Sheet 1, 2 Sheets.

A. E. Harding

Vibrating Propeller.

No. 29,969. Patented Sept. 11, 1860.

Fig. 1.

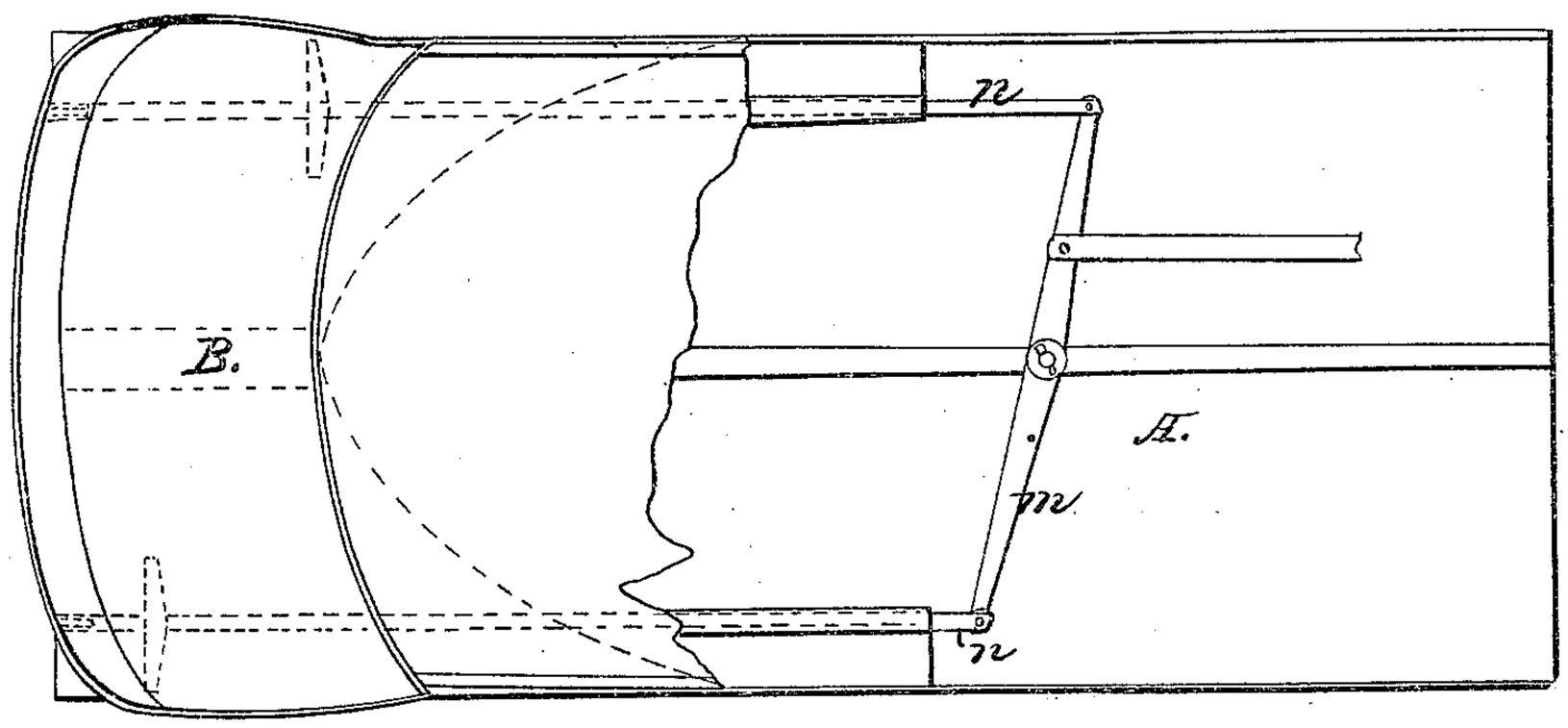
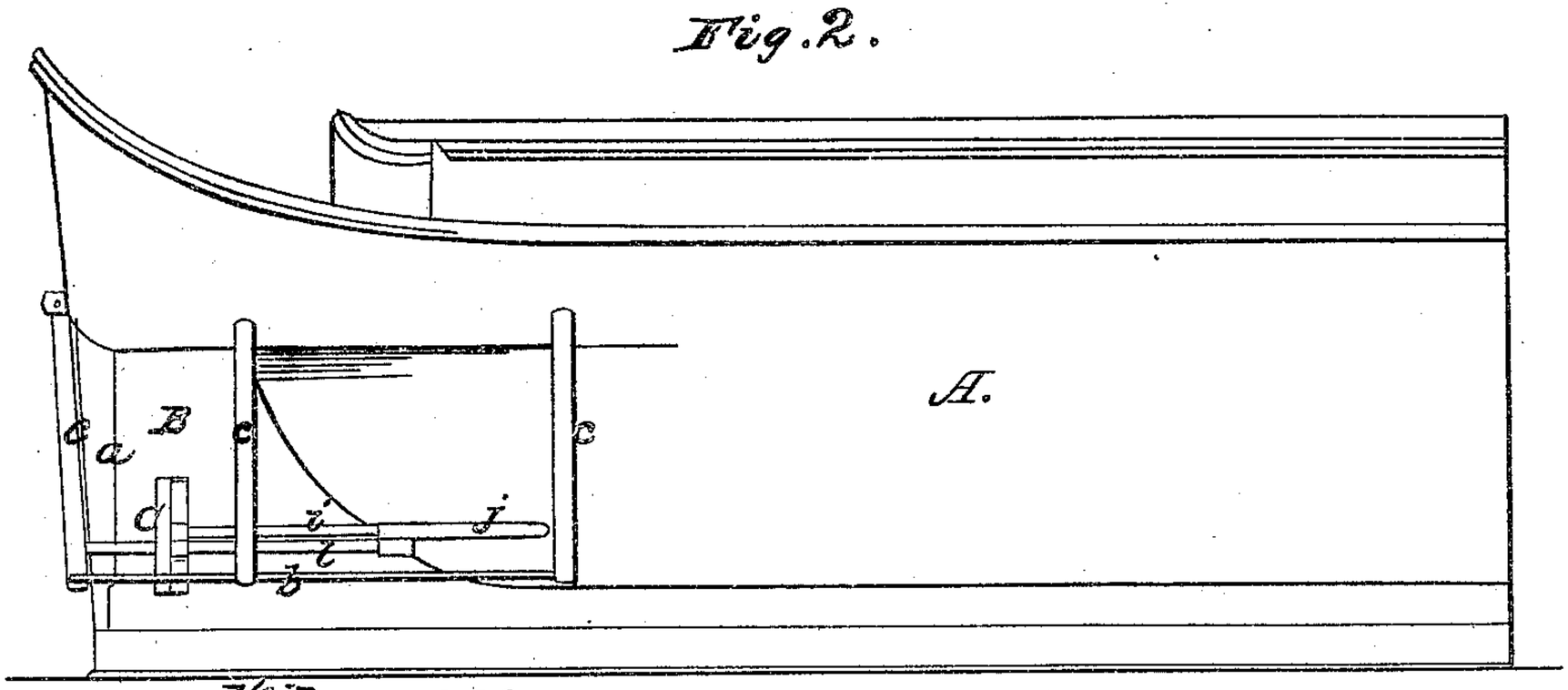


Fig. 2.



Witnesses.

Wm. C. Clough

Jno. B. Adams

Sheets, 2 Sheets.

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Fig. 3.

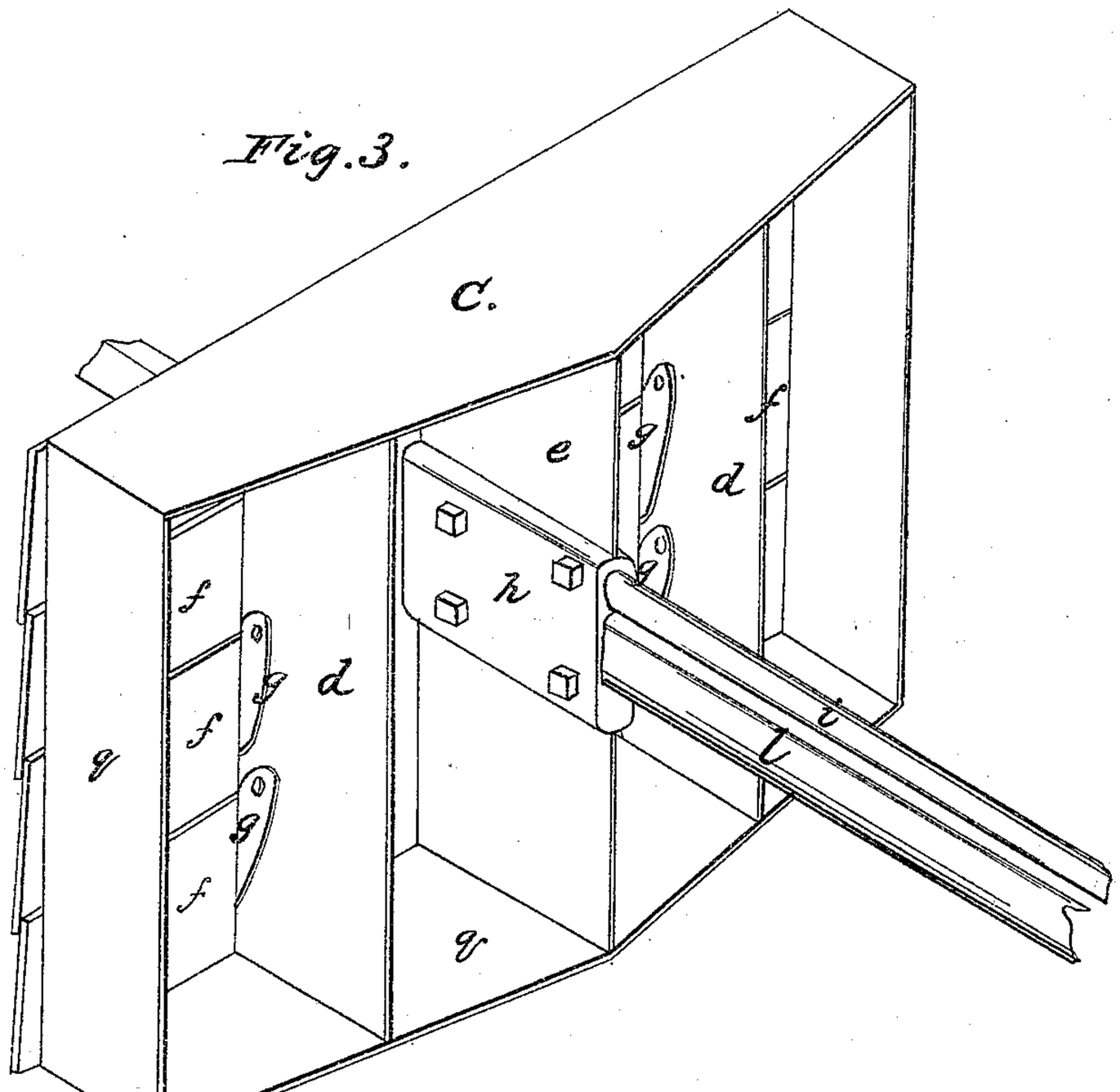

Fig. 4.

Witnesses.

Wm Clough.

Jno P. Adams.

UNITED STATES PATENT OFFICE.

A. E. HARDING, OF MIDDLETOWN, OHIO.

IMPROVED MARINE PROPELLER.

Specification forming part of Letters Patent No. **29,969**, dated September 11, 1860.

To all whom it may concern:

Be it known that I, A. E. HARDING, of Middletown, in the county of Butler and State of Ohio, have invented a new and useful Improvement in Propellers; and I do hereby declare that the following is a full and complete description thereof, reference being had to the accompanying drawings and letters of reference marked thereon, making a part of this specification.

My invention relates to propellers which have a horizontal reciprocating motion and which act upon the water by a plane vertical surface.

Figure 1 of the annexed drawings is a plan of a vessel or canal-boat from which a portion of the deck is removed, revealing the interior arrangements for operating the propellers. Fig. 2 is an elevation of the same, showing the manner of applying the propellers. Fig. 3 is a perspective view of the propeller-frame, representing the hinged blades and the manner of securing them to the frame. Fig. 4 is a horizontal section representing a plan of the working parts.

A is the hull of a vessel or canal-boat. It is constructed with an extension of keel or dead-wood, which projects aft from the stern of the vessel and receives the stern-post *a* at its outer extremity. This stern-post supports the rudder, which is not represented in the drawings.

b is a stout horizontal bar secured to the outside of the hull at a point near the knuckle or lower corner. This bar extends aft in a straight line with the line of the main part of the hull, and, bending at right angles, is extended across the stern of the vessel to a corresponding point upon the opposite side of the vessel, when it is again bent at right angles and extended forward to a point upon the opposite side of the vessel, corresponding with the point from whence it started, where it is secured to the hull. Its transverse part is joined to the stern-post. The bar *b* thus forms three sides of a frame, divided through the center by the dead-wood B into two spaces or areas, one upon either side or "quarter" of the vessel. The frame *b* is supported vertically by the vertical pieces *c*, which are secured to the projecting part of the hull and extend down to the frame.

C C are the propellers, placed and operating in the areas above described, one upon either quarter of the vessel. The form and construction of the propellers are represented in Fig. 3. An outer frame *g* is made of thin sheet metal, and it is so made that only the thin edges of the metal of which it is composed are presented to the water as the propeller is operated.

d d e are vertical plates of sheet metal connecting the top and bottom plates of the frame.

f f are the blades which act against the water when the propeller is in operation. These are hinged to the vertical plates *d d* by the hinges *g g* in a peculiar manner, the pivots or hinges being so arranged as to cause the upper edges of the blades as they swing up and out from the frame to encounter the edges of the plates *d d* at a point just before reaching a horizontal line, thus causing them to return downwardly and close immediately upon the motion of the propeller being reversed, as will hereinafter appear. The center vertical plate *e* carries a block *h*, which is well secured to *e*.

i is a round bar which enters and is secured in the block *h*. This bar *i* extends forward and passes through a stuffing-box *j* in the after part of the vessel, and entering the hold of the vessel is secured to a T head or slide *k*.

l is a horizontal bar, one end of which is secured to the stern of the vessel or to the outside of the stuffing-box *j* and the other or after end to one of the vertical supports *c*. The bar *l* passes through an aperture in the block *h*, and the propeller sliding freely upon the bar it serves as a guide to support and control the propeller.

m is a cross bar or beam pivoted to the keelson of the vessel or to a block of timber resting thereon. It extends across the vessel in either direction from the center, and its outer ends receive the connecting-rods or pitmen *n n*, and these extending aft are secured to the T heads or slides *k*, respectively. The slides work in appropriate guides, which rest upon the frame-work *p*.

o is a pitman by which motion is communicated from an engine to the cross-bar *m*, and thence to the propellers. The propellers have an alternate reciprocating motion, and the length of stroke which they have may be considerably greater than that of the engine

by which they are operated, as the latter may be applied to the bar *m* at any point nearer its center, where the traverse is proportionally less.

The operation of my improved propeller is as follows: The cross-bar *m*, receiving a vibratory motion from the engine through the pitman *o*, communicates an alternate reciprocating motion to the submerged propellers C, the connecting-rods *i* sliding freely in the stuffing-boxes *j*. As either of the propellers C is caused to move forward toward the stern of the vessel, the water acting against the forward faces of the hinged blades *f*, they are caused to open or swing outwardly upon the hinges *g* to nearly a horizontal position, allowing the propeller to return toward the stern of the vessel with comparatively little resistance from the water. Having reached the forward point of its stroke, its motion is reversed and it is caused to move back and away from the stern of the vessel; but the blades *f*, which had been supported by the water in nearly a horizontal position, offering but little resistance to the forward motion of the propeller, now receive the force of the water in an opposite direction and upon their outer faces, and are thus caused to close downwardly to a vertical position, forming a large plane vertical surface, which acts against the water and causes the vessel to be impelled forward. The blades, as has been remarked, are not allowed during the forward motion of the propeller to swing outwardly to a perfectly horizontal line or position. Consequently when the motion of the propeller is reversed the water acts upon their upper or outer surfaces and causes them to fold or close downwardly instantly. The blades have also a tendency to close downwardly by their own gravity.

The construction of the propeller is such as to afford strength and lightness. It is, moreover, so made as to present only the thin edges of the metal sheets to the water as the propeller is caused to return from an outward or working stroke, so that comparatively little of the impelling force communicated to the vessel by the working stroke is counteracted or neutralized by the return-stroke. The vertical plates *d d e* support the blades *f* when they are closed and pressed against the body of water. Hence the plates may be very thin and light. It is proposed to make these blades of thin plate steel. The number of vertical plates *d d* may be increased at pleasure, and they may be supported by transverse or horizontal plates, if desired.

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

The frame *b*, vertical supports *c*, dead-wood extension B, and horizontal guiding-bars *l*, in combination with the reciprocating folding propellers C C, the whole being constructed and arranged in the manner and for the purposes substantially as set forth.

A. E. HARDING.

Witnesses:

S. K. GRAVES,

JNO. Q. ADAMS.