

**Jan. 3, 1967**

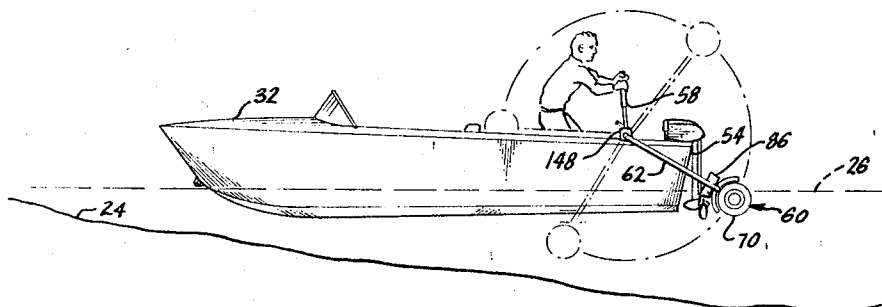
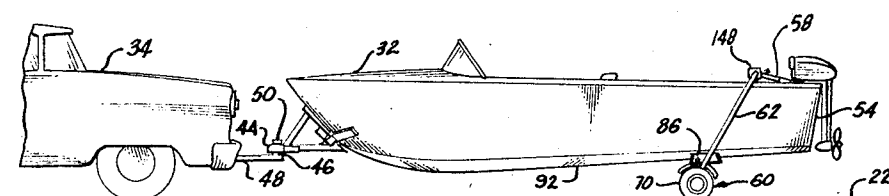
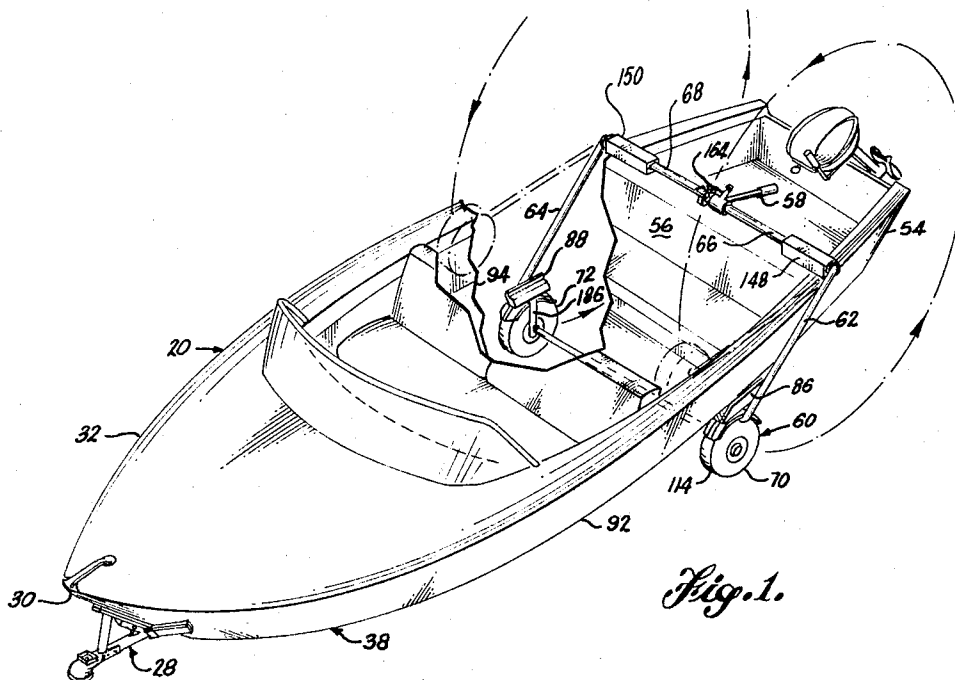
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**3,295,864**

SELF-CONTAINED BOAT TRAILER

Filed Nov. 9, 1964

2 Sheets-Sheet 1



*Fig. 3.*

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2 Sheets-Sheet 2

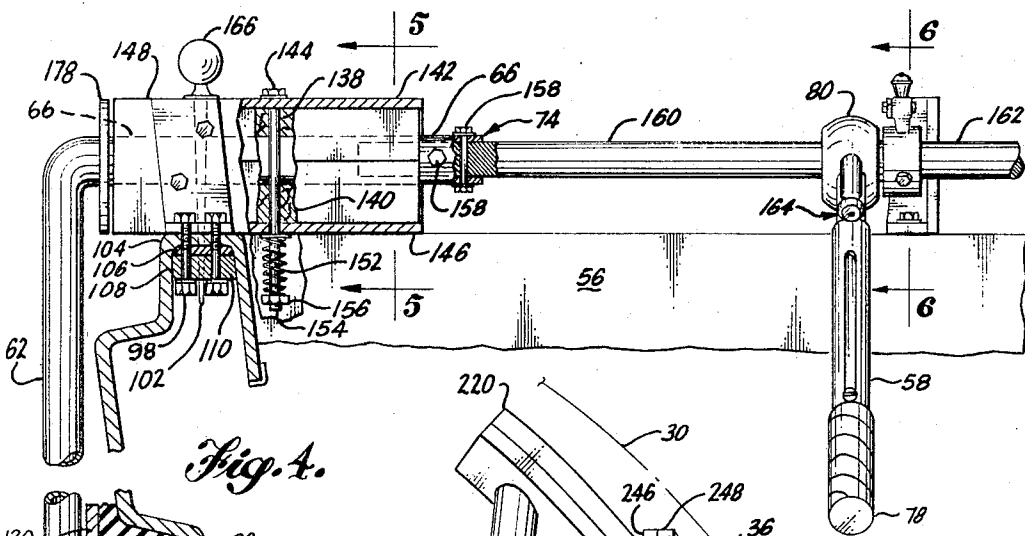


Fig. 4.

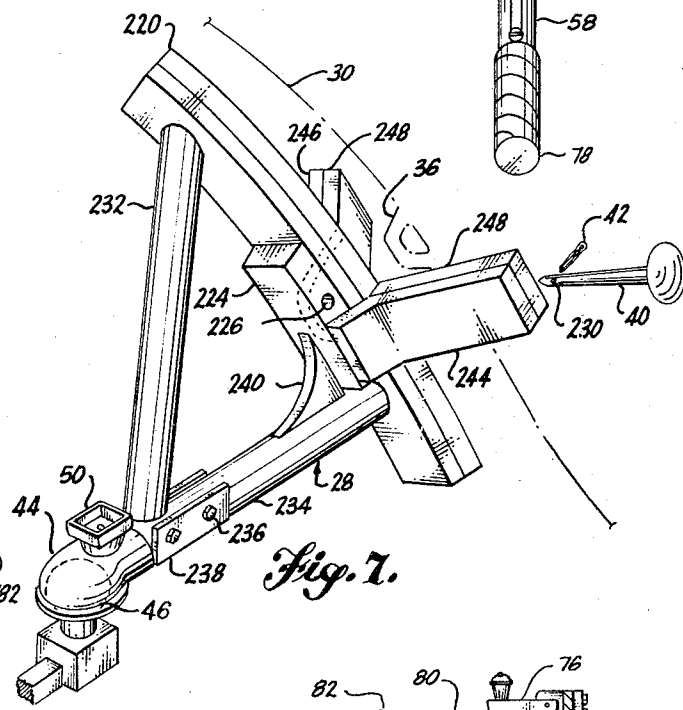
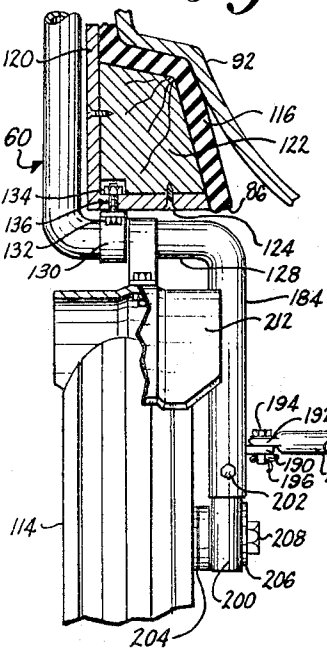


Fig. 7.

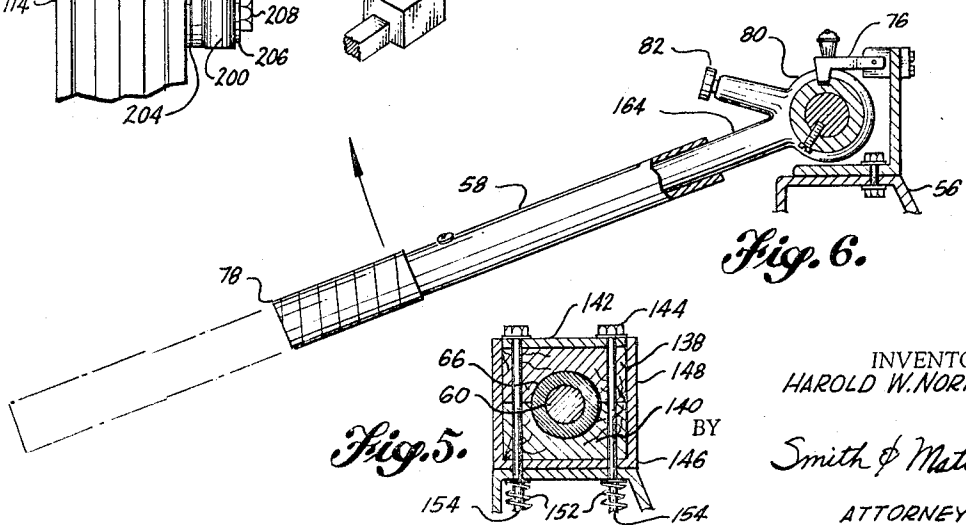


Fig. 6.

Fig. 5.

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3,295,864  
**SELF-CONTAINED BOAT TRAILER**  
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This invention relates to improvements in individual boat transporting trailers and more particularly to improvements in self-contained boat trailers such as shown in the inventor's earlier Patent No. 2,999,252.

The purpose of the invention is to provide a boat having trailer components attached at its bow and near its stern which, combined with the boat itself, make a trailable assembly and create an amphibious craft.

In accomplishing this purpose, many objectives have been undertaken and met, such as:

A trailer-boat bow fitting, when attached to both boat and pulling vehicle, supports the bow of the boat and consequently the entire boat in both a vertical plane and also in a transverse plane, this latter transverse support being very effective in counteracting swaying tendencies of the trailed boat;

Offset strut portions of a transverse primary axle are arranged so their own carried chine supports are positioned to effectively receive considerable hull weight during roadway travel;

A transverse axle, both supporting and resiliently confining the boat on the chine supports of the struts, after launching is conveniently rotated and locked by operation of a ratchet mechanism which causes a rotary retraction of the trailing wheels and their subsequent deposit inside the boat; and

All the boat contacting and interfitted members of the trailer-boat fittings are adjustably positioned to accommodate boats of various hull sizes and contours.

Briefly described, the invention comprises: a boat hull serving as a principal body structure of a trailer; a detachable connection, multiple plane support to removably attach the boat hull at its bow to a pulling vehicle; and a pivoting, retractable over-roadway running gear assembly having shock bearing supports secured to the hull at substantially deck level, a cross axle rotatably held in these supports with its respective side struts arranged to clear a hull side upon pivoting and to turn under a hull chine, chine supports each secured to an axle strut and arranged thereon to support the hull substantially at its chine, wheels rotatably mounted on the axle side struts which are arranged to place the wheels in a vertical plane of rotation passing through the hull just inboard of the gunnel structures upon forward rotation, so the wheels enter the hull space upon retraction and yet support the hull near the chine upon rearward rotation into roadway engagement, thus taking advantage of the hull shape, and a lever assembly to turn the cross axle including an adjustable length arm, cross axle position locks and lockable ratchet connectors joining together the lever and cross axle.

This invention, in a preferred embodiment, is illustrated in the accompanying drawings, wherein;

FIGURE 1 is a perspective of the self-contained boat trailer with hull portions removed and an outboard motor mounted on the transom for illustrative purposes, and also retraction motions are indicated with dash lines;

FIGURE 2 is a side view of the self-contained boat trailer hitched to a towing vehicle, the vehicle being shown only in part;

FIGURE 3 is a side view of the self-contained boat trailer after launching with dotted lines indicating the water level and the retracting movement of the pivoting over-roadway running gear assembly;

FIGURE 4 is a partial transverse section view with

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some portions removed indicating placement of the pivoting over-roadway running gear assembly on and about the boat hull for over-roadway travel;

FIGURE 5 is a section view taken on line 5—5 of FIGURE 4 showing a place of mounting of the cross axles;

FIGURE 6 is a section view taken on line 6—6 of FIGURE 4 illustrating the lever assembly components and their attachment to the cross axle; and

FIGURE 7 is a perspective view of the detachable connecting multiple plane support orientated for attachment to the bow of the boat which is indicated at a spaced distance in dotted lines, and shown attached to a trailer hitch ball components which are also shown in part.

As observed in FIGURES 1, 2 and 3, the invention 20 provides a boater with a boat-trailer combination 20 which is very conveniently maneuvered over roadways 22, down launching ramps 24 and through water 26. The self-contained trailer 20 is particularly appreciated by those boaters who keep their craft at their residences between boating excursions. During short water trips, their launching times are substantially reduced and undertaken with greater ease. There is no delay in transporting a separate boat trailer (not shown) to and from a parking area to encounter the ever present directional backing problems. Also gone is the boat to trailer alignment and maintaining position problems which occur upon reloading boats on trailers at boat ramps. In this regard, wet foot problems are substantially eliminated. Moreover, upon trailering along the highway, there is less trailering weight because the boat hull serves a dual function of the trailer framing. The addition of the multiple plane support 28 at the bow 30 of the boat 32 substantially reduces any swaying tendencies of the trailed boat-trailer combination 20.

To commence his roadway-waterway excursion, the boater backs his vehicle 34 to the vicinity of the boat bow 30. He attaches the multiple plane support 28, as noted in FIGURE 7, to the boat bow 30 at its bow hook 36 which is secured to the hull 38 by a transverse shear pin 40 which in turn is held in place by cotter pin 42. This support assembly he may, of course, keep mounted on the boat 32 between such excursions. Thereafter, the captive cap 44 of support 28 is moved to and slipped over the ball 46 of the vehicle trailer hitch components 48, or vice versa, and the lock 50 is tightened. After securing a safety chain, not shown, required by law as a second hitch on a stand-by basis, the boater travels to the launching ramp.

Near the water's edge, with the boat 32 positioned to enter the water stern 54 first, the lock 50 is released and the safety chain is removed. Then cap 44 is lifted free of the ball 46 and the boat is rolled into the water 26. Once the boat 32 is waterborne and in water deep enough to provide clearance, the boater, as indicated in FIGURE 3, using a lever 58, moves the pivoting, retractable, over-roadway running gear assembly 60 until the angled side struts 62, 64 of its cross axle portions 66, 68 contact the hull 38 positioning the wheels 70, 72 just inboard in a wider beam location of boat 32. A final placement of an axle shaft assembly 74 locking pin lever 76 to secure the roadway running gear assembly 60 completes the launching, except for possible telescoping of handle 78, ratchet 80 adjustment of lever 58 and engagement of its own ratchet locking pin 82.

After the water excursion, in the near vicinity of the ramp 24, beaching operations are undertaken by reversing the sequence of these launching steps. Lock pin 82 is momentarily released to position the lever 58 and its handle 78 is extended. Thereafter, after release of locking pin lever 76, the roadway running gear assembly 60 is

moved in the opposite rotary direction until the chine supports 86, 88 snugly contact the hull chines 92, 94. Upon such firm contact, lock pin lever 76 is reengaged in its over-roadway locked position. Then handle 78 is telescoped and rotated out of the way and reset with its locking pin 82.

The boat 32 is then positioned on the ramp 24 and subsequently engaged again with the towing vehicle 34. During the water excursion some or all of the trailering components may be removed. Generally, the multiple plane support 28 will be removed following withdrawals of both its cotter pin 42 and shear pin 40. If the boat is not to be trailered to another landing place, this support 28 assembly may be deposited in the towing vehicle. However, its light weight, strong construction is sufficiently compact that the support 28 assembly will probably be carried within the boat.

When long overwater trips are anticipated, such as a week's cruising or for racing events and other water excursions wherein weight reduction of any degree is essential, the pivotal retractable over-roadway running gear assembly 60, like the multiple plane bow support 28, may be removed when the boat is waterborne and then left ashore, stored in the towed vehicle or elsewhere.

As indicated in FIGURE 4, removal of pivotal, retractable, over-roadway running gear assembly 60 is accomplished by loosening bolt 98 and nut 100 fasteners 102 located at each gunnel 104 and then removing them with load distributing gunnel backing plates 106. For convenience of such removal, nuts 100 are secured to plates 106. The plates themselves are compositely made both of plywood 108 and a light weight metal 110, and formed to fit to the interior of the gunnel structure, extending fore and aft of cross axle 66, 68 location. After removing the fasteners 102 and gunnel backing plates 106, the remaining assembly of the then retracted pivotal over-roadway running gear assembly 60 is lifted clear of the boat 32 and carried ashore for storage during an extended cruise.

These components and structure so far described, all pertain to the overall considerations with which a boater is principally concerned in regard to his operating use of the major components. However, as is true in all components and structures assembled together to perform such demanding functions, there are refinements which underlie the complete success of such operations.

For example, over-roadway travel entails making provisions for reacting to shocks caused by surface irregularities. The wheels 70, 72 each are equipped with pneumatic tires. The chine supports 86, 88 each have a hull chine 92, 94 contacting surface formed in a resilient material 116 such as sponge rubber serving as a shock-absorbing pad 116. The remaining structure of chine supports 86, 88 are adjustably secured to substantially horizontal portions 128 of angle side struts 62, 64 of cross axle portions 66, 68. Side strut encompassing brackets 130, after placement about the angle side struts 62, 64, are thereafter bolted to chine support frames 120 by bolt 132 and nut 134 fasteners 136.

It is to be noted that the downward-forward angular direction of lowered angle side struts 62, 64 also places the retracted wheels 70, 72 well forward where the beam of the hull is greater. These running and retracted positions require that horizontal strut portions 128 be used. Their lengths are governed by the boat chine 92, 94 locations and the mounting of wheels 70, 72 so that these wheels 70, 72 will stow inside the hull 38.

Additional road shock-absorbing structures are used in securing cross axle portions 66, 68. Near gunnels 104 each cross axle is surrounded by a recessed top 138 and bottom 140 wood block. These blocks and a housing cover section 142 are secured to the remaining channel-shaped housing 148 by using headed bolts 144. These hold-down bolts 144 are resiliently and load-resistively installed. They extend through bottoms 146 of running gear housing sections 148, 150 and shock absorbing coiled

springs 152 are then installed around each of their extending legs 154. The springs 152 are held in a confined position between the transverse boat structure 56 and an abutment nut 156 threaded on each extending leg 154. As serious roadway obstructions are encountered, movements of cross axle portions 66, 68 relative to the housing sections 148, 150 and similarly to the hull 38 are dampened by the action of springs 152 as their confinement spaces are varied.

In respect to making the pivoting retractable over-roadway running gear assembly adjustable, within reasonable limits, to hulls having various beam widths at their gunnel elevation, the cross axle is made in two portions 66, 68. Preferably, the entire axle structure is in two parts 66, 68 with substantial clearance amidships. Likewise, the axle housing is in two sections 148, 150. Therefore, to complete the continuity of these resulting structures, the cross axle portions 66, 68 are non-rotatably secured by bolts 158 at selective locations to ratchet stems or axle extensions 160, 162 which are inserted into the centers of the cross axle portions and which at their opposite ends terminate in the lever 58, ratchet 80, assembly 164. The transverse overlap between cross axle portions 66, 68 and axle extensions or ratchet stems 160, 162, respectively, varies depending on beam widths of various boats on which the assembly is mounted.

Additional positioning of cross axle portions 66, 68 in and respect to running gear housing sections 148, 150 is undertaken. Circular flanges 178 are mounted on each section 66, 68 to limit their inserted distance within housing sections 148, 150 at any time. Then, only when the wheels are completely down and up, a round head tapered shear pin 166 is used on each boat side to lock together all the parts it passes through, i.e., housing members, wood bolts, axle, gunnel and gunnel plates.

Although the pivoting retractable over-roadway running gear assembly 60, as thus mounted on gunnels 104 and swung into engagement with hull chines 92, 94, snugly holds boat 32 subject only to compensating movements of shock absorbing structures, a cross sway brace 182 is desirably extended between lower wheel supporting portions 184, 186 of angle side struts 62, 64 if a roadway to be traveled over is very rough and bumpy. Such a sway brace is illustrated, in part, in FIGURE 4. To facilitate its addition or removal at any time, each end of cross brace 182 terminates in an eyelet structure 190 matching a like eyelet structure 192 secured to each wheel supporting portion 184, 186 of angle side struts 62, 64. These eyelet structures 190 and 192, as paired on each side of the running gear assembly 60, are aligned and held together by a capped pin 194 which, in turn, is itself secured by a cotter pin 196.

This eyelet structure 192, in addition to being secured to angle side struts 62, 64, is also anchored to bar inserts 200. These inserts 200 project into each wheel supporting axle portions 184, 186 where they are bolted 202 into place to extend beyond portions 184, 186 to serve as wheel shaft 204 and shaft bearing (not shown) retaining structure. Each wheel shaft 204 is thereafter secured by a lock washer 206 and 208 nut assembly.

To prevent undue spray departing from running wheels 70, 72 during rainy weather, a fender 212 is positioned over these wheels by a bracket 214 and fastener 216 assembly which is secured to horizontal portion 128 of each angle side strut 62, 64. Or, if preferred, the fender 212 is secured by welding.

The multiple plane bow support 28 also includes shock absorbing structures. There is a shock absorbing cushion 220, such as rubber, extending up and down a brace 222 which substantially matches the bow stern contour. This bow stem brace 222 has reinforcement 224 which is longitudinally apertured 226 to receive a bow fitting 228. The bow fitting 228 also passes through an aligned aperture, (not shown) in cushion 220. In reinforcement 224 is

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transverse aperture 226 to accommodate shear pin 40 which joins the bow support 28 to bow fitting 36 and consequently joins bow support 28 to boat 32.

From reinforced bow stern brace 222, two converging tubular braces, top 232, bottom 234, extend forward to meet and to receive the captive cap 44 assembly of the multiple plane bow support 28 which is bolted 236 on by angular clip assembly 238. This triangular structure essentially arranged in a vertical plane also includes a strengthening fillet 240.

To establish side load reactionary structures, opposite hand side angular bow conforming alignment braces 244, 246 are mounted on bow stem brace 222 and its reinforcement 224. Each one, 224, 246 is faced with shock absorbing cushions 248 which, with cushion 220 on bow stern brace 222, complete the shock absorbing structure of multiple plane bow support 28.

The boat 32 so held cooperatively in this bow support 28 and by pivoting retractable over-roadway running gear assembly 60, trails exceedingly well behind the towing vehicle 34. Shock forces coming from all roadway traffic operations are well dampened and swaying tendencies are sufficiently minimized whereby the vehicle 34 and the towed self-contained boat trailer 20 are driven conveniently and safely over roadways. Then, upon arrivals or during departures from marine ramps, the overall operating convenience is fully recognized following procedures previously noted and illustrated in FIGURES 2, 3, 6 and 7 with specific references to the boater's manipulation of his self-contained boat trailer 20.

As an additional convenience, housings 148, 150 serve as convenient mounting plates for license plates, reflectors and lights (not shown).

I claim:

1. A self-contained boat trailer, comprising: a boat hull serving as a principal body structure of a trailer; a detachable, connecting, multiple plane support to removably attach the boat hull at its bow to a pulling vehicle; and a pivoting, retractable, over-roadway running gear assembly having shock-bearing supports secured to the hull at substantially deck level, a cross axle rotatably held in these supports with its respective side struts arranged to clear a hull side upon pivoting and to turn under a hull chine, chine supports each secured to an axle side strut and arranged thereon to support the hull substantially at its chine, wheels rotatably mounted on the axle side struts which are arranged to place the wheels in a vertical plane of rotation passing through the hull just inboard of the gunnel structures, so upon forward retractive rotation the wheels enter the hull space and upon rearward rotation into roadway engagement support the hull near the chine, thus taking advantage of the hull shape, and a lever assembly to turn the cross axle during such forward and rearward rotations.

2. A self-contained boat trailer, as claimed in claim 1, wherein the lever assembly to turn the cross axle includes: an adjustable length hand operated lever arm, and ratchet connectors joining together the lever arm and cross axle.

3. A self-contained boat trailer, as claimed in claim 2, wherein the ratchet connectors include: locking mechanisms to secure the lever arm at various angular positions with respect to the cross axle.

4. A self-contained boat trailer, as claimed in claim 1, wherein the cross axle is equipped with locking devices to lock the cross axle in both its fully retracted and fully lowered rotative positions.

5. A self-contained boat trailer, as claimed in claim 1, wherein the cross axle and the lever assembly are arranged with the cross axle having a port and starboard section which are adjustably positioned, transversely, to locate their chine supports and, thereafter, are secured by the lever assembly to maintain such transverse adjustment and to rotate together, thereby compensating for various hull contours to be used as the principal body structure of the trailer.

6. In a self-contained boat trailer adaptable assembly for mounting on a boat hull which then serves as the principal body structure of a boat trailer, a pivoting, retractable, over-roadway running gear assembly, adaptable to be secured to a boat hull at substantially its deck level, comprising:

- (a) a cross axle rotatably held in supports adapted to be secured to the boat hull and having its respective side struts arranged to clear a hull side upon pivoting and to turn under a hull chine;
- (b) chine supports each secured to an axle side strut and arranged thereon to support a hull substantially at its chine;
- (c) wheels rotatably mounted on the axle side struts which are arranged to place the wheels in a vertical plane of rotation adaptable to pass through a hull just inboard of hull gunnel structures, so upon forward retractive rotation, the wheels enter hull space and upon rearward rotation into roadway engagement they support a hull near hull chines, thus taking advantage of hull spaces; and
- (d) a lever assembly to turn the cross axle during such forward and rearward rotations.

7. In a self-contained boat trailer adaptable assembly for mounting on a boat hull which then serves as the principal body structure of a boat trailer, as claimed in claim 6, also comprising: a detachable connecting, multiple plane support to removably attach a boat hull at its bow to a pulling vehicle, supporting a boat hull in at least longitudinal and transverse planes.

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