May 16, 1950 E. W. KERN 2,507,790

AUXILIARY RUDDER ASSEMBLY FOR VESSELS

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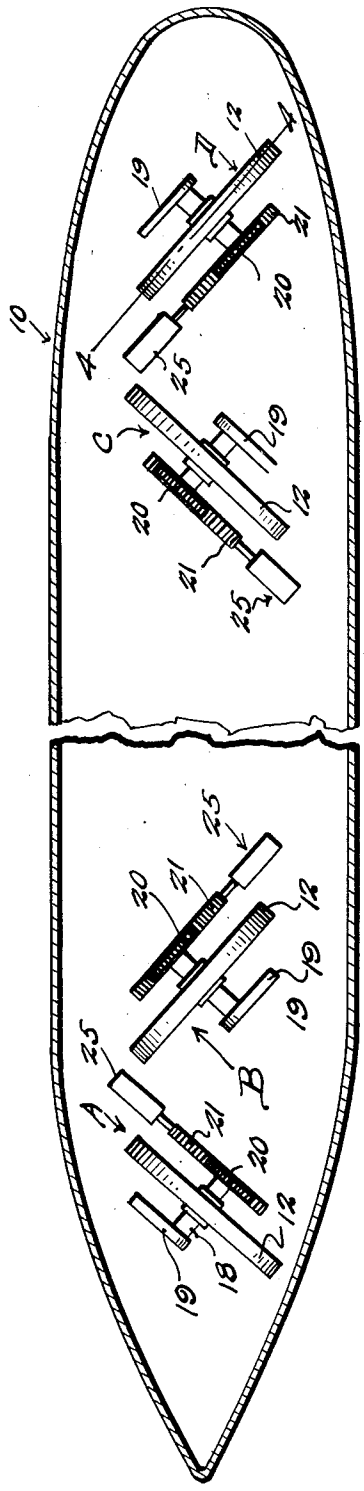


Fig. 1.

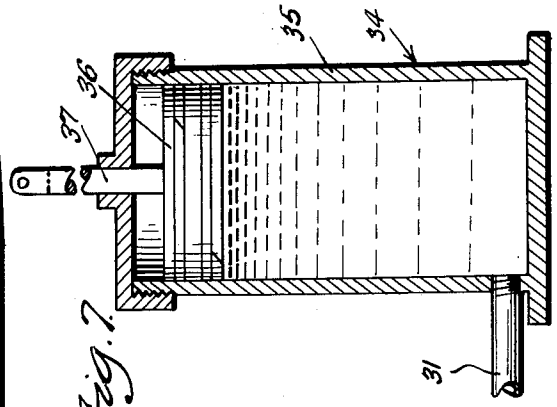


Fig. 7.

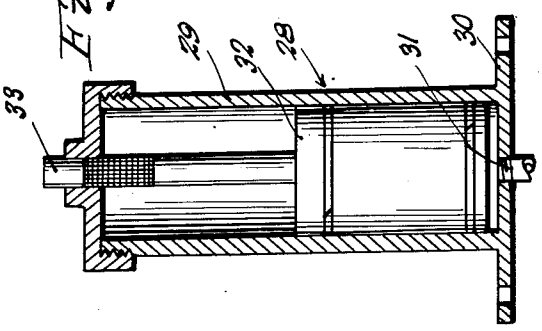


Fig. 6.

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Fig. 3.

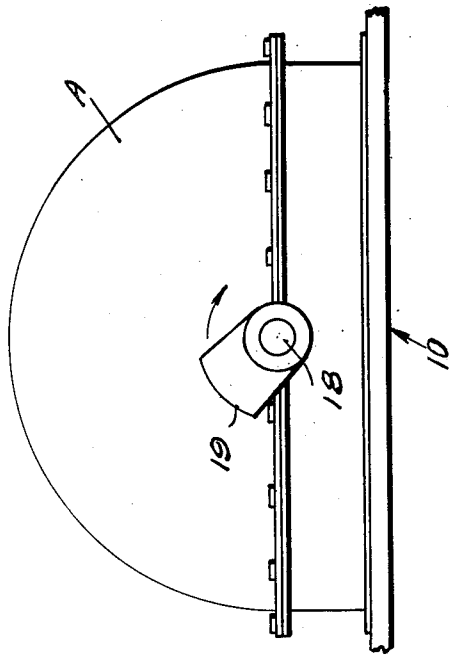


Fig. 4.

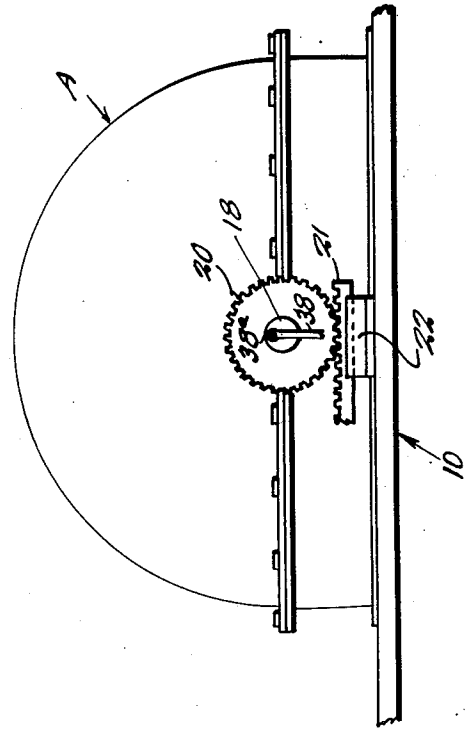
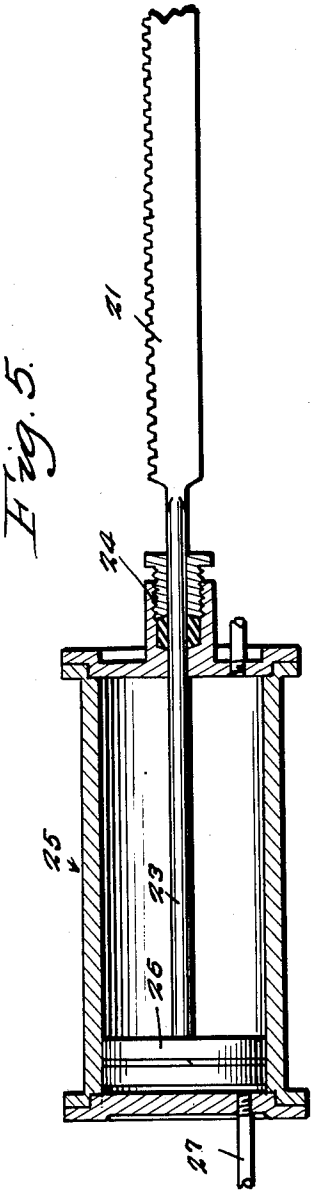


Fig. 5.



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Fig. 3.

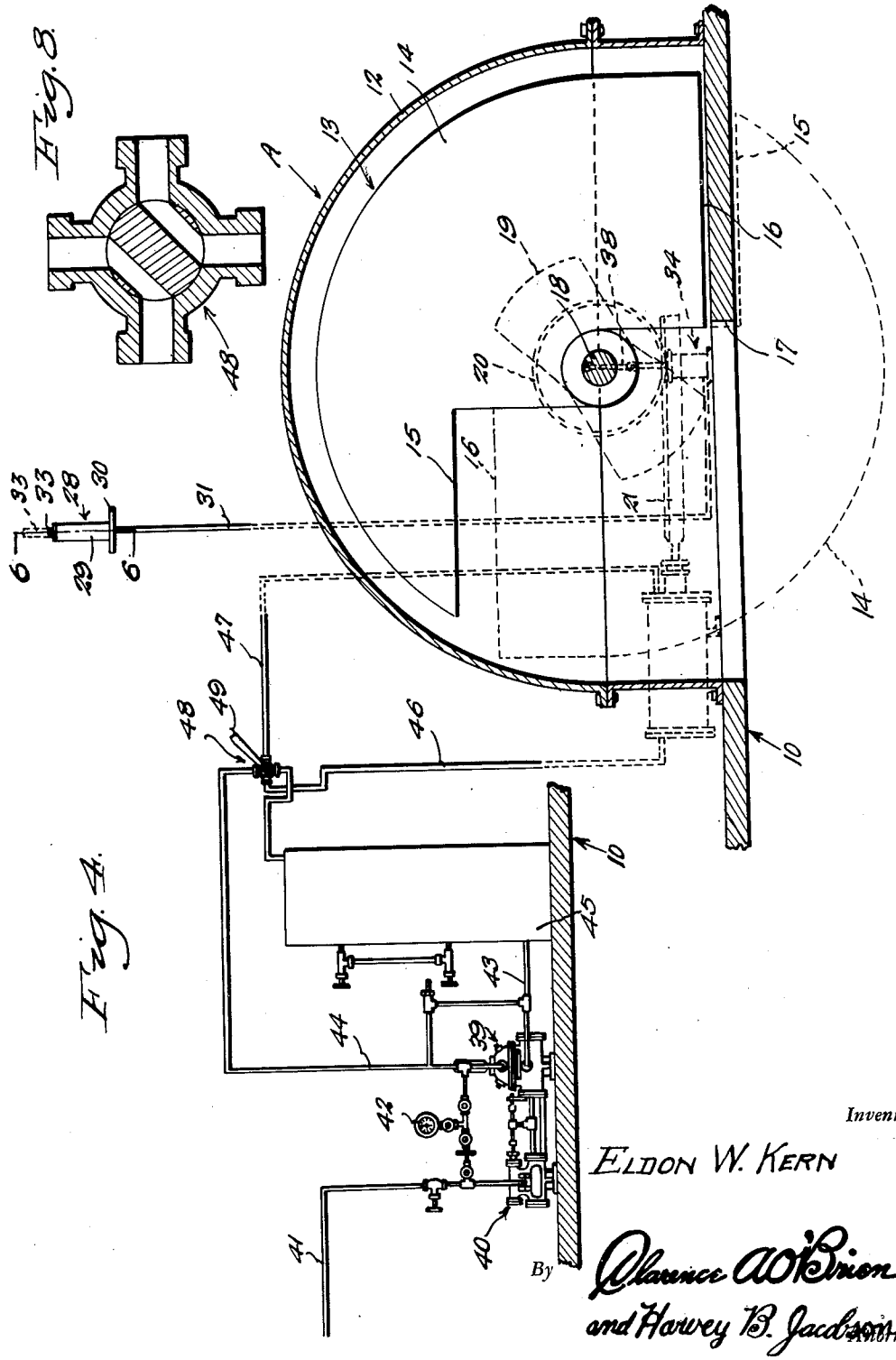


Fig. 4.

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UNITED STATES PATENT OFFICE

2,507,790

AUXILIARY RUDDER ASSEMBLY FOR VESSELS

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Application April 30, 1946, Serial No. 665,967

5 Claims. (Cl. 114—145)

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The present invention relates to a novel and improved ship or vessel hull having built into predetermined areas a number of longitudinally spaced separately and collectively operable rudders, the latter being auxiliary to the main rudder means and such in construction as to expedite navigable maneuvering in restricted waters such as harbors, whereby to obviate the necessity of using expensive and time consuming harbor tugs.

In carrying out the principles of the invention I contemplate the adoption and use of pairs of fore and aft projectible and retractable rudders mounted below the water line in association with the hull, these rudders being individually and collectively utilized when docking the vessel. Thus, such rudder means is useful not only in restricted area harbors for turning the vessel around within the limits of its own length, but also on the high seas as well, this with a view toward minimizing accidents to ships unexpectedly caught in damaging storms.

More specifically, novelty is predicated upon a plurality of individually and collectively usable rudders these being of segmental form and normally, when not in use, contained or housed in protective wells or shields on the interior of the hull and being projected to the exterior for collective use whenever necessary or desired.

Added novelty is predicated upon the use of segmental shaped rudders, the opposite end portions thereof constituting stops or shoulders, one being engaged with the interior of the hull when the rudder is "in" and the other being engaged with the under side or exterior of the hull when the rudder is "out" and ready for use.

Another object of the invention has to do with a rudder construction with the casing designed to accommodate the shouldered segmental rudders, rack and pinion means being provided for accomplishing the desired projecting and retracting results and the rack being longitudinally reciprocated by a cylinder and piston arrangement whereby the latter is adapted to accommodate various types of operating or power plants either electrical, hydraulic or steam as the case may be.

Other objects, features and advantages will become more readily apparent from the following description and the accompanying illustrative drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the views:

Figure 1 is a horizontal section through a vessel's hull, the same illustrating, in top plan view,

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the divergent longitudinally spaced pairs of independently and collectively operable auxiliary rudder assemblies.

Figure 2 is an enlarged side view of one assembly disclosing the shield or well and the rack and pinion actuating means.

Figure 3 is a view of the reverse or counterweighted side, that is in comparison to that shown in Figure 2.

Figure 4 is a view partly in section and partly in elevation utilized to diagrammatically disclose a suitable power plant, this including the steam engine at the extreme left, the steam pressure supply pipe, the adjacent pump, the oil or equivalent fluid storage tank and piping and valve arrangement.

Figure 5 is a section through the piston and cylinder drive for the reciprocatory rack.

Figure 6 is an enlarged vertical section through an indicator on the line 6—6 of Figure 4.

Figure 7 is a sectional and elevational view of the fluid cylinder and piston section of the so-called indicator pipe line and means.

Figure 8 is an enlarged detail sectional view of a hand-controlled, four-way valve used in the pipe system.

Referring now to the drawings by distinguishing reference numerals having reference in particular to the general assemblage somewhat diagrammatically shown in Figure 1 it will be seen that the vessel, or let us say the hull, is denoted by the numeral 10 and this has mounted therein a plurality of collectively usable projectible and retractable rudder devices. I provide four of these and they are arranged across the longitudinal axis in forward and rearward pairs, those in the forward pair being denoted by the characters A and B and those in the rear pair being denoted by the characters C and D. The rudders A and B of the front pair are disposed in divergent relation to each other and diagonally in respect to the longitudinal axis of said hull. Likewise, the rear rudders are disposed in diverging or converging relation. It has been found, in practice, that this duly paired and angular arrangement will enable the rudders to be individually and conjointly utilized to best advantage depending on whether one or more rudders are to be used at the time.

Each rudder assembly or device is the same in construction and the description of one will suffice for all. Attention is therefore directed to Figure 4 in which it will be observed that the housing or casing 12 is of general flat sided semicircular form this to properly contain and accom-

modate the sector or segmental shaped rudder 13. The latter comprises a segmental body portion 14 having one end projecting as at 15 to provide a stop shoulder and the other end fashioned into an extension, as at 16, to provide another stop shoulder. The latter is interiorly engageable with the hull when it is retracted and assumes an out-of-the-way position. The remaining stop shoulder 15 is shaped and arranged to engage with the exterior of the hull, as shown in dotted lines. This is achieved when the rudder is projected around, through and beyond the adapter opening 17 in said hull. The hub portion of the rudder is mounted on an oscillatory operating shaft 18, the latter journaled in suitable bearings. This shaft is provided as seen in Figure 3 with a counter-weight 19 as indicated. The shaft is also provided with a pinion gear 20 as shown in Figure 2 and this is operated by the teeth of a rack bar 21 operable in a guide 22 provided therefor. The rack bar is mounted on a piston rod 23 operable in a stuffing box 24 in the cylinder 25, said piston having a head 26 which is actuated by fluid injected into the cylinder by way of the fluid delivery line or pipe 27.

The numeral 28 in Figure 4 designates an indicator to show the "in" and "out" positions of the rudder. The indicator comprises a cylinder 29 (see Fig. 6) having an attaching base 30, said cylinder having a fluid delivery pipe 31 connected thereto. In the cylinder is a piston 32 operated by the fluid and said piston carries an indicator stem or rod 33 which projects to position shown in dotted lines in Figure 4 to show the full "in" and "out" positions of the rudder. The pipe line 31 connects with a sort of dash-pot arrangement indicated at 34 in Figure 7. This comprises a cylinder 35 with a piston 36 operable therein, the piston having its rod 37 connected with a link 38, said link being pivotally and eccentrically connected with the oscillatory shaft 18 as shown in Figures 2 and 4.

As before implied, any suitable source of controller means, this to be located in the vessel cabin, may be employed for purposes of actuating the piston 26 and the rack and pinion means associated therewith. That is to say, it is possible to use electrical, purely mechanical, or hydraulic or steam devices. In the drawings in Figure 4 I have shown a simple fluid system for reciprocating the piston 26 and this is characterized, as will be seen, by a pump 39, an interconnected and associated steam engine 40, a steam line 41 connected to same and provided with gauge means 42. Connected by pipes 43 and 44 with the pump is a fluid storage tank 45. The fluid pressure pipe 46 serves to deliver the fluid, under pressure, to the intake or pipe-end 27. The numeral 47 designates a return pipe and 48 a two-way controller valve having a control handle or lever 49. It is understood that the power plant shown to the left in Figure 4 is merely an incidental phase of the invention and for that reason has not been explicity detailed or described with explicitness. The main idea is to have ways and means of injecting fluid or air under pressure into the cylinder 25 to operate the piston and to in turn reciprocate the rack bar back and forth in order to utilize this rack and pinion means as the device for projecting and retracting the rudder.

It is to be mentioned at this point, that the rudders (singly or collectively) are dropped into position when the ship is going astern thereby throwing a current against the blades and thereby

enabling quick and reliable handling and maneuvering of the ship or vessel in restricted or turbulent water.

It will be evident too that by providing two sets of rudders, two to a set, with one set inwardly of the bow and the other inwardly of the stern, a novel assemblage is thus had. Further, I deem it important to mention that the two outermost rudders A and D are divergent to one another and oblique to the longitudinal axis of the hull and that rudders B and C are oblique to said axis and divergent to one another. An arrangement is thus had which lends itself to satisfactory use when docking the vessel in restricted waters or when it is necessary to turn partly or all the way around, either port or starboard.

In view of the foregoing descritpion taken in conjunction with the accompanying drawings it is believed that a clear understanding of the construction, operation and advantages of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

I claim:

1. In a construction of the class described, a ship hull having a restricted rudder opening therein, a casing mounted on the interior of the hull and in alignment with said opening, an oscillatory shaft mounted for rotation in bearings in said casing, and a rudder mounted at right angles on said shaft and normally confined within the limits of the well casing but projectible to the exterior of the hull by way of the accommodating opening in said hull, said rudder being of general segmental form and provided at opposite ends with stop shoulders, one shoulder being contactable with the hull and serving to limit the inward swing and position of the rudder and the other shoulder being contactable with said hull and serving to limit the outward projected position of said rudder.

2. In a surface-type vessel hull auxiliary rudder assembly, wherein the auxiliary rudders are vertically projectable and retractable in relation to the hull and, in combination, a vessel hull provided at centrally disposed longitudinally spaced points with auxiliary rudder openings, the latter being across the longitudinal axis of said hull, transversely disposed and oblique to said axis, said openings being arranged in fore and aft pairs and marking the sites of said auxiliary rudders, a well-forming casing aligned with each rudder opening, the casings being mounted on the interior of the hull, and a projectable and retractable rudder mounted in each casing for operation in conjunction with the casing and the coacting rudder opening, each rudder being of general segmental form and provided at opposite ends with alternately operable stop shoulders, one shoulder being adapted to contact the hull and serving to limit the inward retraction of the rudder, and the other shoulder being adapted to contact the exterior of the hull and serving to limit the outward projected position of said rudder.

3. The structure specified in claim 2, operating means for each rudder, and a counterweight operatively connected with each rudder.

4. The structure specified in claim 2, wherein each rudder embodies a shaft with its end portions journaled for rotation in bearings provided therefor in the coacting casing, one shaft-end being provided with counterweight, and the other shaft-end being provided with a pinion for coaction with a reciprocatory rack.

5. An assemblage of auxiliary rudders for use when docking a vessel in restricted waters and individually and collectively functioning in selected group relationship to turn the vessel around, either port or starboard, comprising in combination, a vessel hull provided at centrally disposed longitudinally points with adapter openings for vertically projectable and retractible auxiliary rudders, said openings being across the longitudinal axis of the hull, transversely disposed and oblique to said axis and arranged in fore and aft pairs inwardly of the stem and stern with the openings of the respective pairs in divergent relationship to each other, a water tight casing aligned with each rudder opening, said casings being mounted on the interior of the hull and a projectable and retractible rudder mounted in each casing for operation in conjunction with said casing and the aligned rudder opening, each rudder being provided at opposite ends with alternately operable stop shoulders, one shoulder being adapted to contact the hull and serving to limit the inward retraction of the rudder, and the other shoulder being adapted to contact the exterior of the hull and serving to limit the outward projection of the rudder.

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