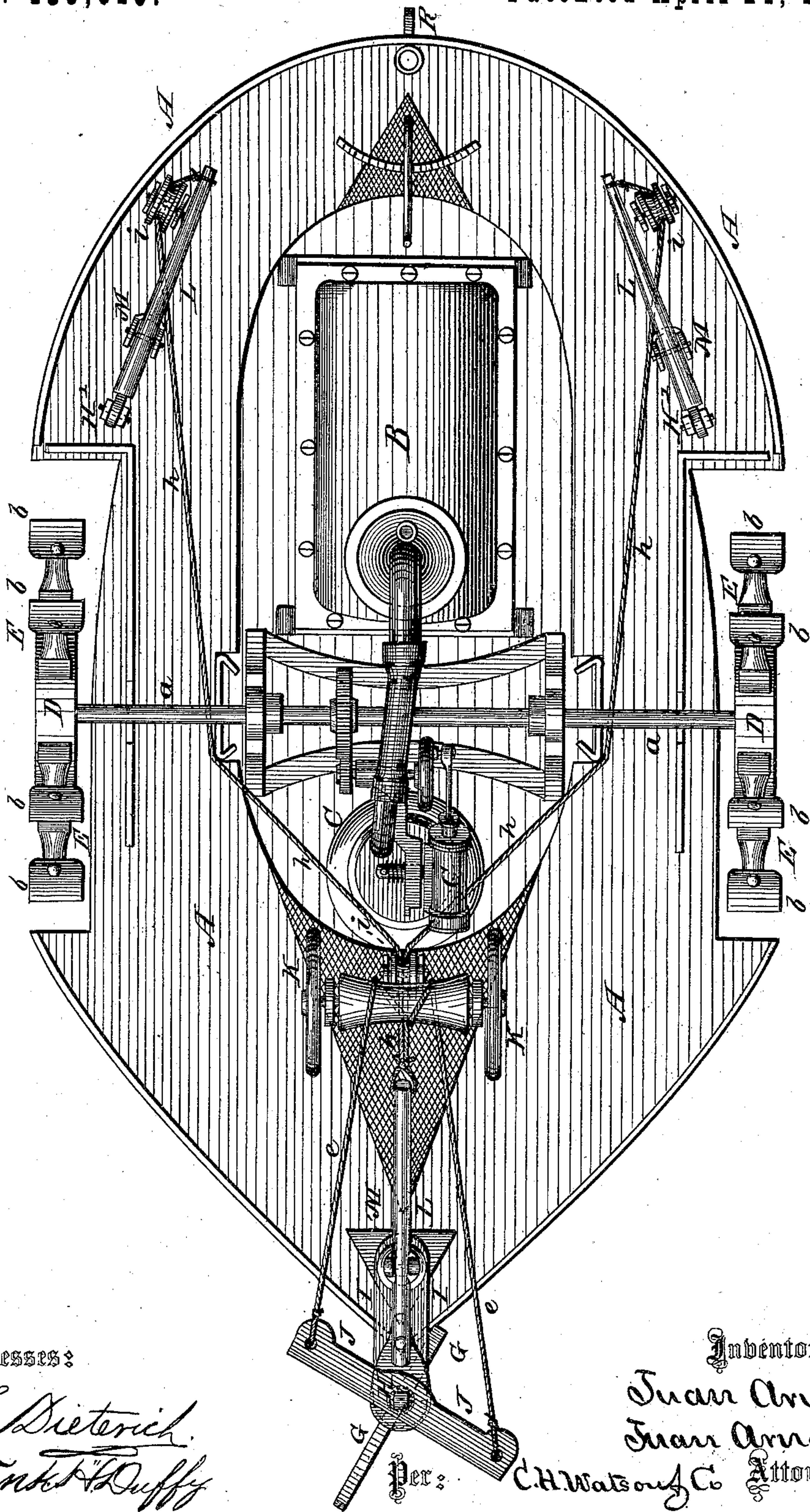


J. ARNAO & J. ARNAO, Jr.  
STEAM ICE-BOAT.

No. 189,910.

Patented April 24, 1877.

Fig. 1.



Witnesses:

P. C. Dieterich.  
Frank H. Duff.

Inventors:

Juan Arnao,  
Juan Arnao, Jr.  
Attorneys.

Per:

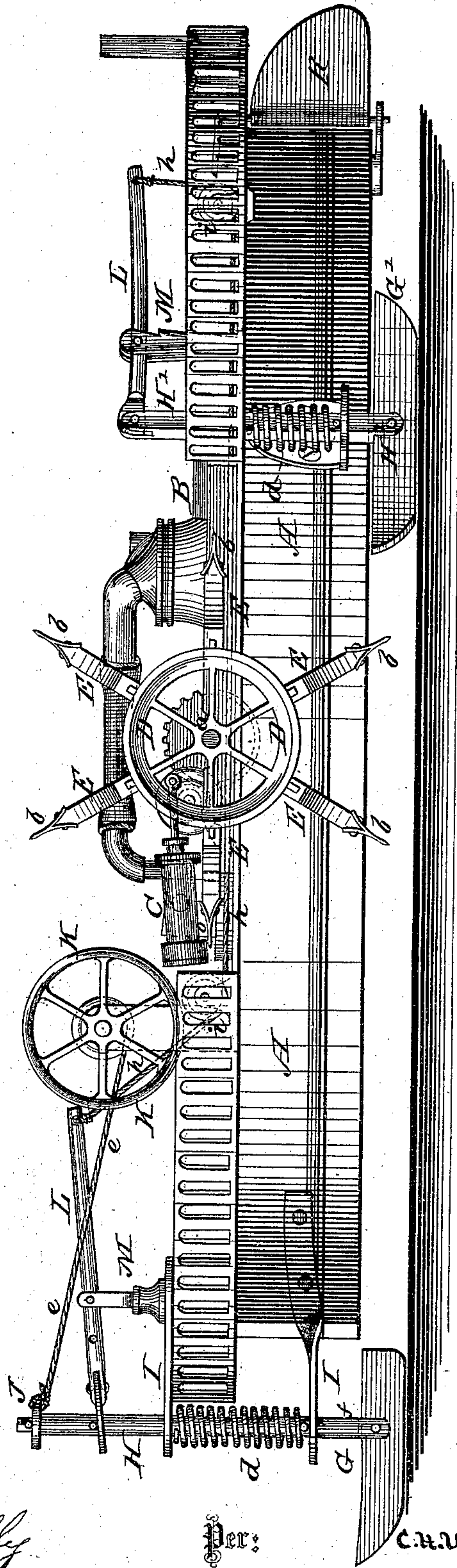
C. H. Watson & Co

J. ARNAO & J. ARNAO, Jr.  
STEAM ICE-BOAT.

No. 189,910.

Patented April 24, 1877.

Fig. 2.



Witnesses:

*P. C. Dieterich*

*Frank H. Duffy*

Per:

Inventor:

*Juan Arnao*  
*Juan Arnao, Jr.*

*C. H. Watson & Co. Attorneys.*



# UNITED STATES PATENT OFFICE

JUAN ARNAO AND JUAN ARNAO, JR., OF BROOKLYN, NEW YORK.

## IMPROVEMENT IN STEAM ICE-BOATS.

Specification forming part of Letters Patent No. 189,910, dated April 24, 1877; application filed January 9, 1877.

*To all whom it may concern:*

Be it known that we, JUAN ARNAO and JUAN ARNAO, Jr., of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Ice-Steamboat; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The nature of this invention consists in the construction and arrangement of an ice-steamboat, as will be hereinafter more fully set forth.

In the annexed drawings, Figure 1 is a plan view, and Fig. 2 a side elevation, of the invention.

A represents a flat-bottomed boat of any suitable size and form. Within this boat is a boiler, B, and steam-engine C, which latter drives, by any suitable mechanism, a shaft, *a*, placed centrally across the boat. Upon each end of the shaft *a* is secured a wheel, D, provided with a series of radiating arms, E E, upon the end of each of which is fastened a broad and flat spur, *b*, to take hold of the ice and propel the boat forward on its runners.

The boat is supported upon the ice by means of three runners, G and G' G'. The runner G is attached to a vertical shaft, H, which passes through two guides, I I, projecting forward from the bow of the boat.

A spiral spring, *d*, is placed around the shaft H, below the upper guide I, and the lower end of the spring attached to or held at a certain point on the shaft.

In like manner the runners G G' are attached to vertical shafts H' H', passing through suitable guides, and provided with springs *d'*. All the runners are attached to their respective shafts by pivots, the lower ends of the shafts being bifurcated to straddle the upper edges of the runners.

The runners G' are arranged one on each side of the boat in rear of the wheels, as shown, and their shafts H' are made square

or angular, so that they cannot turn in their guides; while the front shaft H is made round for the purpose of turning in either direction, and thus turn the front runner G to guide the boat over the ice. This shaft H is provided with a lever, J, projecting on both sides thereof. The ends of the lever are, by cords or chains *e e*, connected with a windlass or steering apparatus, K.

The steam-engine C being in operation, the shaft *a*, with its wheels, having spur-shod arms, are rotated, the spurs taking hold of the ice, and causing the boat to move rapidly forward on its runners, and it is easily guided by means of the windlass or steering apparatus K, which turns the front runner G quickly more or less in either direction.

Each of the shafts H H' is provided with a lever, L, pivoted or otherwise loosely connected thereto. These levers are pivoted in suitable standards M on the boat, and to their outer ends are attached cords or chains *h h*, which are passed around pulleys *i i*, suitably arranged, and then connected together near the windlass K.

The boat may be used in the water in the following manner: The steering-cords *e e* are disconnected from the windlass, and the connected chains or cords *h h* attached thereto, when, by turning the windlass, all the runners are raised and held in an elevated position, so that their lower edges will be in the same plane or above the plane of the bottom of the boat. The boat is then steered by an ordinary rudder, R, in the stern of the boat.

The wheel-arms E then act as paddles to propel the boat, and also break any ice that they may come in contact with.

By releasing the cords or chains *h* from the windlass the springs *d d'* throw the runners down again for use on the ice.

Having thus fully described this invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. The combination of the boat A, shafts H H', with springs *d d'*, and rocking runners G G', as and for the purposes set forth.

2. The combination of the runner G, shaft

H, spring *d*, lever J, cords or chains *e e*, and windlass or steering apparatus K, substantially as and for the purposes set forth.

3. The combination of the runners with their shafts, the levers L, cords or chains *h h*, pulleys *i i*, and windlass K, substantially as and for the purposes herein set forth.

In testimony that we claim the foregoing

as our own we affix our signatures in presence of two witnesses.

JUAN ARNAO.  
JUAN ARNAO, JR.

Witnesses:

ANTONIO C. GONZALEZ,  
JOHN J. FINNEGAN.