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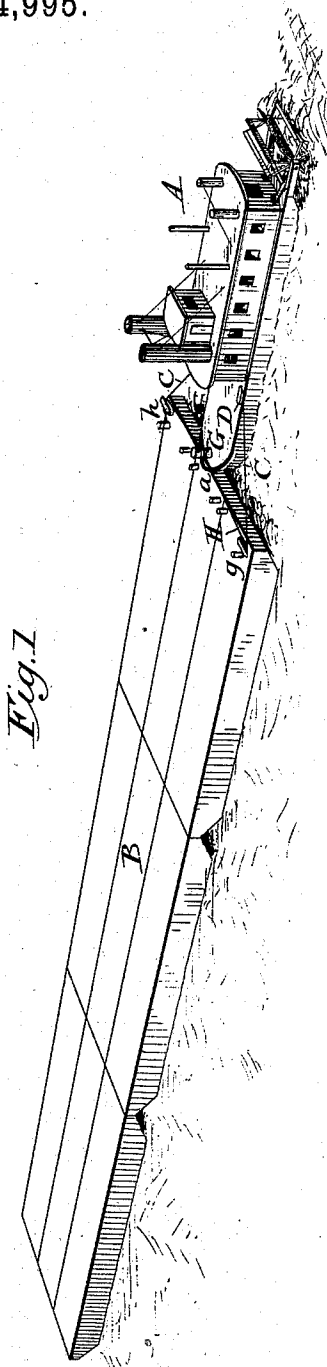
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D. A. McDONALD.

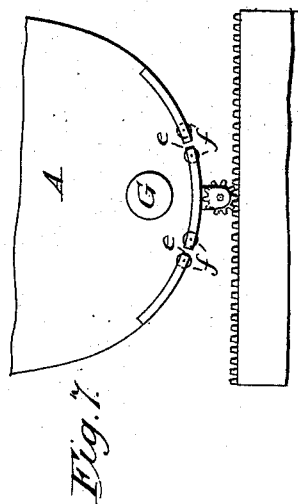
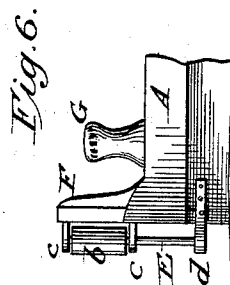
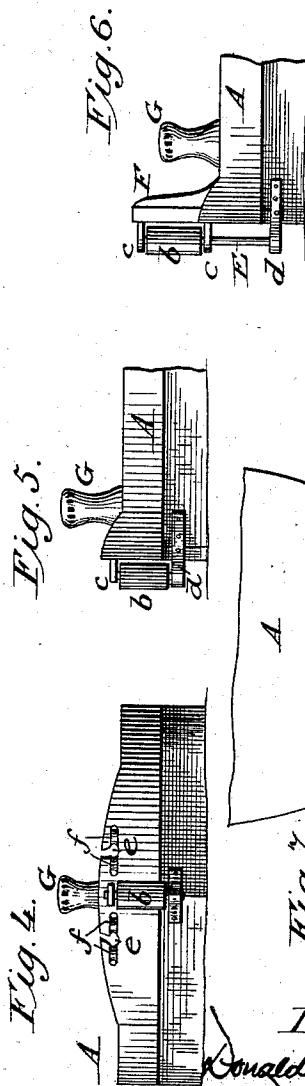
METHOD OF STEERING TOW BOATS AND TOWS.

No. 254,995.

Patented Mar. 14, 1882.



Attest
Walter S. Dodge.
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(No Model.)

2 Sheets—Sheet 2.

D. A. McDONALD.

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Fig. 2.

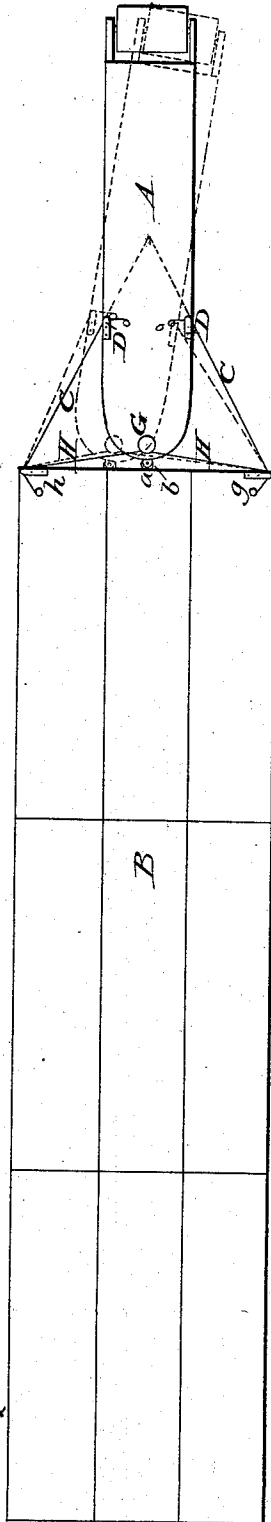
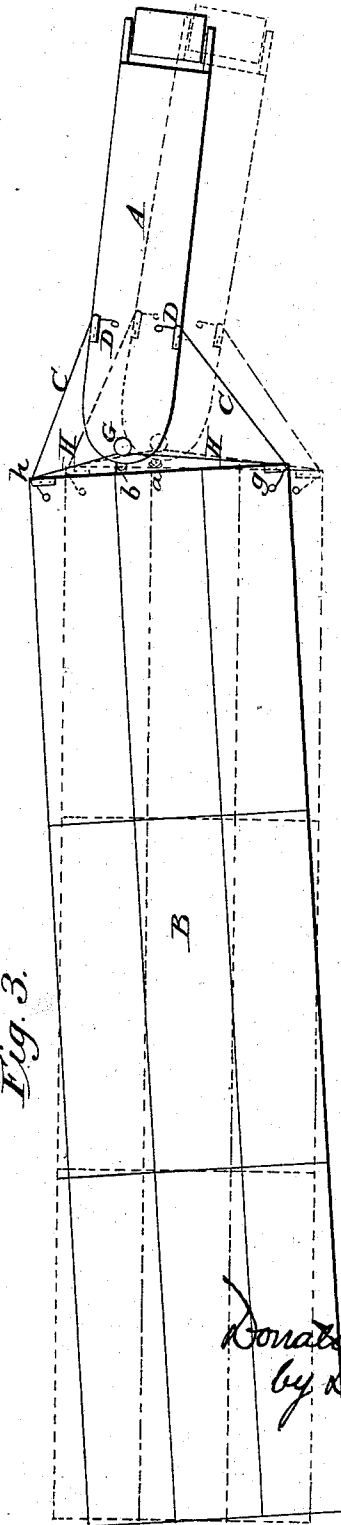


Fig. 3.



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UNITED STATES PATENT OFFICE.

DONALD A. McDONALD, OF LA CROSSE, WISCONSIN.

METHOD OF STEERING TOW-BOATS AND TOWS.

SPECIFICATION forming part of Letters Patent No. 254,995, dated March 14, 1882.

Application filed January 14, 1882. (No model.)

To all whom it may concern:

Be it known that I, DONALD A. McDONALD, of La Crosse, in the county of La Crosse and State of Wisconsin, have invented certain Improvements in Methods of and Apparatus for Propelling Water-Craft, of which the following is a specification.

My invention relates to guiding or moving boats, barges, floats, rafts, and other craft; and it consists in a novel plan of connecting the tow or propelling boat to the craft, whereby the direction of the whole may be quickly and perfectly controlled, thus permitting short turns to be made with great facility and certainty.

The invention further consists in providing the bow of the boat with a roller, by which it is enabled to move readily from side to side while bearing against the craft, and with a capstan, windlass, or other mechanism for winding on and off a cable for effecting such movement.

In the accompanying drawings, Figure 1 represents a perspective view of a fleet of barges propelled by a boat connected according to my improved plan; Figs. 2 and 3, plan views of the same, showing the movements of the propelling-boat; and Figs. 4, 5, 6, and 7, views illustrating details of construction.

Hitherto it has been customary either to draw the boats or barges after the tug or tow boat or to push them before the same, the boats or barges and the towing or propelling boat being lashed together. It is to the latter plan that my invention particularly relates. In practice it is found a matter of great difficulty under this last-mentioned plan to make the short turns required by many of the streams of the country, and particularly in windy weather, when the wind, acting upon the entire craft, including the propelling-boat, throws the same around against the force of the latter, thus often causing great delay and consequent loss. This difficulty, together with the comparatively small effect of the rudders of the propelling-boat when the latter is lashed rigidly to the barges or boats of the raft or fleet, has rendered it necessary to materially reduce the length of the fleets, while the limit in width is soon reached, either by reason of the narrow width of stream or by the resistance offered at the front of the fleet.

In rafting the propelling-boat has in some cases been placed in rear of the raft, its stem being made fast to the rear end of the same at the middle, and the propelling-boat being free to swing about said point of attachment as a center. While being in many respects an improvement upon the former plan of lashing the propelling-boat rigidly to the raft, this plan is objectionable, because of the width of stream required, the propelling-boat often swinging out past the sides of the raft or float in turning the same, and requiring great power to move it to the required angle.

It has also been proposed to make up a long train of boats or barges having respectively concave and convex ends, in order to form in effect a long articulate or jointed boat or craft capable of winding through irregular waterways or making turns which could not be made by a rigid craft of equal or approximate length. It has also been proposed to couple canal-boats together in a similar manner, and thus to make one boat steer another, the boats being, however, drawn instead of pushed.

By my plan I am enabled to make the fleet, raft, float, or other craft much longer than heretofore without necessarily reducing its width, thus, while being able to perfectly manage and control the same, materially adding to its size.

The essential feature of my invention consists in so connecting the propelling-boat to the float, raft, or fleet that it may be swung about its own center and caused to bear at either side of the medial line of the craft, and consequently to act not only with the usual force of its propelling machinery, but to act at one side of the center, and to swing the craft which it pushes about the center of said craft, thus overcoming the necessity of swinging or moving the entire craft bodily sidewise or from one end. This result may be attained in a variety of ways differing in detail but the same in principle; but in practice the plan shown in the drawings, and now to be described, is preferred.

Referring to the drawings, A represents a propelling-boat, and B a fleet, raft, float, or craft to be propelled, which in the drawings is represented as a fleet of barges, firmly lashed or secured together in the ordinary manner, except that instead of extending back of the

bow of the propelling-boat at the sides of the same the sterns of the barges or other craft are, by preference, arranged on line with the stem or bow thereof, which bears against the stern of the craft at the middle.

Coal-barges and many other forms of craft are built with square sterns or ends, as shown in the drawings, so that when lashed together they present a straight or plane face at right angles to the length of the craft; but where the stern is built to a model, or is other than of square form, a frame or timber may be secured upon the stern to afford a straight or plane surface, against which the bow or stem of the propelling-boat may bear, and along which it may move or travel, as presently explained. The straight or plane bearing-surface being thus secured, the propelling-boat is brought into the position shown in Figs. 1 and 2, its stem or bow bearing directly against the stern or the plane surface *a* at the middle or approximate point. Cables or lines *C* are then carried from points *g h* on opposite sides of said point or middle, and equidistant therefrom, to and around kevels *D* on the propelling-boat *A*, passing thence to a winding-drum operated by a small winding-engine or made fast, as desired.

By referring to Fig. 2 it will be seen that the cables *C* are carried in lines which, if extended, would cross or intersect each other at or near the center of the propelling-boat *A*, so that if said boat be thrown to one or the other side it will swing or turn about its center, as indicated by the dotted lines in said figure. It will also be seen that in thus swinging about its center the boat *A* will have its bow or stem held closely against the rear of the craft *B* or against the plane surface *a*, upon which it travels when the boat turns. The importance of having the boat *A* thus turn upon its center is very great—first, because a much greater leverage is secured to effect the turning; secondly, because in turning upon its center the bow or stem of the boat is caused to move to one side of the medial or central line of the craft *B*, thus causing said craft also to swing or turn about its center, by which means great leverage is again secured for turning the craft, and the turning is effected in far less space than where the craft is moved from one end; and, finally, because the craft and the propelling-boat in thus turning upon their centers are assisted by the wind in turning to the same extent precisely as they are retarded, or, in other words, one half moving forward toward the wind and the other half therefrom, the force of the wind on one half is neutralized by the force thereof acting on the other half.

It will thus be seen that a fleet or craft of double the length and of the same width of the usual fleets can be turned in the same space as the ordinary craft, propelled and manipulated in the usual way. In practice I prefer, however, to reduce the width of the fleet, raft, or float, in order to pass readily through

narrower places than can be done with the wider craft, and in order to reduce the resistance at the front of the craft, it being apparent that, the water displaced at the front, the following boats or barges will follow readily in their wake, and as the resistance or displacement is in proportion to the width of the craft or fleet a material saving in power required to propel the same is secured by such reduction in width.

In some cases it may be desirable to provide a frame for attaching to the rear of the propelled craft, having a face curved on the arc of a circle struck from the center of the propelling-boat, so that in swinging about its center said propelling-boat shall not be moved in the direction of its length, as of course it will be when a straight bearing-surface is employed.

In order that the bow or stem of the propelling-boat may move freely from side to side of its normal bearing on the surface *a*, a vertical roller, *b*, is placed on the front of the stem or bow, as shown, or two or more such rollers, as may be found necessary to suit different heights of craft or different loading thereof. By preference I employ a single roller, as shown in Fig. 6; but provide an elongated shaft or axle therefor, and two or more seats or sets of bearings, in either or any of which the roller may be placed, as required, by simply withdrawing the shaft, placing the roller in position, and again inserting the shaft. This will be readily understood by referring to Fig. 6, in which *E* represents the shaft or axle, which may be headed and passed through eyes or blocks *c*, secured upon the stem or supported by a socket-piece or step, *d*, at its lower end, as shown; and *b* represents the roller, as before stated. In order to afford a proper range of adjustment of the roller, the stem *F* of the boat is or may be extended above the deck, as shown in Fig. 6, and suitably braced by knees or timbers, as shown.

For the purpose of moving or swinging the propelling-boat *A* about its center I provide, by preference, a capstan or windlass, *G*, about which is carried a hawser or cable, *H*, attached at opposite ends to the fleet or craft *B*, at opposite sides of the center or normal point of bearing of the boat *A*. The hawser or cable is wound a suitable number of turns upon the capstan, which, being rotated, will carry the bow of boat *A* to one or the other side, according to the direction of such rotation. In practice I prefer to carry the hawser or cable through hawse holes or openings *e*, furnished at each side with sheaves *f*, in order to make the line of draft as nearly in line with the bow of the boat and the bearing-face *a* as practicable.

Instead of the capstan and hawser or cable, it is apparent that a rack and pinion may be employed for effecting the movement of the boat, as shown in Fig. 7; and this, too, whether the bearing-surface be straight or curved.

If necessary, a small engine may be employed

for effecting the movement of the boat about its center, and in any case suitable gearing may be employed to give the necessary power.

A brake will also be provided by which to hold the boat at any desired position or angle, being either in the form of a pawl or locking-dog, to prevent the turning of the windlass or capstan, or a clamp applied to the hawser or cable to prevent its movement or the movement of the boat in relation thereto.

It is apparent that the manner of making fast the cables or hawsers, the details of mounting the roller, the mechanism for moving the boat, and other details may be varied considerably without departing from the limits of my invention.

In case of accident to the mechanism described for moving the boat A about its center, or of its being desirable from any cause to do so, the cables C may be employed for that purpose, being simultaneously wound in at one side and payed out at the other.

It will be seen that good results can be secured, even though the boat does not turn about its exact center; but the nearer the center the easier will be the turning and the more efficient the action. By this plan it will be seen that I am enabled to move the craft and propelling-boat to and from a landing with great ease and precision, the boat and its rudders being set in proper relative positions, and the current of water thrown against the rudders by the backing of the wheel tending to move the stern to one side.

It will be understood that the foregoing description contemplates the employment of stern-wheel boats, which are almost exclusively employed in this class of trade; but I do not confine myself to the use thereof.

I am aware that a vertical roller or a series of such rollers has been applied to the bow of a vessel to break the effect of a collision, and therefore I do not claim such roller broadly; but I am not aware that such roller has been applied to a boat in combination with mechanism for shifting the bow thereof while in contact with a propelled craft.

I am also aware that a capstan and cable have been used for turning or guiding boats, and do not claim such mechanism, *per se*.

Having described my invention, what I claim is—

1. The method substantially as herein set forth of guiding water-craft propelled by a boat in rear thereof, consisting in shifting or moving the point of bearing of the propelling-boat to one or the other side of the medial line of the propelled craft and turning the propelling-boat about its approximate center.

2. In combination with a raft, float, or other craft, a propelling-boat bearing against the rear of the craft and connected therewith, substantially as shown and described, whereby the bearing-point of the propelling-boat may be moved either side of the normal bearing-point and the propelling-boat turned about its approximate center, substantially as and for the purpose set forth.

3. In combination with a raft, float, or other craft, a propelling-boat connected therewith, substantially as shown and described, and adapted to swing or turn about its approximate center, a capstan or winding-drum mounted upon the propelling-boat, and a cable or hawser wound upon said capstan, and having its ends secured to the propelling-craft at opposite sides of the center, substantially as explained, whereby the point of application of the propelling-power may be shifted to one or the other side of the medial line of the propelled craft.

4. In combination with craft B, boat A, cables C, capstan G, and hawser H, all arranged and operating substantially as explained, whereby the operation of the windlass is caused to shift the point of bearing to one side of the medial line of the propelled craft.

5. A boat for propelling and guiding rafts, floats, and other craft, provided with one or more vertical rollers at its bow, whereby the bow is adapted to move freely along the stern of the craft, in combination with mechanism, substantially such as described, for shifting the bow of the boat, as explained.

6. In combination with a boat having eyes or bearings *c c d* on its stem or bow and elongated shaft or axle E, and a roller, *b*, removable from said shaft, as described, whereby it is adapted to be placed at different heights.

DONALD A. McDONALD.

Witnesses:

WILLIAM W. DODGE,
WALTER S. DODGE.