3 Sheets—Sheet 1.

D. McCOLGAN.

Adjustable Centre-Board.

No. 208,750. **Patented Oct. 8, 1878.**

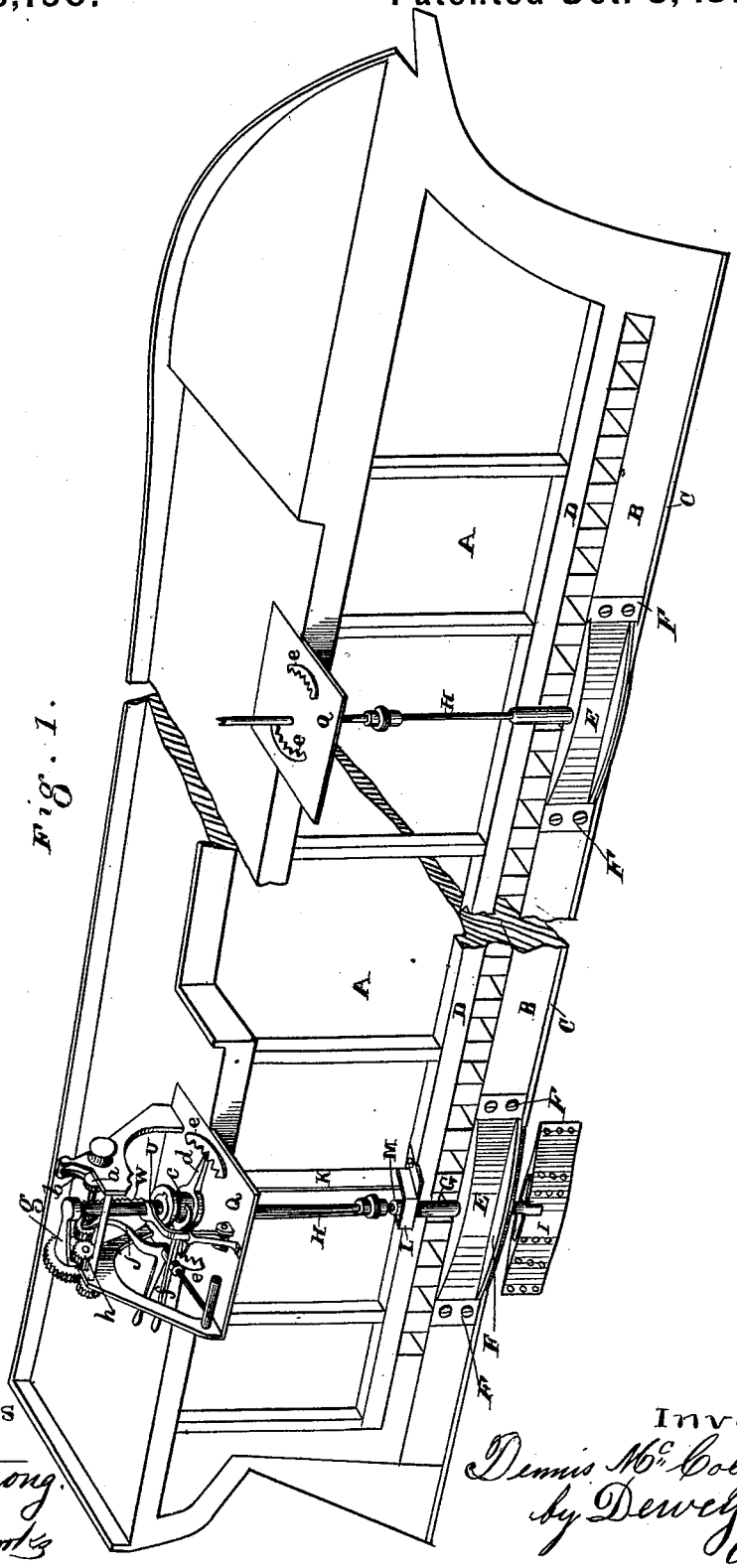

Fig. 1.

Witnesses

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3 Sheets—Sheet 2.

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Fig. 2

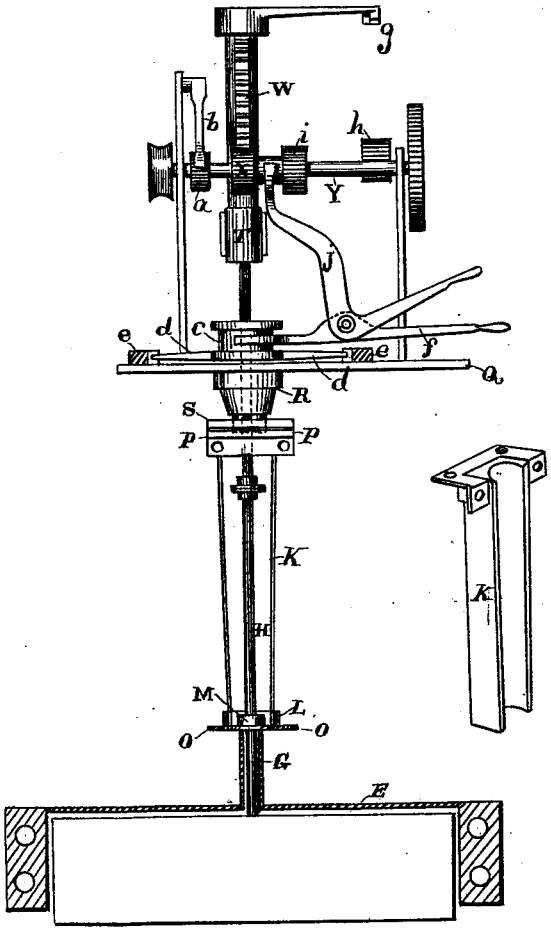

Fig. 3.

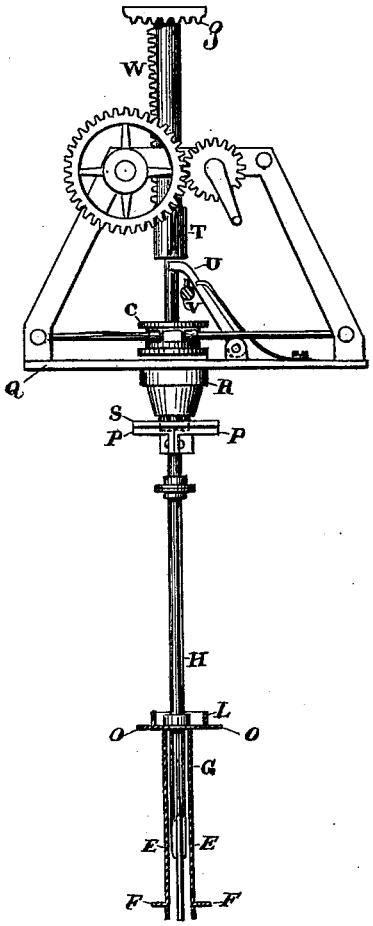

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Fig. 4.

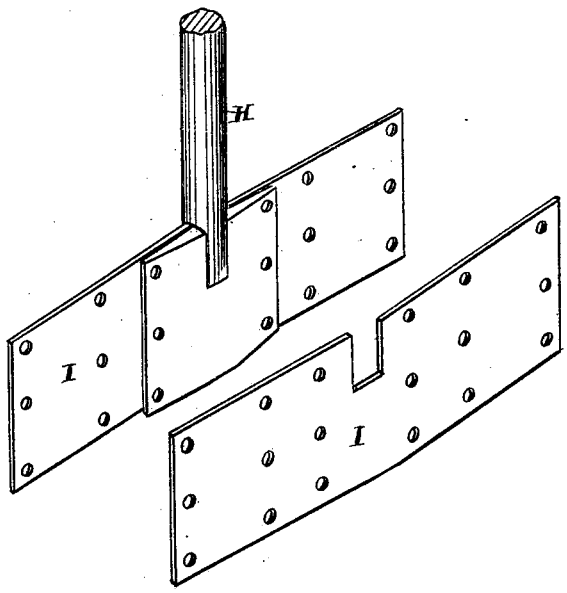
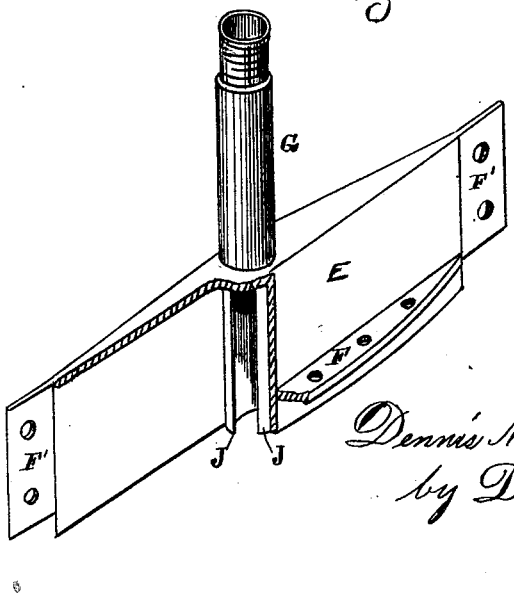


Fig. 5



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UNITED STATES PATENT OFFICE.

DENNIS McCOLGAN, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN ADJUSTABLE CENTER-BOARDS.

Specification forming part of Letters Patent No. **208,750**, dated October 8, 1878; application filed April 22, 1878.

To all whom it may concern:

Be it known that I, DENNIS MCCOLGAN, of the city and county of San Francisco, and State of California, have invented an Improved Adjustable Center-Board; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention relates to improvements in center-boards and center-cases in vessels; and consists, first, in attaching the center-board to a vertical shaft, which extends up through the deck, so that the board may be raised or lowered by means of a windlass on the deck; second, in the use of operating mechanism in connection with the vertical shaft holding the center-board, so that when the center-board is down it may be turned at an angle from the direction in which the ship is moving, so as to more effectually increase the lateral resistance and prevent the vessel from drifting to leeward; third, in the use of a peculiarly-constructed center-board casing, which is all fitted below the keelson, so that no floor-timbers of the vessel have to be cut off to put it in place; fourth, in the peculiar construction of a metal center-board, whereby great strength is obtained and great friction in raising or lowering it is obviated; fifth, in the peculiar construction of the case in which the center-board shaft is inclosed and the sockets in which said case is held in place, so that there is no friction of the shaft in said case and no danger of water entering the vessel from it.

Usually I shall use two of my center-boards on a vessel, one forward and one aft, so that by turning them at opposing angles the vessel may be readily turned from one course to another.

As center-boards are usually constructed, the casing in which they are held is very large in proportion to the amount of center-board available to hold the vessel against the wind and prevent her making too much leeway, because at least one-third of the board, and generally one-half, remains within the casing when the board is down. The reason for this is obvious when the ordinary construction of the casing and the board is understood. Usually a slot is cut in the keel and keelson somewhat longer than the center-board. Inside of the vessel, on top of the keelson, a casing is built, which entirely incloses the slot. The center-board is then placed in the case and secured by a bolt on its lower forward end, so that the after end may be raised or lowered by means of a rope fastened to its upper after end. The upper part of the casing has to be somewhat above the water-line of the vessel, as the water rises in this casing, through the slot in the keel, as high, of course, as it is outside. The center-case, therefore, occupies considerable cargo-space, and practically divides the vessel into two compartments for that part of the length in which it is built.

Now, when the center-board is lowered by means of the rope at its upper after end the board swings down, being held at its lower forward end by the bolt or pivot, and as soon as the upper after end comes out of the case the amount of bearing-surface within the case becomes decreased; and should the board be lowered until the after end becomes horizontal the leverage of the board in the case becomes so great that the case is apt to be opened or strained or the board broken.

If there were any means of giving a bearing all the way to the top of the case when the board was down, there would be no danger of this; and part of my improvements are intended to remedy these defects, as hereinafter described.

In the accompanying drawings, Figure 1 is a view of my device applied to a vessel. Figs. 2 and 3 show enlarged views of the mechanism. Figs. 4 and 5 show the center board and case.

Let A represent the hull of a vessel, on which B is the keel, and C the shoe, usually placed on the bottoms of keels to prevent damage in case of touching on the bottom. D is the keelson, which is placed on top of the keel, inside the vessel, and sits on top of the timbers that fasten on top of the keel.

My center-case is made of metal, preferably a composition casting, and is cast all in one piece with the flanges F and neck G. The ends F′ of the casing are made solid, and have bolt-holes formed in them, so that bolts may be driven laterally through the keel and ends F′ of the casing E, in order to hold the casing

firmly in place. The flanges F on the bottom of the casing come between the shoe C and keel B, and bolts may be driven vertically up through the flanges F into the keel, to more thoroughly hold the casing in position. These fore and aft flanges also assist in stiffening the casing. The casing E extends below the flanges the thickness of the shoe C, so as to come flush with the bottom of the shoe. The neck G extends up from the top of the casing through the keelson, between the timbers, and has threads formed on its upper end for the purpose hereinafter described.

By this construction of the center-case it will be seen that the insertion of the casing does not necessitate the cutting off of any of the floor-timbers of the vessel, and thus weakening her, since the timbers cross on top of the keel, and the casing does not come quite to the top of the keel. By the old method all the floor-timbers had to be cut off, as the casing came above the keel.

The center-board, which fits in the center-case, is made in a peculiar manner. The metal shaft H is forged out flat on its lower end, so as to form flanges on two sides, one flange forward and one aft, both being in one piece, the depth of the center-case. On both sides of this flanged portion of the shaft are fastened, by means of rivets, the plates I, forming the center-board. These plates, shaft, and flanges are made of steel, so as to be strong and light. The plates I are slotted on their upper central edges to admit of being riveted to the flanged lower portion of the shaft, and at the same time to allow the circular part of the shaft to come below the upper part of the plates, as shown. This is done to give greater strength to the center-board and give a firm bearing all along the shaft. Inside of the center-case E, in a vertical line from the neck G to the bottom edge, are formed two grooved flanges, J, in which the shaft H of the center-board moves up and down to lower and raise the center-board, as hereinafter described. This shaft H, forming part of the center-board, has, therefore, a full bearing from top to bottom of the center-case, no matter in what position the center-board may be, and the plates I never touch the inner sides of the casing E. The shaft H passes up through the neck G, and, by coupling with another piece of shafting, goes through to above the deck of the vessel, where the mechanism for operating it (hereinafter described) is placed.

Now, instead of having a large board and center-case, necessitating the cutting away of the floor-timbers and weakening the vessel, I have provided the one described. Nevertheless, means have to be provided to prevent the entrance of the water into the vessel through the space left between the shaft and the interior of the neck G. In order to prevent the water thus entering and not take up too much cargo-space, and at the same time furnish a protection for the shaft H, I construct a square case, K, from the keelson to the lower part of the deck. This case is made water-tight, and in it the shaft moves. The water which may come in through the neck G on top of the casing E will then enter the tight case K, and not come into the vessel.

The bottom part of this wooden water-tight casing fits into a metal socket or shoe, L, as shown. In the center of this socket or shoe L is formed a metal cone, M, as high as the sides of the socket or shoe L. The inner part of this metal cone M is threaded, so as to be screwed down on the outside of the neck G on top of the center-case, thus making a water-tight connection with the center-case E.

The joint around the edges of the socket or shoe L is calked, and the cone M in the socket prevents the wooden case K from binding on the shaft H at this point, which it would otherwise be apt to do. On each side of this socket or shoe L is a lateral flange, O, through which bolts may be driven into the keelson after the shoe is screwed down onto the neck G, as herein described. The shoe or socket L is thus held firmly in place on the keelson by the bolts through the four flanges O.

On the upper end of the case K is a somewhat similar flanged socket, into which the upper end of the casing is fitted. This flanged socket P is made in two parts, for convenience in inserting the case K, and flanges on the sides have bolt-holes formed in them, so that the two parts may be joined together by bolts, as shown.

On the bottom or bed plate Q of the windlass on deck is formed the cone R, which extends down through the deck into the upper part of the case K. The lower part of this cone R is threaded, and onto this cone, under the deck, is screwed the flat plate S. Holes are bored through the sides of the flat plate S, to correspond with similar holes in the horizontal flanges on the flanged socket P on top of the case K, and bolts passing through the holes join the flanged socket P and the plate S together, a rubber gasket being placed between them to prevent leakage. This completes the connection between the center-case E and the windlass on deck, the shaft H passing up through the wooden case K and cone R on the bed-plate of the windlass to where said shaft is connected with the operating mechanism, hereinafter described.

The case K is held in place at its lower end by the shoe or socket L, bolted to the keelson, as described, and the upper end of the case is held in place by the bolts passing through the flanged socket P, the plate S, and into the deck of the vessel. As the lower shoe or socket, L, is screwed onto the neck G of the center-case, and the plate S is screwed onto the cone R on the bed-plate of the windlass under the deck, and the shaft H passes directly down through the case K, as described, the case K is very strongly held in place, and not liable to leakage or displacement. The shaft is thus protected from injury by the cargo, and no water can get out of the case K to in-

jure the cargo. The case thus really strengthens the vessel, instead of weakening it, as in the present method of construction.

The wooden casing K is made in two parts, with a longitudinal central groove, in which the shaft H moves. By the construction described it will be seen that it is easily placed in the vessel and easily kept tight. After being put in place, bolts may be passed through the two parts, or iron straps around them may be connected, so as to bring the two parts in close contact, and then the joints may be calked or stop-waters inserted, as in forming a rudder-casing for a vessel.

The operating mechanism on the deck of the vessel consists of an ordinary ship's windlass, with a few additional parts, as hereinafter described.

The shaft H has formed on it, above the deck, a feathered shoulder, T. This shoulder T is keyed on the shaft high enough above the deck so that when the shaft is lowered far enough for the center-board to be entirely out of the casing the shoulder T will rest on the deck and prevent the shaft from lowering any farther. When the shaft is raised so the center-board is entirely within the center-case E, a pawl, U, drops under the shoulder T and holds the shaft and center-board in position.

A small horizontal shaft, V, passes through the windlass-frame, and has a cam on one side, which, on the shaft V being turned by its crank, disengages the pawl U from the shoulder T, and allows the shaft to drop. A spring in the back of the pawl U keeps the pawl in place against the shaft, and admits of the pawl being disengaged by the action of the cam or the shaft V.

On one side of the center-board shaft H is formed a rack, W, which engages with the center pinion, X, on the shaft Y of the windlass. When this rack and pinion are engaged, by operating the windlass-crank, and thus rotating the shaft Y by means of the ordinary gearing, the shaft H is raised or lowered, raising or lowering the center-board, as described.

The small ratchet-pinion *a* on the end of the shaft Y, inside of the windlass-frame, is intended to engage with the pawl *b*, attached to the windlass-frame, and by dropping the pawl into this ratchet-pinion at any desired point the rotation of the shaft Y is stopped and the shaft H held in that position, thus keeping the center-board in any desired position between its highest and lowest point. Without the use of this ratchet-pinion and pawl the shaft H would have to be held at its highest position by the pawl U, by means of the shoulder T, or would have to be at its lowest position by the shoulder T resting on the deck, unless the weight were held by the windlass-crank. By the construction described, however, the ratchet-pinion *a* and pawl *b*, to stop the shaft Y from rotating, and the center-pinion X being on the same shaft and engaging with the rack W on the shaft H, the shaft H is held in any desired position. By this means any required amount of center-board may be presented to the water to suit existing circumstances.

Inclosing the shaft H, and resting on the deck of the vessel, inside of the windlass-frame, is a peculiarly-constructed clutch, *c*, having a groove formed around it on the outside, and two arms, *d*, which engage with the dogs in the curved ratchet-bar *e*. Inside of this clutch *c* two slots are formed, in which the feathers on the shoulder T of the shaft H engage when the shaft is lowered and the shoulder T rests on the deck. Now, when the shaft H is lowered the shoulder T comes down inside of this clutch *c*, and the feathers on the shoulder engage with the slots in the inner part of the clutch. The clutch is then movable vertically on the shaft H; but the feathers and slots do not admit of a rotary motion to the clutch or shaft, as the arms *d* to the clutch are engaged with the dogs on the curved ratchet-bars *e*, as described. This clutch *c* may be lifted vertically, however, which is done by means of the lever *f*, the short arm of which is made in two parts, which encircle the groove formed around the outer side of the clutch. When the clutch *c* is thus raised and the arms *d* are lifted out of the dogs in the curved ratchet-bars *e*, the shaft H may be rotated, carrying with it the clutch *c*, which then rests on the two arms of the lever *f* instead of on the deck. Then, by dropping the clutch, the arms will engage with another pair of the dogs on the curved ratchet-bar, and the shaft H is held in a new position.

The rotation of the shaft H is accomplished by attaching to its upper end the toothed segment *g*, which, when the shaft H is lowered far enough for the center-board to be clear of the center-case E, engages with the pinion *h*, attached to the upper inner part of the windlass-frame. A pinion, *i*, on the shaft Y engages with the pinion *h*, and by turning the crank of the windlass the shaft Y is rotated, thus rotating the shaft H in either direction by means of the pinions *h* and *i* and toothed segment *g*.

Of course, this rotation of the shaft H is only necessary, and, in fact, only possible, when the center-board is lowered entirely out of the case. Therefore the segment *g* and pinion *h* only engage when the shaft is at its lowest position. For similar reasons the feathers on the shoulder T on the shaft H do not engage with the slots in the clutch *c* until the shaft is at its lowest position. When the shaft is at this lowest point, the shoulder rests on the deck and the weight of the center-board and shaft is on the deck. By means of the clutch with its arms engaging with the dogs, as described, the shaft is held in place and the center-board remains in a line with the keel. By lifting up the clutch, however, and rotating the shaft H one way or another, the center-board may be turned at an angle from the keel, and by dropping the clutch in place again the center-board is held at the desired angle.

The operation of my device is as follows: The shaft and center-board are held up inside

of the center-case by the pawl U dropping under the shoulder T of the shaft. When the vessel comes in the wind, where it is necessary to use the center-board, to present sufficient lateral resistance to prevent her from drifting to leeward, the center pinion, X, on the shaft Y is thrown into gear with the rack W on the shaft H by means of the lever *j*. Then, by operating the main crank of the windlass, the shaft H is slightly raised and its weight held by the pinion X, thus relieving the pawl U, which previously held the weight of the shaft, and by turning the crank of the small horizontal shaft V the cams on said shaft throw the pawl U back, and the shaft H and center-board may be lowered.

In case it is only desired to lower the center-board part way down, the pawl *b* is dropped into the ratchet-pinion *a* on the shaft Y, thus preventing said shaft from rotating, and holding the shaft H and center-board in any required position.

If the full width of the center-board is required, however, the shaft H is lowered until the shoulder T rests on the deck, and then the feathers on said shoulder engage with the slots on the inner part of the clutch *c*.

Now, in order to rotate the shaft H, so as to turn the center-board at an angle with the vessel's course, the lever *j* is operated so as to throw the pinion X out of gear with the rack W on the shaft H, which action of the lever also throws the pinion *i* on the shaft Y into gear with the pinion *h*, which operates the segment *g* on top of the shaft H. The act of lowering the shaft to its lowest position engages said segment on top of said shaft with the pinion *h*. Then the foot is placed on the lever *f*, which lifts the clutch *c* and takes its arms *d* out of the dogs in the curved ratchet-bar *e*. While the clutch is held in this position, by turning on the main crank of the windlass, the shaft H is rotated in either direction and the center-board set at any desired angle. In order to keep it there the clutch *c* is dropped, so that the arms *d* engage with the dogs on the curved ratchet-bar, the feathers on the shoulder T engaging with the slots or grooves on the inner part of said clutch, preventing the shaft H from turning.

By operating the lever *j* so that none of the pinions on the shaft Y engage with the rack or other pinions, the windlass can be used for ordinary purposes. This can be done when the shaft is either up or down.

The dogs on the two curved ratchet-bars on the deck are made to correspond, so that the arms of the clutch fit in one on each side. These dogs may be numbered, so that when two center-boards are used on the same vessel, the center-boards may be set at the same angle.

I propose always to use two of the center-boards, so that the devices described will be duplicated, and one center-board placed a short distance from each end of the vessel. Then in narrow waters, where it is necessary for the vessel to work quickly, one center-board may be set at one angle, and the other at an opposing angle, when they will act like balanced rudders, and assist materially in turning the vessel around in a short space.

With the ordinary construction of center-boards, the center-board must be on a line with the keel at all times. By my construction the center-board may be set at an angle to the vessel's course, so as to set her up to windward, by the increased pressure on the lee side when the board is placed at an angle to the course.

By having two center-boards instead of one, I am not only enabled to use them to assist in turning the vessel, but can so construct my center-cases as not to cut off any floor-timbers, and at the same time have plenty of center-board for ordinary sailing purposes. Moreover, I do not divide the vessel longitudinally into two compartments by a large center-case, as the case in which the shaft operating the center-board is inclosed is quite small, and occupies very little cargo-space.

The center-board and shaft being made of steel, there is no danger of breakage, and the operating mechanism can easily be handled by one man. The windlass used is the same as an ordinary ship's windlass, with the additions described. The center-case being in the solid dead-wood of the keel allows no chance for leakage, as the only hole into the vessel is through the neck on top of the casing, and as the shoe on the bottom of the case screws into this neck a tight joint is easily made. This neck is the only part coming through the keelson, and may be brought up between two timbers, not a single timber having to be cut away. There is very little friction in operating this board, even with heavy lateral pressure upon it, as the plates forming the board do not bear against the inner part of the case, the shaft moving in the grooves inside of the case taking all the friction there is.

In the case of small vessels, by the same operating mechanism on deck at one end of the vessel, I can connect the two main shafts, so as to operate both center-boards from the one windlass, the center-boards, center-casing, wooden case, &c., remaining the same as described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The center-case E, cast or formed in one piece, and fitting into a slot in the keel, as shown, and having the hollow cylindrical extension or sleeve G, projecting up between the floor-timbers, so that it is fitted without cutting or weakening them, substantially as herein described.

2. The center-case E, with its cylindrical sleeve G, fitted into the keel, as shown, and provided with the flanges F F′, by which it is bolted to the keel in two directions, substantially as shown, and for the purpose herein described.

3. The center-case E, cast in one piece, and having the cylindrical sleeve G projecting upward, as shown, said sleeve also extending down upon each side of the interior of the case, so as to guide the center-board without its touching the case, and to give it a sufficient bearing when lowered, substantially as herein described.

4. The cylindrical sleeve G, forming a part of the closed-top center-case E, and extending up between the floor-timbers, in combination with the shoe L and the cone M, fitting over the sleeve and secured to the keelson, as shown, so as to prevent leakage and protect the shaft, substantially as herein described.

5. The shoe L, fitted as shown, in combination with the interior shaft-casing K, extending up to the plate S, beneath the deck, so as to protect the center-board shaft, prevent leakage, and support the deck and unite it with the keel, substantially as herein described.

6. The bed-plate Q, screwed to the deck and having the downwardly-projecting cone R, with its screw-threads, in combination with the plate S, secured beneath the deck, and the shaft-casing K, substantially as shown, and for the purpose herein described.

7. The center-board consisting of the plates I, bolted to the flattened extended flanges at the lower end of the shaft H, said shaft extending up through the sleeve G and case K to the operating mechanism above, substantially as shown, and for the purpose herein described.

8. The plates I, forming the center-board, and bolted to the lower flattened extension of the shaft H, said plates being slotted at the top, so as to allow the circular part of the shaft to extend below the top of the plates and give a firm bearing, substantially as herein described.

9. The shaft H, for operating the center-board, having the rack W upon its upper end, in combination with the pinion X and the disengaging-lever *j*, to raise or lower the center-board and allow the shaft to turn, substantially as shown, and for the purpose herein described.

10. The center-board shaft H, movable vertically, as shown, and having the enlarged feathered shoulder T, in combination with the pawl U, to hold the shaft and board up, substantially as herein described.

11. The center-board shaft H, with its enlarged feathered shoulder T and pawl U, in combination with the horizontal shaft V, with its disengaging-cam, substantially as herein described.

12. The enlargement T of the shaft H, having feathers, as shown, in combination with the inclosing-clutch *c*, with its projecting arms *d*, the curved racks or ratchets *e*, and the operating-lever *f* for the clutch, substantially as herein described.

13. The shaft H, having the segment-rack *g* at the top, in combination with the pinion *h*, whereby the shaft may be rotated and the center-board turned to an angle with the keel when the arms *d* are released from the racks *e*, substantially as herein described.

14. The shoulder or enlargement T upon the shaft H, so placed that it shall rest upon the bed-plate Q when the rack *g* and pinion *h* are in contact, and relieve these parts from the weight of the board, substantially as herein described.

15. The windlass-shaft Y, having the pinions X and *i*, moving on a feather, for alternately rotating the shaft or moving it in a vertical direction, in combination with the pinion *a* and the pawl *b*, whereby the shaft H and center-board are held at any point intermediate between the highest and lowest, substantially as herein described.

16. The windlass-shaft Y, having the pinions X and *i*, for rotating the shaft or moving it vertically, said pinions being united and movable upon a feather by a clutch-lever, *j*, so that one may be engaged to raise or lower the center-board, and the other to turn it when down, substantially as herein described.

In witness whereof I hereunto set my hand.

DENNIS McCOLGAN.

Witnesses:

GEO. H. STRONG,

CHAS. G. YALE.