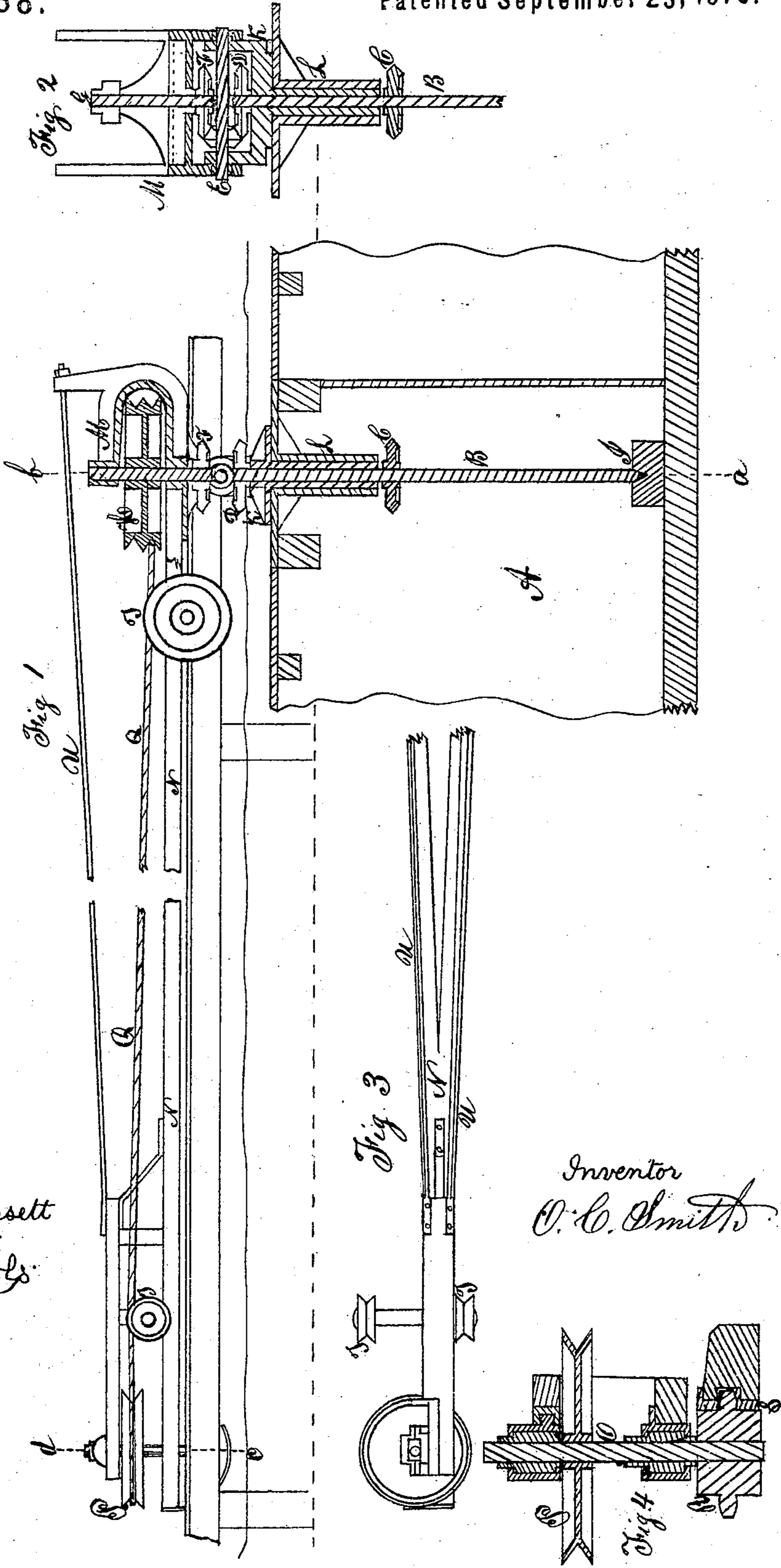


O. C. SMITH.
Propelling Canal-Boats.

No. 143,038.

Patented September 23, 1873.

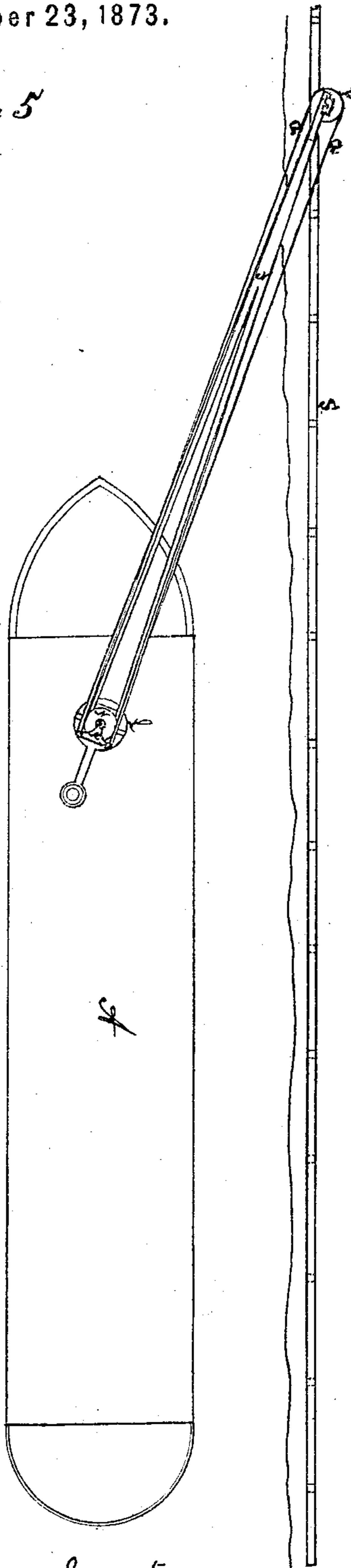


Witnesses
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J. R. Nichols

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Fig 5



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UNITED STATES PATENT OFFICE.

OLIVER C. SMITH, OF IPSWICH, MASSACHUSETTS.

IMPROVEMENT IN PROPELLING CANAL-BOATS.

Specification forming part of Letters Patent No. **143,038**, dated September 23, 1873; application filed July 17, 1871.

To all whom it may concern :

Be it known that I, OLIVER C. SMITH, of Ipswich, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Method of Propelling Canal-Boats, of which the following is a specification:

My invention relates to the combination and arrangement of certain novel devices, through which the power of a steam-engine or other motor is made to operate in towing a canal-boat.

These devices are substantially as follows: A combination of bevel-gears, vertical and horizontal shafts, and frames, so arranged as to form a joint by which a movable arm can be turned around on the shaft as a center, and raised or lowered at its opposite end, the motor being placed in the hold of the boat, and its power applied through the vertical shaft and gears to a pinion shaft and gears on the opposite end of an arm which projects from the boat at any desirable angle, the gear at this end of the arm working in a rack placed on the bank of the canal.

The drawing represents in Figure 1 an elevation partially in section of the apparatus employed. Fig. 2 is a vertical section of the driving apparatus on the line *a b*, Fig. 1. Fig. 3 is a top view of the end of the arm which engages with the rack. Fig. 4 is a sectional view of the shaft, pinion-boxes, and rack on the line *c d*, Fig. 1. Fig. 5 represents a plan view of my invention.

Similar letters of reference indicate like parts in all the figures.

A suitable motor is placed in the hold of the boat A, and is connected to the vertical shaft B by the gear C. On the upper end of the shaft B is fastened a bevel-gear, D, which engages with the pinion-gear on the horizontal shaft E. Another bevel-gear, F, engages with the pinion-gear on shaft E, which drives the shaft G. The driving-pulley H is fastened to the shaft G. The shaft B is supported by a step, I, at the bottom, and the bearing for the upper end of the shaft B is formed in the revolving frame K. This frame is fitted

into a plate, L, by a bearing concentric with the shaft B, the plate L being fastened to the deck of the boat. This arrangement of parts allows the power applied to the shaft B to be transmitted to the shaft G, in whatever position the shaft G may be turned. The shaft G has its bearings in the frame M. This frame is pivoted on bearings on the frame K concentric with the shaft E. This arrangement permits an oscillating movement of the frame M, and parts connected with it, upon the axis of the shaft E. The arm N is made of wood, and is attached to the frame M, and carries on its outer end the shaft O, which is driven by the pulley P through the rope Q. The shaft O has a pinion, R, on its lower end, with suitable teeth to mesh into the rack S fastened to the bank of the canal by suitable supports. T T are guide-rolls for the rope Q. The upper box of the shaft O is made to slide to keep the shaft vertical to the face of the rack, independent of the angle of the arm N, both upper and lower boxes being made oscillating for this purpose. The arm N is braced by rods U secured to arms on the frame M.

Power being applied to the shaft B it is carried to the shaft O through the rope Q, revolving the pinion R in the rack S, which draws the boat along, the arm N being extended from the boat at any angle necessary to reach the rack S. The shaft B is placed in the center of the boat, so as to work on either side of the canal, as desired. The power applied to move the boat operates continuously to compel the pinion R to engage with the rack S.

It is intended that when the boat is loaded to a depth of six feet of water the arm N will be nearly level, and in case the boat is partially laden the shaft O is set perpendicular to the rack S by the sliding box, so that the rack and gear work equally well, whatever may be the relative heights of the boat or rack, and the variations of the levels are compensated for by the oscillating movements of the arm N.

The arm N may be swung in board when passing a boat or going through locks, and

the rack and supports may be so placed on the bank of the canal as not to interfere with its use by the present method of towing.

I claim as my invention—

1. The arrangement of bevel-gears, vertical and horizontal shafts and frames, when combined substantially as described, so as to form a joint by which a movable arm can be turned

around the shaft as an axis, and raised or lowered at the opposite end.

2. The pinion-shaft O, arranged to oscillate in its bearings, so as to keep it perpendicular with the rack S.

Witnesses:

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J. R. NICHOLS.

O. C. SMITH.