S. MARDEN.

Vibrating Propeller.

No. 196,240. Patented Oct. 16, 1877.

Fig. 1.

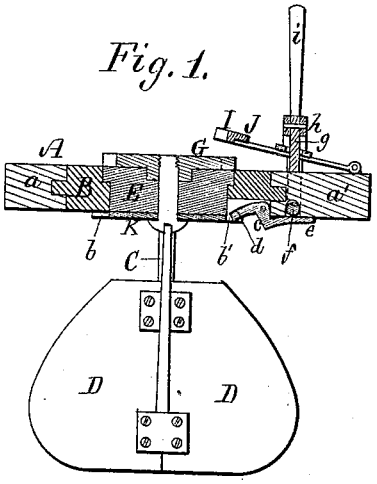


Fig. 2.

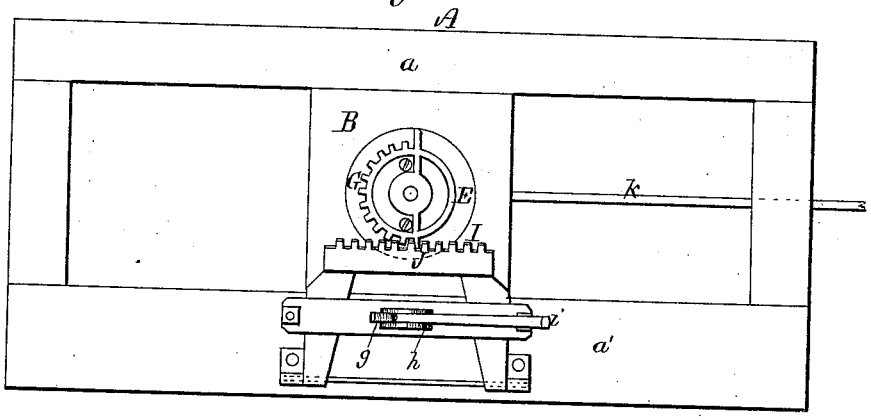
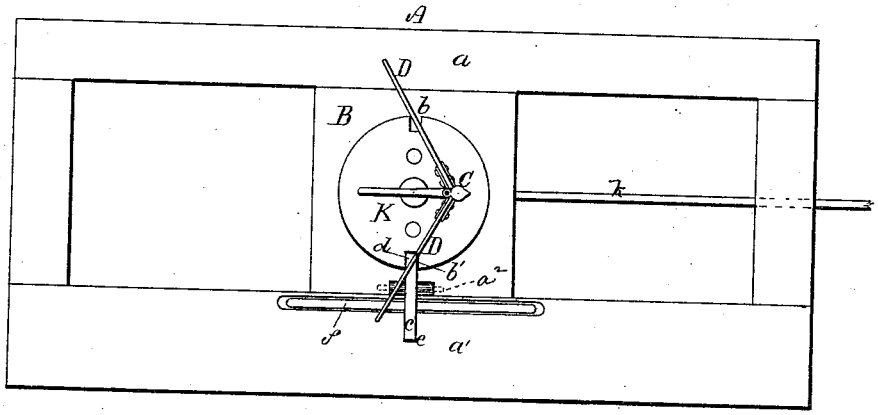


Fig. 3.



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UNITED STATES PATENT OFFICE.

SAMUEL MARDEN, OF NEWTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF HIS RIGHT TO C. W. LORD, OF SAME PLACE.

IMPROVEMENT IN VIBRATING PROPELLERS.

Specification forming part of Letters Patent No. **196,240**, dated October 16, 1877; application filed September 10, 1877.

To all whom it may concern:

Be it known that I, SAMUEL MARDEN, of Newton, Middlesex county, Massachusetts, have invented certain Improvements in Propellers for Navigable Vessels, of which the following is a specification:

This invention, which is designed to supersede paddle-wheels as a means of propelling navigable vessels, consists, primarily, in a pair of blades or vanes, pivoted to the lower end of an upright shaft, which, in turn, is suspended from a cross-head or carriage which travels to and fro on suitable guides or ways affixed to the guards of the vessel, the vanes being so arranged that, as they move in the direction which the vessel is taking, they close together, and present little resistance, but, when driven in the opposite direction, expand automatically, and offer an extended surface to the water, and impel the vessel forward, these strokes being repeated, alternately, at a rate of speed adapted to the required speed of the vessel.

The invention further consists in mechanism for reversing the position and presentation of the blades when it is desired to back the vessel or to turn her about, such reversing mechanism being as hereinafter stated.

The drawings accompanying this specification represent, in Figure 1, a cross-section, in Fig. 2 a plan, and in Fig. 3 an under-side view, of mechanism embodying my invention.

In these drawings, A represents a rectangular horizontal frame, which is to be applied to the guards of the vessel upon each side, in the place occupied by the paddle-wheels of side-wheel steamers; or the side rails *a a* of the frame A may represent rails applied to the guards of the vessel, as in either event they constitute ways or guides for the cross-head B, to be explained. This cross-head is a substantial metallic block, disposed between the ways or slides *a a*, and adapted to slide to and fro between them and be guided by them, after the manner of piston cross-heads of steam-engines.

Within the center of the head B, I swivel the upper end of an upright shaft, C, which thus becomes suspended from and below such head; and to the lower end of said shaft I pivot, at their inner edges, two twin-shaped paddles or vanes, D D, in such manner that, when forced in one direction through the water by the movement of the shaft at the hands of the cross-head, they shall fold closely together and offer little resistance to the water, but, when forced in the opposite direction, shall expand into an extended surface and offer great resistance to such water, and by this resistance serve to propel the vessel forward.

As it is essential to provide a propeller of this character with means for changing the position of its vanes, and reverse the direction of their impact with the water—as, for instance, in changing the direction of the vessel in backing, in which the vanes of both propellers are to be changed; or in the event of desiring to turn the course of the vessel to a considerable extent, or put her about, when one propeller is allowed to act without change and the blades of the other reversed—I proceed as follows in carrying out one plan by which the reversal of each or either propeller may be accomplished.

The upper extremity of the propeller-shaft is secured to one side of a circular head or disk, E, which is disposed in a cavity created in the top of the cross-head B; and to the top of this head E, I secure a sectoral or circular plate, F, having a segmental (in this case a half-circle) toothed rack or pinion, G, cut upon its periphery, while operating in connection with this rack is a straight-toothed rack, I, cut upon the edge of a tilting bar, J, which is hinged at its outer edge to the upper surface of one of the guides or ways a^1, and so situated with respect to the sectoral rack or pinion G that when lowered into the same plane as the latter the teeth of the two shall engage, the result of this engagement being that, as the cross moves across the ways, the pinion, and with it the disk E, shaft C, and propeller-blades D D, are rotated to the extent of half a circle, and the position of said vanes thereby reversed.

To securely hold the propeller-blades in their due position fore and aft the vessel, I dispose upon the under side of the cross-head B, and opposite the disk E, a second circular plate, K, which is secured to the former, and turns with it, and I cut in opposite sides of this stop-

plate K a notch, *b* or *b'*; while to operate with these notches, and to engage one or the other of them, according to the direction in which the propeller-blades are turned, I pivot to one edge of the cross-head B, as shown at a^2, a tilting lever or latch, *c*, the inner and shorter arm or nose *d* of which engages the notch *b* or *b'*, while the opposite arm *e* extends outward below the way or guide a^1.

By depressing the arm *e* of the latch *c* the nose of such latch is raised above the plate and out of the notch *b*, the said plate K, and with it the disk E and propeller shaft and blades, being free to be revolved by suitable means until a half-revolution is effected, and the opposite notch arrives at, or coincides with, the latch, when the latter is released, and its nose enters the last-named notch.

When the rack-bar J is lowered, in the act of reversing the position of the propeller shaft and blades, it is necessary that the locking-latch *c* should be released from its hold upon the stop-plate K; and in order to effect this release automatically and synchronously with the engagement of the rack-bar with the sectoral pinion G, I secure to the under side of the rack-bar a horizontal bar or rod, *f*, which extends downward through a slot or opening in the adjacent guide a^1, and when in an inactive position—that is, when the rack-bar is elevated and out of engagement with the pinion—does not protrude below the lower face of such guide.

When the rack-bar J is lowered, in the act of engaging the pinion, the rod or bar *f* is also lowered, in consonance with it, below the under side of the guide a^1, the result being that, as the latch *c* in its approach wipes against this bar *f*, the longer arm of such latch is lowered and the stop-plate K released, when the rack and pinion engage, and the position of the propeller shaft and blades is reversed, as before stated. It is observed that the length of the rod or bar *f* is such that it acts upon the latch *c* slightly in advance of the contact of the rack and pinion, in order that the release of the pinion may take place before its rotation by the rack begins.

The rack-bar J and rod *f* are to be situated centrally of the path of movement of the cross-head, in order that the reversal of the propeller-blades may be effected at either traverse of such cross-head, while to effect the requisite raising and lowering of the rack-bar J, I erect upon the guideway a^1 a post, *g*, which extends upward through an opening in such bar, and to the top of the post I pivot an eccentric, *h*, the longer arm of such eccentric being provided with a handle, *i*, by which it may be depressed and held with considerable power.

When it is desired to lower the rack-bar into engagement with the pinion G, the handle or lever *i* is depressed, and the eccentric *h* accomplishes the lowering of such rack-bar.

The lever *i*, by suitable connections, is to be under the control of the pilot or captain of the vessel, and by means of it the movements of the vessel, whether backing and filling, or turning about in her course, are perfectly under the control of such pilot or captain from the deck or wheel-house. For this reason the present complicated system of signaling to the engineer, and the delays and mistakes sometimes attending it, are done away with, and the only duty of such engineer is to attend to his engines.

To effect the requisite reciprocating movements of the cross-head and propeller to and fro of the guides $a\ a^1$, I secure to one end of such cross-head a rod, *k*, the other end of such rod being connected to the piston of a steam-cylinder, for instance.

I propose to employ as a motive power whereby to drive the cross-head B a steam-cylinder with suitable valve and connections—such, for instance, as are employed in steam-pumps now in general use, in which the valve is operated by an arm applied to the piston-rod, such piston-rod being connected to the cross-head B of my propeller. I prefer a power of this nature for the reason that such a motor is very simple and strong, and transmits its power directly, and is not liable to derangement, and is much less expensive than a marine engine.

I do not restrict myself to the use of the tilting rack-bar and segmental pinion herein explained as a means of effecting the reversal of the propeller-blades, as it is evident that various equivalents of such devices may be employed, since they are but details of mechanism to effect the movements of an important element in my invention.

I claim—

1. The mechanism herein explained for effecting the reversal of the blades D D, the same consisting of the segmental circular rack or pinion G and tilting rack-bar J, the pinion being affixed to, and operating, the propeller shaft and blades, and the rack-bar hinged to the guideways, and engaging at proper times the pinion, the whole being substantially as and for purposes stated.

2. The tilting latch or locking lever *c*, in combination with the stop-plate K and rod *f*, substantially as and for purposes stated.

3. The combination of the rack-bar J and sectoral pinion G with the propeller shaft and blades and intermediate mechanism, substantially as described, whereby, upon descent of the said bar to engage the pinion, the lock which holds the propeller in position is released automatically, the whole being essentially as and for purposes stated.

4. The combination, with the rack-bar J, of the eccentric *h* and lever *i*, substantially as and for purposes stated.

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