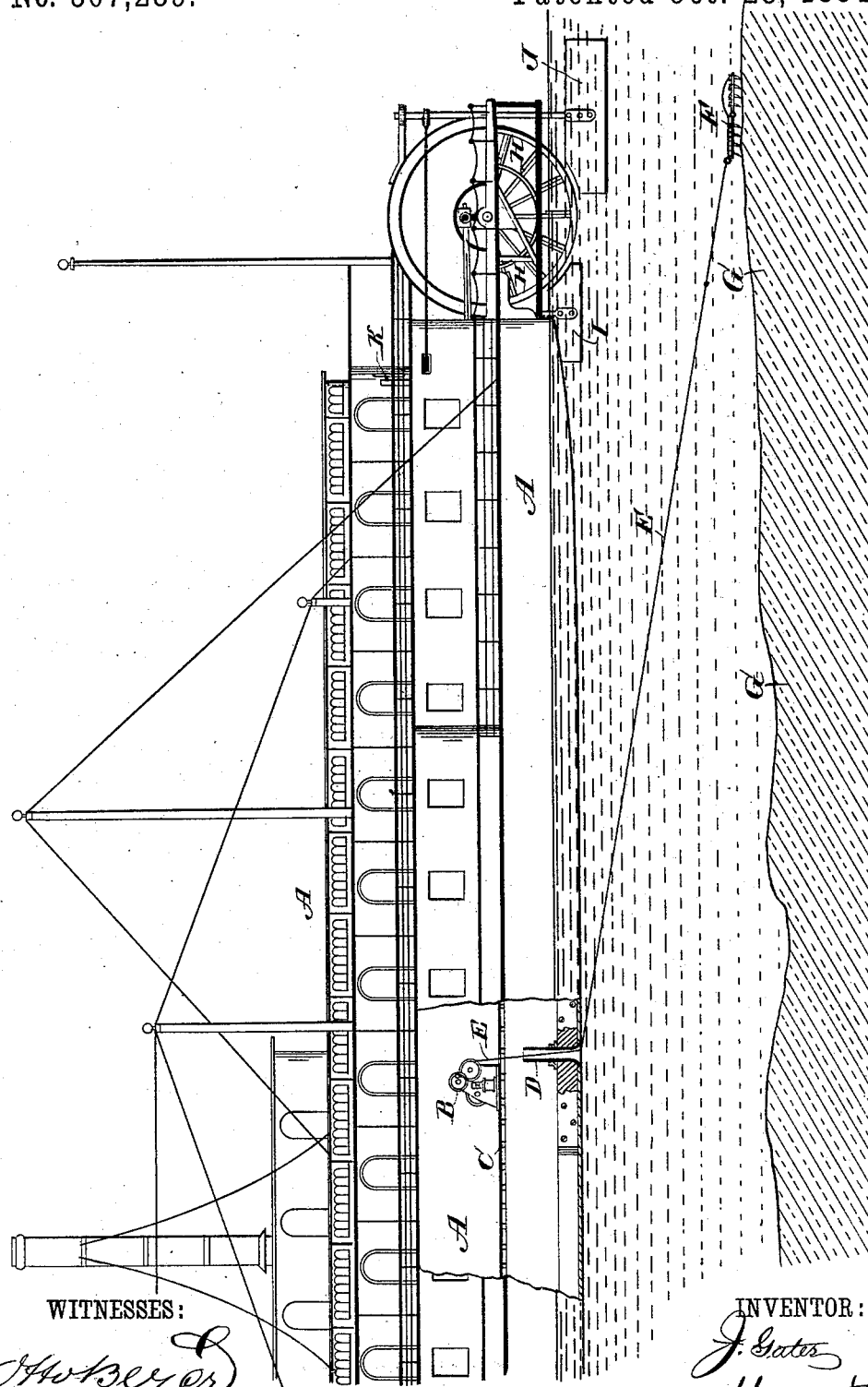


(No Model.)

J. GATES.

METHOD OF AND APPARATUS FOR WORKING SUBMARINE HARROWS.
No. 307,289.

Patented Oct. 28, 1884.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN GATES, OF PORTLAND, OREGON.

METHOD OF AND APPARATUS FOR WORKING SUBMARINE HARROWS.

SPECIFICATION forming part of Letters Patent No. 307,289, dated October 23, 1884.

Application filed April 30, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN GATES, of Portland, in the county of Multnomah and State of Oregon, have invented a new and Improved
5 Method of and Apparatus for Working Submarine Harrows, of which the following is a full, clear, and exact description.

My invention relates to a method of and means for cutting submarine channels by the
10 action of a harrow hauled over the bar or river-bed, assisted by the natural currents of the water-way.

The invention consists in a method of working the harrow by taking in the slack of the
15 harrow-hawser as the vessel moves back and forth to haul the harrow over the channel-way, thereby avoiding a fouling of the hawser and economizing time, labor, and fuel in the operation.

The invention consists, also, in an arrangement of a windlass, in combination with a well through the vessel's bottom at about the center of the vessel, and the harrow and its
20 hawser, whereby the harrow may be operated by the hawser without interfering with the means of propelling the vessel, or with the steering apparatus of the vessel, all as herein-after fully described and claimed.

Reference is to be had to the accompanying
30 drawing, forming a part of this specification, and in which the figure is a side view, partly broken away and in section, of a stern-paddle-wheel vessel fitted with my improved apparatus, and showing the harrow at work on the
35 river bed or bottom.

The letter A indicates a steam-vessel in part—in this instance a stern-paddle-wheel vessel.

B indicates a hoisting drum, winch, or other
40 suitable apparatus, preferably a steam-windlass, which is located on a deck or platform, C, above a well or tube, D, which opens through the vessel's bottom, as shown, and reaches above the water-level at the top, and through
45 which well D the hawser E passes from the windlass B to the harrow F, which in practice will be as large and heavy as can be hauled by the vessel A against a strong tide or current over the bar, shoal, or river-bed G in
50 or through which the channel is to be cut or deepened.

The operation is as follows: The vessel A

will be steamed to the desired point and the harrow F let down to the bar or bed G, the vessel being headed up against the current, and
55 the hawser E suitably paid out and held to drag the harrow F across the bar for tearing up the deposit by the harrow-teeth, so that the sand, silt, gravel, or other material of the bar or bed shall be carried off to a distance
60 by the strong natural current of the water-way, and spread out and deposited to one side or downstream in deeper water. After once crossing the bar G by the harrow, instead of
65 hauling or raising the harrow from the bar or bed, and widely circling around with the vessel A to come bows on and drag the lowered harrow, as at first, over the same track, by which method much time is lost and fuel
70 wasted in propelling the vessel, I propose simply to back the vessel over the same course, meanwhile taking in the slack of the hawser E by the windlass B, to prevent fouling the hawser, and suitably paying out the hawser at the
75 downstream side of the harrow, when the hawser will again be made fast at the windlass end to drag the harrow back on the return course over the same track or in the path of the channel to be cut or widened, and when
80 fully drawn back the vessel will again be moved forward, the slack of the hawser while the vessel moves over the harrow being again taken in, and then paid out suitably and made fast, to again drag the harrow upstream, as at
85 first; and these reverse movements of the vessel and harrow will be continued until the channel is cut to the required depth, as will readily be understood. I place the well D at
90 about the fore-and-aft center of the vessel, so that the hawser E and harrow F may be worked, as above described, without interfering with the paddle-wheel H or screw or other means of propelling the vessel, and also without interfering with the complete control of the vessel by the rudders I or J, or both of them,
95 which rudders I have fitted, respectively, fore and aft of the wheel H.

The aft rudder, J, is particularly useful, when shallow channel-ways are first to be cut or sluiced out by the water forced aft by the
100 wheel H, and in advance of the use of the harrow, such cutting or sluicing being done when the bows of the vessel are held fast, as a pivot on which the vessel's stern may be swung from

side to side of the channel to be cut by the force of the water from the wheel H acting against the aft rudder as it passes it.

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

1. The method of working submarine harrows herein described for cutting channels in water-ways, which consists in taking in the slack of the harrow-hawser as the vessel hauling it advances and backs over the course of
10 the channel, as specified.

2. The combination, with a vessel, A, of the well D, located at about the center of the vessel, the hoisting-windlass B, and the harrow F, connected with the windlass by a hawser, 15 E, passed through the well D, substantially as shown and described.

JOHN GATES.

Witnesses:

L. M. PARRISH,
GEO. E. WATKINS.