

(No Model.)

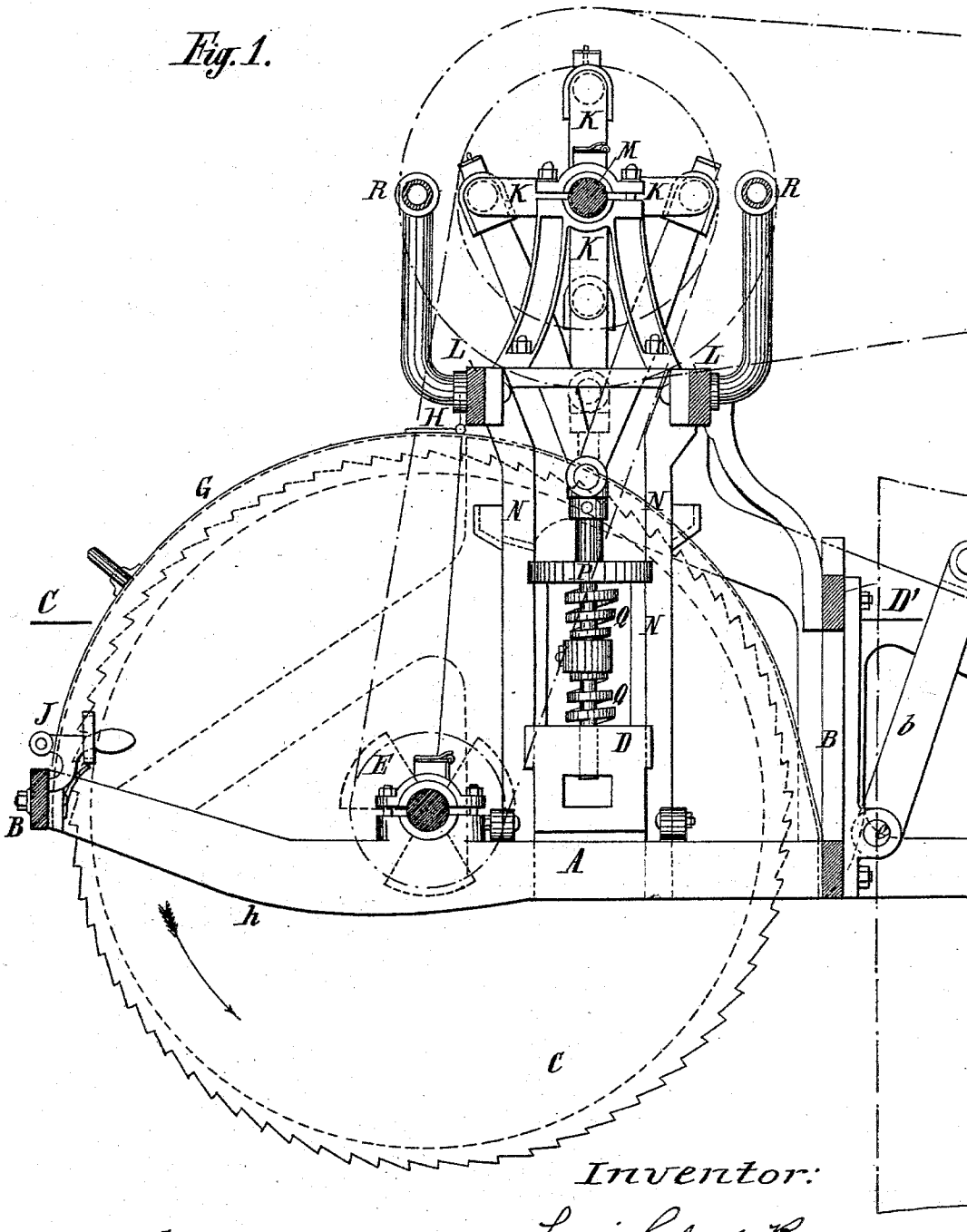
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L. C. BOVY.
ICE BREAKER FOR TUGS, &c.

No. 515,739.

Patented Mar. 6, 1894.

Fig. 1.



Inventor:

Louis Roland Bovy

Witnesses:

E. B. Bolton

E. H. Sturtevant

By

Richard A.

his Attorneys.

(No Model.)

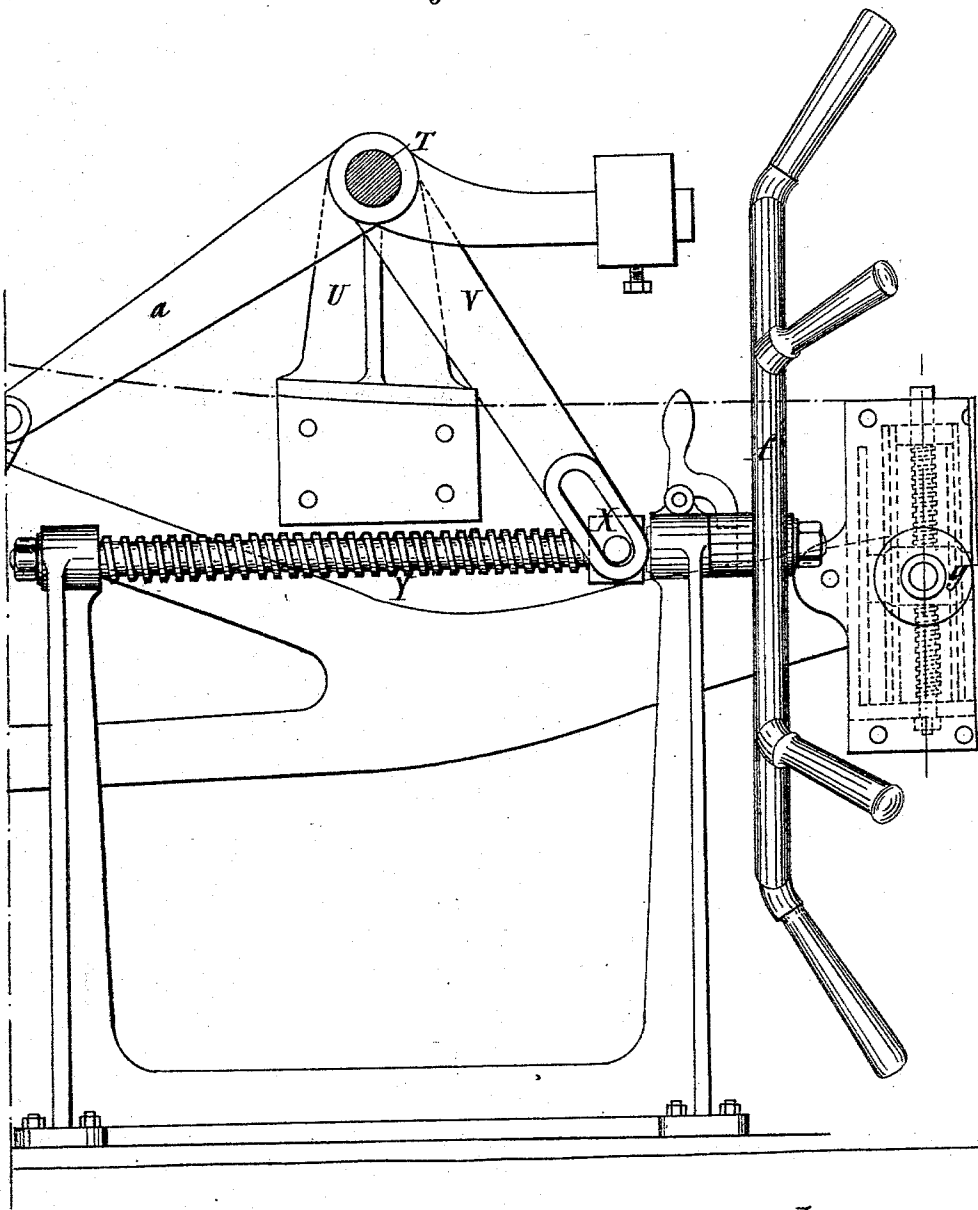
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Fig. 1.^a



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Louis Colard Bovy

BY

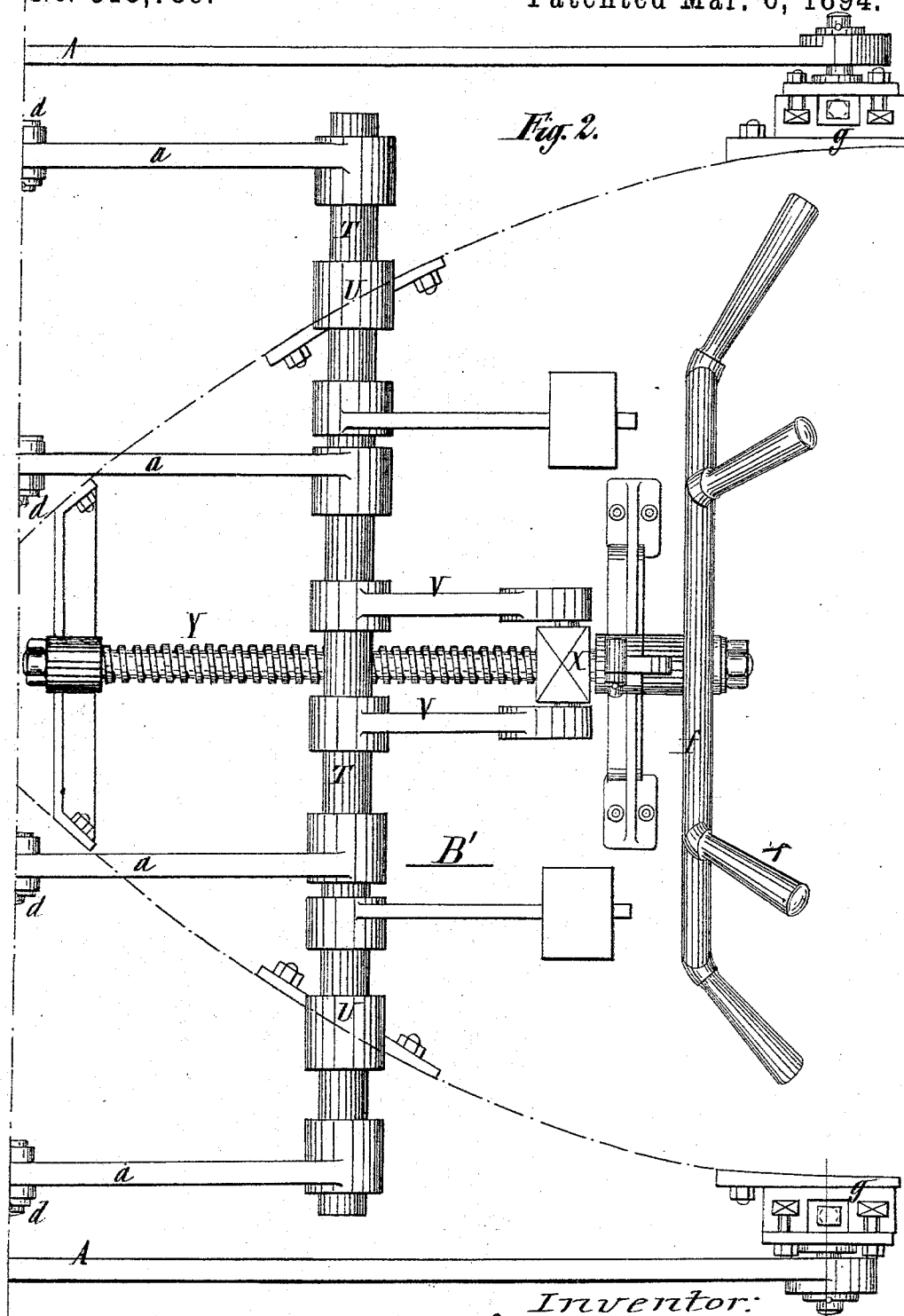
Richard A.

his Attorneys.

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C. B. Bolton

E. K. Sturtevant

Inventor:
Louis Colard Levy
By *Richardson*
his Attorneys.

(No Model.)

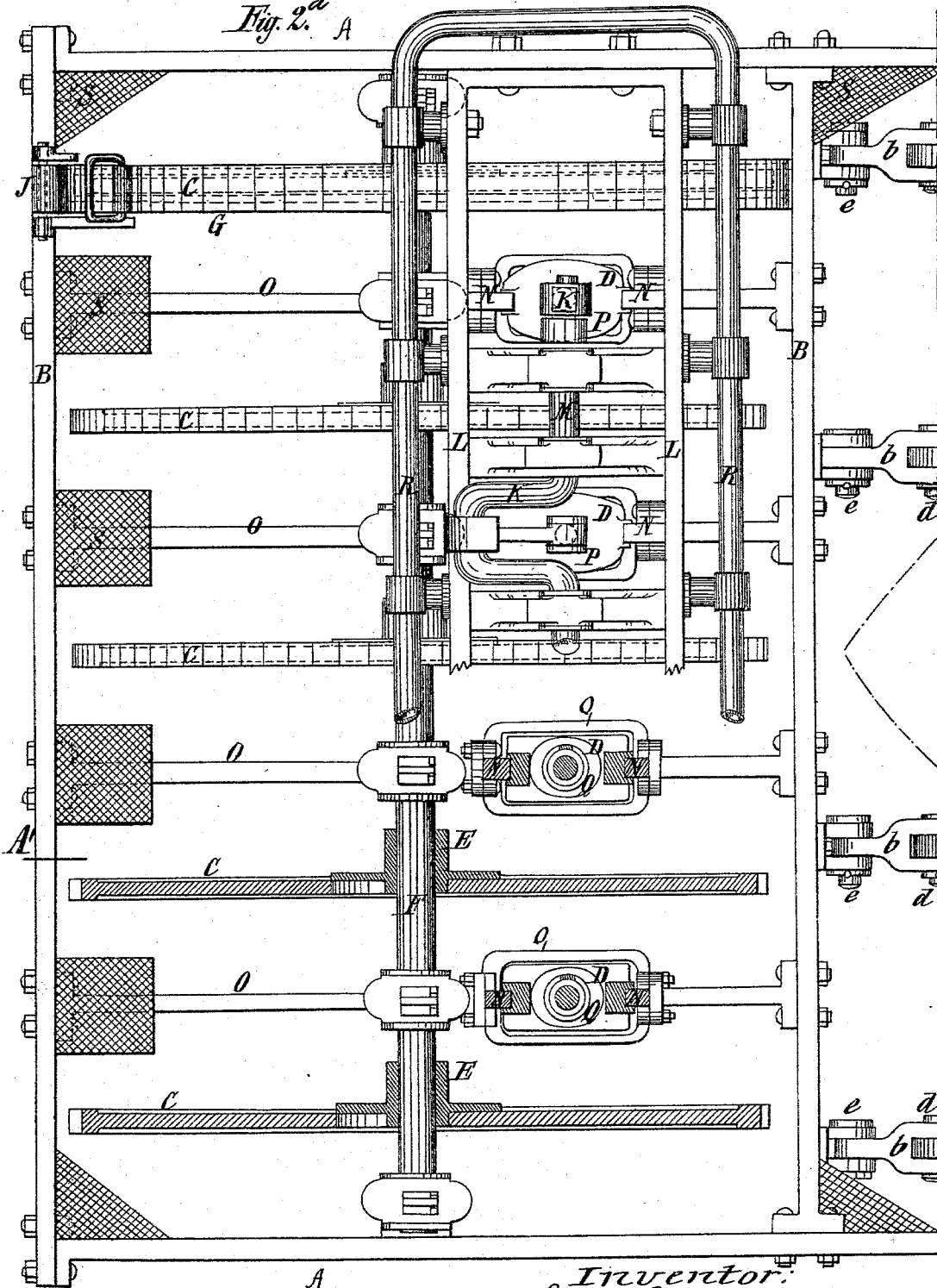
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Fig. 2.^a A



Witnesses:

E. B. Bolton
E. H. Sturtevant

Inventor:

Louis Polard Bovy

By

Richard A. [Signature]
his Attorneys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

LOUIS COLARD BOVY, OF WELKENRAEDT, BELGIUM.

ICE-BREAKER FOR TUGS, &c.

SPECIFICATION forming part of Letters Patent No. 515,739, dated March 6, 1894.

Application filed May 10, 1893. Serial No. 473,751. (No model.)

To all whom it may concern:

Be it known that I, LOUIS COLARD BOVY, a subject of the King of Belgium, residing at Welkenraedt, in the Kingdom of Belgium, have invented certain new and useful Improvements in Ice-Breakers for Tugs and other Vessels, of which the following is a specification.

The long stoppages which occur in navigation during a severe winter such for example as we had in the years 1890 and 1891 have suggested this invention and bear out its importance.

The invention will be best understood by reference to the accompanying drawings in which—

Figure 1 is an elevation partly in section of the supporting and adjusting means for the ice breaking mechanism; Fig. 2 a sectional plan, the section being taken on the level of the hammer or ram, showing the cutting saws and breaking rams. Fig. 1^a is a sectional elevation taken through Fig. 2. Fig. 2^a is a plan view of the mechanism of Fig. 1.

The arrangement consists of two longitudinal beams A connected by two cross beams B, thus forming the main frame of the whole apparatus, which is composed of a series of circular saws C and stamp hammers or rams D. The saws are mounted upon stationary sleeves E rigidly secured to the shaft F. The saws may be removed while the sleeves remain in place so that should any one of the saws break it may be readily replaced and centered, the sleeve having in no way altered its position. An opening G with a hinge H and an automatic closing device J is provided in front of each saw whereby the danger of accidents is greatly reduced while at the same time the saws may be readily examined and repaired if necessary. Each hammer D is interposed between two saws. These several hammers operate alternately in relation to each other. For this purpose the circle described by the cranks K by which these hammers are set in motion is divided into as many equal parts as there are hammers each crank corresponding to one of these divisions. In this manner there is always but one hammer or ram at a time in contact with the ice which reduces the strain and power required to a minimum. A frame L connecting the beam

A serves as a support for the bearings of the spindle M carrying the cranks and also as a point of connection for the guides N of the hammers, at the top. The lower portions of these guides are secured to the cross-pieces O through which the hammers pass. These cross-pieces at the same time connect the cross-beams B. The hammers are arranged in such a manner that if one of the parts operating them should break their upper flanges P would be arrested by the edges of the openings provided for their passage in the pieces O, which would prevent their loss by falling into the water. The spiral springs Q arranged between the stems or rods of the hammers serve to deaden shocks.

A hand-rail R and a flight of steps S form an easy gangway all along the apparatus the whole of which is arranged in front of the boat or tug. The dotted lines in the drawings represent the bow of the latter. A series of pivoted levers enable the height or level of the apparatus to be adjusted for height.

T is a rocking shaft held up by two supports U attached to the sides of the hull of the vessel. Upon this shaft are firmly secured two levers V pivoted to the nut X traveling upon a screw or worm Y. This shaft T is connected with the apparatus by four series of fixed levers *a b* hinged at *d* and *e*. The screw being turned by means of a hand-wheel *f* causes the said lever V and also the shaft T to turn, the shaft imparting movement in a circular path at the points *d*. These junction points *d* which rise or fall according to the direction in which the screw-spindle is turned, carry the points *e* and also consequently all the parts connected to these points along with them. Two slides *g* secured to the side of the ship and adjustable by means of screws serve for altering the respective positions of the saws and hammers in accordance with the water-line if necessary.

For raising the apparatus means other than those described above may be employed such as a drum or barrel having chains wound round it which being guided vertically by suitable pulleys or rollers, need only be secured to the front portion of the apparatus which it is desired to raise. It will be sufficient to set the drum in motion by means of

the screw operated by the hand-wheel to obtain the desired elevating action. It will be seen from the drawings that the whole mechanism is connected to the boat merely by the shaft T and the slides *g*. The shaft M carrying the cranks may be operated by a chain or any special motor provided for the purpose and itself conveys motion to the spindle F of the saws.

10 This ice-breaker may operate in four different ways:—(First.) It may act by pressure *i. e.* by allowing the convex or projecting part *h* of the beams A and cross-pieces O to bear on the ice, such pressure being gradually increased by turning the screw Y, which in so moving tends to carry the apparatus downward. It will be understood that in this case the saws have to be removed. (Second.) The hammers or rams D may be alone brought
20 into operation, they being caused to strike the ice at frequent intervals with sufficient force to break it up into lumps if the resistance is not too great. The beams A and cross-pieces O are so arranged that when they
25 rest upon the ice there remains a free space between it and the hammers when the latter terminate their upward stroke. (Third.) It may operate by the combined action of its weight and of the strokes of the hammers or
30 rams. (Fourth.) Where the ice offers too powerful a resistance owing to its great bulk or depth the circular saws C may be resorted to in addition to the hammers D. The ice having received preparatory cuts from the saws,
35 or being grooved by them and loosened on the sides is easily broken by the hammers next set in operation.

For the purpose of breaking the ice special boats have hitherto been constructed which
40 offer a variety of drawbacks the most serious of which is their expensiveness while they generally fail to act where ice of great depth is to be broken up. It should also be remembered that such boats remain absolutely idle
45 and useless during the greater part of the year.

The apparatus herein above described presents the following advantages over its predecessors:—(First.) Its construction is inexpensive. (Second.) It is independent of any

boat or vessel in connection with which it may operate so that it does not render a boat unfit for use in other than the winter season. (Third.) It may be applied to a boat blocked in the ice and enable it to disengage itself
55 more readily than if it were integral with it. (Fourth.) It enables very deep layers of ice to be broken up, as the diameter of the saws may be varied according to the depth. (Fifth.) It allows of disengaging a boat throughout
60 its width so as to afford it a perfectly free course and (sixth) it enables the ice to be broken up into blocks sufficiently small to be prevented from settling against bridge-piers, weirs, or the like and thereby obstructing the
65 free flow of the rivers or canals.

I claim—

1. In combination, the frame, the saws with their shaft carried thereby, the hammers also carried by the frame, the means for operating
70 the saw and hammers from the boat, said frame with its hammers and saws having pivotal connection as a whole to the bow of the vessel and means for adjusting the frame by turning it on its pivot whereby both the
75 saws and the hammers are adjusted simultaneously, substantially as described.

2. In combination, the ice breaking means, the frame carrying the same having inclined extensions *h*, and the means for adjusting the
80 frame vertically, substantially as described.

3. In combination, the frame, the vertical guides thereon, the hammers working in said guides, the crank shaft at the upper end of the guides, the connections therefrom to the
85 hammers and the means for operating the crank shaft, substantially as described.

4. In combination, the pivoted frame carrying the ice breaking means, the rock shaft T having arms thereon connected with the
90 pivoted frame, the screw shaft, the nut thereon, the arm connecting the nut with the rock shaft and the means for turning the rock shaft, substantially as described.

Dated this 19th day of January, 1893.

LOUIS COLARD BOVY.

Witnesses:

H. BIESEMAN,
A. COLLET.