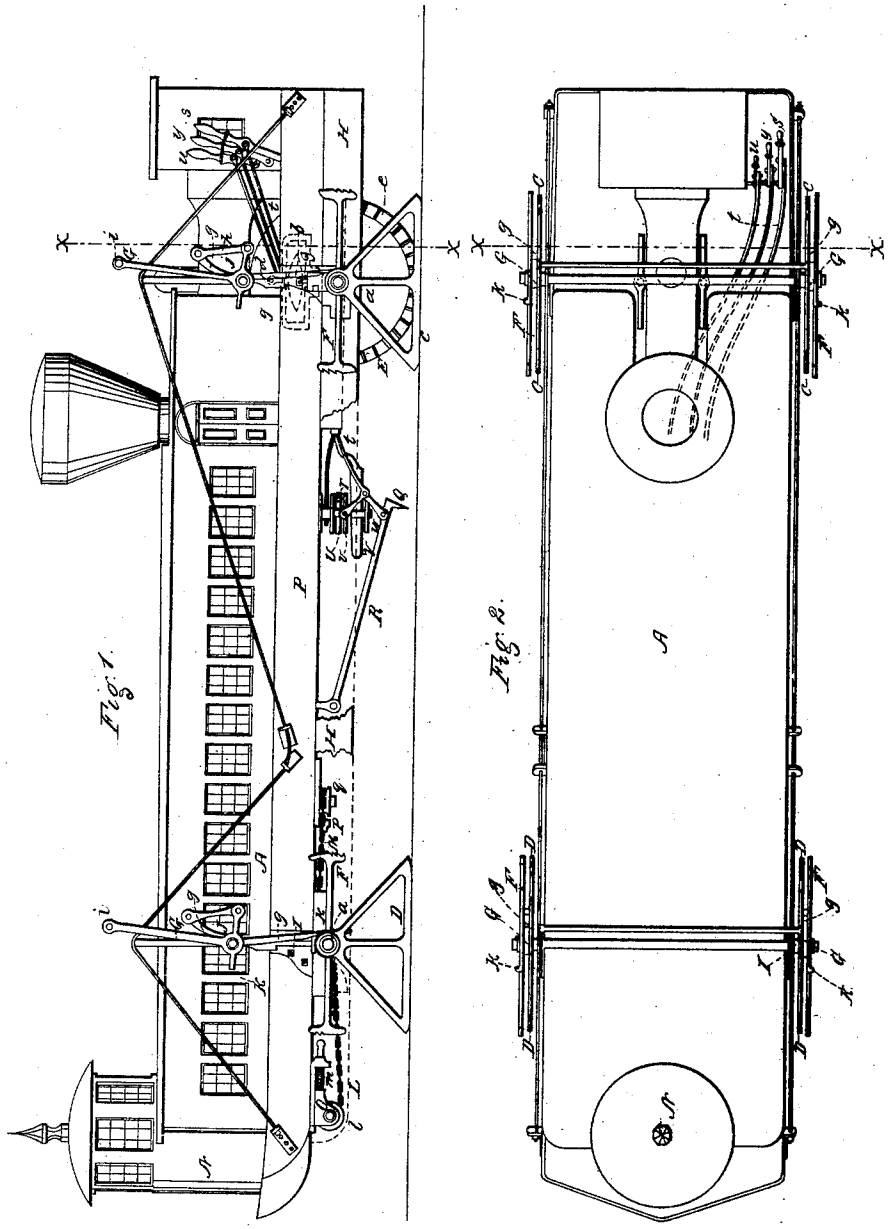
2 Sheets—Sheet 1.

N. WIARD.

PASSENGER AND FREIGHT ICE BOAT.

No. 26,960. Patented Jan. 24, 1860.



Witnesses
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Thos. D. Lowe

Inventor:
Norman Ward

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

2 Sheets—Sheet 2.

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PASSENGER AND FREIGHT ICE BOAT.

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Fig. 3.

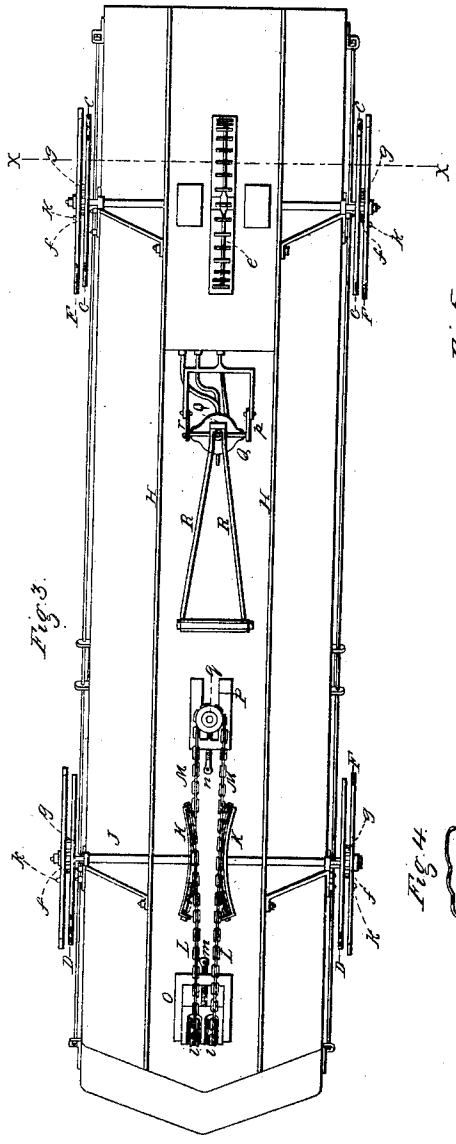


Fig. 5.

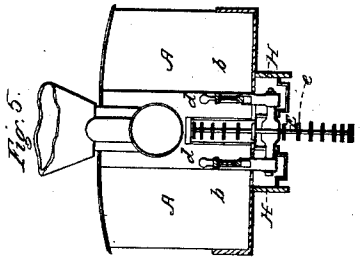
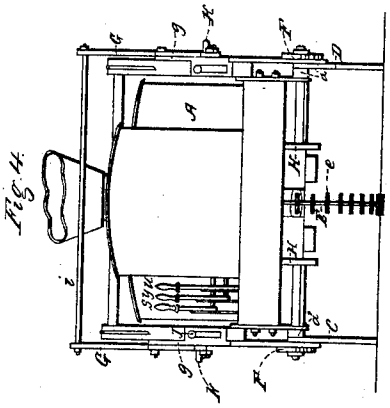


Fig. 4.



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UNITED STATES PATENT OFFICE.

NORMAN WIARD, OF JANESVILLE, WISCONSIN, ASSIGNOR TO DANIEL J. TOWNSEND AS TRUSTEE, OF NEW YORK, N. Y.

LOCOMOTIVE-VEHICLE FOR RUNNING ON ICE OR IN WATER.

Specification of Letters Patent No. 26,960, dated January 24, 1860.

To all whom it may concern:

Be it known that I, NORMAN WIARD, of Janesville, in the county of Rock and State of Wisconsin, have invented certain Improvements in Boats for the Conveyance of Passengers and Freight upon the Ice, the construction and operation of which I have described in the following specification and illustrated in its accompanying drawings with sufficient clearness to enable competent and skillful workmen in the arts to which it pertains or is most nearly allied to make and use my invention.

The object of my said invention is so to combine a boat with runners and skates as to propel it on the ice by locomotive steam power or other equivalent motor for the purposes of general travel and transportation during the winter in northern climates, and have it under reasonable control for such purposes, and at the same time give it the requisite buoyant capacity of a boat for safety in case the ice should break.

My invention is represented in the accompanying drawings as follows:

Figure 1 is a side elevation of my improved machine. Fig. 2 is a plan of it. Fig. 3 is an underside view. Fig. 4 is a back end view. Fig. 5 is a transverse section through the line X X, as drawn across Figs. 1, 2 and 3.

A is the main body or upper fixed portion of the machine. This is conveniently arranged for carrying passengers or freight, its construction being varied to suit the service for which it is intended.

B is a water tight iron boat made in any convenient form, though the form represented I deem best adapted to the purpose for which it is intended. It is the whole width of the cabin or storeroom, and may be more, should it be deemed desirable or necessary for the purpose. It may be divided into water tight compartments if desired to prevent any injury which may befall one part of it from interfering with the buoyancy of the remainder. This boat B is supported by runners or skates C C and D D which skates or runners are hung upon journals or bearings *a* in such a manner as to allow them not only to vibrate to accommodate the inequalities of the ice, but also to be folded entirely up out of the way should it be necessary, their construction being such as to cause them to do so upon meeting an obstruction which would make such action necessary. The boat is propelled by a traction wheel E, which is hung in yielding bearings in such a manner that it may yield in reference to the runners, and so accommodate itself to the surface of the ice over which it is passing, and to the nature of the ice so as to secure perfect adhesion. The bearings in which this wheel is hung are held down by springs *b b* to bring the wheel in contact with, and give it hold upon the ice. These springs are adjustable by means of the set screws *d* so as to give a greater or less penetration of the wheel into the ice, and consequently a stronger or weaker hold upon it as the weight of the load or other circumstances may require. This wheel is operated by two engines in the same manner as the driving wheels of a locomotive engine for railroads.

The driving wheel E has a cutting flange or edge at its periphery which is parallel to the direction in which the machine is to travel; it has also projections *e* at right angles to the edge above mentioned, to give a hold upon the ice to propel the boat forward.

The object of the flange which passes around the wheel and cuts a furrow in the direction of the travel of the boat, is to prevent lateral slip and allow me to use smooth or unfurrowed skates upon the rear truck, which very much facilitates the operation of steering the boat.

By combining the water tight boat with the runners and traction wheel, I am enabled to travel upon the ice with facility, and yet perfectly secure the safety of the freight, passengers, and crew, should the ice break. This combination also enables me to move my machine for traveling upon the ice, through the water for a short distance should emergency require.

It is well known that in certain conditions of the weather if runners are permitted to remain at rest in contact with the ice they become fastened thereto so as to require great power to separate them. To prevent this lifters (F) are employed, one for each runner which are brought to bear upon the ice and thereby lift the boat so as to clear the runners from contact with the ice. The runners or skates are each provided with a hub fitted to an axle or arm projecting from

the side of the boat. In this way each runner is not only free to vibrate in a vertical plane to adapt itself to any undulation of the ice, but in case its forward end should come in contact with some serious obstruction it will turn on its arm in the manner of a carriage wheel and thus pass over the obstruction without serious shock.

The axles or arms of the front set of runners (D, D) are attached each to a vertical axle (I) mounted in suitable boxes so that they can swivel in a horizontal plane to facilitate steering. On the axle of each runner is mounted one of the lifters (F) so as to turn thereon in a vertical plane. The lifter is of greater radius than the runner, and its ends are notched or toothed so that when brought into contact with the surface of the ice it will take hold of it and facilitate the lifting operation. On the hub of the lifter there is a ratchet wheel (*f*) which can be acted upon by a ratchet bar (*g*) to turn the lifter, the ratchet bar being connected by a joint link (*h*) with the short arm of a hand lever (G) so that when it is desired to lift the boat to clear the runners from the ice by working the hand lever the ratchet bar acts on the ratchet wheel which turns the lifter until one end of it comes in contact with and takes hold of the ice, and then it begins to lift, and when the four lifters operated in this way are brought to a vertical line the runners will be clear of the ice so that they cannot become fastened thereto. By continuing the same operation of the hand levers the boat can be let down until the runners again rest on the surface of the ice. Auxiliary runners (H, H) project from the bottom of the boat along the entire or nearly the entire length thereof, but they do not extend down low enough to be in contact with the ice when the runners or skates (C, C) and (D, D) are in place, but when these are turned up from any cause, such as already stated, or any other cause, the said runners then come into play to sustain the load on the ice, and to receive the shock and thereby prevent injury to the the bottom of the boat. And what is very important in coming to a sheet of weak ice not sufficient to sustain the load by the comparatively short skates these can be turned up to let the long runners (H, H) down to the ice. And another purpose is to facilitate the operation of getting the boat out of the water in case it should break through the ice at any time, for which operation the side skates or runners are of no use.

The driving wheel is made in a disk form, and has a cutting or sharp edge nearly or quite entirely around it for the purpose of penetrating the ice, in such a manner as to cut a furrow or channel in the direction in which the boat is being propelled, by which the boat is supported against side strain, and it is made by that means allowable to use plain or smooth skates at the rear end of the machine instead of furrowed ones. The propulsion forward is given by flanges at right angles to these.

It is plain that flanges inclined in opposite directions at an angle so as to make a zigzag track might be made to answer the same purpose, or that the middle flange I have described might be so broken as not to make a quite continuous mark, and yet the same result be accomplished substantially in the same way.

Direction is given to the boat in running, by means of the forward skates D D, which are turned by the man at the wheel in the same manner that the rudder of a ship is operated for a like purpose. The axis I upon which they are turned is placed as nearly over the middle of the runner or skate, and is hung in bearings attached to the boat. By placing this axis as nearly as possible over the runners they are much more easily guided than they would be if this axis was so placed as to require that one runner should be forced considerably forward in giving a change to the direction of motion.

In carrying out the design of the steering apparatus I attach arms J to the runners D, which arms J terminate at the inner end and in segments K, to which the steering chains L and M are attached as shown. The chains attached to the back end of these segments pass over the pullies *l l*, and from thence up to the shaft of the steering wheel in the pilot house N, to which shaft they are attached in the same way that steering chains are usually attached. To so adjust the steering chains as to cause them to bear snugly and keep the skates D firmly in position, and also to provide the means of adjusting these runners so as to make them perfectly parallel, I attached two straining blocks O and P to the underside of the boat, which may be so adjusted with screws *m* and *n* as to bring the chains L and M as taut as required, and the runners D perfectly parallel, the chain M passing over the pulley *q* for that purpose. The operation is obvious.

It is plain that to stop this machine, a peculiar kind of brake will be required, and that new means to operate it will also be necessary. To meet this contingency, I have devised a brake and mode of operating it, which though not adapted to other purposes, I deem particularly well calculated to produce in this case the necessary effect. In the construction of this brake the scraper Q having a thin or sharp edge, is attached to the end of levers or rods R, which are hung at the other end to the bottom of the boat, in such a manner as to allow them to vibrate to raise or lower the scraper Q.

The scraper or brake Q is connected by a toggle joint *r* to the plunger or piston rod which enters a cylinder which is supplied with steam from the boiler. When it is necessary to use the brake, the toggle joint is by a forward thrust of the lever *s*, which is connected to it by the rod *t* brought into such a position as to lower the brake down to the ice, and to hold the brake to its work; steam is then applied above the piston U by a backward movement of the lever *u* which operates the throttle to admit the steam upon said piston. The mode of constructing this part of the device is sufficiently plain to any engineer to render further description of it unnecessary. To prevent the brake from being pressed down too far, the yoke *v* which is attached to the piston rod is supported against the pressure of the steam by the wedge V, which is itself supported by a yoke *w* hung to uprights attached to the bottom of the boat. This wedge V is operated by means of the lever *y*. The rods which pass through the bottom of the boat to operate the brake are surrounded by stuffing boxes so as to prevent leakage should the boat in any contingency fall into the water. The skates C and D are made quite narrow and are sloped backward from the forward end from a short distance above the ice to allow them to pass with facility through any snow which may be on the ice.

The particular improvements which constitute my said invention and which I claim as having been originally and first invented by me are:

1. The combination of the following elements, viz: a water tight boat capable of floating, runners or skates to run on ice and sustain the boat thereon and so connected with the boat as to turn for steering, substantially as described, and a single traction or propelling wheel placed centrally between the runners or skates to act on the ice for the purpose of propelling the boat when its runners or skates rest on the ice, substantially as described. I am aware that two traction wheels, fast on one and the same driving axle have been combined with runners and a boat but in such case the runners were not swiveled to the boat to change the direction of the line of travel and the two wheels being fast on the same axle would resist any means employed for steering, and hence I do not wish to be understood as claiming broadly the combination of traction wheels with runners or skates and a boat, but to limit my claim to the combination above stated.

2. I also claim combining the traction or propulsion wheel with the boat by interposed springs or equivalents thereof, that the wheel may be self adapting to any irregularity of surface while the runners rest on the surface of the ice, as set forth.

3. I also claim in combination with the boat and runners or skates the mechanism, substantially as described, for lifting the runners from the ice by lifters which sustain the weight, substantially as herein described, whereby the runners can be prevented from becoming fastened by frost to the surface of the ice when at rest, as set forth.

4. I also claim the stationary runners attached to the bottom of the boat, in combination with the movable runners or skates at the sides, substantially as, and for the purpose set forth.

5. I also claim constructing the traction wheel, substantially as described, that is, with its periphery a sharp cutting edge to penetrate into the ice to prevent the boat from moving sidewise, and thereby admit of using runners, smooth or rounded, when such periphery is combined with lateral projecting wings having cutting edges to penetrate into the ice and take hold therein, for traction, substantially as described.

6. So connecting each of the movable runners or skates with the boat that each may turn in a horizontal plane on an axis, substantially as, and for the purpose described.

7. I also claim combining with the turning runners or skates and with the steering chains the tension or adjusting blocks or equivalents, substantially as and for the purpose specified.

8. And I also claim connecting the ice penetrating brake by a hinged rod or arm to the boat, substantially as described, in combination with the connection of it by the toggle joint lever, or the equivalent thereof, with a steam piston, substantially as, and for the purpose specified.

NORMAN WIARD.

Witnesses:
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THOS. B. HOW.