

[54] **POWER-OPERATED RETRACTABLE
LADDER FOR PLEASURE BOATS**
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182/86, 91, 195; 105/443, 445, 447; 9/7, 1

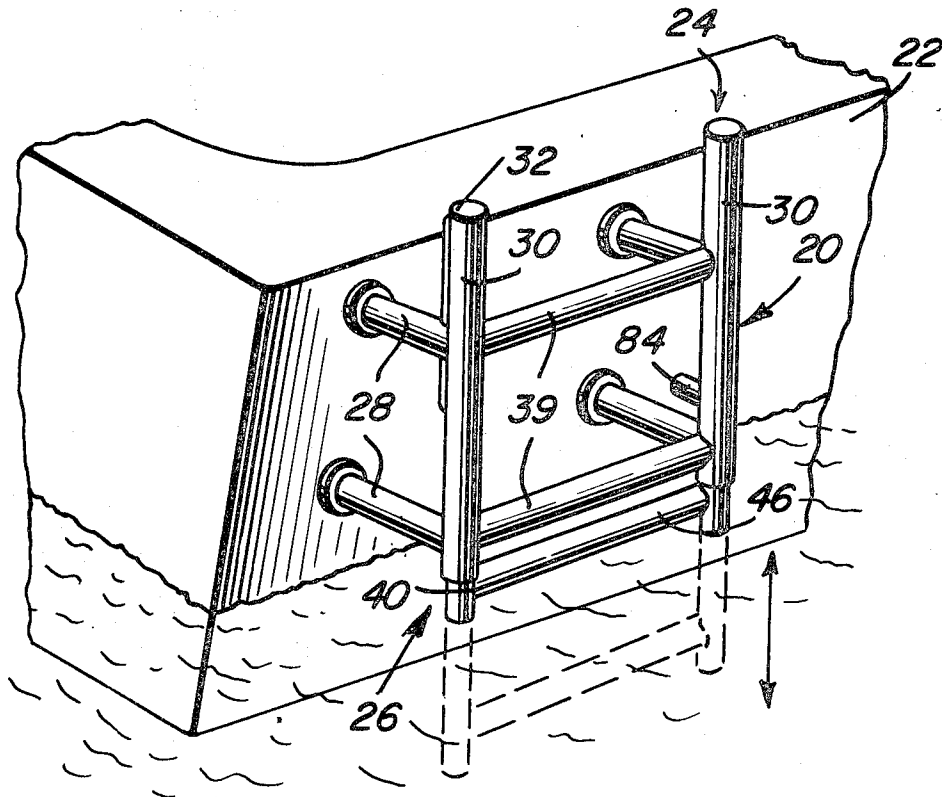
[56] **References Cited**
UNITED STATES PATENTS
586,012 7/1897 Campbell 105/447
3,285,367 11/1966 Brodie 182/97
3,039,562 6/1962 Wagner 182/91

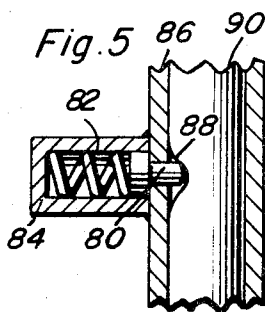
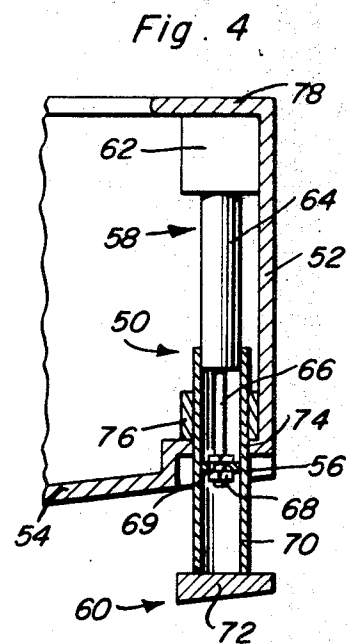
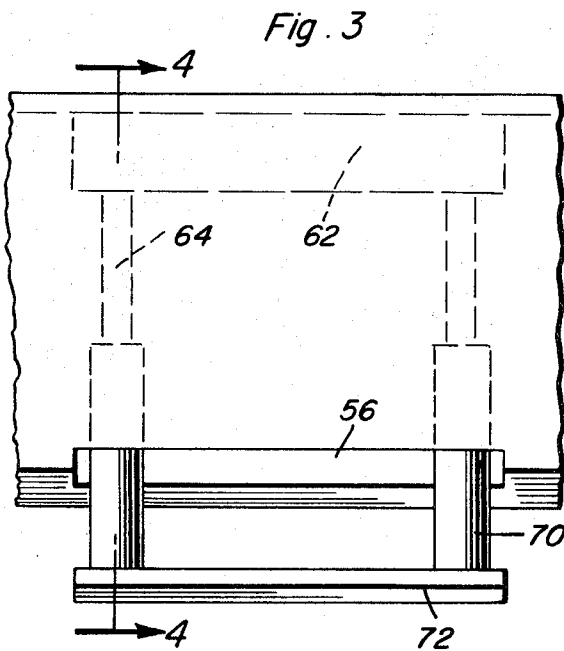
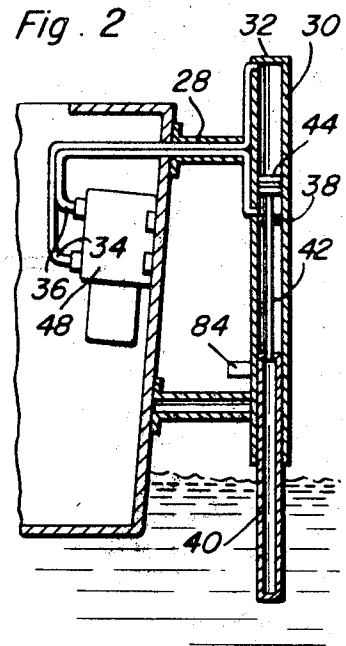
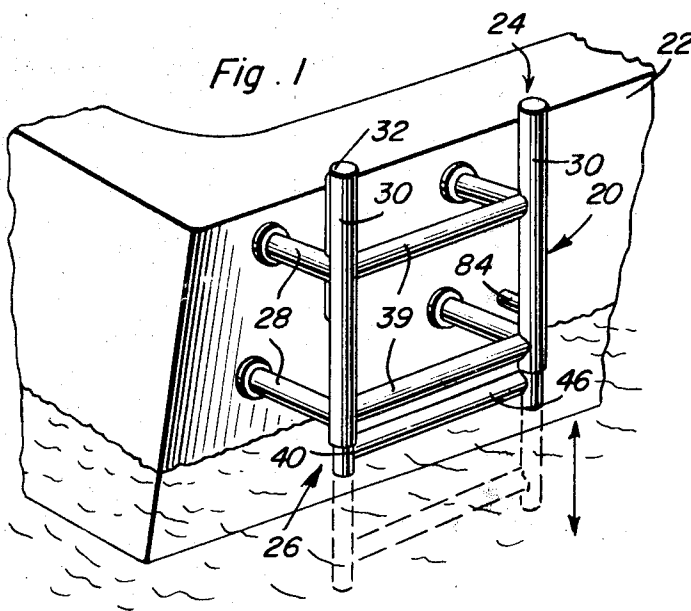
599,666 2/1898 Thornton 182/206
3,033,309 5/1962 Fugere 182/195
3,061,042 10/1962 Giles 182/195
2,860,822 11/1958 Smith 182/93
2,650,750 9/1953 Chesney 182/208
3,464,517 9/1969 Akeman 182/195

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[57] **ABSTRACT**
A boat ladder for pleasure boats to enable a user to easily get into or out of a boat when in the water and also get into and out of the boat when loaded on a transporting trailer, including a movable section and a stationary section supported from the boat hull, together with an interconnection with the movable section to move it from an extended position to a retracted position.

10 Claims, 15 Drawing Figures

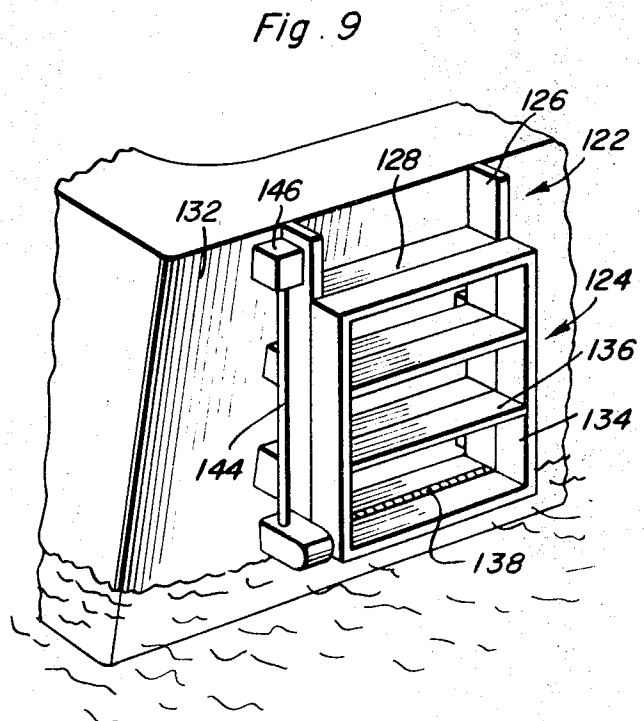
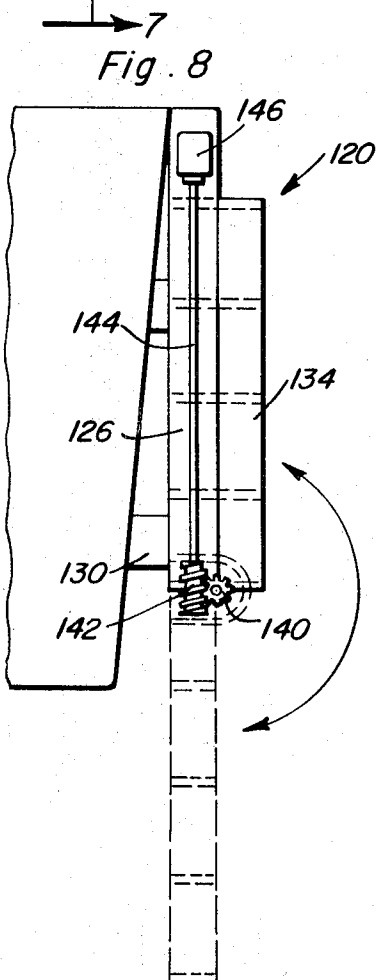
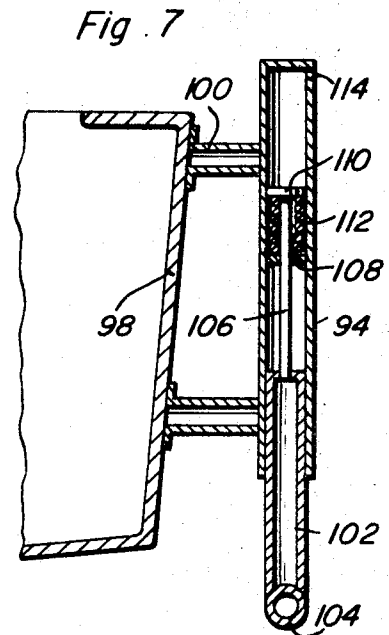
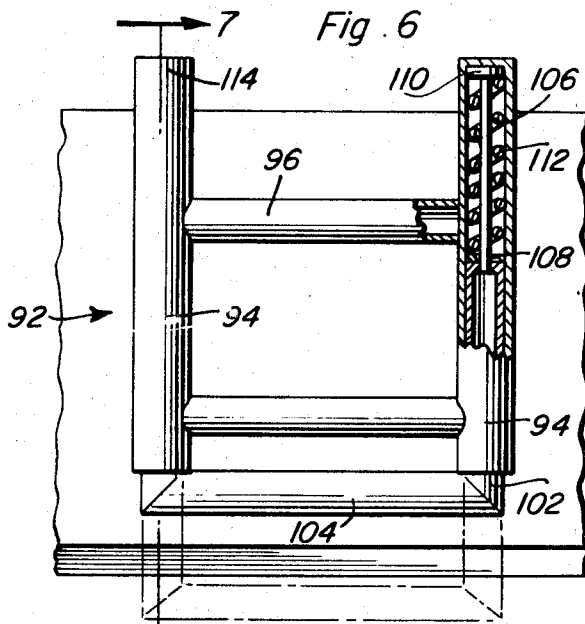




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Fig. 10

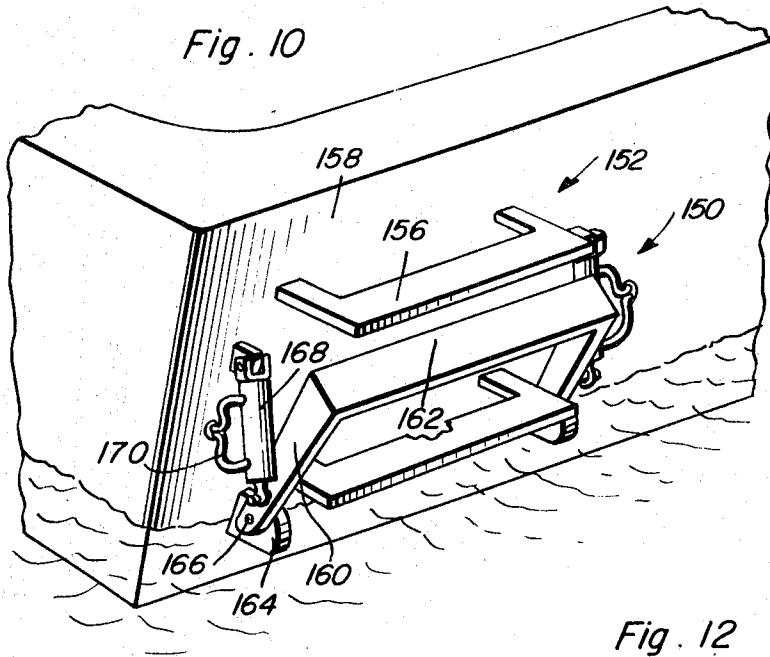


Fig. 12

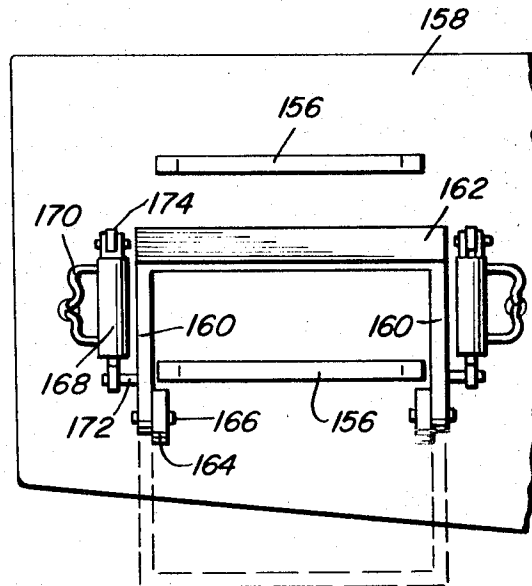
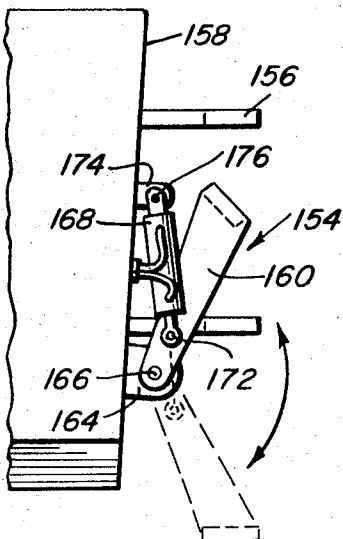


Fig. 11



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Fig. 13

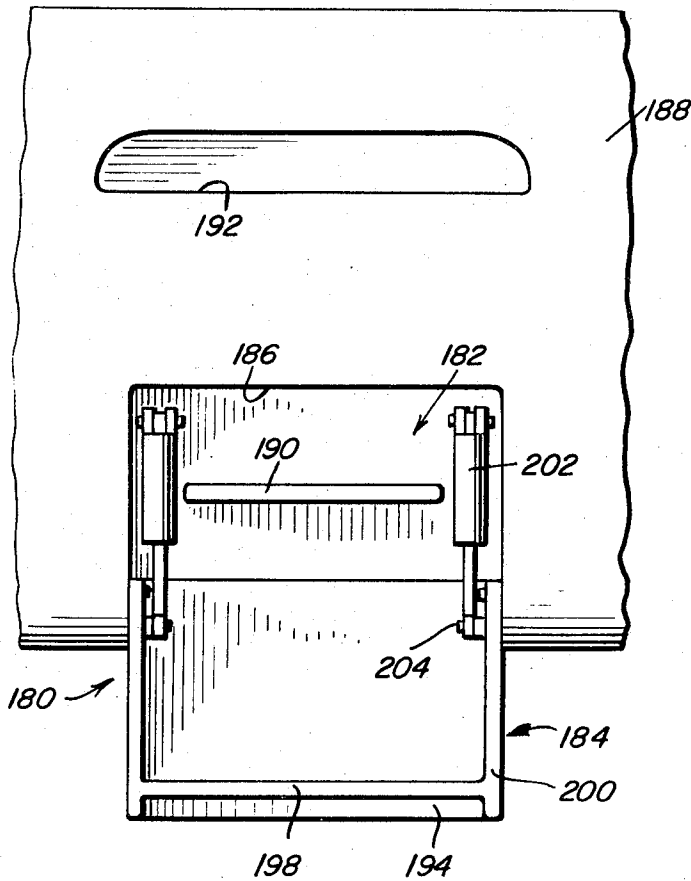


Fig. 14

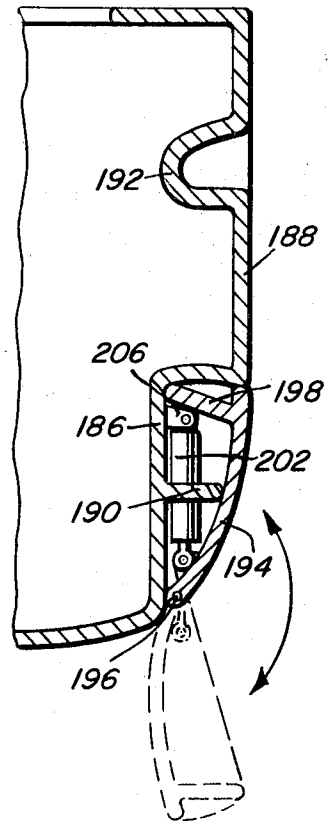
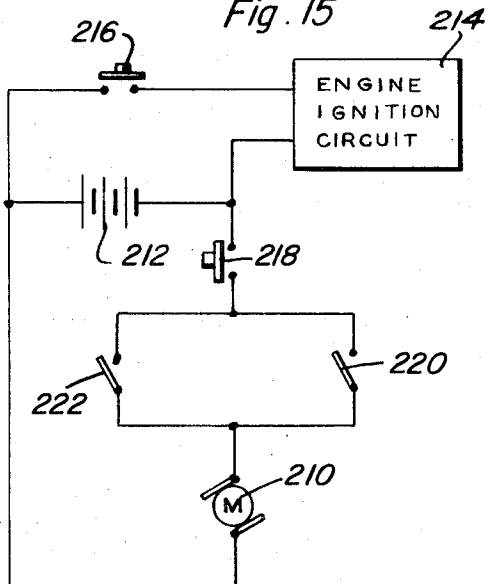


Fig. 15



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POWER-OPERATED RETRACTABLE LADDER FOR PLEASURE BOATS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a boat ladder for pleasure boats and more particularly a power-operated boat ladder to facilitate access into the boat as well as egress therefrom whether the boat is in the water away from a dock or supported on a transporting trailer or other supporting structure with the ladder including a stationary section mounted on the boat hull and a movable section movable in relation to the stationary section and power-operated means connected with the movable section to move it between retracted and extended positions.

2. Description of the Prior Art

Pleasure boat users who wish to get into or out of a pleasure boat when the boat is in the water have always experienced considerable difficulty. When such boats are alongside of a dock, there is no particular problem. However, when the boat is in the water and away from the dock, it is quite difficult to ascend from the water into the boat or to get from the boat into the water in a safe and convenient manner. Also, when the boat is on a transporting trailer, it is also quite difficult to get into the boat or exit from the boat. While some attempts have been made to overcome this problem by the use of ladders which usually are attached to the gunwale of the boat and which swing from a position interiorly of the boat to a position alongside the hull, such devices require manual manipulation thereof by a person in the boat to pivot the ladder to an external position and also occupy some of the space within the interior of the boat.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a permanently mounted, power-operated extendable and retractable device utilized for ascending into a boat or descending out of a boat when the boat is in the water away from the pier or is loaded on a transporting trailer, thereby greatly facilitating the functional utility of a pleasure boat when used by water skiers, divers, swimmers, underwater workers, or others employing the pleasure boat and desiring to enter and exit from the boat.

Another object of the present invention is to provide a boat ladder for pleasure boats that may be installed at the stern, side or bow of the boat according to the desires of the manufacturer or owner.

A further object of the invention is to provide a boat ladder for pleasure boats that will include permanent mounting and stowage which may include a housing for out-of-sight stowage to present a structure which does not interrupt the general lines and configuration of the boat hull, thereby eliminating the use of a loose or portable ladder in the boat and further eliminating the associated potential safety hazard while underway and enabling the space normally employed for stowage of a portable ladder to be better utilized for other purposes.

Still another object of the invention is to provide a boat ladder which may be power-operated by various power devices, such as an electric motor, manually extended by the weight of the user and spring returned, or any combination of such power devices.

Still another important feature of the invention is to provide a boat ladder for pleasure boats in which the ladder includes a movable section which may be longitudinally extended or retracted or pivotally extended or retracted.

Yet another important feature of the invention is to provide a boat ladder for pleasure boats in accordance with the preceding objects which is effective for providing a safe and dependable boat ladder, easily incorporated into pleasure boats or added to existing pleasure boats, and relatively inexpensive to manufacture, operate and maintain.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a portion of a pleasure boat hull with one embodiment of the boat ladder mounted thereon;

FIG. 2 is a vertical sectional view of the boat ladder illustrating the structure for extending and retracting the same;

FIG. 3 is a side elevational view of another embodiment of the boat ladder;

FIG. 4 is a vertical sectional view taken substantially upon a plane passing along section line 4—4 of FIG. 3 illustrating the structural details of this embodiment of the invention;

FIG. 5 is a fragmental sectional view illustrating the structure of a position-locking device for maintaining the ladder in a fully extended or retracted position when power is not being applied;

FIG. 6 is an elevational view with portions in section illustrating another embodiment of the boat ladder with a reciprocating movable section;

FIG. 7 is a vertical sectional view taken substantially upon a plane passing along section line 7—7 of FIG. 6 illustrating further structural details of this embodiment of the invention;

FIG. 8 is a side elevational view of another embodiment of boat ladder for pleasure boats illustrating a pivoted movable section;

FIG. 9 is a perspective view of the construction of FIG. 8;

FIG. 10 is a perspective view of another embodiment of the boat ladder employing a hinged movable section;

FIG. 11 is a side elevational view of the construction of FIG. 10 illustrating the movement of the movable section;

FIG. 12 is a rear elevational view of the construction of FIGS. 10 and 11;

FIG. 13 is an elevational view of another embodiment of the boat ladder with a hinged or pivoted movable section illustrating a manner in which the structure is built into the hull;

FIG. 14 is a detailed vertical sectional view of the construction of FIG. 13; and

FIG. 15 is a schematic view illustrating a representative power circuit for energizing the power mechanism for extending and retracting the boat ladder.

DESCRIPTION OF EMBODIMENTS

Referring now specifically to the drawings, FIGS. 1

and 2 illustrate a boat ladder generally designated by reference numeral 20 that is telescoping and fully power-operated and is mounted on the stern 22 of a pleasure boat and includes a stationary section 24 and a movable section 26.

The stationary section 24 includes a plurality of brackets 28 that may be anchored to the boat hull in any suitable manner and which may be conveniently of tubular construction. Mounted on the outer ends of the tubular brackets 28 is a pair of substantially vertically disposed tubular members or cylinders 30 which are closed at their upper ends, as indicated by numeral 32, and open at the bottom ends thereof to define a fluid-pressure receiving cylinder which has conduits 34 and 36 communicated therewith with the conduit 34 being communicated with the upper end of the cylinder and the other conduit 36 communicated with the lower end thereof immediately above a closure-forming member 38. The two tubular members or cylinders 30 are rigidly interconnected by members 39 which form ladder rungs and which also rigidly interconnect the tubular members or cylinders 30.

The movable section 26 includes a pair of tubular members 40 which longitudinally telescope in relation to the lower end portions of the tubular members 30, as illustrated in FIG. 2. The upper end of each tubular member 40 is provided with a piston rod 42 connected thereto which extends through the closure member 38 and is provided with a piston 44 on the upper end thereof which is reciprocal between the upper closed end 32 and the closure member 38 which forms a cylinder for receiving the piston 44 so that the piston 44 will be reciprocated either downwardly or upwardly depending upon the admission or exhaust of fluid pressure above or below the piston 44. The lower ends of the tubular member 40 are interconnected by a member 46 which generally parallels the members 39 and which forms a ladder rung spaced substantially the same distance from the lower member 39 as the lower member 39 is spaced from the upper member 39 when the members 40 are in their extended positions. As illustrated, even when the movable section 26 is extended a substantial portion thereof is still received in the lower end of the tubular members 30 for effective guiding support thereof. Fluid pressure, such as hydraulic pressure, is supplied by a hydraulic pump and motor unit 48 provided with suitable controls for either extending or retracting the movable section.

The stationary section 24 is configured and constructed and installed in a manner to be clear of the water or it may be constructed in a manner to offer very little resistance during high speed operation of the boat. It is permanently mounted on the boat in any suitable manner and once installed will remain in position. If necessary, an adjustable bracket structure may be provided for orienting the boat ladder in the desired vertical orientation so that the device may be installed on boat hulls having varied hull configurations. Usually, two affixed bars or rungs 39 are adequate but this may be varied depending again upon the vertical dimension of the hull. Also, the movable section is provided with one bar or rung 46 but this may also vary depending upon the desires and requirements for each individual owner or user of the boat. When the movable section is extended, at least one step or bar is placed in the water or beneath the bottom of the boat hull when fully extended. When fully retracted, the movable sec-

tion will not interfere with operation of the boat or with transporting the boat on the trailer or with loading the boat on or off the trailer since it is above the bottom of the hull.

Referring now specifically to FIGS. 3 and 4, a boat ladder similar in operation to that of FIGS. 1 and 2 is illustrated but this device is mounted in the side or bow of the boat hull and is enclosed for hidden stowage when retracted. This embodiment of the boat ladder is generally designated by numeral 50 and is illustrated in built-in arrangement along the inner surface of the side 52 of the boat hull and also includes a modification of the bottom 54 of the boat hull which has a recess 56 formed therein. The boat ladder includes a stationary section 58 and a movable section 60. The stationary section 58 includes a hydraulic pump and motor assembly 62 having a pair of depending guide members rigid therewith which may be in the form of fluid pressure operated double acting piston and cylinder assemblies 64 provided with an axially extending piston rod 66 having an attachment 68 on the lower end thereof.

The movable section 60 includes a pair of tubular members 70 having the lower ends thereof closed and interconnected by a transversely extending step, bar or rung 72. The cylindrical tubular members 70 telescopically receive the cylinders 64 and the interior of the cylindrical members 70 include a partition 69 anchored to attachment 68. The external surface of the cylindrical tubular members 70 are slidably received and guided through apertures 74 in the recess 56 which is shaped to receive the transverse bar or step 72 when retracted. A guide member 76 may be provided on the cylindrical members 70 to guide the movement thereof and suitable hydraulic conduit structures may be incorporated to provide fluid pressure to the cylinders 64 to extend and retract the movable section 60. Thus, the step 72 when retracted will form a continuation of the external surface of the hull, thereby eliminating any possible interference with its passage through the water.

In some boats which may have a high freeboard, an additional step may be necessary on the hull thereon between the movable step 72 and the gunwale 78 and this step may be rigidly fixed to the hull in any suitable manner and is not shown in FIGS. 3 and 4. Rather than providing a projecting step, a recessed step may be formed directly into the hull. Also, this type of construction is especially adapted for boats having relatively low freeboards and is best installed into the boat hull at the time of fabrication thereof. If desired, the boat hull may be provided with a recess or compartment for receiving the entire boat ladder assembly which may be in the form of a preassembled cartridge-type insert which may be merely inserted into the recess or chute or other structure provided therefor and secured in place.

FIG. 5 illustrates a structure for maintaining the movable section stationary in relation to the stationary section when either in its extended or retracted position when no power is being applied. Such device includes a detent 80 spring biased inwardly by a spring 82 received in a housing 84 carried by an external tubular member 86 for engaging a recess or notch 88 with cam surfaces and telescoping member 90. This arrangement may be employed on any of the telescoping embodiments of the ladder.

FIGS. 6 and 7 illustrate another embodiment of the telescoping form of the boat ladder which is manually extended by the weight of the user and spring returned. This embodiment of the ladder is generally designated by numeral 92 and includes a pair of stationary tubular members 94 interconnected by transverse bars, steps, or rungs 94 with the tubular members being connected to the boat hull 98 by brackets 100. The movable section includes a pair of tubular members 102 that telescope into the tubular members 94 with the lower ends of the tubular members 102 being interconnected by a transverse bar, rung or step 104 which may be in the form of a tubular member. The tubular members 102 have an extending piston rod 106 connected thereto which extend upwardly through a stationary partition 108 in the tubular member 94 and terminates in a flange or piston 110 slidably movable within the tubular member 94. A compression coil spring 112 is disposed between the flange 110 and the partition or abutment flange 108 to spring bias the bar or step 104 upwardly. Thus, when a sufficient force is applied to the movable section in a downward direction to overcome the springs 112 or other resilient or elastic material, such as occurs when a user steps on or otherwise pulls down on the step 104, the movable section will descend into the water or beneath the boat. Whenever the downward force is removed, then the movable section will be automatically retracted by the springs or other resilient material. A dampening device, such as a small orifice, 114 may be provided adjacent the upper end of the tubular members to control flow of air and thus cushion the upward movement of the flange or piston 110 when moving upwardly thereby providing timed retraction of the movable section.

FIGS. 8 and 9 illustrate another form of the boat ladder generally designated by numeral 120 which includes a stationary section 122 and a movable section 124 with the stationary section 122 including a pair of side pieces or stiles 126 interconnected by a plurality of steps or bars 128 positioned to enable a person to descend or ascend between the deck or gunwales of the boat and the movable section. Bracket assemblies 130 which may be adjustable and attached to the boat hull in any suitable manner may be provided for mounting the stationary section 122 attached to the stern 132 of the boat hull. The movable section 124 also includes two side members or stiles 134 interconnected by a plurality of transverse steps or bars 136 with the uppermost step of the movable section 124 being hingedly attached to the lower end of the stationary section 122 by the use of a hinge structure 138.

The movable section 124 is swung pivotally about the hinge axis of the hinge 138 by a gear 140 attached to the movable section 124 coincident with the hinge axis. The gear 14 is meshed with a worm drive gear 142 on the end of an elongated drive shaft 144 driven by a suitable reversible electric motor or the like 146 which is mounted on the stationary section 122 so that when the motor 146 is actuated in either direction, corresponding swinging movement off the movable section 124 will occur.

FIGS. 10-12 illustrate another embodiment of the boat ladder generally designated by the numeral 150 and which includes a stationary section 152 and a movable section 154. The stationary section 152 includes a plurality of steps or bars 156 rigidly mounted on the stern 158 of the boat hull with the steps being of any

suitable configuration and attached rigidly to the boat hull in any desired manner. The movable section 154 includes a pair of side members 160 interconnected by a transverse step or bar 162 which defines a generally U-shaped configuration having the ends of the side members 160 pivotally supported from a pair of brackets 164 by a pivot pin, bolt or the like 166. Pivotal movement or swinging movement of the movable section 154 is obtained by a fluid pressure operated piston and cylinder assembly 168 interconnecting the side members 160 and the stern 158 of the boat hull so that as the piston and cylinder assembly 168 is extended and retracted, the movable section 54 is moved from the retracted position illustrated in full lines to the extended position illustrated in full lines to the extended position illustrated in broken lines in FIGS. 11 and 12. Suitable conduits 170 are provided for connection with the piston and cylinder assembly 168 to extend and retract the piston rod. The piston and cylinder assembly has one end attached to the side member 160 by a pivotal connection 172 and the other end is pivotally attached to a bracket 174 by a pivotal connection 176 so that forces exerted by the piston and cylinder assembly 168 will be transmitted through the bracket 174 to the boat hull. The transverse step or bar 162 will be constructed in substantially the same configuration as the steps 156 and will be retracted to a position out of the water except when in use and when the movable section is extended, the transverse step 162 will be below the bottom of the hull or below water level when the boat is floating in the water to facilitate access to the interior of the boat.

FIGS. 13 and 14 illustrate another embodiment of the invention generally designated by numerals 180 and which includes a stationary section 182 and a movable section 184. The stationary section 182 includes a recess 186 defined in the bottom portion of the side or bow portion 188 of the boat hull having a transverse step or bar 190 formed therein in alignment with a vertically spaced inwardly extending recess 192 which defines a step to provide access to the interior of the boat. The movable section 184 includes a panel 194 which generally forms a continuation of the boat hull 188 when in closed position with the lower edge of the panel 194 being hinged to the lower edge of the recess 186 by a hinge pin or other hinge means 196 for pivoting movement from the retracted position illustrated in full lines in FIG. 14 to the extended position illustrated in broken lines. The inner surface of the panel 194 is provided with a transversely extending step or bar 198 which extends between two side walls 200. The side walls 200 are disposed alongside the end walls of the recess 186 when the movable section 184 is retracted. A pair of fluid pressure-operated piston and cylinder assemblies 202 extend between pivot connections 204 with the side walls 200 and brackets 206 on the inner wall of the recess 186 so that when the piston and cylinder assemblies 202 are extended and retracted, the movable section 184 will be pivoted or swung between an extended and retracted position. Suitable conduits, pressure supply means and control valve devices will be provided for selectively extending and retracting the movable section 184.

FIG. 15 illustrates a safety circuit which prevents the ladder operation at high speeds and also prevents engine operation when the ladder is extended and sche-

matically illustrates the motor which extends and retracts the movable section of the ladder either by mechanical connection, hydraulic operation or pneumatic operation, or the like, with the motor being designated by numeral 210. The motor is electrically connected to the battery 212 in the usual manner and the battery is electrically connected to the engine ignition circuit 214 through an ignition safety switch 216 that is normally open when the ladder is extended. The battery 212 is connected to one side of the motor through a throttle limit switch 218 which is normally open at high speed and a ladder switch 220 mounted on the instrument panel or other convenient location accessible to the operator of the boat and a parallel ladder switch 222 located on the stern of the boat hull or on any other convenient location on the boat hull accessible to the person desiring to extend the ladder. Thus, the ladder may be extended by either the operator of the boat or the person desiring to gain access into the boat from a position in the water or from a position exteriorly of the boat when the boat is on a transporting trailer. Any suitable arrangement may be provided for maintaining the throttle limit switch open at high speed settings of the throttle thereby preventing energization of the motor 210 unless the throttle setting has been lowered, thus enabling the switch 218 to close. Correspondingly, when the ladder is extended, an interlock is provided to prevent the ignition safety switch from being closed.

Thus, the ladder may be power-operated by a remote or local station or stations in the boat or out of the boat as may be desired. As indicated, the mounting of the ladder may be at the stern, side or bow of the hull, the drives may include electric motor, hydraulic, manual, or any combination thereof, operating from the existing electrical system of the boat. Various materials which are corrosion resistant and provided with adequate strength may be employed in constructing the ladder. The ladders basically are of the telescoping extending and retracting type and the swinging extending and retracting type and in both types of the invention, a movable section is out of the water during movement of the boat at normal speeds and disposed above the bottom of the boat so that it will not interfere with movement of the boat onto or off of a transporting trailer.

All forms of the invention may employ the movable section and a stationary section which may be an attachment to a boat hull or completely or partially built into the boat hull. The various embodiments of the ladder will include the position locking device to releasably retain the movable sections in either extended or retracted positions when power is not being applied thereto. The position locking device may be in the form of a spring loaded detent associated with the telescopic members as illustrated in FIG. 5 or a similar spring loaded detent associated with the hinged movable section for retaining it in position. The spring bias on the detent may be adjustable by providing an adjustment screw engaging the end of the spring remote from the detent which may be in the form of a pin or peg or a spherical ball detent, or the like. Standard attachment brackets may be provided, such as an anchor flange for securing the attaching brackets to the boat hull and the attaching brackets themselves may be telescopically adjustable or adjustable in any other manner to affix the boat ladder in substantially a vertical position. The electric motor and fluid pump and conduits, electric switch and other control apparatuses associated there-

with are oriented in an accessible manner with the electric motor being reversible to power the movable section toward an extended position or toward a retracted position with the safety circuit assuring that the ladder will only be extended at the appropriate time, such as when the boat is either dead in the water or travelling at very low speed.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. A boat ladder combined with a pleasure boat to facilitate a user getting into or out of a pleasure boat when in the water away from a dock and when on a transporting trailer or the like comprising a stationary section rigid with respect to the boat hull, a movable section movable mounted with respect to the stationary section for movement between extended and retracted positions, each of said sections including at least one transverse member defining a step with the step on the movable section being moved to a lower position below the boat hull when the movable section is in its extended position, the step on the stationary section co-operating with the step of the movable section to span the distance from the top edge of the boat hull to the water when fully extended, said sections being out of the water when the movable section is fully retracted, and power means including motor means interconnecting the stationary section and movable section to move and retain said movable section in at least one direction of movement and control means for the movable section operable both interiorly of and exteriorly of the boat hull.

2. The structure as defined in claim 1 wherein said movable section is reciprocally mounted with respect to the stationary section for substantially vertical movement between extended and retracted positions.

3. The structure as defined in claim 2 wherein said stationary section includes substantially vertically disposed guide members telescopically engaged with portions of the movable section.

4. The structure as defined in claim 3 wherein said means moving the movable section in at least one direction including a fluid pressure-operated piston and cylinder assembly interconnecting the movable section and stationary section, said piston and cylinder assembly being double acting and communicated with a source of fluid pressure for power operation of the movable section between the extended and retracted positions.

5. The structure as defined in claim 1 wherein said movable section is hingedly connected with the stationary section for pivotal swinging movement.

6. The structure as defined in claim 5 wherein said means interconnecting the movable section and the stationary section includes a gear mechanism having drive gear means mounted on the stationary section and driven gear means mounted on the movable section having a center of rotation coincident with the axis of movement of the movable section to swing the movable section when the drive gear means is rotated.

7. The structure as defined in claim 6 wherein said stationary section includes a plurality of vertically spaced and aligned steps mounted alongside of the boat hull, said steps being interconnected by side stiles, said drive gear means being in the form of a drive gear mounted on one of said stiles, drive motor means connected to the drive gear mounted on said stile, said driven gear means including a driven gear meshing with the drive gear with the driven gear being rigid with the movable section for swinging the movable section from a position alongside of the stationary section to a position depending therefrom, said movable section including a plurality of vertically spaced steps interconnected by said stiles, the lower ends of the stationary and movable section being above the waterline when the movable section is in retracted position and a substantial portion of the movable section being below the waterline when the movable section is in extended position.

8. The structure as defined in claim 7 wherein said means retaining said movable section in at least one direction of movement including the drive gear and driven gear, said drive gear being in the form of a worm gear mounted on one of said stiles, said driven gear

being in the form of a worm pinion rigid with the movable section for swinging the movable section when the drive motor is actuated and retaining the swingable section in position when the drive motor means is not actuated, and control means for the drive motor means operable both interiorly and exteriorly of the boat hull, and an ignition safety switch normally in open condition when the ladder is in extended position to prevent operation of the engine ignition circuit when the ladder is extended.

9. The structure as defined in claim 5 wherein said means interconnecting the movable section and stationary section includes a fluid pressure operated piston and cylinder assembly for swinging the movable section about its hinge axis.

10. The structure as defined in claim 1 wherein said stationary section is an integral part of the boat hull, said movable section being housed within the boat hull when in retracted position with the exterior of the movable section generally matching the exterior surface of the boat hull.

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