J. T. Martin.

Vibrating Propeller.

No. 51,955. Patented Jan. 9, 1866.

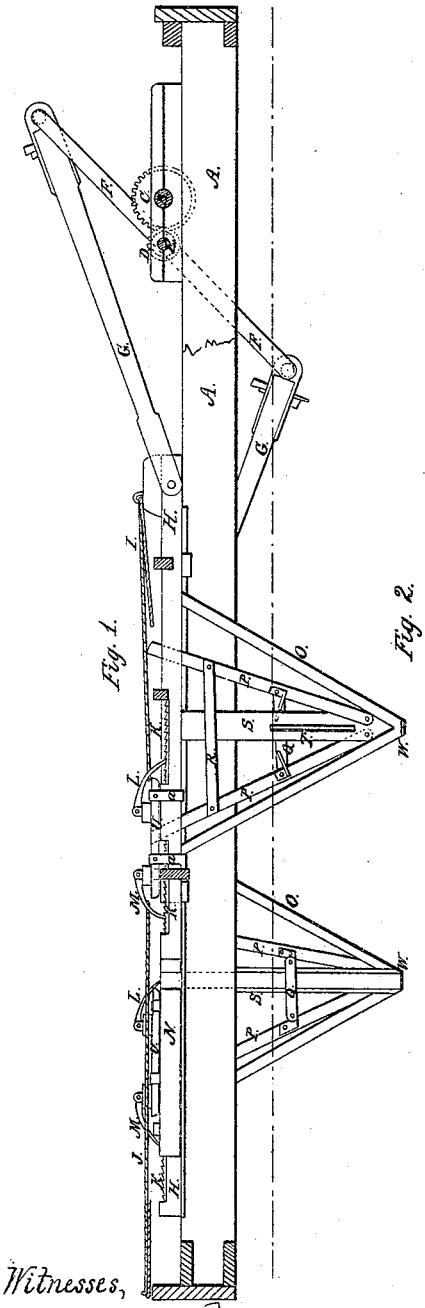

Fig. 1.

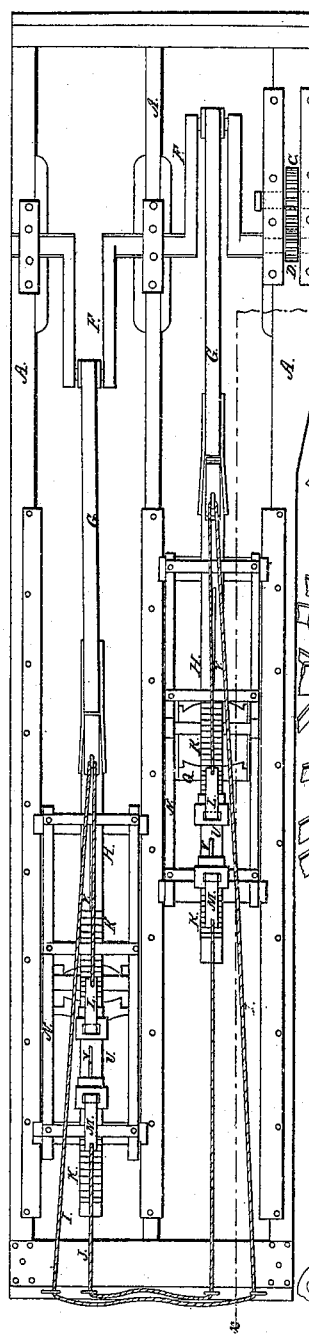

Fig. 2.

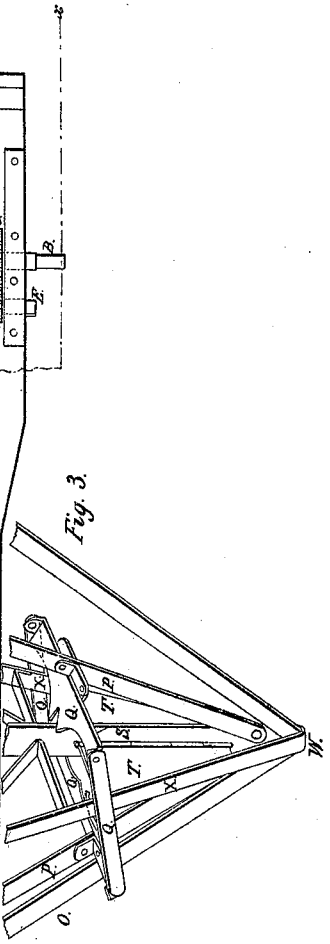

Fig. 3.

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JOSEPH T. MARTIN, OF NEW YORK, N. Y.

PROPELLER.

Specification forming part of Letters Patent No. **51,955**, dated January 9, 1866.

To all whom it may concern:

Be it known that I, JOSEPH T. MARTIN, of the city, county, and State of New York, have invented a new and useful Improvement in Propellers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation, in side view, of a pair of propellers made according to my invention, the view being partly in section on the line *x* of Fig. 2. Fig. 2 is a plan. Fig. 3 is a detailed view of the frame and buckets and floats of one of the propellers.

This invention relates to that kind of propeller which reciprocates in a line parallel with the axis of the vessel to which it is applied; and it consists in a novel construction of the buckets and of the frame in which they are suspended, and in novel means for operating the buckets for reversing the direction of the vessel.

In the example here shown of my invention I have represented two propellers and their frames suspended from the frame of the usual guard on one side of a steamboat. This frame, or the parts thereof which are represented, furnishes ways A, on which the carriages N of the propellers are reciprocated, their reciprocations being effected by means of the pitmen G G, cranks F F, shafts E B, and gear-wheels C D, each of which parts may be of any convenient construction and be modified in any way to suit the circumstances of position, &c., in which the propeller is placed. The ways A are protected with metallic plates in the usual way, and the propeller-frames may be provided with friction-rolls to enable them to be moved thereon with ease and economy of wear, although I have not here shown such rolls.

The letters N N designate two sliding frames, which carry suspended from beneath them the bucket-frames O O. These sliding frames N are guided and supported on the ways A above mentioned, and are reciprocated by means of their connections with the pitmen G. The frames N should be made strong and stiff, so as to be able to endure the strain to which they will be subjected when the propellers are in operation, and they are held down to the ways by any suitable means, so as not to be liable to displacement either vertically or laterally. The middle of each sliding frame has a stout bar or stringer-piece, H, firmly secured to the frame, so as to be made part thereof. They extend in this example beyond the side pieces of the said frames, and to their inner ends the pitmen G are attached.

From each of the sliding frames N is suspended a bucket-frame, O, which may be varied in form and dimensions, and which in this example is brought to a point at its lower end by joining the bars of which it is composed, as seen at W, so that it resembles in outline an inverted cone. Some of its bars are connected with the middle bars, H, of the sliding frames and some with the side bars of said frames, and one of them, S, in each bucket-frame is vertical, being secured by its upper end along the middle of the width of bar H. The vertical bars S are stronger than the others, and they are placed parallel with the sliding frame, so that their edges are presented to the water in the reciprocations of the propeller. The other bars are also arranged so as to present their edges to the water; but instead of using flat bars, as here shown, round or angular bars may be used.

To the flat sides of the vertical bars S, I hinge buckets T, whose shape resembles a triangle whose vertex is downward, they being made of this shape to enable them to swing in the triangular space formed by the vertical bar S and the diagonal bars X X in the front and rear sides of the bucket-frame O. The buckets are hinged in such a manner as that they are capable of swinging through an arc of about one hundred and eighty degrees, so that they may, when the propeller-frame is moved backward, lie snugly against the faces of the vertical bar S.

The letters P designate the vibrating bars, pivoted to the lower part of bar S at its opposite edges and below the buckets, and carried up within outer bars of the bucket-frame through slots V V in the sliding frames N N, in which slots the bars P are made to vibrate by the motion of pawl-carriages U, hereinafter mentioned.

The letters Q designate a four-sided frame, one for each bucket-frame O, which is rigidly connected to the vibrating arms P, the outer

parts thereof being here shown outside of the bars X. The transverse portions of the frame Q, which are immediately connected to the bars P, are curved inward on either side of the last-named bars to allow the buckets to swing inward against the faces of the bar S when the buckets are moving backward, and they are otherwise so made as to allow the bars P, with which they move, to come close up to the edges of the bars S and to serve as stops to arrest the vibration of the buckets toward that bar P which has been brought up as far as it can go toward the vertical bar S. From this construction it will be seen that the vibration of the bars P determines which way the buckets are allowed to swing, since, if the right-hand bar P in Fig. 3 is brought up to the edge of bar S, the transverse part of the frame Q, fixed to that bar P, will prevent the buckets from swinging backward in that direction, but will allow them only to stand open, as shown in Fig. 3. Therefore, if, when these parts are in this position, the sliding frame N is moved toward the left, the buckets will be expanded to their widest extent, and so present the greatest resistance they are capable of to the motion of the propeller through the water. The sliding frame will in the next place, by the revolution of crank F, be drawn toward the right, when the buckets, not being arrested by the transverse part of frame Q, which is attached to the left-hand bar P, will be allowed to yield to the pressure of the water, and will swing clear open until they rest against the face of bar S. In this way the reciprocations of the frame N will cause the vessel with which they are connected to be moved continually forward, the buckets being folded back when moving in one direction, and being spread out to their widest extent and held so while the propeller is moving in the opposite direction.

The bars P and their frames Q are reversed by means of detent-carriages U placed on the middle stringer-pieces, H. These detent-carriages U are mounted on top of the pieces H above one of the slots V, and are held thereto by straps *a*, which surround said piece H, but are so arranged as to permit the pawl-carriages to move on them. The detent-carriages are themselves slotted in continuance of the slots V, above which they are placed, so that the left-hand bars P can pass up through the pawl-carriage, as shown in Fig. 2. The detent-carriages U have each detents L and M extending in different directions from their ends and falling down upon so as to engage with the teeth of rack-plates K, placed on the stringer-pieces within the range of motion of the detents. Those racks which are engaged by the detents L have their slopes inclined in a different direction from those that are engaged by detents M. The carriages are provided with cords or chains I and J, which afford the means of changing their positions on the pieces H, said cords or chains being fastened to the free ends of the detents, so that when they are pulled the detents are thereby raised out of the racks, and the carriages U can then be moved on the pieces H to new positions. The cord I is fastened to the pawls L and the cord J to the pawls M. By means of this arrangement the vibrating bars of both propellers are moved toward the right or the left simultaneously, and the buckets are thereby reversed in their actions, thus accomplishing the same result as is commonly attained by reversing the engine or motive power, but without requiring the engine to stop and without causing any cessation in the movements of the sliding frames N. Only one of the bars P of each bucket-frame is engaged in the slot V of the pawl-carriages, the other bar being guided in a slot, V, made only in the string-piece H.

It will be observed that the opening and closing of the buckets are effected by the resistance of the water to their passage through it, and the direction in which the vessel is propelled is not dependent on the direction in which the engine revolves, but upon the direction in which the buckets open and close, which latter is determined by the position of the stops or transverse parts of the frames Q.

I have here shown a mode of applying my invention to the guard of one side of a vessel only. A like apparatus is to be applied to the other side, and both can be driven by the same engine.

Among other advantages of this invention is this, that a vessel can be turned with ease by causing the buckets on one side to back while those on the other side are driving her ahead, the engine-gear being left unchanged.

What I claim as new, and desire to secure by Letters Patent, is—

1. In propellers which operate by means of buckets or floats which are alternately opened and closed by the resistance of the water, changing the direction in which the buckets open and close by means of vibrating bars P, carrying a transverse frame, Q, which arrests the buckets, substantially as above described.

2. The triangular buckets T, in combination with the conical bucket-frame O, within which they swing, substantially as above described.

3. The detent-carriages U, carrying detents L and M at opposite ends, in combination with the racks K and cords I J, substantially as above described.

4. The detent-carriages U, in combination with the vibrating bars P, which carry the transverse frame Q, substantially as described and shown.

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