H. R. Worthington.

Wheels in Channels.

No. 3,424. Patented Feb. 2, 1844.

Fig. 2.

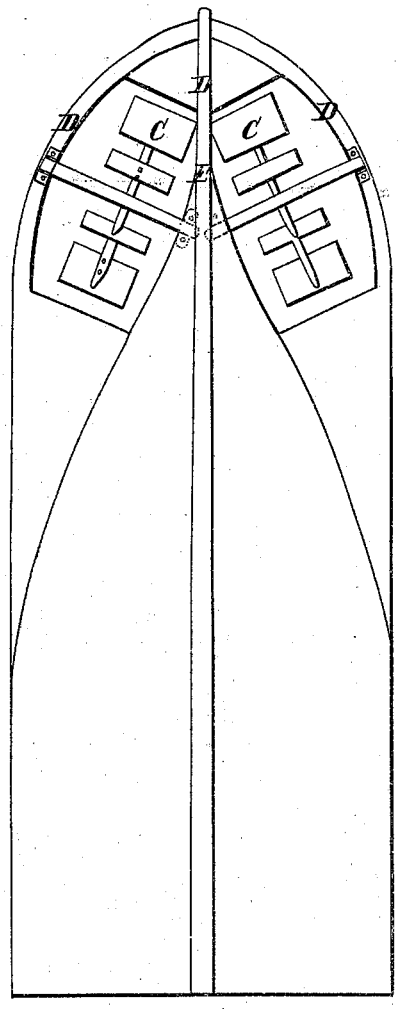
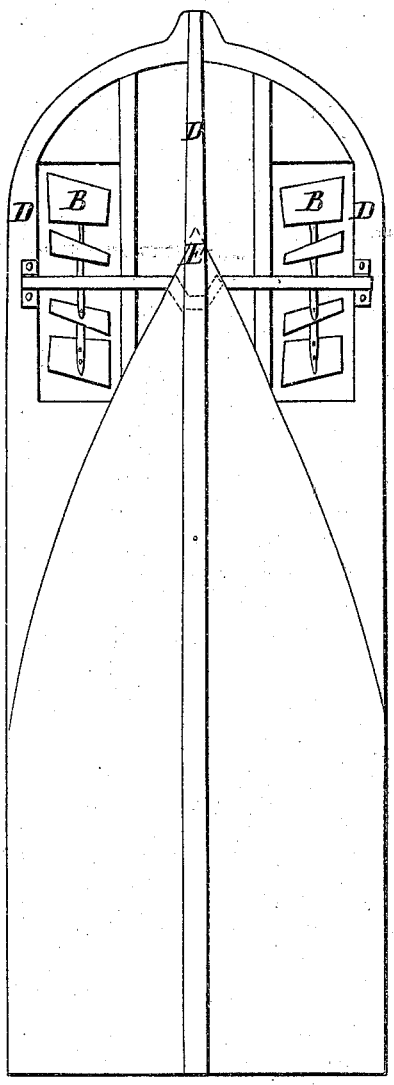


Fig. 1



UNITED STATES PATENT OFFICE.

HENRY R. WORTHINGTON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN PROPELLING CANAL AND OTHER BOATS.

Specification forming part of Letters Patent No. **3,424**, dated February 2, 1844.

To all whom it may concern:

Be it known that I, HENRY R. WORTHINGTON, of the city of Brooklyn, in the State of New York, have invented certain Improvements in the Manner of Constructing and of Propelling Boats and other Vessels Actuated by Steam or other Power, (for which manner of constructing and propelling vessels Letters Patent of the United States were granted to Benjamin D. Beecher under date of the 31st day of December, in the year 1839;) and I do hereby declare that the following is a full and exact description of my improvements thereon, for a perfect understanding of which reference may be had to the specification of the said patent as granted to the said Benjamin D. Beecher.

The following description, together with the accompanying drawings, refer more particularly to the application of my improvements to boats constructed for canal-navigation, as was the case with the improvements patented by Mr. Beecher; but they will also be found useful in vessels navigated in other waters.

The propellers used by me are, as provided by said Beecher, to be so constructed and arranged as "by their particular position and mode of action to withdraw the water from the bows of the vessel and to give it a direction which will lessen its retarding action and carry it most directly to the stern," and when employed upon canals to prevent the formation of the bow wave or swell, "thereby leaving the water more smooth and undisturbed than by any other mode of propulsion hitherto essayed." In carrying this design into operation two spiral or screw wheels were used by Mr. Beecher, the shafts of which wheels were inclined toward each other as they approached the stern of the vessel, this position having been given to said shafts with a view to the causing of the water upon which propellers operated to pass off from the vessel in the direction of the shafts, and thereby to divide or displace the water at the bow for the purpose of diminishing the "plus" or increased hydrostatic pressure always operating against a vessel in motion, and of increasing the pressure at the stern by throwing the water thus taken from the excess at the bow to supply the deficiency or vacuity at the stern resulting from the progressive motion of the vessel. The bottom of the boat, as constructed by Mr. Beecher, was also carried forward under the propellers and nearly in contact with them, the form of the bows having been adapted thereto, and this, it was believed, would aid the action of said propellers in producing the desired effect. In using a boat of this construction which has been under my control I have found that the direction which it was intended to give to the water was not so effectively communicated by the propellers described by Mr. Beecher as it might be by my improved construction and arrangement, where the leaves or buckets of the propellers act uniformly upon the water, so as to pass it from them and from the bows in the desired direction. I have also found that the extending of the bottom of the boat forward under the propellers has a tendency to cause and does cause a portion of water to accumulate and be detained between the rear of the propellers and said extended bottom, thereby counteracting in some degree its free passage toward the stern. In my improved vessel I therefore construct the bows in the usual manner, omit the extended bottom, and arrange the propellers in one of the modes to be now described or in any manner which is substantially the same.

Figure 1 represents a boat having two propelling-wheels B B, which are placed on an axis crossing the boat at or near its bows. To the buckets of these propelling-wheels such degree of obliquity is given as shall cause them by their action upon the water to pass it off from the boat in the same direction with that intended to be given to it by the spiral propellers employed and described by Mr. Beecher. This angle may be varied; but one of forty-five degrees (more or less) will answer the purpose. In this mode of arranging the propellers the action of the engine is communicated to them by direct crank connection without bevel-gearing or any substitute therefor, thereby obviating much mechanical complexity and removing a great objection to the propellers, which have their axes inclined to each other.

In Fig. 2 I have shown a modification of the same principle, in which two paddle-wheels C C of the ordinary construction—that is, having the planes of their paddles passing in a direct line from side to side of

the wheels—may be made to give the required direction to the water. These wheels have their axes placed at such an angle with each other as shall cause their planes to stand in the direction which it is desired to give to the water in its passage off from the bows; but the plan first described is preferred by me, as bevel-gearing or some device producing a like result is required in the latter. This, however, has the advantage of compactness and the saving of room and flotation.

With either of the above-described modes of carrying the improvements into operation boats already built or others which may have their bows formed on the most approved models may be used, while the kind of spiral wheels employed by Mr. Beecher requires the bows to be of a peculiar form especially adapted to said propellers. Upon my plan, also, I can use wheels of larger diameter and still keep them when necessary within the line of fifteen feet, or of such other as shall not exceed the breadth of beam or guards of the boat.

Having thus fully described the nature of my improvements and the manner in which the same are carried into operation, what I claim as new therein, and desire to secure by Letters Patent, is—

The combining with a canal or other boat having bows formed in the ordinary way of two propelling-wheels constructed as herein described and represented and in the manner made known, said wheels being located at or near the bows and in advance of the greatest sectional width of the boat, their buckets also being so arranged that the plane of their surfaces when vertical and acting upon the water shall be at right angles, or nearly so, with the general line of the vessel's bows, so that they may displace or divide the water and cause it to pass off from the bows of the boat in the direction designated, and for the purpose above fully set forth.

HENRY R. WORTHINGTON.

Witnesses:

THOS. P. JONES,

WM. H. BISHOP.