No. 667,158. Patented Jan. 29, 1901.

D. S. WEBSTER.

CENTER BOARD FOR VESSELS.

(Application filed Feb. 9, 1900.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1.

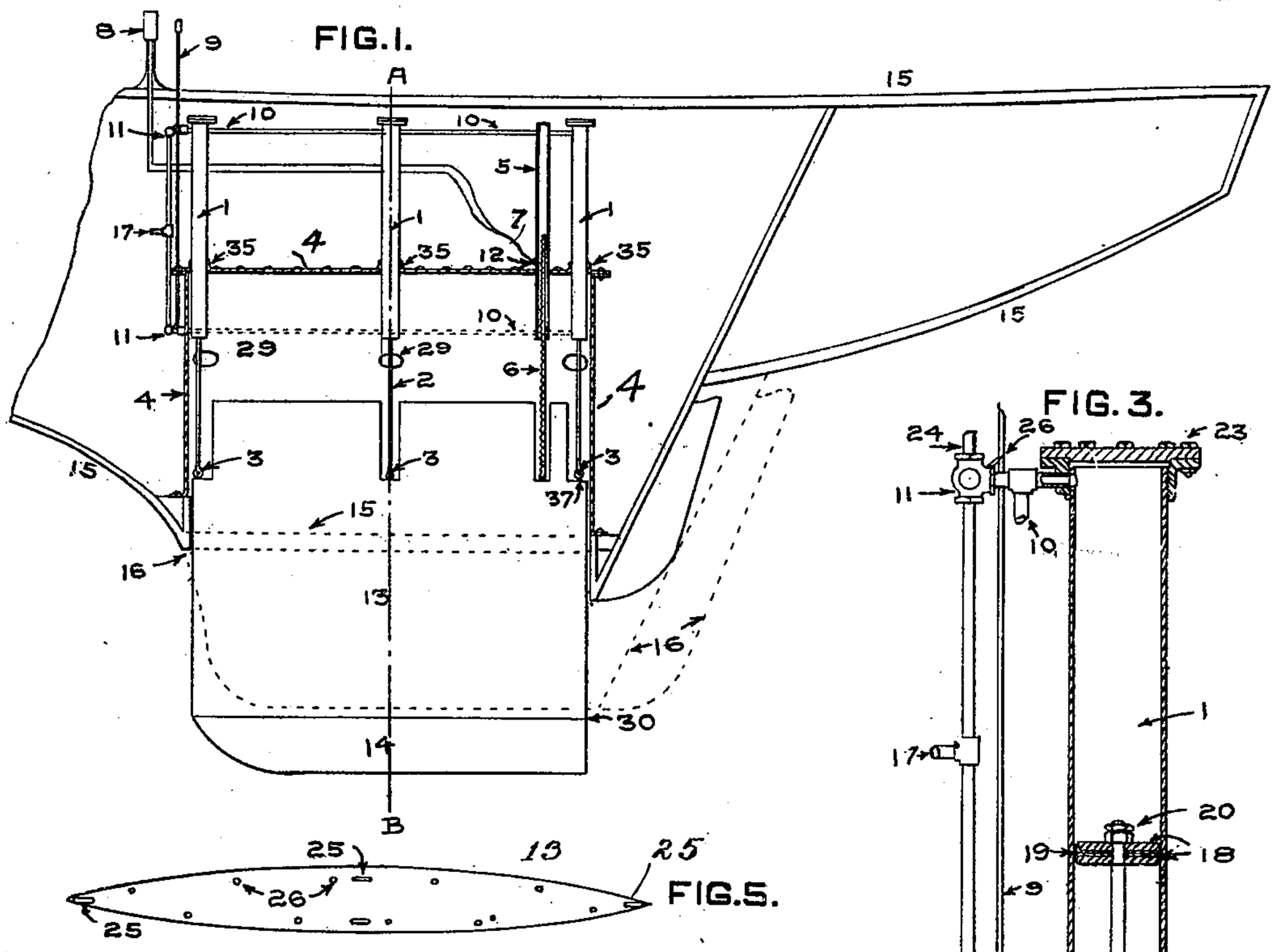


FIG. 5.

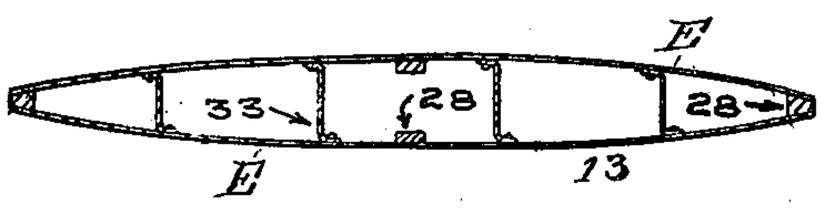
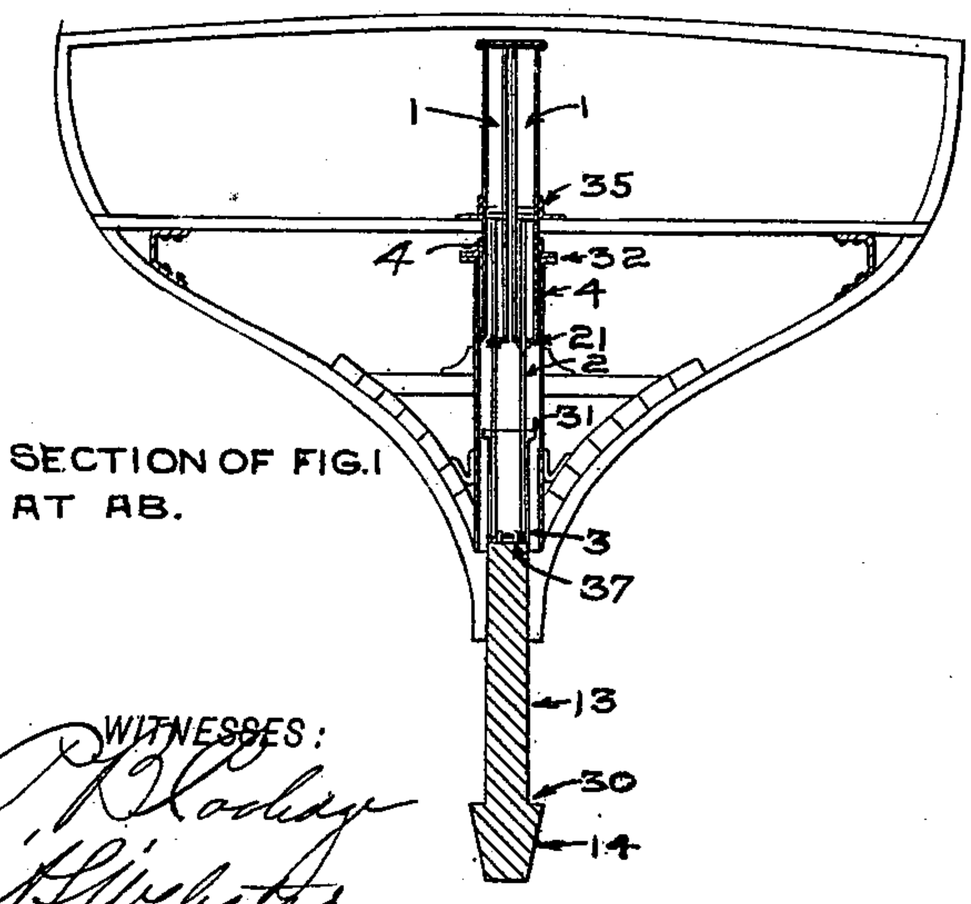


FIG. 4.

FIG. 2.



SECTION OF FIG. 1 AT AB.

FIG. 3.

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FIG. 6.

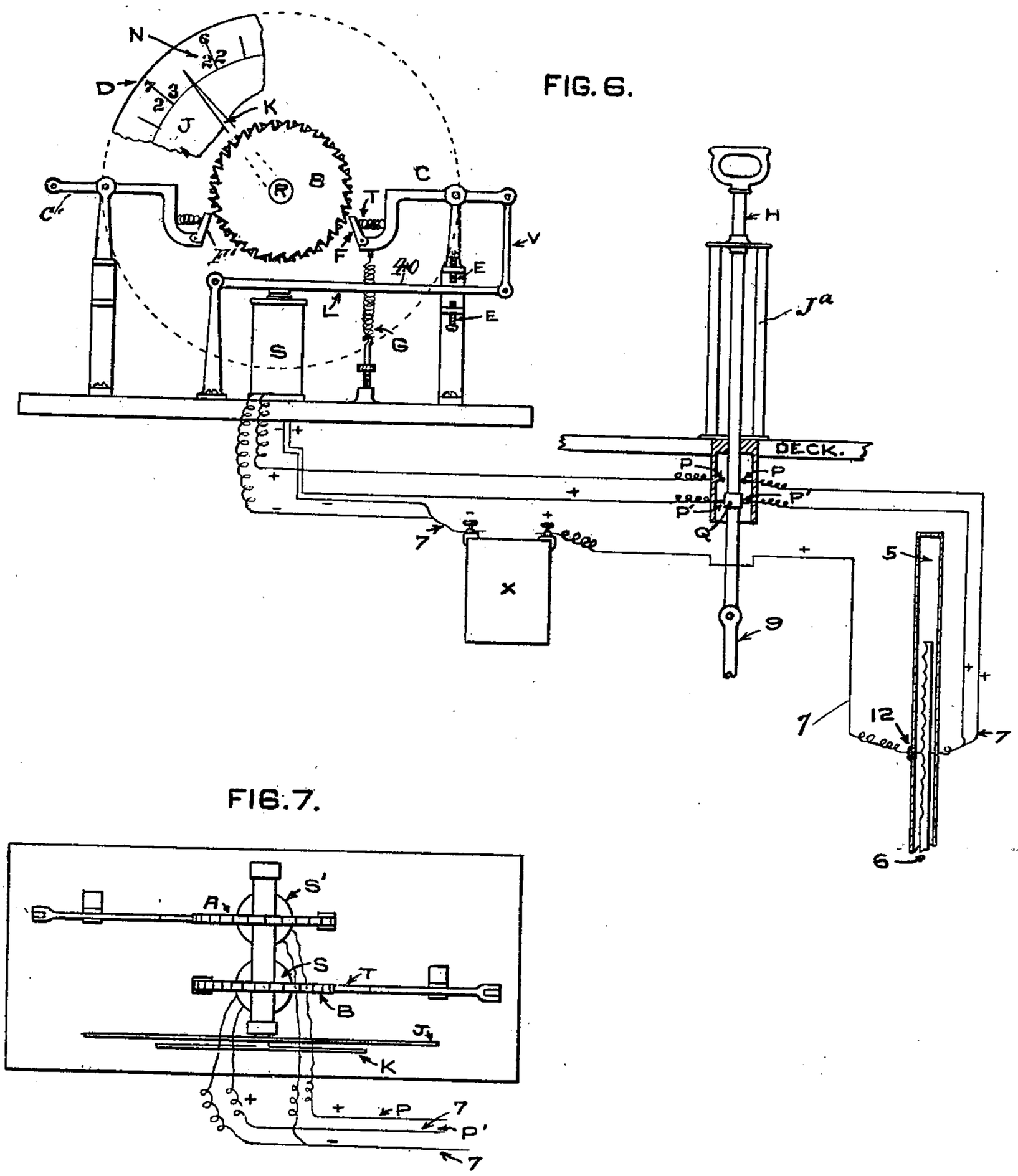

FIG. 7.

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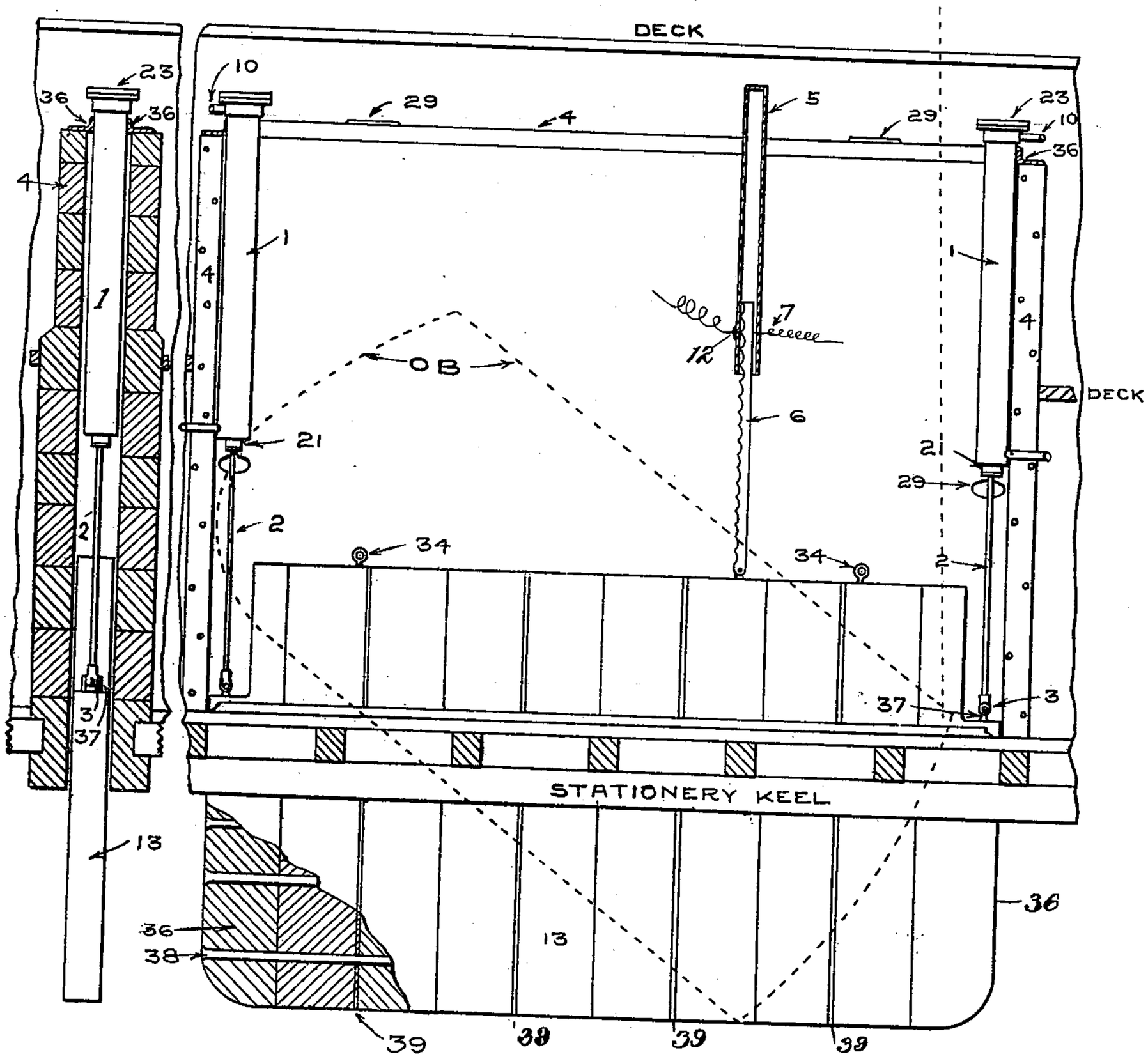
(No Model.)

3 Sheets—Sheet 3.

FIG. 9.

FIG. 8.



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CENTERBOARD FOR VESSELS.

SPECIFICATION forming part of Letters Patent No. 667,158, dated January 29, 1901.

Application filed February 9, 1900. Serial No. 4,706. (No model.)

To all whom it may concern:

Be it known that I, DEAN S. WEBSTER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Yachts' or Vessels' Keels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

It is well understood that steamships, sailing vessels, or yachts having standing keels or being balasted so their keels are deeper in the water and the center of gravity carried to a lower point in their hulls are much steadier than those whose draft is light or shallow without ballast, and especially is this the case in vessels sailing in rough seas or with the wind abeam, and particularly is this true in sailing yachts, and to overcome the above conditions and to prevent the vessel from making leeway some vessels and yachts now use water-ballast, fixed or standing ballast, and what is known as a "fin-keel." This places the yacht in such condition that it has the same displacement and meets the same resistance in passing through the water at all times.

By this invention part of the ballast is made movable and can be extended below the bottom of the yacht or vessel at the master's will and returned within the hull at once, if desired. Stable equilibrium is obtained by bringing the center of gravity at the lowest point of the object. When this movable part of the ballast, which is in form of an adjustable fin-keel, is extended, it lowers the center of gravity, which adds greatly to the yacht's or vessel's stability, and the keel is at the same time submerged deeper in the water, thus helping to keep the vessel upright and from making leeway when the wind is ahead or abeam. When the conditions of the water are such as not to require the lowering of the ballast or adjustable fin-keel, the latter may be raised into the hull of the yacht or vessel, so as to offer much less resistance to the vessel's progress through the water than a fixed fin-keel. When a yacht is running "free" or with the "wind over the quarter," these conditions prevailing, the raising of the adjustable fin-keel will lessen the resistance the vessel meets in its progress through the water, and consequently its speed will increase.

The invention further makes provision for automatically indicating on deck or at some other suitable point the position of the adjustable fin-keel and the draft of the vessel, so that the master or pilot of the vessel may at all times be kept advised of these facts.

With these and such other ends in view as appertain to the nature of the invention and for a full disclosure thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and the drawings hereto attached.

While the essential and characteristic features of the invention are necessarily susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a central vertical longitudinal section of a portion of the hull of a yacht embodying the invention. Fig. 2 is a vertical transverse section taken on the line A B of Fig. 1. Fig. 3 is a vertical section, on an enlarged scale, of one of the hydraulic lifts and connections. Fig. 4 is a sectional plan view of a modified form of fin-keel. Fig. 5 is a plan view of the fin-keel shown in Fig. 4. Fig. 6 is a side elevation, with parts in section, of the mechanism for indicating the position of the fin-keel and the draft of the vessel, the view being on an enlarged scale. Fig. 7 is a top plan view of the indicating or recording device. Fig. 8 is a vertical longitudinal section similar to Fig. 1 and shows a further modified form of fin-keel. Fig. 9 is a vertical transverse section of the construction shown in Fig. 8.

15 in the drawings represents the hull of a yacht or other vessel, and 16 a stationary fin-keel of ordinary construction, one side of which is shown in Fig. 1 in broken lines. This stationary keel is divided in line with an opening in the bottom of the hull thereabove to form a slotted guide, chamber, or well in which an adjustable fin-keel 13 is movably mounted. Upon the interior of the hull above this chamber or well is arranged a sheath or casing 4, constructed of sheet metal

or other suitable material and forming a water-tight inclosure to receive the adjustable fin-keel and prevent inlet of water into the hull or onto the deck when said keel is lowered. This sheath or casing comprises an elongated shell 4, conforming in contour to said well and constituting a continuation thereof, said shell being secured at its lower end to the hull in any approved manner and closed at its upper end. The fin-keel 13 is fitted to slide freely and yet snugly in the well and sheath 4 and is provided with flanged or shouldered top and bottom portions 31 and 14, the former serving as a support to sustain the weight of the keel when extended to its greatest depth below the yacht's bottom. The bottom flanged portion 14 is wider than the well and at all times remains submerged, and its upper side faces form shoulders 30, which may be provided with packing and serve to seal the lower end of the well and exclude water therefrom when the keel is raised to its highest position. As shown in Figs. 1 and 2, the adjustable fin-keel 13 may be constructed of solid wood or metal in one or more parts or sections, or it may be made hollow, as shown in Figs. 4 and 5, wherein it is represented as constructed of spaced metallic plates E, connected by braces 33 and rods or bolts 26. Eyebolts 25, to which the lifting mechanism is attached, are secured to bars 28 at the ends and intermediate of the fin-keel. In the construction shown in Figs. 8 and 9 the fin-keel 13 is uniform in thickness throughout its entire length and breadth and is of composite construction and intended especially for light-draft vessels. The dotted lines marked O B represent the outlines of the centerboard now in use, which may be employed in connection with the fin-keel in vessels of this kind. The lower cut-away portion of the fin-keel discloses the construction. The metal bolts 38 are driven through the wood sections 36 and the metallic plates 39 and securely bind the different sections together and add greatly to the strength of the keel. In lieu of the composite construction, however, this form of fin-keel may be made entirely of metal. Fig. 8 represents the keel sheath or casing 4 in sectional elevation and as having in its top manholes 29. The keel is provided with loops or eyes 34, which may be reached through these manholes for the purpose of shipping the adjustable fin-keel whenever desired.

The mechanism for raising and lowering the fin-keel comprises a series of hydraulic lifts of any desired number and arrangement. In the present instance I have shown four such lifts employed to effect an easy and steady movement of the keel, two of the same being located abreast in line with the center of the keel and the other two in line with the ends of the keel; but this arrangement may be varied. Each lift consists of a cylinder 1 and a piston 18, arranged therein, the piston having its stem 2 working through a stuffing-box 21 in the bottom head 22 of the cylinder and provided at its lower end with a removable eye 3, connected with an eyebolt 25 on the fin-keel. Hand-holes 29 are provided in the sides of the sheath or casing 4, through which access to the interior of said casing is secured for attaching and detaching the eyes 3, so as to enable the fin-keel to be shipped and unshipped with facility. The cylinders are provided at their upper and lower ends with ports for the ingress and egress of the fluid for propelling the pistons, preferably lubricating-oil, which is supplied through a feed-pipe 17, leading from a force-pump suitably located, and this pipe has upper and lower branches leading to coupling-pipes 10, which respectively connect the upper and lower ports of all the lifting-cylinders, so as to supply the fluid thereto simultaneously. At the junctions of the branch pipes with the pipes 10 two-way valves 11 are located, and the stems of these valves are connected with a common operating-rod 9, by which the valves are adapted to be operated in unison. The ports in the valves are so arranged that they are reversed each time the lever or rod 9 is moved upward or downward, and instead of conducting the liquid to the cylinders they allow the liquid to escape through exhaust-pipes 24 and return therethrough to the point from which it came, to be reused when necessary. In other words, when the ports in the upper valves 11 connect the pipes to allow the liquid to enter the upper ends of the cylinders to force the pistons downward the ports in the lower valves, on the other hand, connect the pipe 10 with the pipe 24, through which the liquid exhausts from the lower end of the cylinder. Similarly when the rod 9 is operated in the reverse direction to cause the liquid to flow to the lower end of the cylinders the upper valves are turned to cut off communication between the supply-pipe and to open communication between the upper ends of the cylinders and the exhaust to allow the liquid to exhaust from the upper end of the cylinder. The rod 9 is jointed at its upper end to a rod H, which passes upwardly through the deck of the vessel and through a suitable guide J^a, secured to the deck and provided with an operating-handle. By this means it will be seen that the fin-keel may be readily and conveniently raised or lowered to any desired extent and that when it descends said keel cannot go by the run, as its weight causes the pistons to cushion on the liquid within the lower portions of the cylinders, and an easy and steady lowering occurs. Hence overstrain on the piston-rods is avoided. The operating mechanism may, if desired, be employed to lower the keel, thereby overcoming all tendency of the keel to stick by cramping in the sheath when the yacht or vessel is making leeway.

To enable the master or pilot of the yacht or vessel to ascertain at any time while on deck the position of the adjustable fin-keel

and draft of the yacht or vessel, the following mechanism is employed: A vertical tube or casing 5 is secured to the top of the keel sheath or casing 4 and projects thereinto, and in one side of this tube is mounted a button or movable circuit-closing device 12. This button or circuit-closing device connects with an insulated conducting-wire 7, leading from the positive pole of a battery X, from the negative pole of which lead two wires which connect with a sleeve P, secured to the deck and inclosing the lower portion of the rod H, and are provided therein with contact-points, and from said sleeve other wires having similar contact-points extend. The wires connect with the magnets S and S′. The rod H carries a head or projection Q, mounted to frictionally slide thereon and which is adapted to electrically connect the wires either to energize the magnet S or the magnet S′. Connected with the fin-keel is a bar 6, having a series of teeth or projections adapted to operate the button or circuit-closing device 12. This bar is designed to move with the adjustable fin-keel and up and down within the tube, and the teeth or projections thereon are spaced to represent feet and fractions of a foot. Upon a shaft R, arranged above the magnets, are mounted ratchet-wheels A and B, whose teeth face in reverse directions and are spaced to correspond with the teeth on the bar 6 and with two sets of numerals D and N, arranged circumferentially upon the face of a dial J, such numerals representing the draft in feet and inches of the vessel. A hand or pointer K is mounted to turn with the ratchet-wheels and move around the face of the dial. Coöperating with the ratchet-wheels are spring-actuated pawls F and F′, which operate in reverse directions to turn the ratchet-wheels, the pawl F, for example, operating in one direction to turn its coöperating wheel B and sliding over the teeth of said wheel when the pawl F′ operates in the opposite direction to turn its coacting wheel A. The pawls are mounted upon the free ends of intermediately-pivoted levers C and C′, whose opposite ends are connected with the free ends of pivoted magnet-levers 40 by means of links V. A spring G normally holds the magnet-levers C C′ in operating position, and said levers are independently operated by means of said magnet-levers, which latter are drawn down when the magnets are energized. The stroke of each magnet-lever is controlled by thumb-screws E, located upon the bearings of the lever C, whereby nicety of action is insured. In Fig. 6 the signs + and — indicate the direction in which the electric circuit flows, plus meaning from the battery to the magnets and minus from the magnets to the battery.

The operation is as follows: The hand or pointer is attached to the end of the ratchet-shaft adjoining the face of the dial and its movements are controlled by the ratchet-wheels. Each stroke of the pawl F on the teeth of the ratchet-wheel B will turn the ratchet-wheels the space of one tooth upon the shaft R. When looking at the front or face of the dial D, the ratchet-wheel B when acted upon by its magnet will turn the pointer forward upon the dial—that is, from left to right. The action of the ratchet-wheel B will reverse the motion of ratchet-wheel A and turn the pointer backward or from right to left. The dial and pointer in Fig. 6 indicate the yacht's or vessel's draft to be twenty-two feet six inches below its sheath or the bottom of the yacht or vessel, and Figs. 1 and 3 indicate the piston of the adjustable fin-keel under this condition. The rod 9 and valves 11 are in position in Fig. 3 to raise the adjustable fin-keel. Should power now be applied to the force-pump, the motive fluid (preferably ordinary lubricating-oil) would be forced through the lower pipe 10 to the lower ends of all the lifting-cylinders, thereby forcing the fin-keel upward. This movement would at the same time be communicated to the bar 6, which would move upward into the tube 5, and its teeth would thereby be caused to press the button or circuit-closing device 12. By this means a complete circuit would be formed between the battery and magnet S through the wires and head Q of the rod H, and the magnet would attract its magnet-lever and draw it downward, thereby operating the lever C and causing the pawl F to move the ratchet-wheel B the space of one tooth to the right and the pointer correspondingly. When, on the other hand, the parts are arranged reverse to that shown in Fig. 3 to force the fin-keel downward, the head Q connects the wires and the current is caused to pass from the battery through the wire of the magnet S′, whereby the hand or pointer is operated in the reverse direction to indicate an increase instead of a decrease in the vessel's draft, as will be readily understood.

Having thus described the invention, what is claimed as new is—

1. In a vessel, a vertically-movable keel, a vertical cylinder about in the plane of the said keel, a piston working in the cylinder and having its rod attached to the aforesaid keel, and means for controlling the inlet and exhaust of a motive fluid at opposite ends of the cylinder, substantially as described.

2. In a vessel, a vertically-movable keel, a pair of cylinders abreast about in line with the center of the keel, other cylinders at the ends of the keel and in the plane thereof, pistons working in the cylinders and having their rods attached to the said keel, and means for simultaneously controlling the inlet and the exhaust of a motive fluid at opposite ends of the several cylinders, substantially as set forth.

3. A vessel having a well or opening in its bottom, a keel movable vertically therein, and mechanism for operating the keel, comprising a vertical cylinder and piston, valves controlling the inlet and exhaust of a motive

fluid at opposite ends of the cylinder, and means for alternately opening and closing said valves, substantially as described.

4. A vessel having a well or opening in its bottom, a keel movable in said opening, and mechanism for operating the keel comprising a plurality of cylinders, pistons in the cylinders and having rods connected to the keel, coupling-pipes connecting the upper ends and the lower ends of all the cylinders, a supply-pipe, valves controlling the passage of a fluid motive agent from the supply-pipe to the coupling-pipes, and means for alternately opening and closing said valves.

In testimony whereof I have signed my name to this specification in the presence of the two subscribing witnesses.

DEAN S. WEBSTER.

Witnesses:
P. B. COOLIDGE,
A. L. WEBSTER.