

No. 614,142.

Patented Nov. 15, 1898.

C. STEINER.

APPARATUS FOR CUTTING CANALS THROUGH ICE.

(Application filed June 7, 1894. Renewed Oct. 8, 1898.)

(No Model.)

Fig. 3.

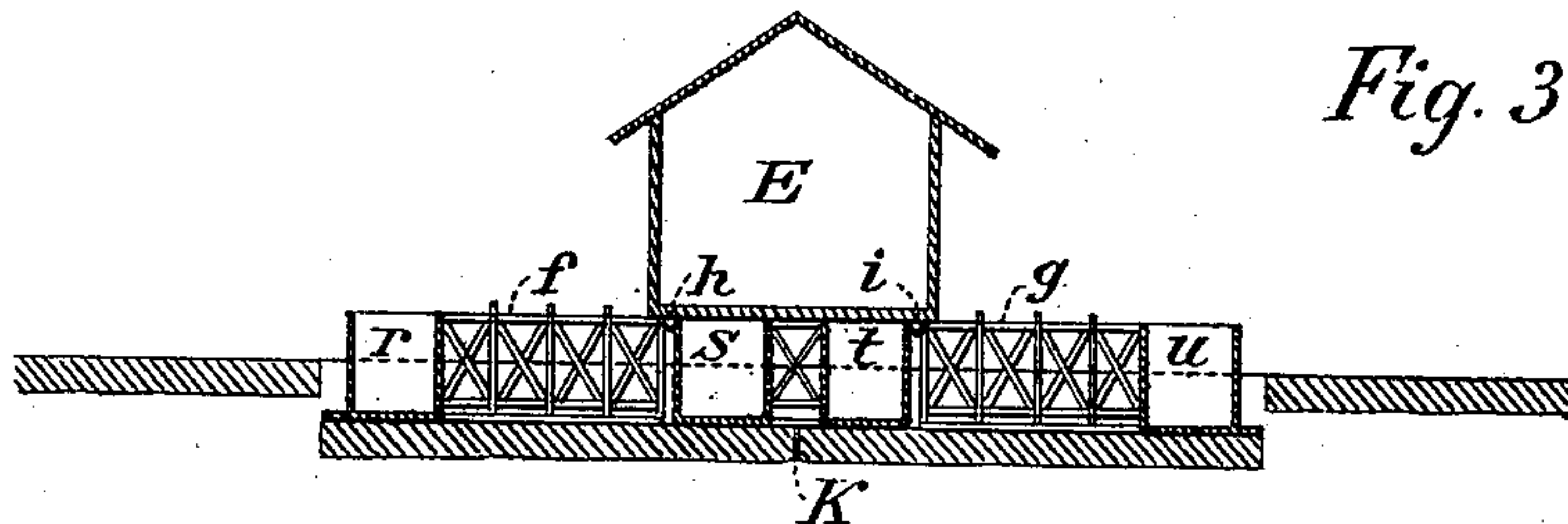


Fig. 2.

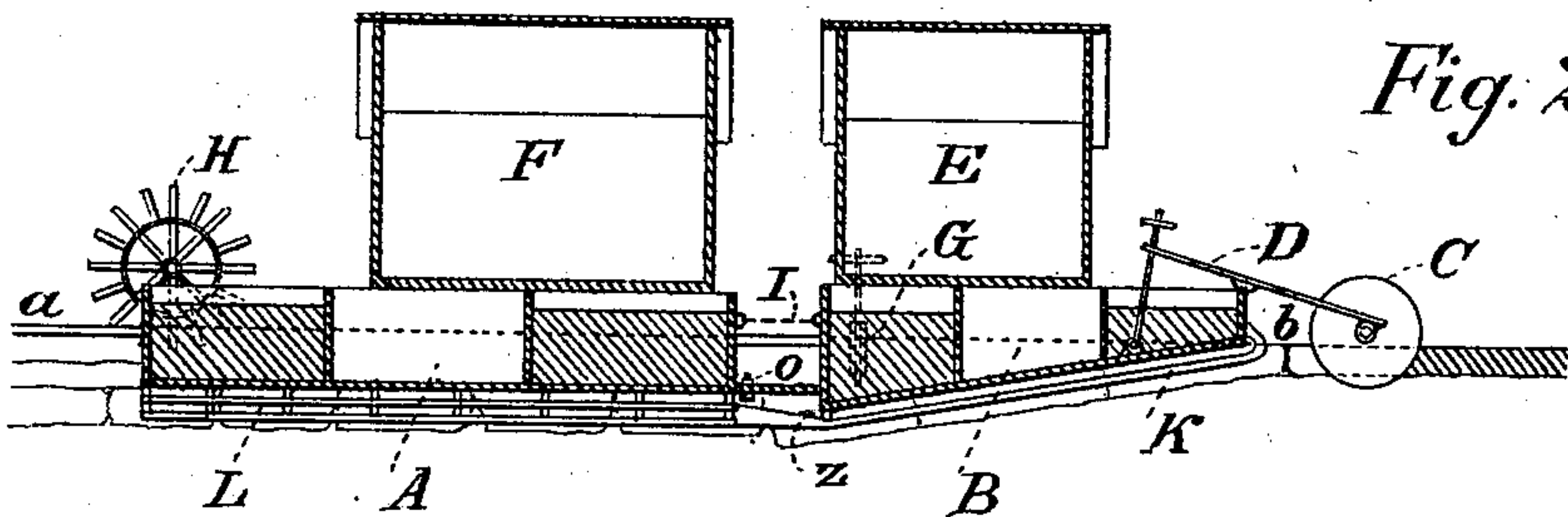
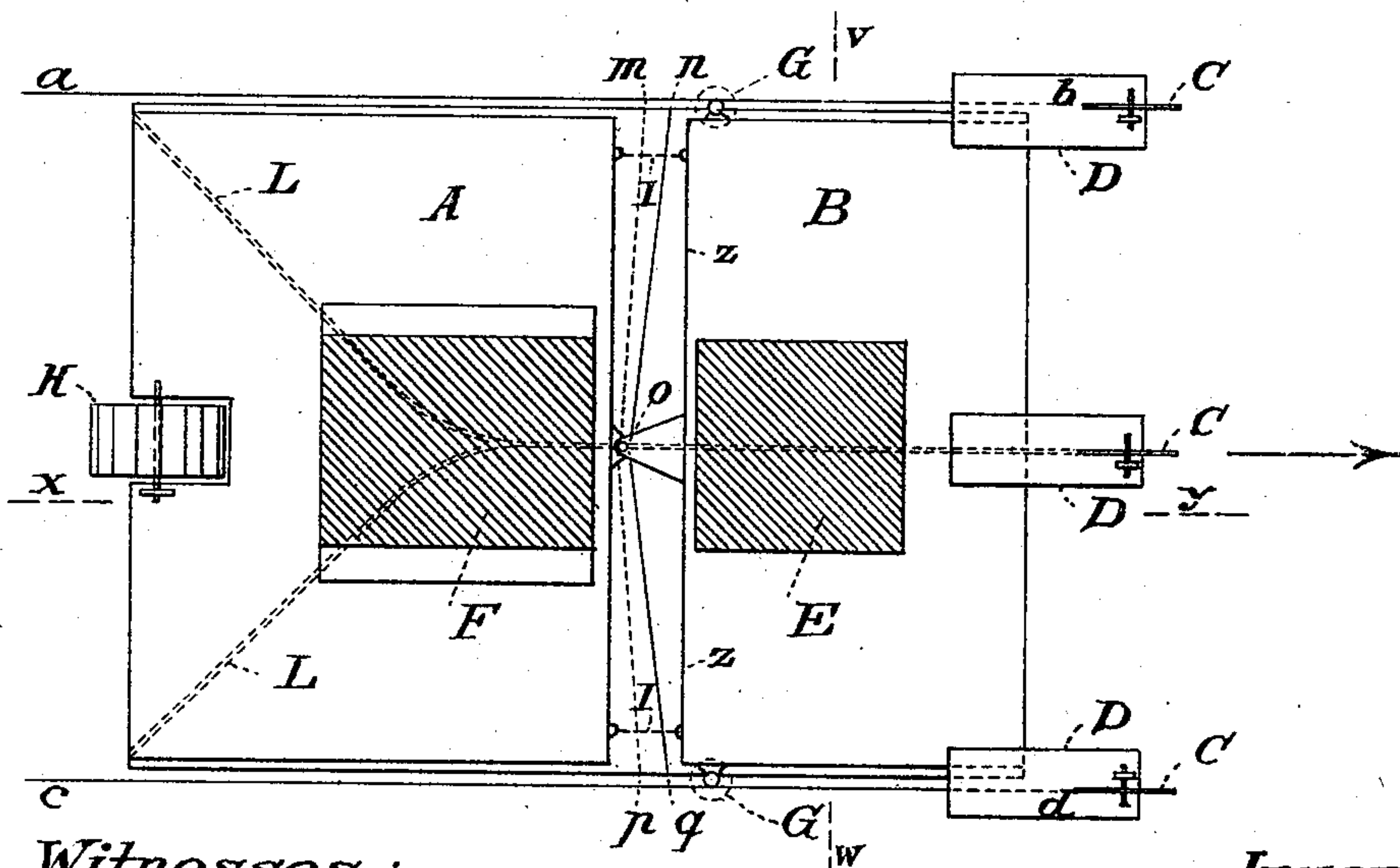


Fig. 1.



Witnesses:

J. H. Snell
George F. Barton.

Inventor.

Charles Steiner

UNITED STATES PATENT OFFICE.

CHARLES STEINER, OF ELMIRA, NEW YORK.

APPARATUS FOR CUTTING CANALS THROUGH ICE.

SPECIFICATION forming part of Letters Patent No. 614,142, dated November 15, 1898.

Application filed June 7, 1894. Renewed October 8, 1898. Serial No. 693,044. (No model.)

To all whom it may concern:

Be it known that I, CHARLES STEINER, a citizen of the Republic of Switzerland, residing at Elmira, New York, have invented a certain Improvement in an Apparatus for Clearing a Canal Through Ice on Navigable Water, of which the following is a specification.

On the northern rivers, lakes, and sea harbors of the United States navigation is limited to a certain period of the year on account of the ice, while during the remainder of the year navigation is stopped or kept open only with great expense by powerful steamboats.

It is the object of my invention to provide an economical and efficient means to open and clear canals through the thick layers of ice which generally cover the northern waters for hundreds of miles during winter-time, and thus to keep navigation open during the whole year or such a period as may be desirable and agreed upon.

The important advantage of having navigation independent of the temperature has not been accomplished as yet for large distances and with economy. Except through great masses of floating ice, which, however, generally occur only during a few days, the invention is adapted to make navigation reliable.

The drawings show and hereinafter is described a suitable arrangement of the apparatus, the subject-matter claimed as novel being hereinafter definitely specified.

Figure 1 is a plan view of the apparatus at work advancing in the direction of the arrow, the parallel lines *a b* and *c d* signifying the limits or borders of the canal. Fig. 2 is a longitudinal section *x y* of the apparatus, showing its position on the ice when at work. Fig. 3 is a cross-section *v w* through one of the two floating vehicles or rafts, showing in detail the construction of the same.

Similar letters of reference indicate corresponding parts.

In the drawings, A and B are the two rafts, composed of a number of pontoons connected by trusses *f g* and supporting an immersed bottom with smooth lower surface over their whole length and width, one bottom overlapping the other at the interspace of the rafts, so that the bottom of the raft B extends to the line *m o p* and that of the raft A begins

at the line *n o q*. The bottom of the raft B is inclined and has an edge *z* at the lower end of the slope, which projects somewhat over the bottom of the interspace and of raft A on the whole width of the vehicle. The two rafts are connected by means of a strong central hinge *o*. The pontoons *r s t u*, &c., are connected by means of the trusses *f g* and allow a vertical deflection of the raft by means of hinges at points *h i*.

For a small-sized canal, where the floating vehicle may easily be made strong enough to resist bending, all rafts may be firmly connected in one raft.

The pontoons are divided transversely in a number of water-tight compartments, which may be partly loaded with water.

Ahead of the raft B are erected on adjustable platforms D a number of circular saws C, one being located at the center and two at the borders of the canal.

G and G are two cylindrical drums with rough surface rotating on upright shafts, which can be pressed against the evenly-cut borders of the ice-canal.

H is a paddle-wheel.

E and F are the buildings or sheds for the motors, the transmission-gearings, and the men.

I I are two chains for regulating the interspace in the curves.

K is a flat guide-rail behind the central saw.

L L are guide-rails of stronger construction on the bottom of the raft.

When at work, the ice is cut by means of the circular saws, and the tables of ice are pressed under the advancing inclined bottom of raft B, sliding along the guide-rail K until the lower end *z* of the incline reaches them. After passing beyond this line of the moving inclined plane the tables of ice break at the projecting edge *z* of raft B on account of their buoyancy, and are then under the bottom of the interspace and of raft A, which is nearly horizontal, and adjusted at such a depth that it stands deeper than the lower edge of the adjacent unbroken borders of ice at the border-lines *a b* and *c d*. The strong guide-rails L L, which diverge in a skew direction by their forward movement, then shift the ice outwardly underneath the unbroken borders, leaving the canal free for navigation.

When the ice is solid and of sufficient thickness, the moving force is exerted by means of the two lateral drums G, while the paddle-wheel serves for moving through open water or thin or broken ice, forward or backward, the chains I I being used in curves.

There may be employed only one or a number of motors to supply the necessary power.

The adjustment of the necessary draft and inclination of the vehicle is done partly by the load of water pumped into the pontoons and partly in some other manner, as the inventor may deem fit.

This apparatus differs from former ice-breakers in its construction as well as in its action. In all former ice-breaking boats known to me the inclined planes press the ice outwardly and downwardly at the same time. This cannot take place without crushing the ice, and thus causing an enormous loss of motive power. In my apparatus, however, the table or block of ice is first moved down-

wardly and the outward movement is caused only when said block of ice has been brought before at sufficient depth to pass without hindrance underneath the borders of the canal.

I claim—

In an apparatus for cutting a canal through ice a vehicle, made up of rafts, connected together, the bottom of one portion of said vehicle being an inclined plane and the bottom of the other portion forming two nearly horizontal planes; guide-rails, attached to said vehicle beneath its bottom and running centrally down the inclined bottom onto the nearly-horizontal bottom, thence diverging to the outer side of said bottom, to press the cut ice first downwardly and then outwardly under the uncut ice, substantially as set forth.

CHARLES STEINER.

Witnesses:

KARL VON WAGNER,
HANS VON WAGNER.