(No Model.)

2 Sheets—Sheet 1.

E. F. BROWN.

ICE CUTTING APPARATUS.

No. 588,393. Patented Aug. 17, 1897.

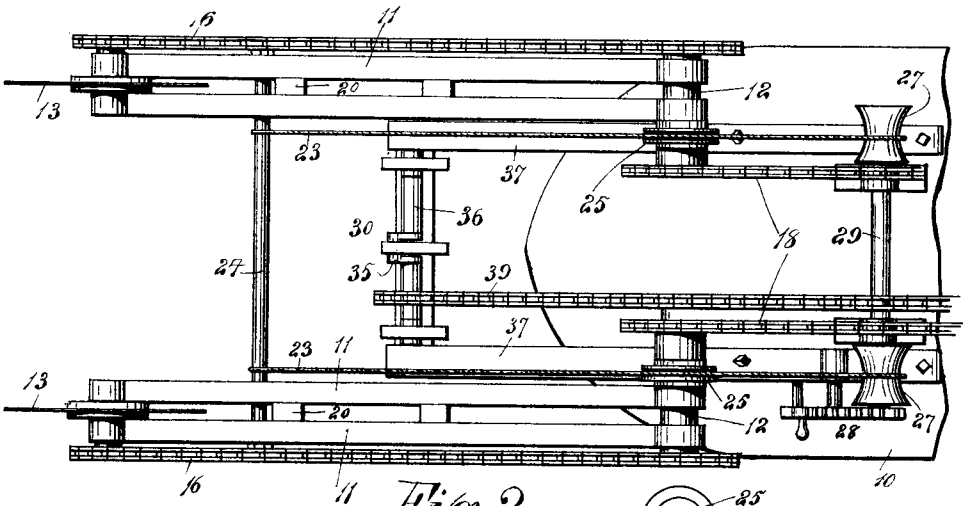


Fig. 2

Fig. 3

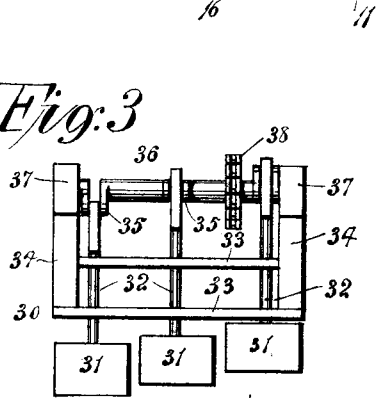


Fig. 1

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(No Model.)

2 Sheets—Sheet 2.

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ICE CUTTING APPARATUS.

No. 588,393.

Patented Aug. 17, 1897.

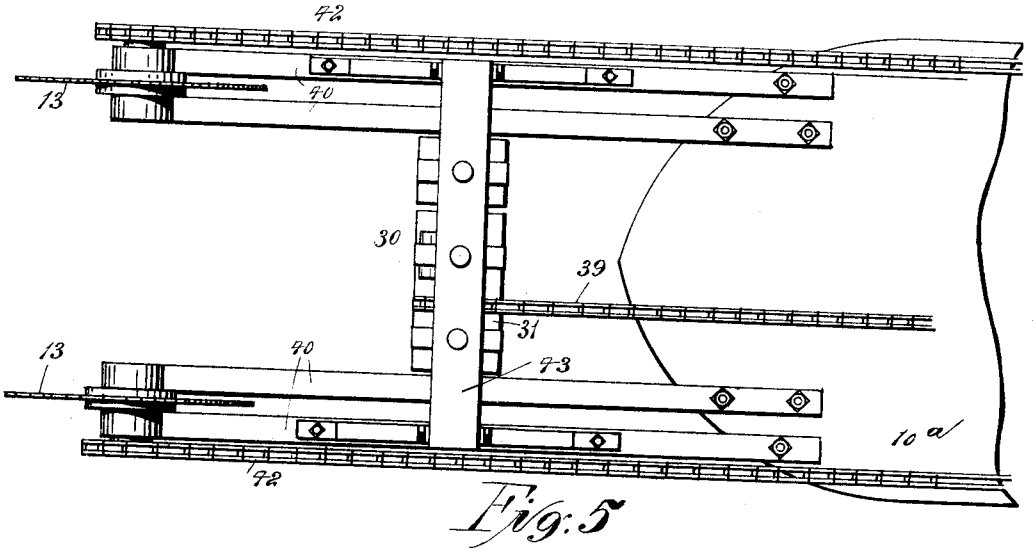


Fig. 5

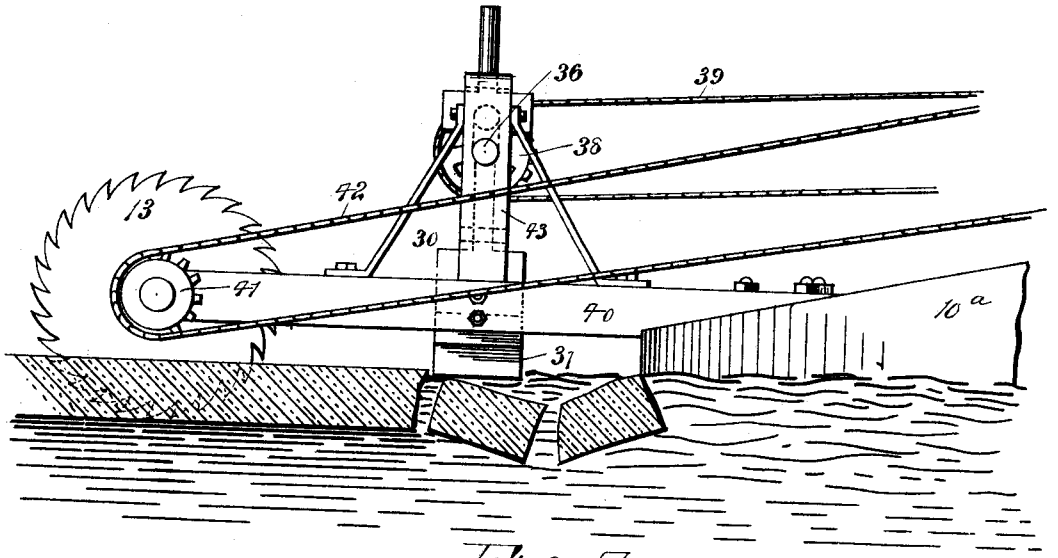


Fig. 7

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UNITED STATES PATENT OFFICE.

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ICE-CUTTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 588,393, dated August 17, 1897.

Application filed September 26, 1896. Serial No. 607,012. (No model.)

To all whom it may concern:

Be it known that I, EDWIN F. BROWN, of Somerville, in the county of Somerset and State of New Jersey, have invented certain new and useful Improvements in Ice-Cutting Apparatus, of which the following is a full, clear, and exact description.

My invention relates to improvements in ice-cutting apparatus; and the object of my invention is to produce a simple apparatus which can be conveniently applied to various kinds of boats and by which a channel may be quickly opened through thick ice and easily kept open after once being formed, to the end that navigation may be prolonged in very cold countries and channels kept open all winter, if desired.

Another object of my invention is to produce an apparatus of this kind by which ice as it is cut may also be utilized for commercial purposes.

Still another object of my invention is to produce an apparatus which is comparatively cheap, which can be easily controlled and operated, and by which the cost of maintaining an open channel or rapidly cutting such channel may be rendered nominal.

To these ends my invention consists of certain features of construction and combinations of parts, which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken side elevation of my improved apparatus as applied to the bow of a boat. Fig. 2 is a plan view of the same. Fig. 3 is a detail front elevation of the battery of ice-breaking plungers and the guides for the same. Fig. 4 is a broken side elevation of a slightly-modified form of the apparatus in which the ice-cutting saws and the battery of plungers are held on a rigid support, and Fig. 5 is a plan view of the apparatus shown in Fig. 4.

In carrying out my invention I use a boat or scow 10, which may be of any approved kind and which can be driven in any usual way, the boat having by preference an overhanging bow, from which project forward hangers or frames 11, which, as shown in Figs. 1 and 2, are hung on driving-shafts 12, so that the saws at the free ends of the supporting hangers or frames can be vertically adjusted as desired. These saws 13 are placed on independent mandrels 14, so that they can be driven independently, and thus when running in open water and desiring to cut a strip from the ice at one side of the boat one saw can be driven while the other remains stationary. If desired, however, the saws can be hung on one mandrel.

The saw-mandrels can be driven in any usual manner, and, as illustrated, each has a sprocket-wheel 15, which is driven by a chain 16, extending back to a second sprocket-wheel 17 on one of the driving-shafts 12, and these shafts are driven by sprocket-chains 18, (see Fig. 2,) which connect with sprocket-wheels on the driving-shaft and with any suitable source of power.

The supporting-frames 11 are preferably mounted on guide-rollers 19, which run on the ice, and the rollers are journaled on hangers 20, which are vertically adjustable, having slots 21 to receive the bolts 22, by which they are fastened to the supporting-frames. It will be observed that the guide-rollers can be adjusted so as to hold the saw-mandrels at the desired position in relation to the ice, and this is much better than to rely entirely on the cables, hereinafter referred to, for hoisting the frames or hangers 11.

The supporting-frames 11 are moved vertically by means of the cables 23, which are secured to the cross-rod 24 of the aforesaid frames and run over guide-pulleys 25 on the posts 26, which are erected on the deck of the boat 10, the rear ends of the cables being secured to the drums 27, which are worked by an ordinary windlass 28 and connected by a shaft 29. By working the windlass the cables are wound on the drums and the supporting-frames 11 raised, together with the saws 13, which they carry, and by permitting the drums to unwind the frames 11 are lowered.

Between the supporting-frames 11 and a little behind the saws is a battery of plungers 30, adapted to strike the ice successively between the saw-kerfs and worked by preference somewhat after the manner of the well-known plungers of a stamp-battery, such as

is used in crushing ore. The plungers, however, have heads 31, which can be sharpened to enter the ice readily, being ground like any ice-cutting implement. These heads are secured to shanks 32, sliding through suitable guides 33 and supported on the drop-frames 34, which are hung from the timbers 37, protruding forward from the deck of the boat 10. The several shanks 32 are connected by means of cranks 35 to a crank-shaft 36, which is journaled on the timbers 37 and has a sprocket-wheel 38, driven by a chain 39, connecting with a suitable source of power. I have not shown in great detail the crank mechanism for working the plungers 30, as I do not limit my invention to any particular means of working these plungers, as obviously they can be reciprocated in many ways.

In Figs. 4 and 5 I have shown a slightly-modified form of the apparatus, the boat 10^a having a bow which slopes downward toward the water-level and from which project forward parallel supporting-frames 40, which are rigidly secured to the bow, and the saws 13 aforesaid are journaled at the ends of the frames 40 and driven by means of sprocket-wheels 41 and chains 42. The battery 30 of plungers is also rigidly supported from the frames 40 by means of the cross-frame 43, which is attached to the upper side of the frames 40. The plungers are otherwise operated and arranged as already described.

The saws should be made with very coarse teeth, so that the boat carrying them can be pushed forward with considerable speed, and as this is done the saws are rapidly revolved and cut parallel kerfs in the ice. The battery of plungers is at the same time set in motion by the turning of the crank-shaft and the plunger-heads 31 descend successively on the ice between the saw-kerfs and break it into blocks, as shown in Figs. 1 and 4.

If a channel has been already cut, the boat may be run so as to bring one of the saws in operation at a point near the edge of the channel, and in this way the channel may be widened and ice cut into blocks suitable for commercial use. If the ice is useless, the boat rides over the blocks, which are permitted to float off with the current.

It will be seen from the foregoing description that any suitable boat or vessel can be used in connection with the sawing and breaking apparatus and that the vessel may be ballasted to bring the apparatus into the right relative position as regards both boat and ice; also that a greater number of saws can be used, if desired.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with the vessel and the forwardly-projecting supports thereon, of the independent mandrels carried by the supports, independently-driven saws journaled on the mandrels, and a vertically-arranged battery of plungers supported behind the saws, the plungers being arranged to strike successively on the ice, substantially as described.

2. The combination with the vessel, of the vertically-swinging supports on the bow thereof, the saws journaled on the said supports, means for driving the saws, the vertically-adjustable guide-rollers secured to the supports, a rigid frame held behind the saws and in advance of the vessel's bow, and a battery of positively-driven plungers held on the rigid frame and arranged to strike successively on the ice, substantially as described.

3. The combination with the vessel, of the swinging supports or frames projecting forward from the vessel, the vertically-adjustable guide-rollers secured to the frames, the independently journaled and driven saws on the supporting-frames, and vertically-reciprocating plungers arranged behind the saws and in advance of the vessel, substantially as described.

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