2 Sheets—Sheet 1.

L. ALVORD.

Chain-Wheel Propeller.

No. 209,541. Patented Nov. 5, 1878.

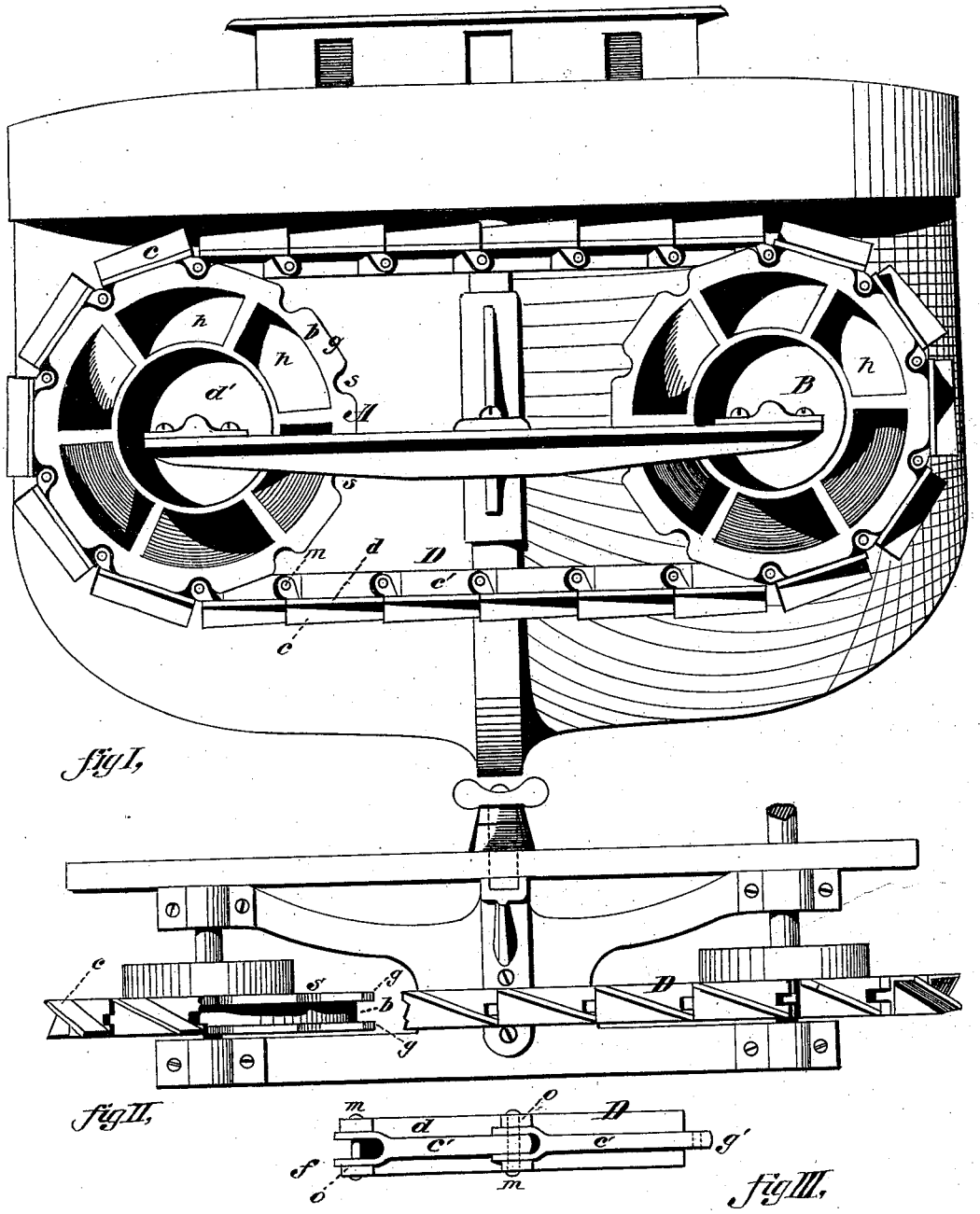

Fig I,

Fig II,

Fig III,

Witnesses,
M. H. Burrall
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Inventor
Luther Alvord
By R. F. Hyde, Atty

2 Sheets—Sheet 2.

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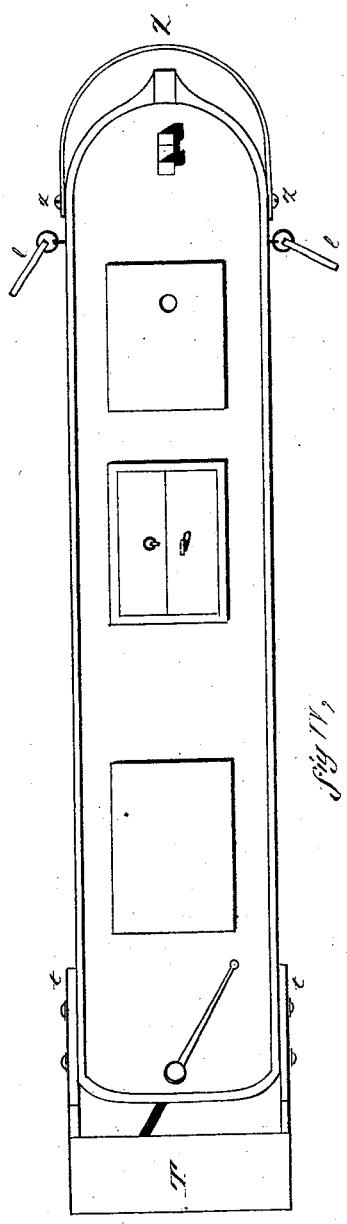

Fig. II.

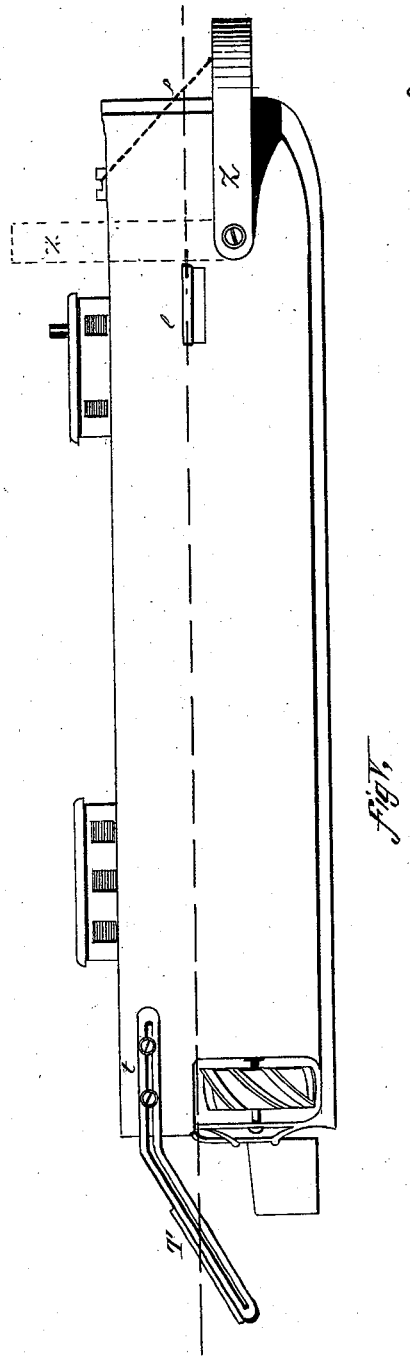

Fig. I.

Witnesses
Edward Morris.
L. V. Smith

Inventor
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UNITED STATES PATENT OFFICE.

LUTHER ALVORD, OF SOUTH HADLEY, MASSACHUSETTS.

IMPROVEMENT IN CHAIN-WHEEL PROPELLERS.

Specification forming part of Letters Patent No. **209,541**, dated November 5, 1878; application filed April 8, 1878.

To all whom it may concern:

Be it known that I, LUTHER ALVORD, of South Hadley, State of Massachusetts, have invented an Improved Chain-Wheel, of which the following is a specification:

My invention consists more particularly of improvements upon the invention for which Letters Patent of the United States were granted me February, 1876, and numbered 174,178, and have for their object the construction of an endless chain of peculiar pattern, in combination with two or more carrying-rolls, so constructed as to augment the power of the connecting-chain as a screw, when employed to carry floats, and so as to form a propelling apparatus, in which two or more wheels are connected to work in unison, and through a connection that can itself re-enforce their power; and although this device is more particularly intended as a propeller for canal-boats and other vessels, it can, through slight modifications, not affecting its principle as an invention, be made to scour channels, remove sand, and perform similar analogous functions.

In the drawings, Figure I is an elevation of my device as arranged in the stern of a vessel. Fig. II is a plan view in partial section, and Fig. III is an enlarged detail view; Figs. IV and V showing a canal-boat with my improvements.

In Fig. I, the two wheels A B being counterpart, it will be sufficient to describe the construction of one.

Between the hub *d* and the perimeter *b* are placed the spokes *h*, in the form of floats or blades, at such angle to the axis of the wheel as will cause them to act upon the water as a screw to the best advantage. I prefer a pitch of forty-five degrees for such angle as giving the best results. The perimeter *b* has extending from it the two flanges *g g*, which, in effect, form, with the perimeter, a channel in the face of the wheel. This is shown in Fig. II.

It will be seen that a wheel so constructed will, when submerged and revolving, form a propeller to a vessel, to which it is attached in a direction coincident with its axis. The chain D is of a vertibrate form, in which each link consists of a plate, *d*, carrying a blade, *c*, set at a right angle to its face and at an angle to the axes of the chain itself, approximating to that at which the blades *h* of the wheel A B are set. The plate *d* rests upon and forms part of the bar *c'*, which is the link proper, as one of its ends, *f*, is formed into a recess, to receive the end *g'* of the adjacent link, while its other end, *g'*, is received in a similar recessed end, *f*, of another link. This is shown in Fig. III. The ends *g'* and *f* are secured by rivets or bolts *m*, which form journals, to permit a chain of blades so constructed to be flexible; but as the hinges *m* are below the plates *d*, (or eccentric thereto,) whose ends come in contact when the plates themselves are in the same plane, as shown in Fig. I, it will be seen that the chain is flexible in only one direction, and that it is in effect a solid bar or angle-iron in every other. At the ends *f* the stock of bar *c'* is increased to form lugs *o*. The flanges *g g* of the wheels A B have the corresponding depressions *s* formed in them at a distance apart corresponding to the distance between the lugs *o* of the chain, and the edges of the flanges intermediate between the depressions *s* are made straight. The chain D, when it runs onto a wheel, has its lugs received in the depressions *s*, while the under surface of the plates *d* bear on the corresponding plane surfaces of the flanges *g g*, and the bar portion *c'* is received in the channel between the flanges, there being no possibility of the chain slipping in any direction at any time.

It will be seen that two or more wheels, as described, connected by such a chain, and having power applied to an end or intermediate wheel, will act on a large surface of water in unison, and with a compactness that could not be obtained in one wheel having the same float-surface, while at the same time in deep water the wheels can be lowered to act all in a dense medium, or can, in shallow water, such as in a canal, be lifted above the level of the keel, and be still entirely submerged.

From the strong construction of the chain it can be used to deepen channels, and upon modifying the form of floats upon the chain the mechanism may be used to bring mud or sand to the surface. In Fig. 5 it is shown drawn into a recess in the stern of a canal-boat, to be entirely out of the way when the boat goes through a lock.

Fig. II shows the wheels so hung that they may be lowered or raised.

My invention also relates to improvements in the construction of canal-boats, having for their object the insuring of a proper position being taken by the boat in the water, to economise the power required for propulsion, to increase the speed, and to do away with swell accompanying the moving canal-boat and so injurious to the canal-banks.

In Fig. IV a movable stern-board, T, is shown, arranged transversely to the longer diameter of the boat and across the stern, so that its frame ends *t t*, sliding in their supports upon the side of the boat, admit of the stern-board T being extended to be submerged in the water or entirely withdrawn from it. This board T may be operated by a lever, or in any other convenient way, and its object, when partially or entirely submerged, is to correct the tendency of the propeller-wheel in the stern to force the bow toward the surface of the water, and consequently cause the keel to form an angle with the surface of the water, instead of remaining parallel thereto, as the keel, when so inclined, causes a much larger surface to be brought against the water, with increased resistance as a result, accompanied, also, with a much larger preceding wave or swell; and to cause the boat to maintain its proper horizontal position, to avoid these results, the board T is submerged behind the propeller, at the angle most suitable to serve as a tiller, to effectively counteract the tendency of the bow to rise.

Fig. V shows the board T in profile, and also the adjustable fastening for the arm *t* upon side of the board.

Fig. IV shows a movable false bow, Z, which is hinged at *z z* upon each side of the boat, near its bow, and projects in front of the boat when lowered into the water, as shown in Fig. IV. It has also secured to its front a cord or chain, *p*, or equivalent means, for swinging upon its axes *z z*, to raise it out of the water when the boat is not in motion or passing through a lock. The bow Z is so formed, as seen in Fig. V, to rise over the boat, entirely out of the water; and it consists of a broad wooden or metallic band, conforming in general outline to the bow of the boat. Its action, when lowered into place and the boat is in motion, is to, upon its inner face, receive the reflex wave made by the bow of the boat and of its bottom, and prevent it from passing beyond and ahead of the boat.

Fig. V shows the pieces *l l*, hung upon pivots upon each side of the boat, at one of their ends, so that when the boat is in motion these pieces hang out from the boat, and, floating upon the surface, cut down all swell that would otherwise find its way to the banks. They are hung at the water-line, as shown in the drawings, and I prefer to form them of metallic plates, having one of their edges embedded in a floating wood cleat, so that when held upon the water by these cleats the plate part will extend below the surface of the water, to more effectually cut off any swell.

By these means I construct a canal-boat in which all swell that could injure the banks is cut off, and which at the same time, from the position in which it is held in the water when in motion, can have the maximum speed imparted to it.

What I claim is—

1. Two or more propeller-wheels, A B, having the floats *h*, held in place between a perimeter and hub, when geared together by an endless chain working upon said perimeters to move in unison, substantially as shown and described.

2. The combination, with two or more propeller-wheels, A B, constructed as shown and described, of an endless chain provided with blades and engaging with the perimeters of said wheels, to cause them to move together.

3. The chain D, constructed as shown and described, of the plates *d*, blades *c*, links *c'*, and lugs *o*, in combination with the flanges *g g*, depressions *s*, intermediate bearing-surfaces of the flanges, and channel between them, when constructed on one or more wheels, A B, substantially in the manner and for the purpose set forth.

4. The combination, with the stern of a propeller, of the adjustable inclined board T, in the manner and for the purpose set forth.

LUTHER ALVORD.

Witnesses:
R. T. HYDE,
T. M. BROWN.