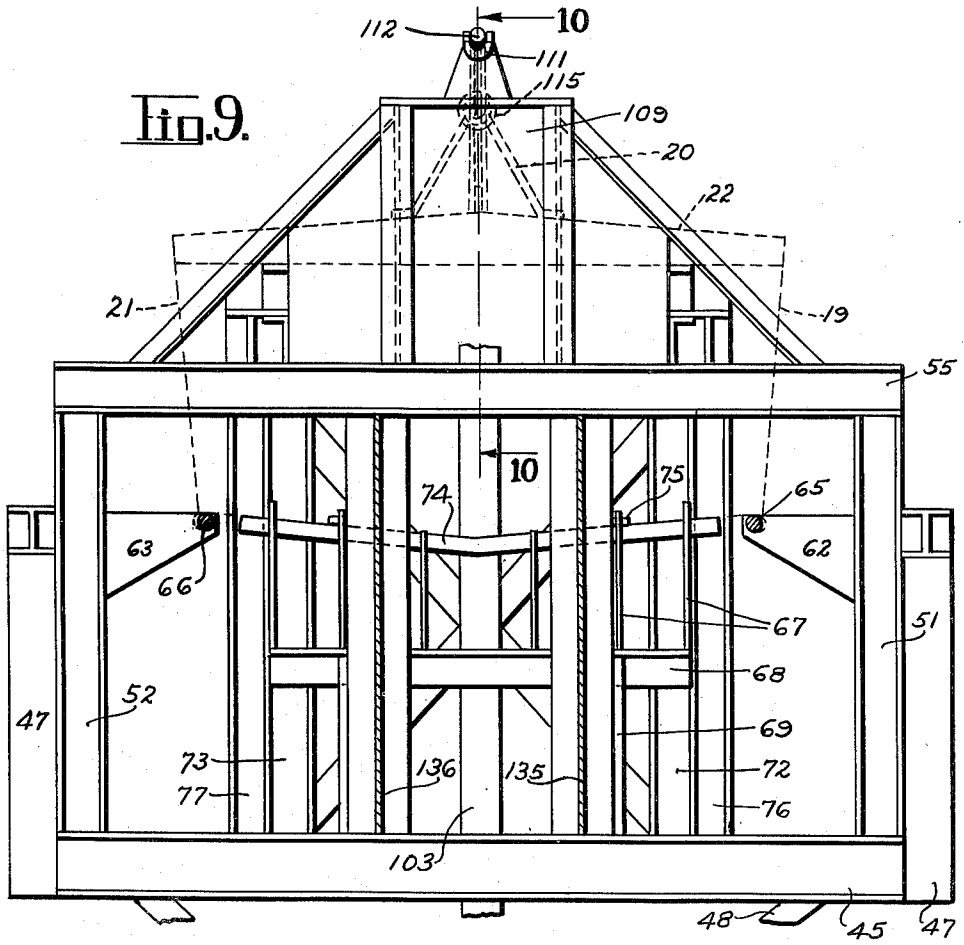
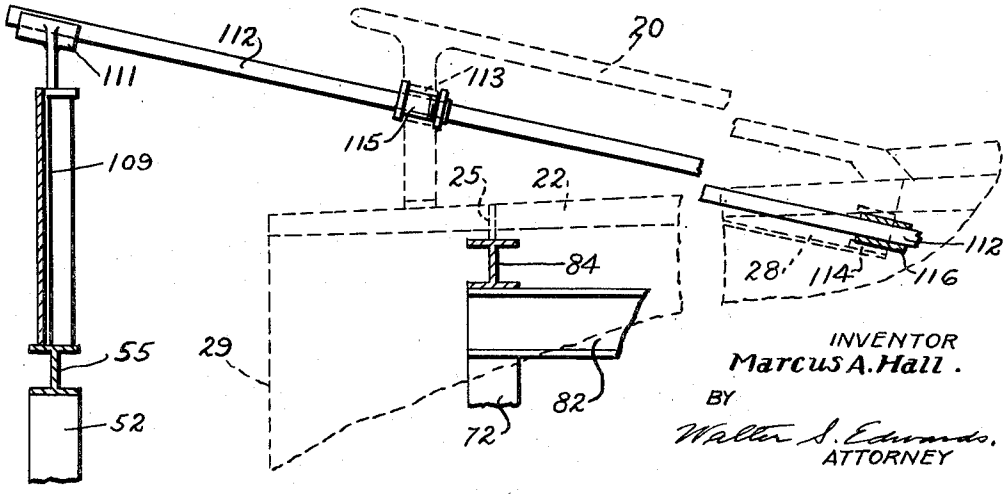


Fig. 10.



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UNITED STATES PATENT OFFICE

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BOAT HULL ASSEMBLY JIG

Marcus A. Hall, Branford, Conn., assignor to Steelcraft Boats, Incorporated, a corporation of Connecticut

Application February 27, 1947, Serial No. 731,348

25 Claims. (Cl. 9—6.5)

1

This invention relates to boat assembly jigs and more particularly to a mechanism by which the various pre-fabricated units of a metal boat hull may be located and held, with respect to each other in proper position to be assembled together, and to move these parts during the assembly thereof into various positions to facilitate such assembly and the securing of them together.

In the manufacture of metallic boats various parts, such as decks, bottoms, etc., are fabricated previous to the assembly of the complete boat hull and are then brought together and assembled to each other. It is therefore desirable that mechanism be provided to properly support these prefabricated parts in position relative to each other before they are fastened together. It is also desirable that, as parts are added to the boat hull being assembled, provision be made in the structure of the mechanism to revolve the part, or parts, already assembled together into accessible position to permit efficient assembly of other parts thereto. It is the principal object of this invention to provide an improved mechanism for accomplishing the above desideratum.

Another object of this invention is to provide an assembly jig having improved means for holding the various prefabricated parts of a metallic, or like, boat hull, which may be readily raised and lowered, and revolved as desired during the assembly of the parts.

Still another object is to provide in an assembly jig of the above nature improved means to raise, lower, and revolve the boat hull unit, or units, holding means.

A further object is to provide in an assembly jig for boat hulls improved means to locate and hold accessories in position to be attached to the boat hull being assembled.

A still further object is to provide an improved assembly jig for metallic, or like, boat hulls which will be relatively inexpensive to manufacture, simple in construction, compact, and very efficient, safe, and durable in use.

With the above and other objects in view which will appear as the description proceeds, there has been illustrated in the accompanying drawings a boat hull assembling jig in which the features and principles of this invention may be conveniently and practically embodied.

In the drawings:

Figure 1 is a side view of a boat hull assembly jig in which the features and principles of this invention are embodied;

Figure 2 is a top plan view of the same;

Figure 3 is an end view of the same;

2

Figure 4 is a cross-sectional view of the jig taken on the line 4—4 of Figure 1;

Figure 5 is a broken enlarged elevational sectional view taken on the line 5—5 of Figure 3;

Figure 6 is a broken enlarged horizontal sectional view taken on the line 6—6 of Figure 3;

Figure 7 is a broken enlarged cross-sectional view of the carriage portion of the mechanism taken on the line 7—7 of Figure 1;

Figure 8 is a broken enlarged cross-sectional view of the carriage portion of the mechanism taken on the line 8—8 of Figure 1;

Figure 9 is a broken away enlarged cross-sectional view of the carriage portion of the mechanism taken on the line 9—9 of Figure 1;

Figure 10 is a broken sectional view taken on the line 10—10 of Figure 9;

Figures 11, 12, 13, and 14 are side, front, rear, and top plan views respectively of a metallic boat hull which the assembly jig of this invention is adapted to support, hold, and revolve in accordance with the features and principles of this invention.

Referring now to the drawings wherein like reference numerals designate like parts throughout the several views the reference numeral 15 denotes (see Figures 11, 12, 13, and 14) the upper forward deck of a metallic boat hull which preferably is prefabricated into a unit by assembling together its component parts such as preformed top plates, beams, etc. A preformed rear deck 16 is also prefabricated by assembling its parts together into a unit. Side decks 17 and 18 as units, side plates 19 and 21, and a shaft supporting strut 20 are preformed as units ready for assembly. The boat bottom 22 is pre-fabricated into a unit from preformed plates 23 and 24, floor bottom and engine bed beams 25, keel bars 26 and 27, shaft log 28, etc. A transom plate 29 is preformed as a unit ready for assembly. These various units are then properly located one at a time in position on the assembly jig of this invention and secured together to form a complete boat hull.

The boat hull assembly jig of this invention includes a base frame comprising base side beams 31 and 32 extending lengthwise, base end beams 33 and 34 extending crosswise adjacent the ends of the side beams 31 and 32, and vertical beams, or risers 35, 36, 37, and 38 extending upwardly from each of the jointures of the side and cross beams 31, 33; 31, 34; 32, 33; and 32, 34. Suitable bracing beams 39 and 40 are provided to support and brace each of the vertical beams 35, 36, 37 and 38. At one end of the base frame, which

will be hereinafter termed the front end, the cross beam 34 is interrupted intermediate its ends (see Figure 4) to permit removal of a completely assembled boat hull from the jig onto a cradle (not shown) but which rolls on tracks 41 and 42. The base frame is suitably anchored to concrete piles as indicated in Figures 1, 3 and 4.

A boat hull supporting carriage is disposed between the frame uprights 35, 36, 37, and 38 and comprises lengthwise side beams 43 and 44 and end cross beams 45 and 46 suitably reinforced by diagonally disposed beams 47 (see Figure 2) and a strut counter-balancing cage composed of angularly disposed beams and bars 48 and 49 tied together at their outer ends by lengthwise bars 50. The carriage has a rectangular vertically disposed end frame at each end of the beams 43 and 44, the bottom members of which are constituted by the end cross beams 45 and 46, and having vertical side beams 51, 52 and 53, 54 each pair being tied together at their upper ends by cross beams 55 and 56 respectively. The bracing beams 47 tie the end frames to the lengthwise beams 43 and 44. The vertically disposed end frame composed of beams 46, 53, 54 and 56 is disposed at the front end of the base frame and the other end frame composed of beams 45, 51, 52 and 55 is disposed at the rear end of the base frame.

A plurality of vertically disposed plates 58 extend across the carriage frame from one lengthwise beam 43 to the other 44, the first being spaced rearwardly from the forward end frame, and the others being spaced apart along the carriage. The plates 58 locate and support the forward deck unit 15, as indicated in dotted lines in Figure 1, the upper edge of each being formed to substantially fit the surface contour of said deck 15 which is clamped at its rear edge to a cross bar 59 by a plurality of C clamps 61. At and along each side lengthwise beam 43 and 44 is a spaced apart series of short plates 62 and 63 respectively, each extending inwardly and formed on its upper edge to conform to the contour of the side decks 17 and 18 respectively. The plates 62 and 63 are supported from the lengthwise side beams 43 and 44 by uprights 64. The outer edges of the forward deck 15 and of the side decks 17 and 18 rest on rails 65 and 66, one at each side of the carriage, and which are bent to the desired contour of the side of the boat hull and of these units as they are preformed before assembly. The rear deck unit 16 is supported on lengthwise extending bars 67 in turn supported from the lengthwise side frame beams 43 and 44, on a cross beam 68 held up by vertical beams 69, and by a cross beam 71 secured to and extending between a pair of vertically disposed uprights 72 and 73 of a hull supporting frame and which are spaced forwardly from the vertical side beams 51, 52, and are disposed between the rails 65 and 66. The bars 67 are of different heights to conform crosswise with the contour of the rear deck 16, and support a cross bar 74 disposed to have the outer rear edge of the rear deck 16 seat thereon. Two or more of the bars 67 are made longer than the others and have an upright extension on their outer ends spaced from the rear end of the rear deck 16 whereby wedges 75 may be inserted to securely clamp the lower edge of the transom plate unit 29 against the adjacent edge of the rear deck 16.

The hull supporting frame, including the pair of uprights 72 and 73 at the rear end thereof, has a pair of uprights 76 and 77 at its front end and a pair of uprights 78 and 79 intermediate its ends. These uprights extend upwardly from cross beams 81 secured to and extending between the lengthwise side beams 43 and 44. Preferably the uprights 72, 73 are disposed, in relation to the aft deck 16, just forward of its forward edge, and the uprights 76, 77 are disposed, in relation to the forward deck 15, just to the rear of its rear edge. The uprights of each pair are spaced apart laterally to a maximum amount while permitting them to be withdrawn, from the assembled boat hull, between the side decks 17 and 18, and the end pairs of uprights are so disposed that they may be readily withdrawn, from the assembled boat hull, between the front and rear decks, 15 and 16. The upper ends of the uprights 72, 73 and 78 are tied together by, and support, a lengthwise beam 82, and the uprights 73, 77 and 79 are tied together by and support a lengthwise beam 83. A plurality of lengthwise spaced apart cross beams 84 rest on, extend between, and are secured to the lengthwise beams 82 and 83 in position to have the boat hull bottom, floor and engine bed beams 25 seat upon their upper surfaces, the cross beams 84 being of proper height at each boat beam to properly support the bottom unit 22 of the boat hull. A plurality of turnbuckles 85, detachably secured to the lengthwise beams 82 and 83 and to selected ones of the boat hull beams 25 are used to clamp the boat hull unit 22 tightly down upon the cross beams 84.

A vertically disposed lengthwise extending bar 86 extends between the uprights 76, 77 and 78, 79 above the cross beams 84 and is formed along its upper edge to engage and support the boat hull bottom 22 at the jointure between the plates 23 and 24. Posts 87 and 88 laterally spaced apart and extending upwardly from the cross beam 84 at the uprights 76 and 79 are engaged by the hull beam 25 at these points to locate and support the hull bottom. Similar posts 89 and 91 are supported on the cross beam 84 at the uprights 76 and 77, and on a cross beam 92 extending across the frame from the side beams 82 and 83. The bar 86 is tied to the respective cross beams 84 by posts 93 and to the cross beam 92 by plates 94. Inasmuch as the uprights 72, 73 and 76, 77 and 78, 79 are permanently secured to the carriage by being welded to the cross bars 81, which, in turn are welded to the lengthwise carriage beams 43 and 44, the hull supporting frame, formed as described above may be termed as being integral with said carriage. Vertically spaced and lengthwise extending rods 95 and 96 formed to fit the contour of the boat hull sides 19 and 21 where they engage the same, to locate and support the same during the assembly of the hull, are hingedly supported from laterally spaced apart uprights 57, see Figures 1 and 2, disposed intermediate the uprights 72, 73 and 78, 79, from the uprights 78 and 79, and from the uprights 76, 77, by being pivoted to bars 97 extending outwardly from each of said uprights. The rods 95 and 96 locate the side plates 19 and 21 and are arranged to be swung upwardly out of the way to permit the completed boat hull to be removed from the hull supporting frame.

Provision is made to locate and support the boat hull at its front end by means of a curved beam 98 formed to fit the bow of the boat hull. The beam 98 is detachably secured to the hull supporting frame at the foremost cross plates 58 by bolts 99 and at its upper end to a supporting plate 101 by bolts 102. One of the cross beams 35 of

the boat hull rests on the plate 101 which is mounted on and secured to a post 103 secured to and extending upwardly through the carriage from the frame work thereof. A detachable tie rod 104 is provided to reinforce the curved beam 98. Side bars 105 and 106 are detachably secured at their front ends to the post 103 by means of a bracket 107 mounted on the post 103. The rear ends of the bars 105 and 106 are detachably secured to the front end of the hull supporting frame at the uprights 76 and 77 by brackets 108. The outer edge of each bar 105 and 106 is formed to fit the contour of the side plates 19 and 21 respectively to locate and support the same in position during the assembly of the boat hull.

Means to properly locate the shaft supporting strut 20 (see Figure 10) is provided and comprises a frame work 109 of plates and beams secured to and extending upwardly from the end cross beam 55. A rod end support 111 is supported by the frame work 109 to locate and support a rod 112 which is threaded through the shaft bearing lug 113 of the strut 20 and into and through the bearing lug 114 of the shaft log 28. Suitable bushings 115 and 116 are provided on the rod 112 to locate the bearing lugs 113 and 114 respectively, and to hold these lugs in alignment while the strut 20 is secured to the hull bottom 22.

Mechanism is provided to raise and lower and also revolve the boat hull carriage to facilitate the assembly of the various hull units. This mechanism is best shown in Figures 3, 5, and 6 of the drawings and includes a vertically disposed rectangular frame work at each end of the carriage each of which comprises horizontal upper and lower beams 117 and 118 and side beams 119 and 121 with suitable corner brace plates 122. The frame work at each end of the carriage is in lateral alignment with the frame risers 35, 36 and 37, 38 at the respective ends of the main frame. The risers 35, 36, 37, and 38 are preferably I beams with the grooved edge of the risers of each pair in aligned opposition whereby to form vertical guides for the side beams 119 and 121 of each frame work. Brackets 123 secured to and at each corner of each frame work upon the side beams 119 and 121 extend into the groove of the adjacent riser. Each bracket 123 supports and carries a pair of rollers 124 and 125. The roller 124 is journaled to the bracket 123 to extend beyond the same and engage the central wall 126 of the adjacent riser and the roller 125 is journaled to the bracket 123 to extend beyond each side thereof to engage the side walls 127 and 128 thereof (see Figure 6) whereby the frame work will be smoothly guided in any vertical movement along the risers. An electric solenoid operated catch 129 (see Figure 4) is provided on each side of each frame work to automatically engage any one of a series of teeth 131 provided in the edge of the side wall 128 of each riser to prevent the carriage dropping inadvertently during raising and lowering it.

Each end framework has bearing plates 132 extending inwardly from the horizontal beams 117 and 118 to support rollers 133. Spaced apart circular plates are suitably secured together to form a large roller 134 to ride on the rollers 133. In this instance four rollers 133 are provided spaced about each of the peripheries of the rollers 134. The rollers 134 are secured to the adjacent end frames of the carriage by spaced apart beams 135 and 136, which are secured to and extend between the horizontal beams 45, 55, and 46, 56, and to the inner plate of each of the rollers 134. By this construction the hull supporting carriage is supported and carried by the frame work at each end, which is vertically movable up and down the risers, and may revolve in respect to the main frame by means of the large rollers 134 riding on the rollers 133 supported on the adjacent end frame work, the rollers 133 having end flanges 130 adapted to prevent lengthwise movement of the carriage by straddling the edge of the large roller 134.

The carriage carrying frame-works are arranged to be raised and lowered along the risers of the main frame by an electric motor 135' (see Figures 1, 2, and 3), which, through a gear reduction in housing 136', is arranged to rotate a shaft 137 extending the length of and along one side of the main frame being journaled at intervals in bearings 138. Secured on the front and rear ends of and rotating with the shaft 137 is a pair of cable drums 139, 141 and 142, 143 respectively. A cable 144 leads from the drum 139 to and over a pulley 145 journaled at the upper end of the riser 37, and a cable 146 leads from the drum 142 to and over a pulley 147 journaled at the upper end of the riser 35. A cable 148 leads from the drum 141 downwardly over idler rollers 149, 151, and 152 (see Figures 2 and 4) to and over a pulley 153 journaled at the upper end of the riser 38 and a cable 154 leads from the drum 143 across the main frame and over an idler roller 155 to and over a pulley 156 journaled at the upper end of the riser 36. From the respective pulleys 145, 147, 153, and 156 the respective cables lead downwardly to and over pulleys 157, one of which is secured by a bracket 158 to each of the upper corners of each end frame work and then upwardly to be fastened to the adjacent riser at 159. Proper actuation of the motor 135' will wind up the cables on their respective drums to raise the end frame-works and through the connection of the large rollers at each end with the boat hull carriage will raise the carriage and the boat hull parts and units thereon to any desired height and by reverse operation permit the same to lower.

An electric reversible motor 161 (see Figures 1, 2, 3, 5, and 6) through a gear reduction in casing 162 drives a gear 163 by means of a chain belt 164. The gear 163 is secured on a shaft 165 having a toothed disc, or pinion, 166 secured thereon to mesh with spaced apart pins 167 extending between the plates forming the large roller 134 at the rear framework adjacent the rear end of the main frame. The shaft 165 is journaled in a bracket 169 secured to and extending downwardly from the upper beam 117 of the rear end framework. As shown the motor 161 and the gear reduction housing are mounted on a bracket 168 secured to and carried by the lower beam 118 of the rear end framework. Actuation of the motor in either direction will revolve the boat hull supporting carriage and with it the boat hull parts and units carried thereby into any readily accessible position.

Operation

Assuming that a completed boat hull has just been removed from the assembly jig, embodying the features of this invention, the hull supporting carriage will be in a position opposite that shown in Figure 1. That is, the carriage will be up-side down from the showing in Figure 1 in order to permit the removal of the boat hull from the hull supporting frame onto a cradle (not shown) which was previously disposed in

under the carriage on the tracks 41 and 42 (see Figures 2 and 4) to receive the boat hull and facilitate it being withdrawn from in under the carriage. After a boat hull has been removed the carriage is revolved 180 degrees by operation of the motor 161 and then lowered by operation of the motor 135 to dispose it in the position shown in Figure 1. It is, of course, to be understood that in order to have removed the completed hull from the carriage the shaft bearing aligning rod 111 and bushings 115 and 116 were removed, the side plate locating and supporting bars 95 and 96 were swung upwardly and fastened, the side plate locating and supporting bars 105 and 106 were removed, and the curved bow supporting beam 98 was removed.

Having positioned the carriage as shown in Figure 1, the side plate bars 95 and 96 are lowered into position and fastened. The forward deck unit 15 is now placed and clamped on cross plates 58, the rear deck unit 16 is positioned and clamped on the lengthwise bars 67 and its rear edge rests on the cross bar 74. The side decks 17 and 18 are placed and clamped on the bars 62 and 63 respectively and their outer edges with the outer side edges of the forward deck 15 line up with and rest on the side bars 65 and 66. The side bars 105 and 106 are now positioned and secured on the post 103 and uprights, and the curved beam 98 is attached to the post 103 and the carriage frame. The joints between the forward deck 15 and the side decks 17 and 18 are now tack-welded together along the lines 172 and 173 (see Figure 14), and joints between the rear deck and the side decks are tack-welded along the lines 174 and 175.

The bottom unit 22 is now laid in position onto the hull supporting frame and the post and curved beam 103 and 98 respectively and the transom plate unit 29 is positioned in place between the rear deck unit 16 and the bottom unit 22. The bottom unit 22 and the transom plate unit are now clamped in place and tack-welded together along the line of jointure 176 (see Figure 13). The transom plate and the rear deck are tack-welded along the line of jointure 177.

The carriage is now revolved ninety degrees to present one of its sides uppermost by operation of the motor 161. A side plate unit, for instance 19 is laid in place upon the frame and its edges at their jointure with the edges of the forward deck 15, transom plate 29, rear deck 16, side decks, and bottom unit 22 are tack-welded. The carriage is then revolved one hundred and eighty degrees and the other side plate unit is secured to the bottom unit, decks, and transom plate. The carriage is then revolved back ninety degrees to the position shown in the drawings whereat the welding is completed around the edge of the bottom unit 22, and the strut 20 is assembled thereto by the use of the locating bar 111 and bushings 115 and 116. After completion of the above operations the curved forward beam 98 and the side bars 105 and 106 are removed, the side supporting bars are swung upwardly and fastened, the strut locating rod 111 and bushings 115 and 116 are removed, and the carriage is raised by operation of the motor 135, revolved by operation of the motor 161 one hundred and eighty degrees, and then lowered to lay the completely assembled boat hull upon a cradle to be rolled out from under the carriage.

In the mechanism above described, the boat hull is assembled by positioning its various prefabricated units on a locating and supporting carriage. The carriage is rotatively mounted on, and supported by, end slides, or frames, by means of a large roller 134 secured to the carriage, and the rollers 133, the latter being secured to the end slides. The slides, or end frames, carrying the rollers 133 are adapted to smoothly slide between opposing pairs of vertical risers to raise or lower the carriage under control of the motor 135. The combination and association of the various novel features in the structure of the boat hull assembling jig illustrated provides a mechanism whereby prefabricated and/or pre-formed boat hull units may be practically, rapidly, and efficiently assembled together to form a true shaped, sturdy and serviceable boat hull with a minimum expenditure of labor and time.

While there has been shown and described herein a boat hull assembling jig in which the features and principles of this invention may be embodied in practice, and for a particular style and form of boat hull, it will be understood that the same may be embodied in other specific forms and for other styles and forms of boat hulls without departing from the spirit and essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the claims rather than to the foregoing description to indicate the scope of the invention.

Having thus fully disclosed the invention, what is claimed as new and for which it is desired to secure Letters Patent, is:

1. An assembly jig for boat hulls composed of preformed forward and aft decks, a bottom, and sides, provided as separate units, said jig comprising a base frame, a boat hull units receiving, locating and supporting carriage supported by said frame, means to raise and lower said carriage on said frame, and means to revolve said carriage within said frame to position it to receive the said different boat hull units.

2. An assembly jig for boat hulls composed of preformed forward and aft decks, a bottom, and sides provided as separate units, said jig comprising a base frame having corner risers, a boat hull units receiving, locating and supporting carriage disposed and supported wholly between said risers to be raised and lowered between said risers, means to raise and lower said carriage, and means movable with said carriage as it raises and lowers, to revolve it into position to receive the said different boat hull units.

3. An assembly jig for boat hulls composed of preformed forward and aft decks, a bottom, and sides, provided as separate units, said jig comprising a base frame having vertical corner risers, a slide mounted to slide between the corner risers at each end of said base frame to be raised and lowered, means to simultaneously raise and to simultaneously lower said slides, a boat hull units receiving, locating and supporting carriage supported by and wholly disposed and extending between said slides and being pivotally mounted thereto to be revolved to positions to receive the said different boat hull units, and means to so revolve said carriage.

4. An assembly jig for boat hulls composed of separate units, said jig comprising a rectangular frame having vertical corner risers, each riser having a channel formed therein, the channels of the risers at each end of said frame being in opposed relation, a slide extending between the risers at each end and mounted to slide vertical-

ly in the channels thereof, a boat hull units receiving and supporting carriage extending between and pivotally connected to the slides to revolve into positions to receive different boat hull units, said connecting means including a roller connected to each end of said carriage and roller supporting rollers carried by said slides, one of the rollers connected to the carriage having means at its periphery to mesh with a gear pinion, and a driven gear pinion carried by the adjacent slide to engage said meshing means to rotate the roller through it said carriage, and means to simultaneously move said slides along the risers.

5. In a boat hull assembly jig, a base frame, a boat hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto to position different boat hull units for assembly together, means to so move and revolve said carriage, and means integral with said carriage to locate and support boat hull deck units and including a rail at each side of said carriage positioned to have the outer edges of said deck units seat thereon.

6. In a boat hull assembly jig, a base frame, a boat hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto to position different boat hull units for assembly together, means to so move and revolve said carriage, and means integral with said carriage to locate and support boat hull deck units and including a rail at each side of said carriage positioned to have the outer edges of said deck units seat thereon, and members extending inwardly of said carriage from said rails to support the body portions of the deck units.

7. In a boat hull assembly jig, a base frame, a boat hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto to position different boat hull units for assembly together, means to so move and revolve said carriage, and means integral with said carriage to locate and support boat hull deck units and including a rail at each side of said carriage positioned to have the outer edges of said deck units seat thereon, and members extending inwardly of said carriage from said rails to support the body portion of the deck units, the rear deck unit supporting members extending lengthwise and being of different heights to fit the contour of the rear deck unit.

8. In a boat hull assembly jig, a base frame, a boat hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto to position different boat hull units for assembly together, means to so move and revolve said carriage, and means integral with said carriage to locate and support boat hull deck units and including a rail at each side of said carriage positioned to have the outer edges of said deck units seat thereon, and means vertically spaced from said deck unit supporting rails to support a boat hull bottom unit.

9. In a boat hull assembly jig, a base frame, a hull units receiving carriage mounted on said frame for vertical movement and to so be revolved in respect thereto, means to move and revolve said carriage, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, and outwardly swinging hull side units locating bars.

10. In a boat hull assembly jig, a base frame, a hull units receiving carriage mounted on said frame for vertical movement and to so be revolved in respect thereto, means to move and revolve said carriage, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, and a pair of vertically spaced apart hull side units locating bars pivotally mounted on each side of said hull supporting frame.

11. In a boat hull assembly jig, a base frame, a hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto, means to move and revolve said carriage, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, and hull bow side supporting and locating beams detachably connected to said hull supporting frame and extending forwardly therefrom.

12. In a boat hull assembly jig, a base frame, a hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto, means to move and revolve said carriage, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, hull bow side supporting and locating beams detachably connected to said hull supporting frame and extending forwardly therefrom, and a hull bow end supporting beam detachably connected to said carriage and extending forwardly from said bow side supporting beams.

13. In a boat hull assembly jig, a base frame, a hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto, means to move and revolve said carriage, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, and a strut locating and supporting means detachably connected to an end of said carriage and extending from an end thereof over said bottom unit supporting means.

14. In a boat hull assembly jig, a base frame, a hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto, means to move and revolve said carriage, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, a hull bow end supporting beam detachably connected to said carriage and extending forwardly from the bottom unit supporting means, and a strut locating and supporting means detachably connected to said carriage and extending forwardly from an end thereof over said bottom unit supporting means.

15. In a boat hull assembly jig, a base frame, a hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto, means to move and revolve said carriage, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, a pair of vertically spaced apart hull side units supporting and locating bars pivotally mounted on each side of said hull supporting frame, and hull bow side supporting and locating beams detachably connected to said carriage and extending forwardly from the hull supporting frame.

16. In a boat hull assembly jig, a base frame, a hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto, means to move and revolve said

carriage, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, a pair of vertically spaced apart hull side units supporting and locating bars pivotally mounted on each side of said hull supporting frame, hull bow side supporting and locating beams detachably connected to said carriage and extending forwardly from the hull supporting frame, a hull bow end supporting beam detachably connected to said carriage and extending forwardly from an end of said hull supporting frame, and a strut locating and supporting means detachably connected to an end of said carriage and extending from an end thereof over said hull bottom unit supporting means.

17. In a boat hull assembly jig, a base frame, a boat hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto to position different boat hull units for assembly together, means to so move and revolve said carriage, means on said carriage to locate and support boat hull deck units including a rail at each side of said carriage positioned to have the outer edges of said deck units seat thereon, members extending inwardly of said carriage from said rails to support the body portions of the deck unit, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means spaced upwardly from said rails, and hull side units supporting and locating bars pivotally connected to the sides of said hull supporting frame.

18. In a boat hull assembly jig, a base frame, a boat hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto to position different boat hull units for assembly together, means to so move and revolve said carraige, means on said carriage to locate and support boat hull deck units including a rail at each side of said carriage positioned to have the outer edges of said deck units seat thereon, members extending inwardly of said carriage from said rails to support the body portions of the deck units, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, hull side units supporting and locating bars pivotally connected to the sides of said hull supporting frame, and hull bow side supporting and locating beams detachably connected to said hull supporting frame and extending forwardly therefrom.

19. In a boat hull assembly jig, a base frame, a boat hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto to position different boat hull units for assembly together, means to so move and revolve said carriage, means on said carriage to locate and support boat hull deck units including a rail at each side of said carriage positioned to have the outer edges of said deck units seat thereon, members extending inwardly of said carriage from said rails to support the body portions of the deck units, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, hull side units supporting and locating bars pivotally connected to the sides of said hull supporting frame, hull bow side supporting and locating beams detachably connected to said hull supporting frame and extending forwardly therefrom, and a hull bow end supporting beam detachably connected to said carriage and extending forwardly from the forward end of said hull bow side supporting beams.

20. In a boat hull assembly jig, a base frame, a boat hull units receiving carriage mounted on said frame for vertical movement and to be revolved in respect thereto to position different boat hull units for assembly together, means to so move and revolve said carriage, means on said carriage to locate and support boat hull deck units including a rail at each side of said carriage positioned to have the outer edges of said deck units seat thereon, members extending inwardly of said carriage from said rails to support the body portions of the deck units, a hull supporting frame carried by said carriage, said hull supporting frame including hull bottom unit supporting and locating means, hull side units supporting and locating bars pivotally connected to the sides of said hull supporting frame, hull bow side supporting and locating beams detachably connected to said hull supporting frame and extending forwardly therefrom, a hull bow end supporting beam detachably connected to said carriage and extending forwardly from the forward end said bow side locating means, and a strut locating and supporting means detachably connected to the rear end of said carriage and extending therefrom over said hull supporting frame.

21. An assembly jig for boat hulls composed of preformed side, forward and aft decks, a bottom, and sides provided as separate units, said jig comprising a base frame, a boat hull carriage mounted on said base frame for vertical movement and to be revolved in respect thereto to position the different boat hull units for assembly together, means to so move said carriage, a rail extending lengthwise along each side of said carriage, rigidly secured thereto, and positioned to correctly locate the aforesaid deck units when they are seated thereon, and a bottom unit supporting frame extending upwardly from said carriage rigidly secured thereto and extending laterally between the side deck units and lengthwise between the forward and aft deck units of the boat hull to correctly locate the bottom unit in respect to the deck units seated on said rails.

22. An assembly jig for boat hulls composed of preformed side, forward and aft decks, a bottom, and sides provided as separate units, said jig comprising a base frame, a boat hull carriage mounted on said base frame for vertical movement and to be revolved in respect thereto to position the different boat hull units for assembly together, means to so move said carriage, a rail extending lengthwise along each side of said carriage, rigidly secured thereto, and positioned to correctly locate the aforesaid deck units when they are seated thereon, a bottom unit supporting frame extending upwardly from said carriage rigidly secured thereto and extending laterally between the side deck units and lengthwise between the forward and aft deck units of the boat hull to correctly locate the bottom unit in respect to the deck units seated on said rails, and hull side unit locating and supporting members pivotally secured to each side of said bottom unit supporting frame and extending lengthwise thereof.

23. An assembly jig for boat hulls composed of preformed side, forward and aft decks, a bottom, and sides provided as separate units, said jig comprising a base frame, a boat hull carriage mounted on said base frame for vertical move-

ment and to be revolved in respect thereto to position the different boat hull units for assembly together, means to so move said carriage, a rail extending lengthwise along each side of said carriage, rigidly secured thereto, and positioned to correctly locate the aforesaid deck units when they are seated thereon, a bottom unit supporting frame extending upwardly from said carriage rigidly secured thereto and extending laterally between the side deck units and lengthwise between the forward and aft deck units of the boat hull to correctly locate the bottom unit in respect to the deck units seated on said rails, and a member detachably secured to said carriage and extending forwardly between the forward deck unit and the bottom unit to support and locate the forward end of the bottom unit.

24. An assembling jig for boat hulls composed of preformed side, forward and aft decks, a bottom, and sides provided as separate units, said jig comprising a base frame, a boat hull carriage mounted on said base frame for vertical movement and to be revolved in respect thereto to position the different boat hull units for assembly together, means to so move said carriage, a rail extending lengthwise along each side of said carriage, rigidly secured thereto, and positioned to correctly locate the aforesaid deck units when they are seated thereon, a bottom unit supporting frame extending upwardly from said carriage rigidly secured thereto and extending laterally between the side deck units and lengthwise between the forward and aft deck units of the boat hull to correctly locate the bottom unit in respect to the deck units seated on said rails, and side units locating and supporting members detachably secured to said carriage and extending forwardly from said bottom supporting frame between the bottom unit and the forward deck unit.

25. An assembly jig for boat hulls composed of preformed side, forward and aft decks, a bottom, and sides provided as separate units, said jig comprising a base frame, a boat hull carriage mounted on said base frame for vertical movement and to be revolved in respect thereto to position the different boat hull units for assembly together, means to so move said carriage, a rail extending lengthwise along each side of said carriage, rigidly secured thereto, and positioned to correctly locate the aforesaid deck units when they are seated thereon, a bottom unit supporting frame extending upwardly from said carriage rigidly secured thereto and extending laterally between the side deck units and lengthwise between the forward and aft deck units of the boat hull to correctly locate the bottom unit in respect to the deck units seated on said rails, and a shaft bearing strut supporting and locating means detachably secured to the rear end of said carriage and extending forwardly over said bottom unit supporting frame.

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